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WYNOOCHEE HYDROPOWER/FISH HATCHERY: FEASIBILITY REPORT AND ENVI--ETC(U)
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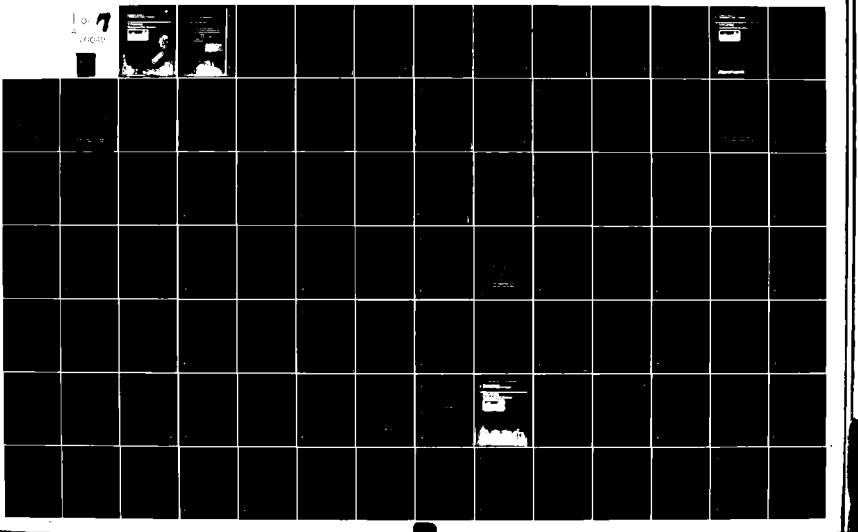

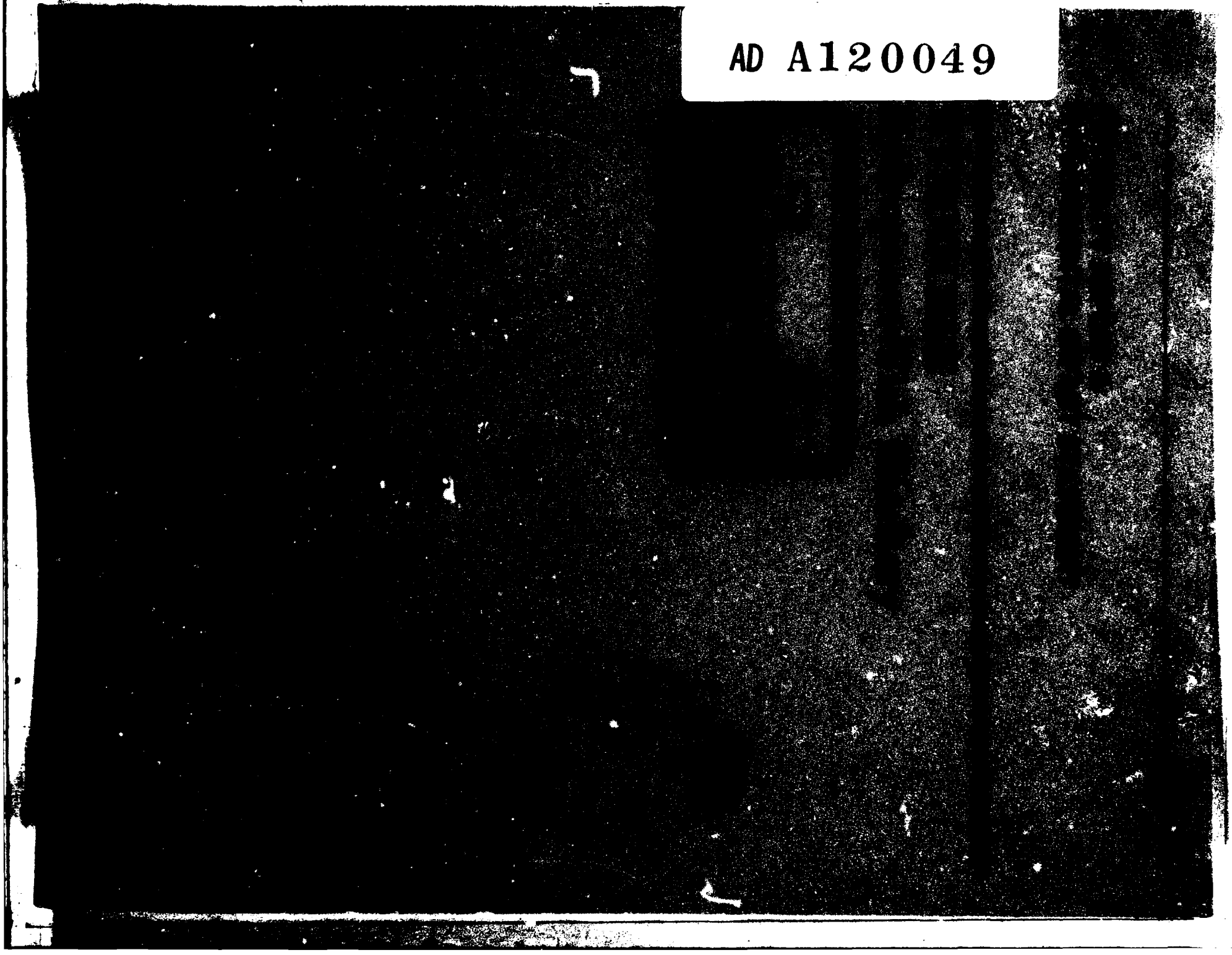

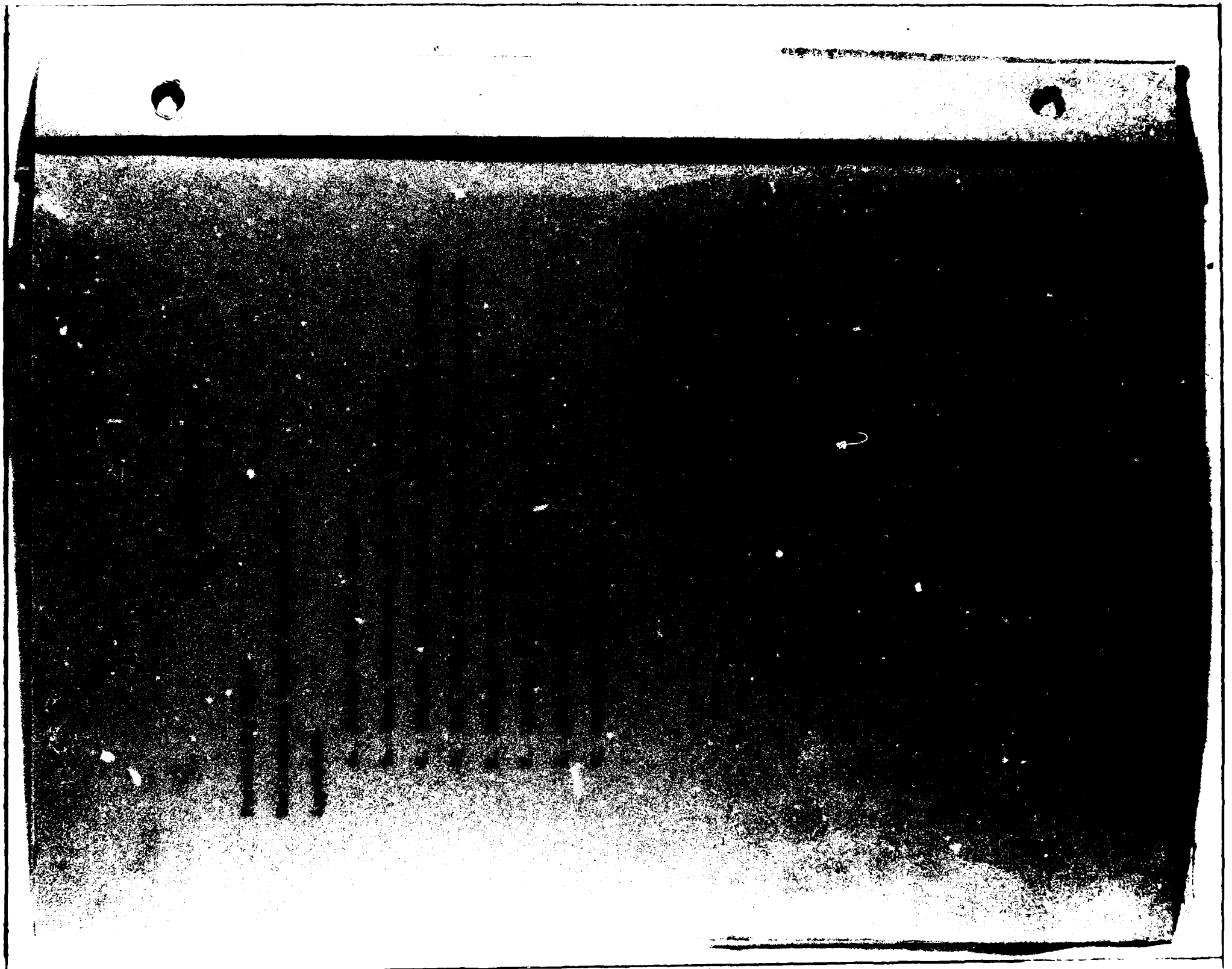

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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

Presents results of a feasibility study on the desirability of developing the hydropower potential and fish enhancement opportunities at Wynoochee Dam, Washington. Recommended plan is an 11.3 megawatt hydropower addition which would produce an average 36,900 megawatt hours energy per year and a 405,000 - pound hatchery for anadromous fish which would add 127,500 adult fish to the annual harvest. Investment cost would be $43,410,000 (October 1981) of which $23,420,000 is for the hydropower facility and $19,990,000 for the hatchery.

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SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

WYNOOCHEE HYDROPOWER/FISH HATCHERY STUDY
FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT

EXECUTIVE SUMMARY

This report presents the results of a feasibility study undertaken by the Seattle District, U.S. Army Corps of Engineers, on the desirability of developing the hydropower potential and fish enhancement opportunities at Wynoochee Dam, Washington, 35 miles north of the town of Montesano in Grays Harbor County, Washington.

The planning objectives for this study were to:

a. meet a portion of the increasing electrical energy needs in the Pacific Northwest by development of the hydropower potential of Wynoochee Dam, Washington, and

b. meet a portion of the increasing demand for anadromous fish in the Pacific Northwest by development of fish enhancement opportunities at Wynoochee Dam, Washington.

A wide range of planning criteria was used to evaluate the hydropower and fish enhancement alternatives, design options for the alternatives, and alternative plans. The alternatives included hydropower at Wynoochee Dam, various fish enhancement measures in the vicinity of Wynoochee Dam, and no action. The recommended plan is an 11.3-megawatt hydropower addition to Wynoochee Dam which would produce an average of 36,900 megawatthours energy per year and a 405,000-pound hatchery for anadromous fish 3,000 feet downstream of Wynoochee Dam which would add 127,500 adult fish annually to the anadromous fish harvest. Total fish enhancement would be 118,660 adult spring chinook salmon and steelhead. The hatchery could be constructed in two phases, with the second phase constructed up to 20 years after the first phase. A satellite fish station in the Chehalis River Basin for collection of brood stock is included in the plan. Measures have been incorporated into the plan to minimize impacts to the extent practicable. The plan has a net benefit to the environment, the enhancement of anadromous fisheries. The recommended plan meets the two planning objectives of this study. There would be no change in the operation of the existing Corps of Engineers Wynoochee Lake project for its authorized project purposes.

Total investment cost for the recommended plan would be $43,410,000 (October 1981 price level), of which $23,420,000 is allocated to the hydropower facility and $19,990,000 is allocated to the fish hatchery. The plan is economically justified, producing $2.90 in total average annual benefits for every $1 in total average annual costs. The hydropower facility would produce $1.10 in average annual power benefits for every $1 in average annual power costs; the average annual cost of energy

produced would be 5.7 cents per kilowatthour. The fish hatchery would produce $4.70 in average annual fish enhancement benefits for every $1 in average annual fish costs.

The Corps of Engineers would construct the recommended plan, operate the hydropower facility, and provide 100 percent of the first hydropower costs; 100 percent of the annual operation, maintenance, and replacement (OM&R) hydropower costs; 75 percent of the separable recreation (sport) fishery first costs; 100 percent of the separable commercial/Indian fishery first costs; and 100 percent of the joint fishery first costs. The Bonneville Power Administration would market the power in the Pacific Northwest and repay the power costs from power revenues. A Federal fish agency (to be identified) would become owner and manager of the fish hatchery and provide 100 percent of the separable commercial/Indian fishery annual OM&R costs and 100 percent of the joint fishery annual OM&R costs. The State of Washington has expressed its intent to act as local sponsor of the fish hatchery and provide 25 percent of the separable sport fishery first costs, 100 percent of the separable recreation (sport) fishery annual OM&R costs, and 100 percent of the costs associated with fulfilling its previous mitigation responsibility for the existing Wynoochee Lake project.

The Federal first cost is presently estimated at $41,601,000 and annual OM&R cost at $848,000. The non-Federal first cost is presently estimated at $1,809,000 and annual OM&R cost at $205,000.

A draft environmental impact statement (EIS) on the Wynoochee hydropower/fish hatchery plan was prepared and circulated for public and agency review and comment 3 December 1981 through 28 February 1982. Public and agency comments were incorporated into the final EIS.

There is strong public and agency support for development of both the hydropower facility and the fish hatchery. There is no known opposition to the recommended plan.

The District Engineer's recommendation is that an integrated hydropower/fish hatchery project at the existing Wynoochee Lake Project, Washington, be authorized for Federal construction and OM&R in accordance with the recommended plan presented in this report. This plan is subject to such modifications thereto as in the discretion of the Chief of Engineers may be advisable and subject to cost sharing and financing arrangements with responsible non-Federal agencies which are satisfactory to the President and Congress.

WYNOOCHEE HYDROPOWER/FISH HATCHERY

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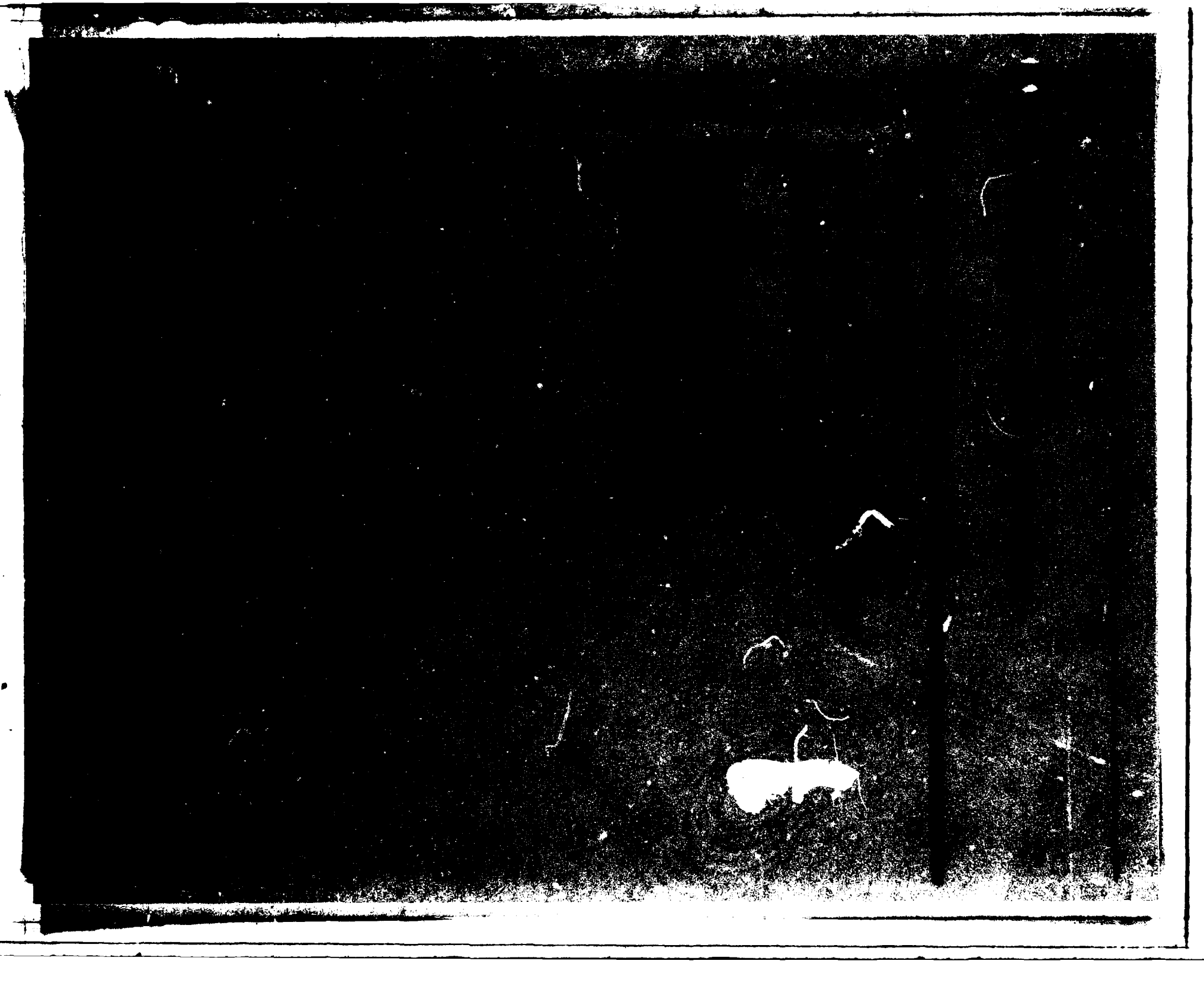


SECTION 1. BACKGROUND

1.01 Study Authority. This study was conducted under the authority of the Chehalis River Basin study resolution adopted on 19 April 1946:

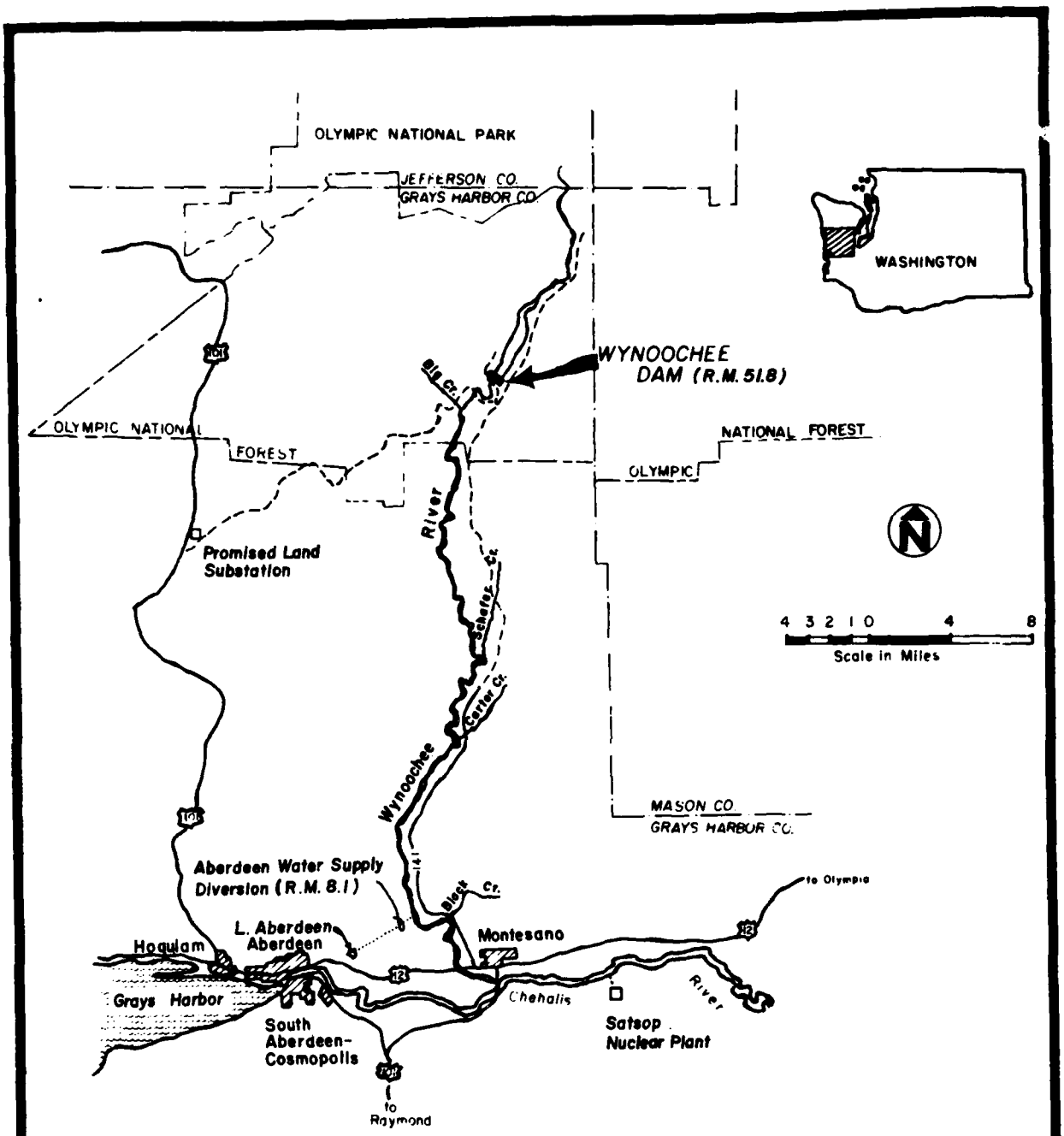
"Resolved by the Committee on Flood Control, House of Representatives, that the Board of Engineers for Rivers and Harbors, created under section 3 of the River and Harbor Act approved 13 June 1902, be and is hereby requested to review the report on the Chehalis River and Tributaries, Washington, submitted in House Document numbered 494, 78th Congress, second session, with a view to determining whether any modification of the recommendations contained therein should be made at this time."

This study was also conducted in response to section 203 of the River and Harbor (R&H) Act of 1962 and in accordance with the Fish and Wildlife Coordination Act of 1958, as amended. Section 203 of the R&H Act of 1962 (Public Law 87-874, 23 October 1962) authorized the Wynoochee Lake Project provided "that the installation of the power-generating facilities shall not be made until the Chief of Engineers shall submit a reexamination report to the Congress for authorization."

1.02 Type of Study. This report presents the results of an interim feasibility study undertaken by the Seattle District, U.S. Army Corps of Engineers. The study was conducted in interim response to the study authorization for the purpose of reporting to Congress for their action on the desirability of developing the hydropower potential and fish enhancement opportunities at Wynoochee Dam, Washington, and to present a full assessment of the environmental impacts of the alternatives and alternative plans.

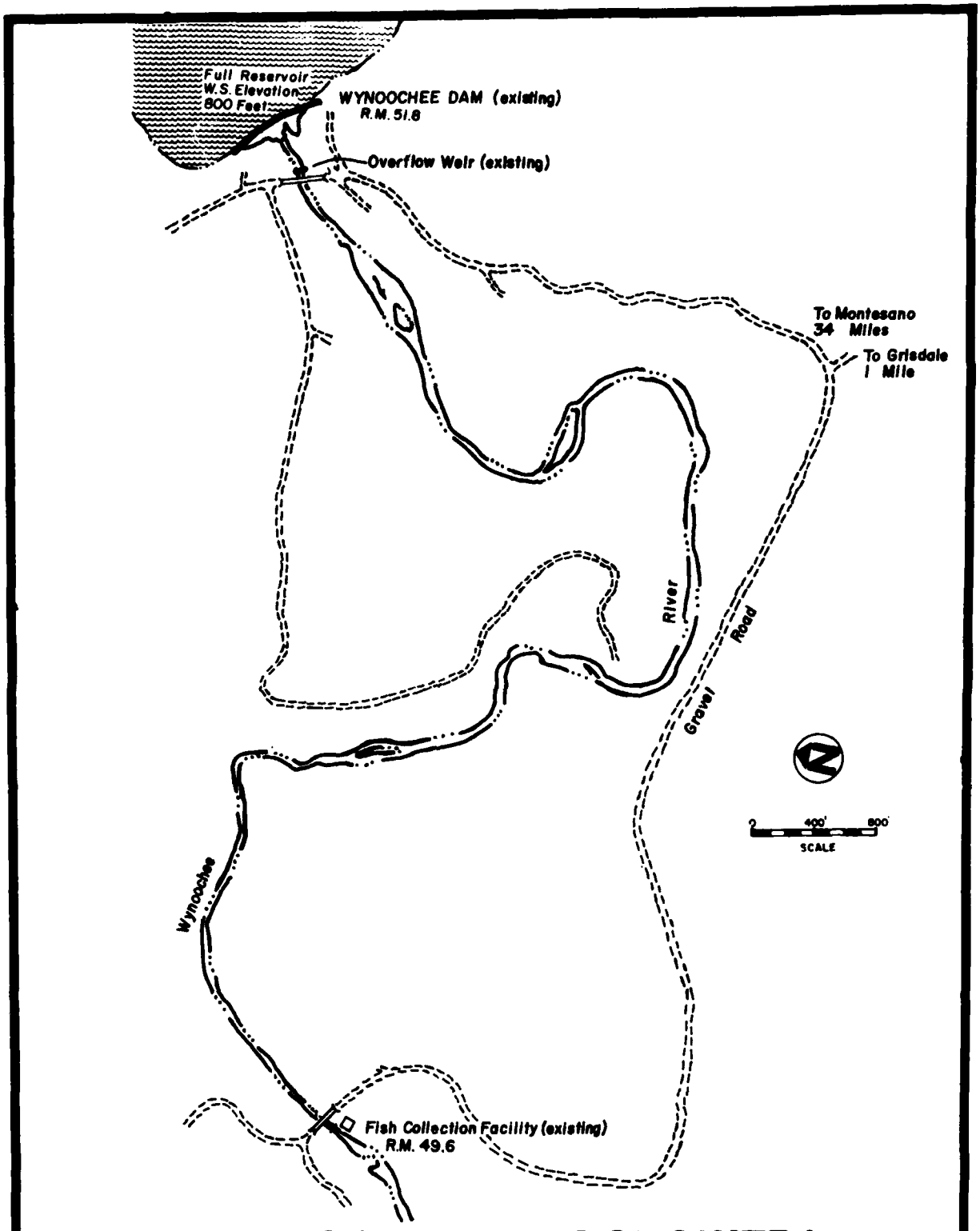
1.03 Location of Study Area. The study area is the Chehalis River Basin and Grays Harbor area in western Washington. This area includes the Wynoochee River Basin and the plan area in the immediate vicinity of the Corps of Engineers' Wynoochee Dam, 35 road miles north of the town of Montesano in Grays Harbor County, Washington (figure 1). The Wynoochee River originates on the southern slopes of the Olympic Mountains in the Olympic National Park and flows into the Chehalis River 13 miles upstream of Aberdeen, Washington. The Chehalis River flows into Grays Harbor at Aberdeen. The plan area extends from Wynoochee Dam at river mile (R.M.) 51.8 on the Wynoochee River downstream to the existing Corps fish collection facility at R.M. 49.6 (figure 2). The outputs of the alternatives considered would be provided to the Pacific Northwest region.

1.04 Existing Wynoochee Lake Project Purposes and Operation. The Wynoochee Lake Project is a 177-foot-high (above streambed) concrete and earthfill dam constructed by the Corps of Engineers from years 1969 to 1972 (plate 1). The project provides 70,000 acre-feet of total storage and is presently operated for city of Aberdeen industrial water supply, winter flood control, and fisheries. Hydropower development was considered originally in the Wynoochee River studies but was not included in the existing project due to the lack of economic feasibility at the time of authorization. Incidental fish enhancement benefits were attributed to the Wynoochee Lake Project for improved streamflows which



LOCATION OF WYNOOCHEE DAM

FIGURE 1



WYNOOCHEE HYDROPOWER/ FISH HATCHERY PLAN AREA

FIGURE 2

enhance transportation and rearing habitat of anadromous fish. The existing project includes mitigation lands for elk and a fish collection facility and trucking program for anadromous fish. In addition, the Washington Department of Game was paid $696,000 for mitigation of steelhead and cutthroat trout spawning habitat losses associated with the project.

1.05 Wynoochee reservoir provides 59,500 acre-feet of usable storage between the minimum pool at elevation 700 feet and the normal maximum pool at elevation 800 feet. The project is drafted to flood control pool elevation 764 feet to provide 35,000 acre-feet of storage for flood control regulation from 1 November to approximately 15 March. The reservoir is generally filled from elevation 764 feet to elevation 800 feet between 15 March and 1 June to provide up to 59,500 acre-feet of conservation water supply. The city of Aberdeen has contracted to repay all costs allocated to water supply or approximately 78 percent of the annual investment, operation, maintenance, and replacement costs of the existing project. Operational outputs and requirements of the existing project are as follows:

a. Present withdrawal of 125 cubic feet per second (c.f.s) city of Aberdeen industrial water supply at Wynoochee R.M. 8.1; ultimate withdrawal of 300 c.f.s. when Aberdeen requests it sometime in the future. Water supply releases are scheduled according to the industrial water supply needs of the city and are provided in regular segments of increasing flows.

b. Up to 120 c.f.s below R.M. 8.1 for fish passage.

c. 62 c.f.s. release by the city of Aberdeen past R.M. 8.1 to Washington Public Power Supply System starting in approximately 1986 to replace Chehalis River water withdrawn for cooling at the Satsop nuclear plant. The 62 c.f.s. would be provided from the city of Aberdeen's water supply entitlement and would be in addition to the 50 c.f.s. minimum flow requirement below R.M. 8.1 when the city of Aberdeen reaches its ultimate entitlement sometime in the future.

d. 35 c.f.s. for future irrigation downstream of R.M. 27 during June, July, and August. Actual regulation for irrigation will not commence until appropriate irrigation contracts have been signed.

e. Winter flood control storage is designed to regulate the Wynoochee River below Black Creek to 18,000 c.f.s.

f. Minimum allowable releases from Wynoochee Dam are 190 c.f.s., except for 140 c.f.s. when necessary from 1 May to 30 June to complete refilling the reservoir.

g. One foot per hour water level fluctuations immediately downstream of Wynoochee Dam when flows are less than 2,500 c.f.s.; no fluctuation restriction when flows are greater than 2,500 c.f.s.

1.06 Existing Wynoochee Lake Project Fish Mitigation.

a. General. Prior to construction of the Wynoochee Lake Project, approximately 1,500 coho salmon, 1,400 steelhead, and 500 searun cutthroat trout spawned in the Wynoochee River above the damsite at R.M. 51.8 to Wynoochee Falls at R.M. 61.0. The Wynoochee Dam blocked passage to this area and the reservoir inundated the area from R.M. 51.8 to R.M. 57.2. Mitigation for anadromous fish losses associated with Wynoochee Lake Project construction was provided for two categories of losses: (1) $696,000 was transferred to the Washington Department of Game (WDG) for the construction of hatchery facilities for the mitigation of steelhead and cutthroat trout habitat inundated by the Wynoochee reservoir, and (2) fish passage facilities were constructed as part of the Wynoochee Lake Project to allow continued use of the remaining spawning areas above Wynoochee reservoir by coho salmon, steelhead, and searun cutthroat.

b. Hatchery Facilities. Fish spawning areas in the 5.4 miles of the Wynoochee River immediately above R.M. 51.8 were inundated by formation of the Wynoochee reservoir. Approximately 1,000 steelhead and 330 searun cutthroat trout spawned in this area and were lost due to construction of the Wynoochee Lake Project; there was no appreciable spawning of coho salmon in the reservoir area. Additionally, some steelhead losses were expected downstream of the dam due to the operation of the Wynoochee Lake Project. As a result of coordination among the Federal and state fish resource agencies, artificial propagation facilities were recommended for mitigation. Accordingly, under a signed Memorandum of Agreement dated 28 July 1977 between the Corps of Engineers and WDG (Construction of Fish Hatchery Facilities for Prevention of Natural Spawning Areas for Anadromous Trout Occasioned by Construction of Wynoochee Lake Project), $696,000 was provided to the WDG in 1977 for construction of fish hatchery facilities and for operation and maintenance of those facilities for the life of the Wynoochee Lake Project. The transfer of these funds to the State of Washington was authorized by the Water Resources Development Act of 1974 (Public Law 93-251). WDG was to release sufficient steelhead smolts to increase the number of post-project returning adult steelhead by 1,700 fish and planned to produce these smolts through expansion of the Aberdeen hatchery. Problems in obtaining water supply have prevented the intended expansion of the Aberdeen hatchery by WDG, and only interim measures to produce steelhead have been undertaken. To date, the WDG has implemented temporary rearing pens in Lake Aberdeen for rearing a portion of the steelhead necessary to mitigate for the existing dam.

c. Fish Passage Facilities. With implementation of the Wynoochee Lake Project, fish spawning and rearing in the Wynoochee River upstream of the reservoir was continued by construction of an adult fish collection facility 2.2 miles downstream of the dam, a release facility above the dam, and multilevel low-flow pipes through the dam which were designed to provide safe passage of downstream migrants. These

facilities were to provide mitigation for 1,500 coho salmon, 400 steelhead, and 170 cutthroat trout estimated to spawn in the stream habitat upstream of the reservoir. Under the present operation, adult fish are transported from the collection facility by truck to a release station in the river upstream of the reservoir. Progeny of the fish spawning in this reach of the river move through the reservoir on their seaward migration and pass through the dam via one of the six low-flow outlets which provide for downstream temperature control and passage for downstream migrants. Since the multilevel low-flow outlets were a prototype design, the efficiency of the structure to safely pass seaward migrants was tested in 1974-1976. The test results indicated that the structure was not operating at its intended efficiency and have led to requests by the WDG and Washington Department of Fisheries (WDF) for additional mitigation. The WDG has requested total mitigation for 570 steelhead and cutthroat trout that spawned upstream of the reservoir. The WDF has requested mitigation for one-third (i.e., 500 adults) of the coho run annually and continuation of the operation of the fish facilities for the remaining two-thirds (i.e., 1,000 adults) of the annual coho salmon run. The State of Washington and the Corps have deferred further negotiation for improved Wynoochee Lake project mitigation because, as mutually agreed, the proposed fish hatchery would fully mitigate fish runs to the pre-Wynoochee Lake project condition.

1.07 Needs. Energy and anadromous fishery resource needs in the Pacific Northwest have increased considerably since Wynoochee Dam was authorized for construction.

a. Energy. Average annual energy deficits in the West Group Area (Pacific Northwest) are forecast to range from 8,960,000 megawatt-hours (MWH) (1,023 average annual megawatts (MW)) in 1982-1983 to 26,160,000 MWH (2,986 MW) in 1988-1989 to 20,320,000 MWH (2,326 MW) in 1992-1993, according to the 1982 Northwest Regional/Sum-of-Utilities (SOU) Forecast prepared by the Pacific Northwest Utilities Conference Committee (PNUCC) (May 1982) based on critical water conditions. The probability of the region being without sufficient resources to meet electrical needs due to increased loads and delays of nuclear and thermal development has caused power planners to focus on smaller renewable resource projects and conservation methods. These new plans emphasize the development of small hydropower and other methods to relieve the potential deficits. However, since the PNUCC forecast already includes anticipated conservation and renewable resource development, the demand for electrical energy will probably exceed generating resources by over 20 million MWH in the next decade and beyond.

b. Anadromous Fish. The natural runs of anadromous fish in the Pacific Northwest are being adversely impacted by logging, pollution, and water resource projects. In particular, the fish runs in the Chehalis River Basin and Grays Harbor area have declined. The demand for anadromous fish by commercial, Indian, and sport fishermen has exceeded the available declining stocks and the remaining natural spawning and rearing areas available for producing anadromous fish have proved to be insufficient to meet the continuing increased demand on the fisheries.

There is, therefore, a need to enhance the salmon and steelhead runs in the Chehalis River Basin and Grays Harbor area over their present levels.

To overcome the potential economic loss caused by these impacts on the sport and commercial fisheries, the Federal, state, and local governments are investigating ways of increasing the supply of harvestable anadromous fish. A fishery enhancement bill was passed by Congress in 1980 (Salmon and Steelhead Conservation and Enhancement Act of 1980, Public Law 96-561) to provide funds to enhance anadromous fisheries in the Pacific Northwest. Various state agencies and local interests have made considerable progress in improving the general environmental conditions in the Grays Harbor area. In addition, the Washington State Departments of Fisheries and Game have long recognized the potential for a fish hatchery at Wynoochee Dam. In a letter from the Governor of the State of Washington dated 23 April 1980 (see appendix C), the Corps was requested to study the feasibility of a fish hatchery in conjunction with hydropower development at Wynoochee Dam. The Grays Harbor Fisheries Enhancement Task Force, established by the Grays Harbor Regional Planning Commission, was formed in 1980 to discuss plans to enhance the declining anadromous fishery in the Grays Harbor area. The fish enhancement plan, adopted in July 1980 by the Commission (appendix B), recommended the Wynoochee fish hatchery as one of two long-range plans to enhance the fishery. Special emphasis has been placed by the fishery agencies on enhancing spring chinook salmon, a species facing near extinction in many watersheds of the Northwest.

1.08 Pertinent References.

a. U.S. Army Corps of Engineers, Seattle District, 1961, Report on Survey of Wynoochee River, Washington (published as House Document No. 601, 87th Congress, 2d Session, 1962), recommended a multiple-purpose project at R.M. 42.5 on the Wynoochee River.

b. U.S. Army Corps of Engineers, Seattle District, 1965, Wynoochee Reservoir, Washington, Design Memorandum 1, Site Selection, selected the site for a multiple-purpose project at R.M. 51.8 on the Wynoochee River.

c. U.S. Army Corps of Engineers, Seattle District, 1966, Wynoochee Reservoir, Washington, Design Memorandum 3, General Design, presented design details of the Wynoochee Lake Project.

d. Public Utility District No. 1 of Grays Harbor County, Washington, June 1979, Wynoochee River Project, Appraisal Report, presented results of an appraisal study by R. W. Beck and Associates on hydroelectric power development at existing Wynoochee Dam and the undeveloped Oxbow site at R.M. 42.5.

e. Public Utility District No. 1 of Grays Harbor County, Washington, April 1980, Application before the Federal Energy Regulatory Commission for Preliminary Permit for Wynoochee River Waterpower Project.

f. Grays Harbor Fisheries Enhancement Task Force, July 1980, An Action Plan for Grays Harbor Fishery Enhancement, A Report to the Grays Harbor Regional Planning Commission.

g. City of Aberdeen, Grays Harbor County, Washington, November 1980, Competing Application before the Federal Energy Regulatory Commission for Preliminary Permit for Wynoochee River Water Power Project.

h. Public Utility District No. 1 of Grays Harbor County, Washington, May 1981, Wynoochee Dam Hydroelectric Project Pre-Draft SEPA EIS Consultation Packet of Information.

i. Matthews, Stephen B., September 1981, Biological Report for Wynoochee Hatchery Management Planning, prepared for Seattle District, Corps of Engineers.

Copies of these pertinent references are available for review in the Seattle District office.

SECTION 2. PLANNING OBJECTIVES AND CRITERIA

2.01 Planning Objectives. Planning objectives are statements of the primary water and related land resources management needs of the study area which led to the request for the study. For this study, the planning objectives were to:

a. meet a portion of the increasing electrical energy needs in the Pacific Northwest by development of the hydropower potential of Wynoochee Dam, Washington; and

b. meet a portion of the increasing demand for anadromous fish in the Pacific Northwest by development of fish enhancement opportunities at Wynoochee Dam, Washington.

2.02 Planning Constraint. The only planning constraint placed on this feasibility study by the Corps of Engineers was that there would be no change in the outputs of the congressionally authorized project purposes of Wynoochee Lake Project as a result of adding hydropower and fish enhancement facilities.

2.03 Planning Criteria.

a. General. A wide range of planning criteria was used to evaluate the hydropower and fish enhancement alternatives, design options for the alternatives, and alternative plans according to their contribution to the National Economic Development (NED), Environmental Quality (EQ), Regional Economic Development (RED), and Other Social Effects (OSE) accounts of the Water Resources Council's Principles and Standards for Water and Related Land Resources. The criteria considered include legal, financial, policy, social, economic, engineering, and environmental factors and conditions which impose constraints and limitations on the planning process or provide rules and guidelines for evaluation. The criteria also include needs, opportunities, and concerns in addition to those which specifically address the planning objectives. All applicable planning criteria for the study are presented in the following paragraphs under the account to which they are primarily related.

b. National Economic Development Criteria. The NED criteria consisted of needs that would result in NED benefits. The pertinent NED criteria were:

(1) reduce energy deficits in the Pacific Northwest; and

(2) enhance the anadromous commercial, Indian, and sport fisheries harvest in the Pacific Northwest.

In addition, the following constraints, procedures, and guidelines were used in the NED analysis:

(1) all costs were determined for the October 1981 price level;

(2) the Federal interest rate used in the evaluation of alternative plans was 7-5/8 percent (Fiscal Year (FY) 1982) in accordance with the formula prescribed by the Water Resources Council;

(3) all alternatives were evaluated on a 100-year economic life;

(4) a simplified small-scale hydropower benefit evaluation procedure established in response to the Water Resources Council's Procedures for Evaluation of National Economic Development Benefits and Costs in Water Resources Planning (14 December 1979 Federal Register, Section 713.601(b), p. 72938; ER 1105-2-40, January 1982) was used (appendix C); and

(5) each project purpose must provide benefits at least equal to its cost in accordance with Corps of Engineers and Water Resources Council policy.

c. Environmental Quality Criteria. The EQ criteria consisted of specific environmental related resource constraints and opportunities to increase environmental quality. These included criteria imposed by Federal, state, and local regulations and those uniquely related to the study area. The pertinent EQ criteria were:

(1) enhance runs of salmon and steelhead in the Chehalis River Basin and Grays Harbor area;

(2) minimize adverse impacts on resident fish and wildlife in plan area;

(3) minimize energy use;

(4) maintain water quality of Wynoochee River within existing state classification;

(5) preserve or salvage significant historic and prehistoric cultural resource sites affected by potential project construction or effects in accordance with authorities contained in the National Historic Preservation Act of 1966, the Reservoir Salvage Act of 1960 as amended by Public Law 93-291, and Executive Order (EO) 11593;

(6) preserve wetlands in conformance with EO 11990;

(7) preserve flood plain in conformance with EO 11988;

(8) protect habitat of any threatened and endangered species;

(9) allow for appropriate instream flows in the Wynoochee River;

(10) be compatible with existing Wynoochee Lake Project mitigation facilities;

(11) provide State of Washington the opportunity to develop mitigation facilities for previous steelhead losses associated with existing Wynoochee Lake Project under 28 July 1977 Memorandum of Agreement;

(12) minimize adverse impacts on existing wild stocks of anadromous fish in the Chehalis River Basin and Grays Harbor area; and

(13) assure that Wynoochee River fluctuations continue to be compatible with the fish resource.

d. Regional Economic Development Criteria. The RED criteria consisted of opportunities to increase economic efficiency within the Chehalis River Basin and Grays Harbor area which may also provide increases in NED benefits. This list also included areas of concern listed in Section 122 of Public Law 91-611. The pertinent RED criteria were:

(1) reduce energy deficits in the Pacific Northwest;

(2) enhance the anadromous commercial, Indian, and sport fisheries harvest in the Pacific Northwest;

(3) increase employment of unemployed or underemployed resources in the Chehalis River Basin and Grays Harbor area;

(4) increase recreational opportunities in Chehalis River Basin and Grays Harbor area.

e. Other Social Effects Criteria. The OSE criteria included those engineering policy standards that were applied to all alternatives to assure the maintenance of public health and safety and those opportunities and constraints related to the well-being of people. This list also included areas of concern listed in Section 122 of Public Law 91-611. The pertinent OSE criteria were:

(1) maintain structural soundness of Wynoochee Dam;

(2) maintain operation of Wynoochee Lake Project for its authorized project purposes;

(3) minimize adverse social impacts in plan area;

(4) provide improved Indian fisheries;

(5) assure that river fluctuations continue at existing safe levels; and

(6) provide water quality consistent with existing state classification for Wynoochee River.

SECTION 3. FORMULATION AND EVALUATION OF ALTERNATIVES

3.01 Plan Formulation Approach. The plan formulation process began with the identification of the planning objectives, constraint, and the planning criteria. A range of hydropower and fish enhancement alternatives was identified to meet the planning objectives while addressing as many of the planning criteria as possible. Alternatives and design options for the alternatives were evaluated, screened, and refined during preliminary and detailed technical studies. Hydropower formulation was done in accordance with the Water Resources Council's guidelines for small hydropower projects (see paragraph 4.25a). Plans including the no-action plan were evaluated against the planning criteria and a plan was selected. The selected plan consisted of an underground hydropower facility and a fish hatchery. Hydropower development with a 1,200 c.f.s. powerhouse was selected based on net power benefits and energy production; the fish hatchery was sized at 190 c.f.s. to provide the maximum opportunity for fish enhancement development. Extensive study coordination and public involvement were conducted throughout the study. Plan formulation details are presented in appendix G.

3.02 Preliminary Analysis and Screening. Alternatives for meeting the two planning objectives were formulated, evaluated, and screened during preliminary engineering, economic, and environmental studies. The alternatives included hydropower at Wynoochee Dam, various fish enhancement measures in the vicinity of Wynoochee Dam, and no action.

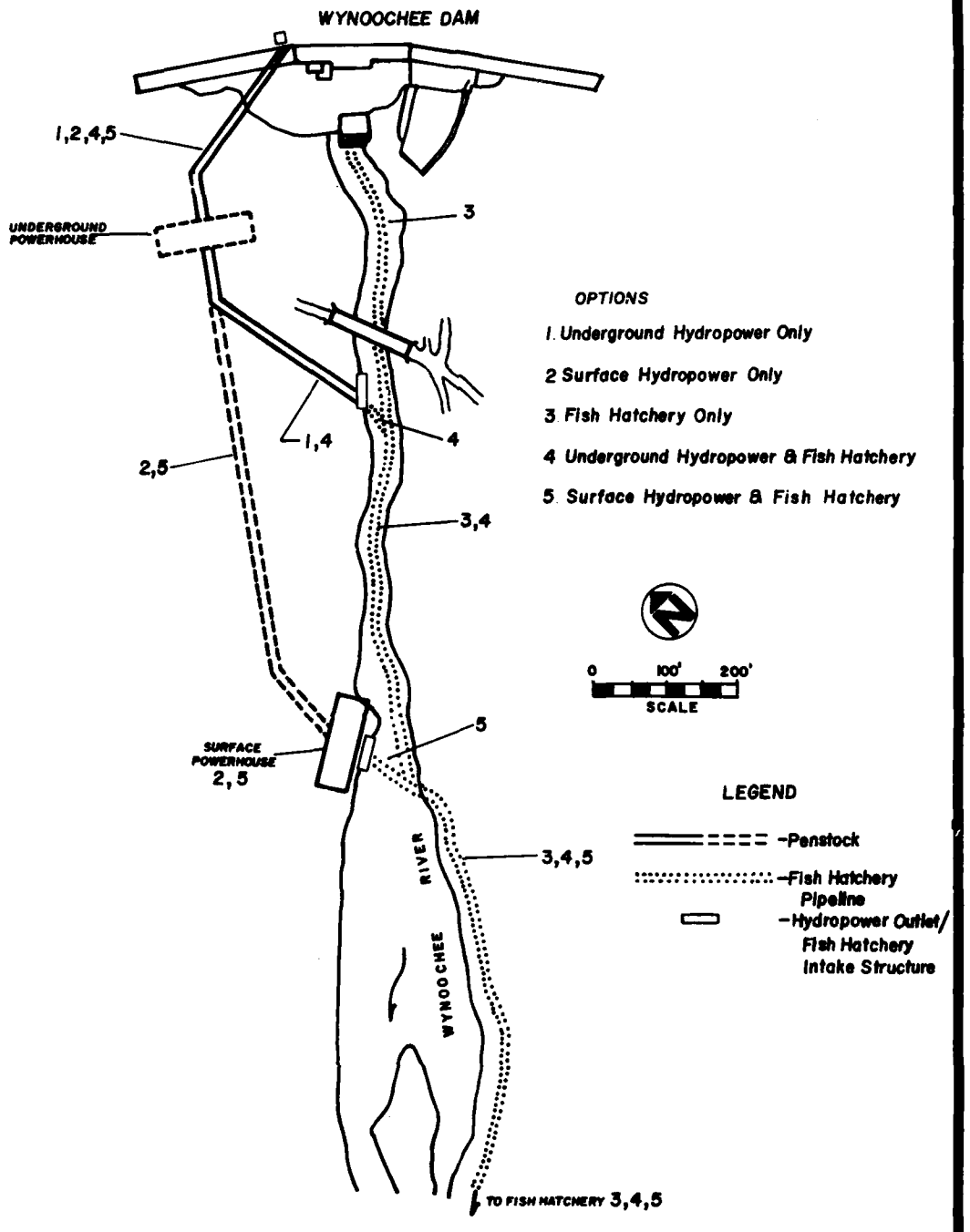
a. Hydropower at Wynoochee Dam. Studies were conducted to determine the powerhouse configuration most appropriate to produce energy from a reasonably high percentage of expected outflows from Wynoochee Dam without modifying existing project operations. A preliminary hydraulic capacity of the powerhouse was selected to be 1,200 c.f.s., the flow equalled or exceeded 20 percent of the time in December, the month with the highest runoff at Wynoochee Dam. As detailed in appendix G, seven powerhouse locations (figure 3) with various penstock configurations were considered during the preliminary studies. As part of the preliminary screening process, hydropower design options were dropped from further study if they (1) presented a potential hydraulic and operational constraint on the operation of the spillway of the Wynoochee Dam, (2) would operate with relatively high loss in net power head when compared to the other alternatives, (3) would result in insufficient room or access for construction of the feature, or (4) would include a pipeline along the rock canyon bottom below known overburden slide areas. As a result of this preliminary screening, all but two hydropower design options were deleted from further consideration: a right bank underground powerhouse 200 feet downstream of the dam and a right bank surface powerhouse 900 feet downstream of the dam, both of which would have a penstock tunnel under the right bank abutment and through the right bank.

b. Fish Enhancement at Wynoochee Dam. Three alternatives are possible in the vicinity of Wynoochee Dam to enhance the anadromous fish runs: spawning channels, rearing ponds, and a fish hatchery. All three would take advantage of the gravity water supply from Wynoochee Dam. As discussed in appendix G, a fish hatchery was considered to be the most viable fish enhancement alternative in the vicinity of Wynoochee Dam because it would provide optimum use of the opportunity at Wynoochee Dam in terms of production and efficiency. Following selection of the fish hatchery alternative, three alternative fish hatchery sites were evaluated in the vicinity of Wynoochee Dam, one on the left bank and two on the right bank. The left bank site located on a high level bench 2,000 feet downstream of the dam was eliminated from consideration because the site was too small an area for a hatchery to utilize the available water (190/140 c.f.s. minimum flow release) and because the site was too high above the river to be connected with a gravity flow pipeline from a hydropower facility. The right bank sites located approximately 3,000 feet downstream of the dam were similar except that one site was located on a intermediate level bench (635 feet elevation) and the other on a low level bench (615 feet elevation). Although other fish hatchery sites in the Chehalis River Basin and Grays Harbor area could be developed by state and other Federal agencies, the other sites do not offer the unique combination of factors that make a right bank fish hatchery site below Wynoochee Dam the most desirable hatchery site in the basin (refer to appendix G). Both right bank sites could accommodate a hatchery which could utilize all the available water and could be connected with a gravity flow water supply pipeline from a hydropower facility. However, the lower level site was selected over the intermediate level site because it would cause less hydropower head loss if the fish hatchery had a direct gravity flow pipeline connection from a hydropower facility. In addition, the lower fish hatchery site would be a source of suitable aggregate materials for construction of the hydropower facility.

c. No Action. Under the no-action alternative, there would be no Federal hydropower or enhancement fish hatchery development at Wynoochee Dam at this time. No action is discussed further in paragraph 3.04.

3.03 Detailed Studies.

a. Design Options. As outlined in appendix G, detailed design and cost estimate studies, geotechnical investigations, and environmental studies were conducted on the five possible hydropower and fish hatchery design options or combinations of design options which remained after the preliminary studies. The project outputs and construction costs of the remaining design options (figure 3) were as follows:



WYNOOCHEE HYDROPOWER/ FISH HATCHERY DESIGN OPTIONS

FIGURE 3

Design Option	Description	Powerhouse Capacity (MW)	Average Annual Energy (MWH)	Fish Production (Pounds)	October 1981 Construction Costs ($000,000)
(1)	Underground hydropower only	11.3	37,400		25.6
(2)	Surface hydropower only	11.3	37,400		23.4
(3)	Fish hatchery only			405,000	20.1
(4)	Underground hydropower plus fish hatchery	11.3	36,900	405,000	41.6
(5)	Surface hydropower plus fish hatchery	10.2	36,900	405,000	38.5

Detailed design and cost studies showed an economic advantage for developing a combined hydropower and fish hatchery project, with the underground hydropower/fish hatchery option $3.1 million more expensive than the surface hydropower/fish hatchery option. A combined hydropower and fish hatchery project would produce 500 MWH of energy per year less than a hydropower only project due to tailwater head losses associated with the fish hatchery intake structure. Detailed geotechnical investigations (refer to appendix F) considered that the risk of potential slide problems associated with the surface powerhouse offset the additional construction cost of the underground powerhouse and determined that the underground powerhouse location is geotechnically sound with no known potential problems. Detailed environmental studies showed that an underground hydropower and fish hatchery option would result in the greatest net beneficial environmental impact. Therefore, based on present information, the combination of the underground hydropower and fish hatchery was the only design option which remained for consideration as an alternative plan during this feasibility study. Additional consideration will be given to the alternate project locations during preconstruction planning and engineering (PP&E) to verify selection of the most advantageous design option. In response to coordination with state and Federal fish resource agencies, the fish hatchery plan was expanded

by adding a satellite fish station on the lower Skookumchuck River. Detailed siting and design studies of the fish station will be accomplished during PP&E as the details of the hatchery and its management are formulated.

b. Optimization. The optimum level of hydropower development was determined by comparing the net power benefits and percent of total potential energy produced by the underground powerhouse with four different hydraulic capacities (800 c.f.s., 1,000 c.f.s., 1,200 c.f.s., and 1,400 c.f.s.) as part of a combined hydropower/fish hatchery project. A comparison of the four power plants was as follows:

	Powerhouse Hydraulic Capacity			
	800 c.f.s.	1000 c.f.s.	1200 c.f.s.	1400 c.f.s.
Total Capacity (MW)	7.5	9.5	11.3	13.3
Equivalent Thermal Capacity (MW)	5.2	6.3	7.1	7.5
Average Annual Energy (MWH)	33,100	34,900	36,900	37,600
Percentage Total Potential Energy	80%	85%	90%	91%
Annual Power Benefits ($1000)	1,856	2,053	2,223	2,297
Annual Separable Power Costs ($1000)	1,643	1,775	1,969	2,219
Net Power Benefits ($1000)	213	278	254	78

A plot of power benefits versus power costs (in appendix G) showed the maximum net power benefits would be $289,000. A plot of net power benefits versus powerhouse hydraulic capacity (in appendix G) showed the maximum net power benefits would occur with a 1,060 c.f.s. hydraulic capacity. The 1,200 c.f.s. powerhouse was chosen over the 1,060 c.f.s. powerhouse as the selected level of hydropower development to capture the extra energy production (2,000 MWH/year) with only a slight decrease in net power benefits ($35,000/year). Details of the hydropower optimization are presented in appendix G.

The fish hatchery was sized to use the minimum allowable releases from Wynoochee Dam, which are 190 c.f.s., but can be reduced to 140 c.f.s. from 1 May to 30 June to complete refilling the reservoir. No constraints on hatchery operation due to reduced water supply during May and June have been identified by the fisheries agencies because flexibility in hatchery operation would allow for reduced water supply during these months. The 190 c.f.s. flows would provide the maximum opportunity for fish enhancement development at Wynoochee Dam, thereby permitting maximum fishery enhancement in the Chehalis River Basin and Grays Harbor area.

3.04 Alternative Plan 1: No-Action.

a. Description. Under the no-action plan, the most probable future without Federal action, there would be no Federal hydropower or enhancement fish hatchery development at Wynoochee Dam at this time. There is a possibility of non-Federal hydropower development at Wynoochee Dam as discussed in paragraphs 3.06a and 5.03h; however, there is no expressed interest in non-Federal hydropower development at Wynoochee Dam at this time. Energy conservation programs and renewable resources development by public and private utilities and state and local governments would continue. Fish habitat improvement measures and fishery management by state and Federal fisheries agencies would also continue. Although the enhancement fish hatchery has been recognized as a quality project by non-Federal entities, there are no proposals for complete non-Federal development of an enhancement fish hatchery at Wynoochee Dam.

b. Evaluation of Key Criteria. Under the no-action plan, there would be a slight reduction in the regional energy deficit and the harvest of anadromous fish would not be enhanced or would show minor improvement if other enhancement programs are implemented. A comparison of the no-action plan with the base condition and recommended plan is summarized in table 1; a detailed comparison is presented in table EIS-2 and in appendix G.

3.05 Alternative Plan 2: Combined Underground Hydropower and Enhancement Fish Hatchery (National Economic Development Plan/Environmental Quality Plan/Recommended Plan).

a. Description. The combined underground hydropower and enhancement fish hatchery plan is an 11.3-MW and 36,900-MWH per year hydropower addition to Wynoochee Dam and a 405,000-pound fish hatchery downstream of Wynoochee Dam. The plan includes a multilevel intake structure, penstock tunnel, penstocks, underground powerhouse, switchyard, bypass pipe, draft tubes, tailrace tunnel, hydropower outlet/fish hatchery intake structure, hatchery backup water supply pipe, fish hatchery water supply pipeline, fish hatchery, and a satellite fish station. A 22-mile transmission line would be the responsibility of the Bonneville Power Administration (BPA). The underground powerhouse with three turbines (1.7, 4.8, and 4.8 MW capacity) would be located 200 feet downstream of the dam, 200 feet behind the right canyon wall. The enhancement fish hatchery, with raceways, rearing ponds, and adult holding ponds for salmon and steelhead, would be located on a low meander bench on the right bank 3,000 feet downstream of the dam (plate 2) and would be constructed in two phases. The fish hatchery would add 118,660 adult spring chinook salmon and steelhead to the anadromous fisheries harvest each year.

b. Evaluation of Key Criteria. The combined underground hydropower and enhancement fish hatchery plan would produce $2.90 in average annual power and fish enhancement benefits for every $1 in average annual costs. There would be a slight reduction in the regional energy deficit. The recommended plan would result in a major increase in the anadromous fishery, while minimizing adverse environmental impacts. The plan would provide the State of Washington the opportunity to fulfill its mitigation responsibilities under the 28 July 1977 Memorandum of Agreement with the Corps and would not change the operation of the existing Wynoochee Lake Project. Because the combined underground hydropower and enhancement fish hatchery plan would produce both energy and fish with a net beneficial contribution to the environment, this plan is considered to be both the NED plan, the plan that most contributes to the national economic development, and the EQ plan, the plan that emphasizes environmental quality contributions. This plan is also the recommended plan because it meets the two planning objectives of this study and does not violate the planning constraint. A comparison of the recommended plan with the base condition and no-action plan is summarized in table 1; a detailed comparison is presented in table EIS-2 and in appendix C. Section 4 is a detailed description of the recommended plan.

TABLE 1

SUMMARY COMPARISON OF ALTERNATIVE PLANS

Needs	Base Condition (present condition)	Alternatives: No Action (most probable future without Federal action)	Alternatives: Recommended Plan
Power	Regional energy deficit of 8,960,000 MWH in 1982-1983.	Regional energy deficit forecast to range from 26,160,000 MWH in 1988-1989 to 20,320,000 MWH in 1992-1993; forecast includes anticipated conservation and renewable resource development. No Federal hydropower development at Wynoochee Dam; non-Federal hydropower development at Wynoochee Dam is possible but no expressed interest at this time (approximately 10.4 MW capacity; 35,900 MWH/year energy). Slight reduction in regional energy deficit.	Regional energy deficit forecast same as under no action. Federal hydropower development at Wynoochee Dam (11.3 MW capacity; 36,900 MWH/year energy). Slight reduction in regional energy deficit.
Anadromous Fish	Remain at present level.	Fish habitat improvement measures and fishery management by state and Federal fisheries agencies. Some improvement of anadromous fish runs over base condition if other enhancement programs are implemented. No Federal enhancement fish hatchery development at Wynoochee Dam; there are no proposals for non-Federal enhancement fish hatchery development at Wynoochee Dam.	Federal enhancement fish hatchery at Wynoochee Dam. Major enhancement of anadromous fishery (118,660 adult spring chinook salmon and and steelhead). Provides State of Washington opportunity to develop previous mitigation responsibilities.

3.06 Plans of Others.

a. Public Utility District No. 1 of Grays Harbor County, Washington. The Grays Harbor Public Utility District (PUD) was interested in developing the hydropower potential of Wynoochee Dam. An appraisal report prepared for the PUD by their consultant, R. W. Beck and Associates, recommended development of a 10.4-MW surface powerhouse on the right bank, 900 feet downstream of the dam (hydropower design option 2c), which would produce 35,900 MWH of average annual energy. An underground powerhouse in the right bank 200 feet downstream of the dam was also considered (hydropower design option 1c). A Federal Energy Regulatory Commission (FERC) preliminary permit was granted to the PUD in April 1981 to study hydropower development at Wynoochee Dam. The Seattle District, Corps of Engineers, has cooperated with the PUD and their consultant in providing data and in coordinating study efforts to avoid unnecessary duplication. In response to the public's desire, the Corps and PUD expressed an intent to enter into a Federal/non-Federal hydropower partnership. On 22 February 1982, the PUD withdrew its intent to be local sponsor due to its inability to guarantee to finance the project at a future date. The PUD, as local sponsor of the hydropower facility, would have marketed the power output of the proposed hydropower facility at Wynoochee Dam and paid 100 percent of the hydropower costs. The PUD surrendered its preliminary FERC permit on 1 July 1982. There is no expressed interest in non-Federal hydropower development at Wynoochee Dam at this time. The PUD has also investigated the 22-MW Oxbow site at Wynoochee R.M. 42.5.

b. City of Aberdeen, Washington. In November 1980, the city of Aberdeen filed a competing application for a FERC preliminary permit to develop Wynoochee hydropower. In March 1981, the application was withdrawn. The city has officially endorsed the hydropower facility and fish hatchery.

c. Washington Departments of Fisheries and Game. The Washington Department of Game (WDG), under a memorandum of agreement with Seattle District, is responsible for developing and operating hatchery facilities for mitigating the loss of 1,700 adult steelhead caused by construction of Wynoochee Lake Project. Funds in the amount of $696,000 for this purpose were provided to the State of Washington under a Memorandum of Agreement dated 28 July 1977. Problems in obtaining water supply have prevented expansion of the Aberdeen hatchery by WDG, and only interim measures to produce steelhead have been undertaken. To date, the WDG has implemented temporary rearing pens in Lake Aberdeen for rearing a portion of the steelhead necessary to mitigate for the existing dam. If the Wynoochee fish hatchery is authorized, a portion of the fish hatchery would be used by the State of Washington to fulfill its obligation under the Memorandum of Agreement. Studies by WDG, Washington Department of Fisheries (WDF), and the Corps of Engineers have shown the runs of anadromous fish at Wynoochee Dam have declined since completion of dam construction in 1972. Accordingly, the state agencies have requested additional mitigation. The State of Washington and the

Corps have deferred further negotiation for additional mitigation pending authorization of the Wynoochee hydropower/fish hatchery plan. For additional information on existing project fish mitigation, see paragraph 1.06.

d. U.S. Forest Service. The U.S. Forest Service (USFS) manages the timber resources in the Shelton Ranger District of the Olympic National Forest according to the Shelton Cooperative Sustained-Yield Unit (CSYU) agreement with Simpson Timber Company. The Wynoochee hydropower/fish hatchery plan area lies within the boundaries of the Shelton District. The Shelton CSYU agreement, initiated in 1946, commits designated national forests and Simpson Timber Company lands to an integrated management plan for a sustained production of timber over the 100-year term of the agreement. The management plan is updated every 10 years. Of the total 350,176 acres of land in the Shelton CSYU, 112,874 are national forest land and 237,302 acres are Simpson Timber Company land. The current timber resource management plan prepared by USFS under the agreement covers the period of 1977-1986. A new management plan for the Shelton District is currently being developed by the USFS. The ongoing management study divides the forest into physical and biological units and compares existing output of these units to the various alternative management strategies for increasing the output for a selected use (e.g., wildlife, timber production, etc.). The EIS for this new plan is scheduled for public review in December 1982. In addition to its timber management program, the USFS has an ongoing program of fish habitat improvement projects in the Shelton Ranger District.

SECTION 4. RECOMMENDED PLAN

4.01 Plan Description. The recommended plan would be located in the immediate vicinity of the Corps of Engineers' Wynoochee Lake project, 35 road miles north of the town of Montesano in Grays Harbor County, Washington. Wynoochee Dam is located at R.M. 51.8 on the Wynoochee River. The recommended plan is an 11.3 MW capacity and 36,900 MWH per year hydropower addition to Wynoochee Dam and a 405,000-pound fish hatchery downstream of Wynoochee Dam. The fish hatchery would contribute 118,660 adult spring chinook salmon and steelhead to the commercial/Indian and sport harvests annually. An underground powerhouse would be located 200 feet downstream of the dam, 200 feet behind the right canyon wall. The fish hatchery would be located on a low meander bench on the right bank 3,000 feet downstream of the dam between R.M. 50.6 and 51.2.

4.02 A multilevel intake structure would be located adjacent to the upstream face of Wynoochee Dam monolith 5. From the intake foundation, a vertical shaft would be excavated down to meet the horizontal penstock tunnel where an emergency gate would be provided. The penstock would continue directly beneath the grout curtain under monolith 5 to the underground powerhouse. A bypass would be provided around the powerhouse to supply water to the fish hatchery when the powerhouse was shut down. A surface switchyard would be provided near the powerhouse. The power would be marketed by the Bonneville Power Administration (BPA), who would be responsible for a transmission line following the Donkey Creek Road 22 miles to the Promised Land substation. The transmission line is not included in the recommended plan; however, impacts of a buried transmission line are addressed in the discussion of the impacts of the recommended plan. A tailrace tunnel would exit from the right canyon wall about 400 feet downstream from the dam into the hydropower outlet/fish hatchery intake structure. The fish hatchery intake structure would increase the tailwater on the unit 4 feet to provide head to meet fish hatchery water flow requirements. The tailrace tunnel would have two separate conduits so that only the unit having flow diverted to the hatchery would be subject to increased tailwater elevation. A gravity flow, pressure water supply pipeline would be constructed from the fish hatchery intake structure to the enhancement fish hatchery on the right bank. The fish hatchery would utilize the 190/140 c.f.s. minimum flow from Wynoochee Dam and would consist of raceways, rearing ponds, adult holding ponds for anadromous spring chinook salmon and steelhead, and appurtenant structures. The fish hatchery would be constructed in two phases (Phase I, 135 c.f.s., 296,000 pounds; Phase II, 55 c.f.s., 109,000 pounds) because of the expected delay in developing a viable fishery from the extremely depressed spring chinook salmon. A satellite fish station in the Chehalis River Basin would be used primarily for collection of spring chinook salmon brood stock. Plates 2 and 3 present the general plan layout. Selected plan details are presented in appendix E.

4.03 Hydrology.

a. Climatic Conditions. The climate of the Wynoochee Basin is cool, with relatively dry summers and mild, cloudy, and wet winters. Precipitation is abundant throughout the basin but varies locally and seasonally. Annual precipitation at Wynoochee Dam has ranged from 119 to 180 inches, with a mean of 153 inches. November through March are the wettest months and June through August are the driest months. Temperatures at Wynoochee Dam have ranged from 1° F to 102° F.

b. Drainage and Streamflow. The Wynoochee River originates on the southern slopes of the Olympic Mountains and flows generally south for 67 miles to the Chehalis River. The Wynoochee River Basin is elongated in a north-south direction, has a drainage area of 195 square miles, and comprises 10 percent of the drainage area of the Chehalis River Basin. Tributaries to the Wynoochee River are generally small. Flow in the Wynoochee River is highest during the winter season from October to March. During this period, the streamflow is characterized by frequent sharp rises, a result of concentrated 2- to 5-day rainstorms or series of storms. Streamflow generally decreases by March or April as the winter rains subside. Seasonal temperatures then rise, melting the winter accumulation of snow. This results in another high-water period, usually in late May or June. From July through September, streamflow is at its lowest.

4.04 Existing Wynoochee Lake Project Purposes and Operation. The purposes and operation of the Corps of Engineers' Wynoochee Lake project are discussed in paragraphs 1.04 and 1.05.

4.05 Existing Water Quality. The water quality of the Wynoochee River is classified as Class AA (extraordinary) by the State of Washington. Discharges from Wynoochee Dam are in compliance with the water quality standards and very suitable for a fish hatchery water supply. Findings of water quality analyses are described in detail in appendix H. Water quality sampling is continuing to aid in design during PP&E.

4.06 Environmental Setting. The plan area lies within the boundaries of the Olympic National Forest. Most of the land in the area is owned and managed by the USFS for recreation, wildlife preservation, and timber production. Vegetation is that typical of a northwestern rain forest, with western hemlock the climax species and Douglas fir the subclimax species. Wildlife includes a diversity of mammalian species, including Roosevelt elk and Columbia black-tailed deer, and numerous bird species, including the bald eagle, which is federally listed as threatened in Washington State. Both resident and anadromous fish presently spawn upstream and downstream of the plan area. Additional details on the environmental conditions in the plan area are presented in section 3 of the environmental impact statement.

4.07 Geotechnical Considerations.

a. Geologic Setting. The Wynoochee Lake project lies on the southern flank of the Olympic Mountains in a structurally controlled, glaciated, U-shaped valley, partly filled with glacial sediments. The valley is cut principally in basaltic lava flows from about 8 miles upstream to 10 miles downstream of the dam. Wynoochee Dam spans a narrow, 120-foot-deep rock gorge cut through the high point of a midvalley rock knob, which is largely mantled by glacial materials. Submarine, pillow basalt comprises the foundation of the dam and consists of tilted lava flows that strike roughly west to northwest. The foundation basalt is closely jointed and finely crystalline with carbonate veinlets. Most joint surfaces are coated with unweathered dark chlorite. The rock is generally competent and impermeable, though closely jointed and fractured. The area is close to the seismically active Puget Trough which has produced historic earthquakes in excess of Richter magnitude 7.

b. Exploration and Analyses. The Corps' geotechnical feasibility investigations of the powerhouse sites consisted of one recent diamond drill borehole in the underground powerhouse site, borehole camera photography, refraction seismic lines, geologic mapping, and reanalysis of earlier borings. Converse, Ward, Davis, Dixon, Geotechnical Engineers, supervised an exploration program for R. W. Beck and Associates, design engineers for the Grays Harbor PUD; five boreholes were drilled during their exploration program. Preconstruction investigations for Wynoochee Dam consisted of 45 borings of which four borings gave useful information on rock character in the vicinity of the underground powerhouse site. Geologic maps prepared before and during previous construction show information on rock contours and geologic structure relative to the site area. Overburden cover at the underground powerhouse site is generally less than 10 feet thick. Correlation of the rock structure exists between the canyon wall and diamond drill borings. The data show one significant joint cluster with the following attitude: N20-35E, 35-45NW. Controlled blasting procedures will be required during excavation in the closely jointed basalt to minimize damage to excavated chambers and slopes and to insure the continued integrity of the canyon and existing dam. Systematic rock reinforcement (bolts) will be necessary to prevent progressive loosening of the jointed material. No major problems are anticipated with either seepage or cut slope stability on the project. An evaluation of the results of these investigations, coupled with the structural analysis of the rock mass characteristics, confirmed that the underground powerhouse location is geotechnically sound and the most favorable powerhouse location. Drilling logs and detailed discussion are in appendix F.

c. Material Sources and Waste Area. Concrete aggregate investigation consists of eight backhoe trenches on the lower right meander bench about 3,000 feet downstream from the dam. Composite disturbed samples of sandy gravel were taken from several trenches for petrographic examination. Materials vary from zones of moderately clean, sandy gravel to silty, gravelly sand, with lenses of silty sand and

areas with cobbles and boulders. Adequate quantities of materials for the production of concrete aggregate for the hydropower facility appear available from this area, the proposed location for the fish hatchery. Preliminary investigations showed no apparent foundation problems would be expected for the fish hatchery. Approximately 20,000 cubic yards (c.y.) of rock from excavation can be disposed of in the concrete aggregate borrow excavation and/or used for site grading at the fish hatchery site. Rock borrow may be obtained from a nearby quarry source 1/2 mile west of the project.

4.08 Design Criteria.

a. Intake Structure. The intake structure was designed to avoid interference with operation of the existing project water conveyance facilities and continue to provide existing multilevel withdrawal capability to control water temperature.

b. Powerhouse. The powerhouse was designed as a baseload, run-of-river facility to utilize available flows between the 190/140 c.f.s. minimum flow of the existing project up to a total hydraulic capacity of 1,200 c.f.s.

c. Fish Hatchery. The 190/140 c.f.s. water supply to the fish hatchery would have to be provided under all possible operational conditions. The hatchery details must be standard and conform to state specifications which incorporate recent state-of-the-art advances.

4.09 Structural Features and Hydraulic Design. Refer to plates 2 and 3 for the general plan layout of the recommended plan. Selected plan details are presented in appendix E.

a. Intake Structure. The intake structure would be a 30-foot by 25-foot tower constructed on a rock bench at elevation 720 feet, adjacent to the upstream face of dam monolith 5. The Wynoochee Reservoir would be drawn down to just below elevation 720 feet during construction to permit construction in the dry. The tower would have four independently operated, vertical lift, selective withdrawal slidegates that would provide water withdrawal from one level at a time. The intake structure opening would be between elevations 723 feet and 800 feet. The slidegates could be raised or lowered to provide optimum temperature control through withdrawal at any one level of warmer surface water, colder water at depth, or intermediate temperature water. If the reservoir level drops below elevation 730 feet (a once in 33 years occurrence with full water supply development), the powerhouse would be shut down. The tower would permit passage of the total powerhouse hydraulic capacity of 1,200 c.f.s. with an average velocity of about 1.6 feet per second (f.p.s.) and a negligible hydraulic loss. The intake would be located in the upstream face of the tower resulting in intake velocities of about 4.5 f.p.s. and head loss of about 0.5 foot at a discharge of 1,200 c.f.s. Trashracks would be provided over the

intake. Stoplogs would be used for dewatering the intake structure. A vertical shaft 22 feet in diameter would be excavated from the intake foundation down approximately 50 feet to a horizontal penstock tunnel at elevation 670 feet. A hydraulically operated slidegate would be located at the entrance to the powerhouse penstock to provide emergency closure and penstock maintenance capability. Design of the intake structure will be verified through hydraulic model studies during PP&E to insure that acceptable hydraulic conditions are met.

b. Penstock. The 300-foot-long, 10.5-foot-diameter penstock would consist of a steel-lined tunnel through rock beneath the grout curtain under monolith 5. At maximum discharge, the penstock velocity would be about 13.9 f.p.s. About 50 feet upstream from the powerhouse, the penstock would trifurcate into two 8-foot-diameter and one 5-foot-diameter steel penstocks supplying the three individual units. A slow-acting butterfly valve upstream of each unit would provide emergency closure capability. The turbine wicket gates would regulate turbine flows to synchronous speed. Both the butterfly valve and wicket gate operating speeds would be regulated to protect the penstocks and penstock tunnel against dynamic effects of a rapid shutdown. Total head loss through the penstock was estimated to be approximately 3 feet.

c. Powerhouse. The powerhouse would be located underground in the right bank of the river about 200 feet downstream from Wynoochee Dam. The underground powerhouse would be 128 feet long, 40 feet wide, and 57 feet high. The edge of the powerhouse would be located 200 feet behind the canyon wall and the top of the powerhouse would be 100 feet below the surface. The underground powerhouse would use the rock to form the walls and ceiling and would be coated with 6 inches of shotcrete and secured with rock bolts. Total powerhouse hydraulic capacity would be 1,200 c.f.s. The powerhouse would have an installed nameplate capacity of 10.2 MW from three units of 1.8, 4.2, and 4.2 MW and would produce 36,900 MWH of average annual energy. The small unit would utilize the 190/140-c.f.s. minimum flow from Wynoochee Dam. The small unit was designed for a discharge of 190 c.f.s. (best efficiency) at a rated net head of 133 feet based on a reservoir elevation of 780 feet. When the reservoir is at the flood control elevation of 764 feet, the small unit output would be 1.7 MW. The two large units were designed for a discharge of 500 c.f.s. each ("full-gate" efficiency) at a rated net head of 117 feet based on a reservoir elevation of 764 feet. The continuous overload capacity of the three units would be about 11.3 MW (1.7, 4.8, and 4.8 MW). For descriptive purposes, the powerhouse is considered to have a capacity of 11.3 MW. The turbines would be the horizontal shaft Francis-type and the generators would be synchronous type. The turbines would discharge approximately 1,200 c.f.s. at flood control pool elevation 764 feet and provide considerable flexibility for operation between 730- and 800-foot reservoir levels. The hydropower operation would be subordinate to all other authorized project purposes, and the facility would operate as a run-of-river plant producing base-load energy from the reservoir releases.

A vertical access shaft 22 by 27 feet would be excavated over the maintenance area in the powerhouse adjacent to the small turbine. The vertical access would contain a vent, power trunk, stairway, personnel elevator, and equipment shaft. Large equipment would be loaded into the powerhouse through a hatch in the access inclosure roof by use of a mobile crane. Once in the powerhouse the equipment would be handled by a 20-ton bridge crane. A valved, steel bypass pipe around the small unit from its steel penstock to its draft tube would provide flexibility to insure continuous passage of the minimum flow to the fish hatchery during periods of total powerhouse shutdown for either maintenance or emergency conditions. The bypass pipe was designed to minimize residual energy at the pipe exit into the small unit draft tube and would be controlled by a spherical valve located near the pipe exit. The bypass valve would operate automatically to provide a fail-safe water supply to the fish hatchery under emergency conditions.

d. Switchyard and Transmission Line. The 100-foot by 100-foot switchyard would be located at the surface, west of the powerhouse access inclosure and across the road out of sight. For the purpose of describing the impacts in the feasibility report and EIS, a buried transmission line within the existing power right-of-way along Donkey Creek Road was chosen by the Corps of Engineers based on preliminary BPA studies. BPA would be responsible for the transmission line and, accordingly, the transmission line is not included in the recommended plan; however, impacts of a buried transmission line are addressed in the discussion of the impacts of the recommended plan. The buried line is considered the least environmentally damaging plan by the Corps of Engineers and is consistent with the USFS policy requiring burial of transmission lines on national forest land. Various transmission line alternatives and routes were considered. Routes considered were southwesterly from Wynoochee Dam 22 miles along Donkey Creek Road to the Promised Land substation and southerly from the dam 35 miles down the Wynoochee Valley Road to Montesano. Alternative lines considered were a buried transmission line and an aerial transmission line. The detailed studies required to definitively determine the economics and operational advantages or disadvantages of a buried transmission line as opposed to an alternative aerial transmission line would be conducted during further BPA studies. The BPA, which would be responsible for construction, operation, and maintenance of the transmission line, would be responsible for the final decision as to type of line and location. That decision would be made in cooperation with the Corps of Engineers and the USFS. A supplemental environmental document would be prepared during PP&E to address the transmission line alternatives and their impacts and would be distributed for public and agency review and comment. An aerial transmission line, if selected, would be designed to minimize environmental impacts, including placement of the line to minimize timber production losses and esthetic impacts to the extent possible. Extensive coordination with the USFS would be necessary to minimize significant conflicts with current land use along the transmission corridor.

e. Draft Tubes and Tailrace Tunnel. Flow from the powerhouse would exit to the Wynoochee River about 400 feet downstream of the dam through concrete-lined draft tubes and a tailrace tunnel about 20 feet in overall diameter and 350 feet in length. The tunnel was sized to limit velocities to about 6 f.p.s. at 1,200 c.f.s. and would result in about 1 foot of head loss. This head loss, combined with losses in the intake structure and penstock, would cause approximately 5 feet of total head loss to the units. Downstream from the powerhouse, the draft tubes would be vented to the atmosphere to prevent damage to the units in the event of a rapid unit shutdown. Emergency gates for each draft tube would be incorporated with the air vent shafts. The draft tubes from each unit would merge into a tailrace tunnel housing two conduits. The upper tailrace conduit was sized to convey 1,000 c.f.s. It would accommodate flow from the two large units which would exit directly to the river. The lower tailrace conduit was sized to convey 500 c.f.s. During periods when the small unit is out of service, water could be diverted from the draft tube of the large unit adjacent to the small unit into the lower conduit. The lower conduit, which would be the hatchery diversion conduit, would accommodate flow from either the small unit or one large unit. Flow in this smaller tailrace conduit would be diverted to the fish hatchery intake structure where sufficient head would be maintained to insure flow to the hatchery. Final design of the draft tubes and tailrace tunnel system will be verified by model studies during PP&E.

f. Hydropower Outlet/Fish Hatchery Intake Structure. The lower tailrace conduit would exit the tailrace tunnel via a structure at the canyon wall designed to provide approximately 4 feet hydraulic head which is sufficient to supply the required 190/140 c.f.s. to the fish hatchery. The raised tailwater elevations caused a 500 MWH average annual energy reduction; during PP&E, the possibility of eliminating the minor reduction in power productin would be examined. The hatchery intake structure was also designed to dissipate residual energy when the turbines were bypassed. The hydropower outlet would consist of a retaining wall at the mouth of the tailrace tunnel where slots would be provided for stoplogs for dewatering the tailrace conduits. The lower tailrace conduit would be connected to the fish hatchery intake structure which would be 20 feet wide, 50 feet long and 25 feet deep. The design water surface in the fish hatchery intake structure would be approximately 641 feet. An overflow section, equipped with a flapgate to prevent river water from overtopping the structure walls, would be provided to prevent the water surface elevation in the structure from exceeding 641 feet. Because the tailrace conduits would be separated, only that unit having flow diverted to the fish hatchery would have its tailwater elevation raised 4 feet. Riverflows with a frequency in excess of 100 years are expected to overtop the intake structure. A 140-foot-long, 6-foot-diameter gated steel pipe would extend from the existing overflow weir located just downstream from Wynoochee Dam to the fish hatchery intake structure. This pipe would be provided to insure the uninterrupted flow of good quality water for the 190/140 c.f.s. fish

hatchery water supply during periods when the entire powerhouse complex (intake structure, penstock, powerhouse, draft tubes, and tailrace) was shut down for maintenance, which normally would be a scheduled event. This water would come from one of the six existing low flow passages through Wynoochee Dam. The water behind the weir would be flushed out before diverting water to the fish hatchery. Providing water to the fish hatchery via this alternate pipeline could only occur when the two existing sluices through the dam were not in use because their discharges could possibly cause nitrogen supersaturation problems in the fish hatchery water supply. Final design of the hydropower outlet/fish hatchery intake structure will be verified by model studies during PP&P.

g. Fish Hatchery Water Supply Pipeline and Head Tank. The fish hatchery gravity flow water supply would be via a buried 5.0-foot-diameter steel pipeline approximately 2,400 feet long from the fish hatchery intake structure to the fish hatchery head tank. The gravity flow water supply pipeline was selected in lieu of pumping directly from the river at the hatchery site because the pipeline and related features would have a lower total average annual cost than a pumping plant (see appendix G). The pipeline would operate under pressure at 190 c.f.s. design flow with the water surface elevation of 641 feet in the fish hatchery intake structure. From the intake structure the pipeline would be concrete encased and buried in the gorge as it crossed the river. The pipeline would exit the river and would be placed in an excavated trench on the left bank, with thrust blocks placed at changes in alinement or grade. The pipeline would then cross under the river to the fish hatchery site on the right bank. At this river crossing the pipeline would be deeply buried and encased in concrete to avoid problems if scouring occurred. On the right bank, the pipeline would cut through a 35-foot-high ridge composed of common materials before emptying into the fish hatchery headwater tank. The right bank topography from the intake structure to the fish hatchery makes it impractical for a pipeline route. A second, small pipeline to the fish hatchery is discussed below. The hatchery head tank would operate at water surface elevation 631 feet, 16 feet above the estimated 100-year frequency Wynoochee River water surface elevation at the hatchery outlet structure. Water would be distributed to the various hatchery components via a once-through water system from the head tank. The head tank would also provide dissolved gas equilibrations.

h. Fish Hatchery. The fish hatchery would be constructed on a 50-acre site about 3,000 feet downstream of the dam and was designed to operate with the minimum 190/140 c.f.s. release from Wynoochee Dam. Except for the months of May and June, 190 c.f.s. is the operational minimum flow from the dam; in May and June, the operational minimum flow may drop to 140 c.f.s. However, no constraints on hatchery operation due to the potential water supply reduction from 190 c.f.s. to 140 c.f.s. have been identified by the fisheries agencies, because flexibility in hatchery operation could allow for reduced water supply during May and June. The hatchery would be constructed in two phases because of the expected delay in developing a viable fishery from the extremely depressed spring chinook salmon.

Phase I, the initial fish hatchery construction, would utilize 135 c.f.s. of the total 190 c.f.s. of water available (95 c.f.s. for steelhead, 40 c.f.s. for spring chinook salmon). For the spring chinook salmon, six 10-foot by 100-foot fingerling raceways, one 1/2-acre rearing pond, and one 1/2-acre adult holding pond would be provided. For steelhead, twenty 10-foot by 100-foot raceways, four 2-acre rearing ponds, and two 10-foot by 100-foot adult holding ponds would be provided. Site preparation of the complete hatchery site would be done as part of Phase I construction. A common hatchery building would house both salmon and steelhead egg incubation facilities, offices, living quarters for temporary personnel, and visitor exhibits. A separate building would be provided for food storage, garage, and maintenance shop. Four residences for permanent personnel would also be provided. Power to the hatchery and residences would be provided as station power from the hydropower facility. The existing adult fish collection facility located at R.M. 49.6 would be utilized for the collection of adult fish that would be held at the hatchery until ready for spawning. A 100-foot by 100-foot sedimentation pond would be provided for holding effluent from raceways while they are being cleaned. The existing access road to the fish hatchery site would be upgraded. The road would have a gravel surface down to the residence area and a paved surface in front of the residences and around the hatchery area.

An insulated 12-inch pipeline would lead directly from the reservoir to the adult salmon holding pond. This would provide about 7 c.f.s. of cold water (approximately 48° F) for optimum holding conditions for spring chinook salmon during the summer months prior to spawning. This pipeline would start deep in the cold water levels of the reservoir and parallel the penstock powerhouse bypass, draft tube, tailrace tunnel, and fish hatchery water supply pipeline to the fish hatchery. This pressure line would also provide fire protection, wash-down lines, and irrigation for the houses and hatchery ground. An oxygenation system for the water would be provided at the holding pond since water at low levels in the reservoir can often be low in oxygen content. The potential for a small (approximately 50 kW) generating unit at the end of this pipeline will be investigated during PP&E.

An existing high ridge on the upstream side of the fish hatchery site prevents flooding of the site up to the estimated 100-year frequency flow. The ridge is subjected to erosive action by the river and its failure would result in flooding of the hatchery by relatively high exceedence frequency floods. A 2-foot-thick riprap blanket designed to withstand velocities of 10 to 13 f.p.s. would be provided on the right bank of the river along 700 feet of the ridge to preserve its integrity for floods up to the 100-year frequency flow.

Phase II of hatchery construction could be accomplished up to 20 years later, depending on development of the spring chinook salmon run and fishery management decisions. For spring chinook salmon, fourteen 10-foot by 100-foot fingerling raceways, two 1/2-acre rearing ponds, and

one 1/2-acre adult holding pond would be constructed. No additional steelhead facilities would be constructed. Two residences would be added and the water distribution system expanded. An additional 55 c.f.s. would be distributed to the new facilities, expanding the hatchery to the full 190 c.f.s. design flow.

i. Existing Fish Collection Facility. Under the proposed plan, the upstream anadromous fish run would be stopped at the existing fish collection facility located 2.2 miles downstream of Wynoochee Dam. The existing facility would no longer be used as part of the existing Wynoochee Lake Project to collect fish for truck hauling above the reservoir. Instead, the fish collection facility and two fish haul trucks would be transferred from the existing project to the fish hatchery. Fish would be collected at the fish collection facility, hauled to the fish hatchery, and placed in the holding ponds. Since the existing fish collection facility and truck hauling system are a fish mitigation feature of the existing project, a portion of the fish hatchery would substitute for the existing project mitigation by producing an equivalent number of fish. All cost savings and/or cost increases to the existing project and to the proposed fish hatchery from the transfer of the fish collection facility from the existing project to the fish hatchery and from the substitution production in the fish hatchery as part of the existing project were considered to be equal for this feasibility study. The loss of the upstream fish run would therefore be a cost to the proposed hydropower/fish hatchery project (see paragraph 4.13). A detailed examination of the transfer and substitution savings and costs will be conducted during PP&E. The need for any modification of the existing fish collection facility to serve the hatchery will also be examined during PP&E.

j. Satellite Fish Station. One satellite fish station has been included as a feature of the recommended plan for construction as part of the first phase of the fish hatchery plan. The specific location of this station and the details of its management would be developed in PP&E by the fisheries agencies in close coordination with the Indian tribes. A possible location for the satellite fish station is on the lower Skookumchuck River in the Chehalis River basin where it would be used to collect spring chinook salmon brood stock and possibly to aid in an outplanting program for juvenile salmon. During the early years of hatchery operation, the satellite fish station is of extreme importance because of the necessity to obtain a hatchery brood stock of spring chinook salmon indigenous to the Chehalis River Basin. The satellite fish station would not be utilized for the rearing and release of steelhead, but could be used for the collection of some adult steelhead for hatchery brood stock.

The station could include an adult attraction, collection, and holding system and an acclimation pond for rearing and imprinting juvenile salmon. A fish collection system would collect fish from the river or tributary and trap them in a holding facility. Subsequently, the fish

would be transported to the Wynoochee fish hatchery for continued holding and for spawning. Some of the progeny from these fish would be transported from the hatchery back to the satellite station where the fish would be reared until ready for their seaward migration, at which time they would be released into the stream. The time spent in the acclimation pond should result in the fish having a keener homing instinct to that stream when they return as adults. Additionally, use of the satellite fish station could provide the flexibility for a greater overall production from the fish hatchery facilities.

4.10 Relocations. No permanent relocations would be necessary to implement the recommended plan. Alternative parking at the existing Wynoochee Lake project visitor center would have to be utilized during construction because the powerhouse construction would temporarily involve the parking lot. The existing access road to the fish hatchery site would be upgraded.

4.11 Real Estate. Approximately 5 acres would be involved in the hydropower portion of the recommended plan. Most of these lands are already under Corps of Engineers' jurisdiction, with a small area under USFS jurisdiction. Approximately 60 acres would be needed for the fish hatchery portion of the recommended plan (site, water supply pipeline right-of-way, and access road). Most of these lands are under Corps of Engineers' and USFS jurisdiction, with a small area under private ownership. Approximately 5 acres would be needed for the satellite fish station and most of these are expected to be in private ownership. All lands associated with the recommended plan were estimated to cost approximately $2,000 per acre. The buried power transmission line from the switchyard to the Promised Land substation would be the responsibility of the BPA and would involve less than 50 acres along 22 miles of existing right-of-way. Most of these lands are under USFS jurisdiction or in private ownership, primarily Simpson Timber Company and ITT Rayonier, with a small area under Corps of Engineers' jurisdiction. Property transfers of USFS lands to the Corps of Engineers and the Federal fish agency in lieu of land purchase will be pursued during PP&E. Easements to use USFS and private roads will also be required. The USFS and Simpson Timber Company have expressed their willingness to cooperate with the Corps of Engineers in all real estate transactions.

4.12 Environmental Features. The major environmental feature of the recommended plan is the fish hatchery, which would utilize up to 190 c.f.s., the existing minimum flow release from the dam; produce 189,000 pounds (Phase I, 80,000; Phase II, 109,000) of spring chinook salmon smolts and 216,000 pounds of steelhead smolts (Phase I only) (see appendix C); and enhance the anadromous fish runs in the Chehalis River Basin, Grays Harbor area, and in the northern Pacific Ocean. The annual production of the fish hatchery (commercial/Indian and sport) is estimated at 87,000 adult spring chinook salmon (Phase I, 35,200; Phase II, 51,800) and 40,500 adult steelhead (see table 2 and appendix C). Total fish enhancement of the anadromous fish harvest would be 118,660 fish

TABLE 2

ANNUAL ADULT SALMON AND STEELHEAD ENHANCEMENT AND MITIGATION DISTRIBUTIONS FROM WYNOOCHEE FISH HATCHERY

	Phase I			Phase II	Total		
	Salmon	Steelhead	Total	Salmon	Salmon	Steelhead	Total
Total Fish Production							
Commercial/Indian	31,600	22,500	54,100	49,500	81,100	22,500	103,600
Ocean	(3,600)			(5,000)	(8,600)		
Terminal	(28,000)			(44,500)	(72,500)		
Sport	3,600	18,000	21,600	2,300	5,900	18,000	23,900
Ocean	(400)			(500)	(900)		
Terminal	(3,200)	———	———	(1,800)	(5,000)	———	———
Total	35,200	40,500	75,700 (100.0%)	51,800 (100.0%)	87,000	40,500	127,500 (100.0%)
Project Caused Fish Losses (Project Mitigation)							
Commercial	5,000	570	5,570		5,000	570	5,570
Sport	1,000	570	1,570	———	1,000	570	1,570
Total	6,000	1,140	7,140 (9.4%)	0	6,000	1,140	7,140 (5.6%)
Previous State of Washington's Mitigation Responsibility							
Commercial		850	850			850	850
Sport	———	850	850	———	———	850	850
Total	0	1,700	1,700 (2.3%)	0	0	1,700	1,700 (1.3%)
Enhancement Portion of Fish Production (Total Production Less Mitigation)							
Commercial	26,600	21,080	47,680	49,500	76,100	21,080	97,180
Sport	2,600	16,580	19,180	2,300	4,900	16,580	21,480
Total	29,200	37,660	66,860 (88.3%)	51,800 (100.0%)	81,000	37,660	118,660 (93.1%)

(Phase I, 66,860; Phase II, 51,800) per year. Final design, species selection, operation of the hatchery, and a management plan would be determined in PP&E as a coordinated effort among the Corps of Engineers and Federal and state fish agencies. Other environmental features of the recommended plan include a satellite fish station, bypass pipes in the powerhouse and existing overflow wier, the 12-inch pressure pipeline leading from the reservoir to the salmon holding pond, pollution abatement/settlement pond, fish and wildlife mitigation, landscape plantings, revegetation of disturbed areas using species of high wildlife value, planting of a vegetative buffer zone around the hatchery, and a postconstruction monitoring program. A specific revegetation plan for disturbed areas will be developed in PP&E. These environmental features were designed to insure the successful operation of the hatchery facility, minimize project impacts on the environment, and monitor the effectiveness of the fish hatchery in its role in the management of the total regional fishery. A multilevel intake structure is included in the plan to provide selective withdrawal capability for temperature control to maintain the existing project water quality control capability.

4.13 Mitigation. Part of the hatchery production would be utilized to mitigate for termination of the use of anadromous fish spawning habitat upstream of the Wynoochee Reservoir due to implementation of the recommended plan. The estimated number of fish that could be accommodated by that habitat is 1,500 coho salmon adults and 570 steelhead and cutthroat trout adults. The adult production required for this mitigation is 7,140 fish (see table 2 and appendix C). Another portion of the hatchery production would be used for mitigation of previous steelhead spawning habitat losses associated with the existing Wynoochee Lake project. The estimated number of fish attributable to that habitat is 1,700 steelhead adults (see table 2 and appendix C). This latter mitigation is the responsibility of the State of Washington under the 28 July 1977 Memorandum of Agreement with the Corps of Engineers. Reference paragraph 1.06 for additional information on existing project fish mitigation. The two mitigation portions of the hatchery would total approximately 5.6 percent and 1.3 percent of the total annual fish hatchery production, respectively, based on the total adult salmon and steelhead harvest from the fish hatchery (see table 2). The mitigation would be included in the first phase of fish hatchery construction. The remaining production of 118,660 fish (93.1 percent), which is not attributable to mitigation, is considered the enhancement portion of the fish hatchery. The species of fish in the Wynoochee River requiring mitigation for the construction of the Wynoochee hydropower/fish hatchery plan are coho salmon, steelhead trout, and sea-run cutthroat trout. The Wynoochee fish hatchery plan includes the production of spring chinook using one-half of the available water supply (Phase I, 40 c.f.s.; Phase II, 55 c.f.s.) and the production of steelhead trout using the other one-half (95 c.f.s.) of the total 190 c.f.s. available. For purposes of this hatchery plan, coho salmon are being mitigated by spring chinook salmon, which results in a conservative benefit-to-cost ratio

because of more costly propagation methods that must be utilized for spring chinook salmon. Also for purposes of this hatchery plan, steelhead trout are being substituted for sea-run cutthroat trout production because of the lack of cutthroat hatchery brood stock available to WDG. The Federal and state fish agencies will consider the specific species/stocks to best integrate the hatchery with natural production and the various fisheries. Final species selection for the hatchery would be determined in PP&E. In addition to fish mitigation, two 2-acre elk pastures to be constructed adjacent to the hatchery are included in the plan. These pastures would be vegetated with appropriate plant species to provide a winter food source for elk and thus reduce the impacts of hatchery-related losses of elk habitat. Because the pastures would be located on the hatchery site itself, no additional land acquisition would be necessary.

4.14 Cultural Resources. Implementation of the recommended plan would have no known impacts on prehistoric or historic cultural resources. Cultural resources reconnaissances were conducted at the existing Wynoochee Lake project in 1966 and in the plan area in June 1980. Neither reconnaissance found evidence of prehistoric or historic cultural resource sites. A letter dated 20 June 1980 from the Deputy State Historic Preservation Officer (appendix B) indicated that no archeological and historic resources are listed within the plan area in the National or State Registers of Historic Places or the State Inventory of Historic Places.

4.15 Recreation Facilities. No expansion of existing Wynoochee project recreation facilities or development of new recreation facilities is included in the recommended plan. One or more fishermen access sites could be provided downstream of the hatchery. However, the plans and locations of these access sites would be the responsibility of the hatchery owner and operator. The final plans and location of these sites would be determined during PP&E in coordination among the Corps, State of Washington, U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS), and USFS. However, the hatchery building would house some visitor exhibits in addition to salmon and steelhead egg incubation facilities, offices, and living quarters for temporary personnel. The major recreational benefit of the recommended plan would be the sport fishery enhancement in the Chehalis River Basin and Grays Harbor area that would result from operation of the Wynoochee fish hatchery.

4.16 Project Costs. The estimated cost for the recommended plan would be $41,600,000 (October 1981 price level). Table 3 presents a summary of the project costs by major feature. Details of the cost estimate for the recommended plan and cost estimate summaries for the design options are presented in appendix E. For the purposes of the cost allocation (see appendix C), the cost of the second phase of the fish hatchery was discounted 20 years at an interest rate of 7-5/8 percent. The total construction cost of the recommended plan would therefore be $40,275,000

TABLE 3

COST ESTIMATE SUMMARY

RECOMMENDED PLAN

UNDERGROUND HYDROPOWER PLUS FISH HATCHERY (PHASES I AND II)

Account No.	Feature or Item	October 1981 Item Cost ($1,000)	October 1981 Feature Cost ($1,000)
01	LANDS AND DAMAGES		$10
04	DAM		
.4	Power Intake Works	$5,180	5,180
06	FISH AND WILDLIFE FACILITIES		18,250
	Fish Hatchery - Phase I	16,740	
	Fish Hatchery - Phase II	1,510 1/	
07	POWERPLANT		12,290
.1	Powerhouse	5,320	
.2	Turbines and Generators	4,350	
.3	Accessory Electrical Equipment	960	
.4	Miscellaneous Powerplant Equipment	220	
.5	Tailrace	1,200	
.6	Switchyard	240	
19	BUILDINGS, GROUNDS, AND UTILITIES		280
20	PERMANENT OPERATING EQUIPMENT		190
	Subtotal		$36,200
30	ENGINEERING AND DESIGN (E&D)		$2,950
	Phase I E&D (7-1/2 percent)	2,710	
	Model Studies (Phase I)	130	
	Phase II E&D	110	
31	SUPERVISION AND ADMINISTRATION (S&A)		$2,450
	Phase I S&A (6-1/2 percent)	2,350	
	Phase II S&A	100	
	TOTAL (October 1981 Price Level)		$41,600

1/Future construction cost not discounted.

APPROVED

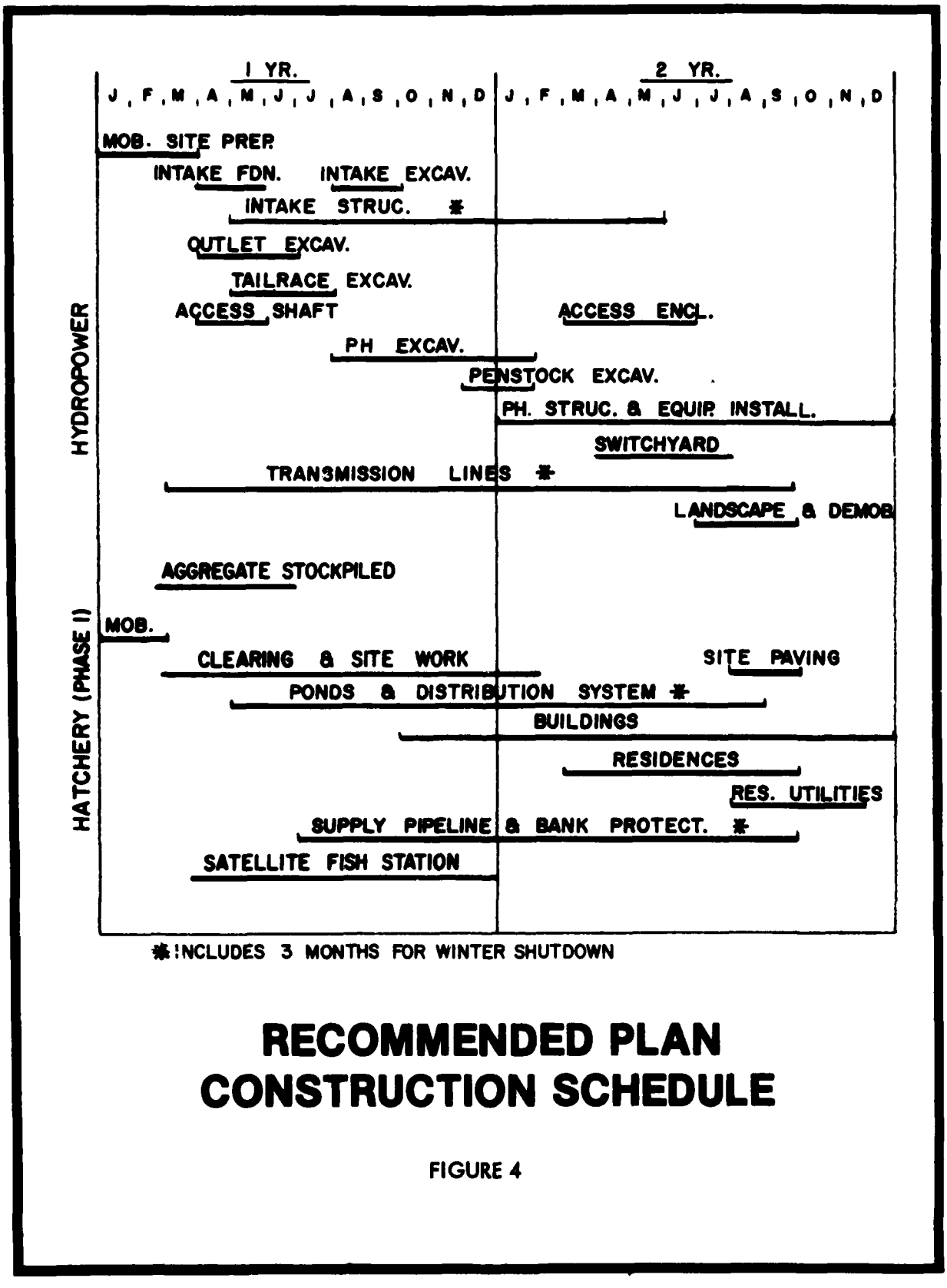
CHIEF, ESTIMATING UNIT

DATE 6/30/82

(Phase I, $39,880,000, including $450,000 for State of Washington previous mitigation responsibility; Phase II, $395,000). Adding interest during construction to the construction cost results in a total investment cost of the recommended plan of $43,410,000 (Phase I, $42,985,000, including $485,000 for State of Washington previous mitigation responsibility; Phase II, $425,000).

4.17 Construction. Assuming congressional authorization of the recommended plan and appropriation of PP&E funds by 1984 with subsequent construction funding, project construction could be initiated in FY 1987. Construction of the hydropower, fish hatchery (Phase I), and satellite fish station portions of the recommended plan would be concurrent and take approximately 2 years to complete. The construction schedule is presented in figure 4. Cofferdams and drainage wells would be required at two locations: one would be at the hydropower outlet/fish hatchery intake structure and the other where the pipeline crosses the river near the hatchery site. Aggregate for concrete would come from a borrow pit at the hatchery site. Material removed from other construction sites would be used to level the fish hatchery site. To avoid conflict with hatchery construction, the aggregate would be stockpiled ahead of time. Phase II of the fish hatchery would be constructed up to 20 years after Phase I.

4.18 Drawdown of the reservoir while constructing the multilevel intake structure would be necessary. Prior to 1 March of the first year of construction, the reservoir would have to be down to elevation 720 feet and maintained at that level for 2 months while the intake foundation is constructed and the first section of the precast structure is anchored in place. As the water is allowed to rise after 30 April to refill the reservoir, the intake structure would form a cofferdam for excavation of the penstock tunnel. There is a 10 percent frequency of occurrence of the reservoir level exceeding elevation 720 feet and getting the construction area wet during the 1 March to 30 April drawdown period. This frequency incorporates the provision for 245 c.f.s. at R.M. 8.1 for Aberdeen water supply diversion (125 c.f.s.) and fish flows below R.M. 8.1 (120 c.f.s.). The frequency of not maintaining the 245 c.f.s. at R.M. 8.1 would be 5.8 percent. An earlier drawdown period would increase the chance of getting the construction area wet to above 10 percent and a later spring drawdown period would increase the chance of not providing the 245 c.f.s. at R.M. 8.1. Reservoir storage is needed for low flow augmentation during the summer months, and the frequency of using the reservoir for flood regulation during the fall and winter months would be greater than 20 percent. In the event that the 245 c.f.s. flow cannot be provided at R.M. 8.1 as a result of the 2-month drawdown, appropriate measures to modify the fish flow requirement at R.M. 8.1 would be implemented in coordination with state fish agencies to avoid any potential loss of water supply benefits attributable to the Wynoochee Lake project without seriously impacting river fisheries. Specific measures would be explored with the state fish agencies during PP&E.



RECOMMENDED PLAN CONSTRUCTION SCHEDULE

FIGURE 4

4.19 Operation and Maintenance. The powerhouse was designed to operate over a wide range of flows and reservoir levels. Reservoir releases would be made by the Corps of Engineers to meet the congressionally authorized purposes of the existing Wynoochee Lake project and the water quality and quantity needs of the proposed fish hatchery. The hydropower operation would be subordinate to all other purposes and the facility would operate as a run-of-river plant producing baseload energy from the reservoir releases. In general, energy production would be low during the period of water supply conservation operation (April to August) when reservoir releases are low; energy production would be high during the period of flood control operation (November to February) when reservoir releases are high. If the reservoir dropped below elevation 730 feet (a once in 33-year occurrence with full water supply development), the powerhouse would be shut down and flows routed through the existing low flow outlets.

4.20 Four selective withdrawal bulkheads in the intake structure would control the temperature of the water to the river and the fish hatchery. The elevation of the withdrawal would be a function of temperature gradient in the reservoir and the temperature needed for fish production. Water would be withdrawn from one level at a time. Generating units would automatically shut down either individually or totally by butterfly valves in the penstocks depending upon the extent of an emergency. In such case, water supply to the hatchery would be maintained by a powerhouse bypass, which would also be automatically operated. Gates in the draft tube tunnels would make it possible to divert water from either the small unit or one of the large units to the hatchery via the lower tailrace conduit, fish hatchery intake structure, and fish hatchery water supply pipeline. Stoplogs would be used to dewater the multilevel intake structure. If water were completely shut off in the penstock, water could be supplied to the hatchery by opening the existing selective withdrawal system in the dam and diverting water from behind the existing overflow weir through a pipe to the fish hatchery intake structure. This activity would be scheduled to coincide with the periods in which the sluices would not be operated so as to avoid nitrogen supersaturation problems in the fish hatchery water supply.

4.21 The hydropower facility would be operated and maintained by the Corps of Engineers. The facility would not have to be staffed on a 24-hour basis but would be provided with automatic shutdown features and an alarm system that would sound in the Wynoochee project office and residence area. Existing Wynoochee Lake project staffing would be augmented with not over three additional spaces, as one or more additional existing spaces would be eliminated with transfer of the fish collection facility to the fish hatchery. The additional personnel spaces for the proposed hydropower facility plant would include two powerhouse mechanics and one electrician. Additional restructuring and training within the existing staff would provide necessary powerhouse supervision and staffing for minor maintenance. Energy to the existing project (approximately 500 MWH) and fish hatchery (approximately 500 MWH) would be provided as station power from the hydropower facility. Major maintenance would be

accomplished using staff on assignment from existing power projects within the Seattle District. The proposed hydropower facility would also receive necessary support from other elements of the Seattle District, as the existing Wynoochee Lake project does now. A maintenance area would be provided in the powerhouse adjacent to the access shaft, and an elevator in the access shaft would handle small parts and equipment. Large objects would be handled by mobile crane and lowered or raised through a hatch in the roof of the access inclosure. A bridge crane would handle material within the powerhouse. Some permanent operating equipment for the hydropower facility would be purchased; existing equipment at the Wynoochee Lake project office could also be used. Following construction of Phase I of the fish hatchery, including the satellite fish station, by the Corps of Engineers, ownership of the hatchery and fish station would be turned over to the sponsoring Federal fish agency, which would become owner and manager of the hatchery and fish station. Through contract with the Federal fish agency, operation of the hatchery and fish station would be accomplished by WDF and WDG for salmon and steelhead, respectively. Detailed operation and maintenance procedures and staffing requirements will be developed during PP&E.

4.22 A monitoring program is included in the recommended plan for postconstruction water quality monitoring of the hatchery effluent; an evaluation of the effects of enrichment from the hatchery effluent on the biota of the Wynoochee River and of any consequent increases in salmonid and resident fish natural production downstream of the hatchery outlet; an evaluation of fishery contribution rates and harvest management strategies of Wynoochee hatchery-released fish for the purpose of maximizing harvest with minimal impact on wild stocks; and monitoring hatchery operation to insure maximum efficiency and to minimize the potential adverse effects of disease and competition or predation on native fish runs due to hatchery-released fish. The program would be funded by the Federal and state fish agencies. Information from the monitoring program would provide continual input to fisheries management of the Chehalis River Basin and Grays Harbor area as well as provide important data on salmonid production for application in other watersheds. Findings would also be instrumental in determining when Phase II hatchery construction should occur. The details of the monitoring program for the Wynoochee hatchery would be formulated in coordination with state and Federal fisheries agencies, Indian tribes, and interested public during PP&E.

4.23 Operation and Maintenance Costs. Generalized annual operation and maintenance costs for the hydropower portion of the recommended plan were taken from the Corps of Engineers' Hydropower Cost Estimating Manual (May 1979) and updated to October 1981. An 11.3-MW capacity plant was determined to have an annual operation and maintenance cost of $212,000. Annual operation and maintenance costs for the fish hatchery portion of the recommended plan were based on the cost per pound of fish production using figures provided by WDG and WDF (appendix C), updated to October 1981. Based on $1.68 per pound for fish production, the 405,000-pound fish hatchery would have an annual operation and maintenance cost of $680,000 (Phase I, $497,000; Phase II, $183,000). The

satellite fish station would have an annual operation and maintenance cost of $35,000, based on 7 man-months of effort per year. The monitoring program (for cost purposes assumed to last 25 years) was estimated to have an average annual cost of $141,000 for manpower, equipment, equipment operation, maintenance of onsite monitoring and field facilities, and travel. Operation and maintenance of the wildlife mitigation lands would have an estimated cost of $1,000 per year. The total operation and maintenance costs would be $1,069,000 per year. For the purposes of the cost allocation (see appendix C), the annual operation and maintenance cost of the second phase of the fish hatchery was discounted 20 years at an interest rate of 7-5/8 percent. The total average annual operation and maintenance costs of the recommended plan would therefore be $928,000 (Phase I, $886,000, including $16,000 for State of Washington previous mitigation responsibility; Phase II, $42,000).

4.24 Replacement and Replacement Costs. All mechanical and electrical items in the recommended plan would be replaced during the 100-year economic life of the project. These replaceable items are noted in the detailed cost estimate (appendix E) and would be replaced at year 33 and year 67. The annual replacement cost was determined by discounting the future replacement costs at the current (Fiscal Year (FY) 1982) Federal interest rate of 7-5/8 percent back to project initiation, and then amortizing the values at 7-5/8 percent over the 100-year economic life of the project. The total replacement costs would be $126,000 per year (hydropower, $64,000; hatchery Phase I $60,000; hatchery Phase II, $2,000). For the purposes of the cost allocation (see appendix C), the annual replacement cost of the second phase of the fish hatchery was discounted 20 years at an interest rate of 7-5/8 percent. The total average annual replacement costs of the recommended plan would therefore be $125,000 (Phase I, $124,000, including $1,000 for State of Washington previous mitigation responsibility; Phase II $1,000).

4.25 Economics of Recommended Plan.

a. Power Benefits. Benefits for the hydropower portion of the recommended plan were determined using a simplified hydropower benefit analysis developed in response to the Water Resources Council's procedures on small-scale hydropower (Procedures for Evaluation of National Economic Development Benefits and Costs in Water Resources Planning, 14 December 1979, Federal Register, Section 713.601(b), page 72938; ER 1105-2-40, January 1982). The analysis includes development of the project's equivalent thermal capacity and fuel cost escalation of energy values. Details of the power benefit analysis are presented in appendix C. Average annual power benefits, based on a 100-year economic life at 7-5/8 percent Federal interest rate, were computed using an equivalent thermal capacity of 7.1 MW, an average annual energy output of 36,900 MWH, and 1 October 1981 at-site power values based on data prepared by the San Francisco Regional Office of the FERC. The average annual power benefits would be as follows:

Capacity: 7.1 MW equivalent thermal capacity x $118.80 KW/yr = $843,000

Energy: 36,900 MWH average annual energy x 37.4 mills/KWH = $1,380,000

Total: $2,223,000

b. Fish Benefits. The enhancement fish benefits were determined as the difference in economic values for the commercial/Indian fishery harvest and sport fishery recreation-day use between the with project and without project conditions in accordance with Water Resources Council's procedures. Based on data furnished by WDG and WDF, the Wynoochee fish hatchery would enhance the annual anadromous fish harvest by 118,660 adult fish (Phase I, 29,200 salmon and 37,660 steelhead; Phase II, 51,800 salmon) (see table 2). Both species have commercial/ Indian and sport fisheries, with the salmon being caught in both the ocean and the freshwater fishing areas. Using with and without project catch-to-escapement ratios, harvest distributions, and ex-vessel prices provided by WDG and WDF and recreation-day values determined by the travel cost or contingent valuation methods of evaluation, the annual fish enhancement benefits were determined. Since annual fish benefits from Phases I and II production would occur between project years 4 and 104 and between project years 24 and 104, respectively, the average annual fish enhancement benefits, based on a 100-year economic life and 7-5/8 percent Federal interest rate, would be $10,259,000 (Phase I, $2,615,000 for salmon and $6,965,000 for steelhead; Phase II, $679,000 for salmon). Details of the fish benefit analysis are presented in appendix C.

c. Cost Allocation. Project costs were allocated between the two project purposes, power and fish enhancement, using the separable costs-remaining benefits cost allocation procedure. Costs and benefits of the second phase of the fish hatchery were discounted 20 years at 7-5/8 percent and added to the first phase to determine the total fish hatchery costs. Costs associated with the State of Washington's previous mitigation responsibility were excluded from the cost allocation. A summary of the cost allocation is presented in table 4; details of the cost allocation are presented in appendix C. The allocated power and fish costs of the recommended plan (in $1,000) are as follows:

	Power	Fish	Total	Previous State of Washington Mitigation Responsibility
Investment Cost	$23,420	$19,505	$42,925	485
Interest and Amortization	1,787	1,488	3,275	
Annual Operation, Maintenance, and Replacement Costs	321	715	1,036	17
Total Annual Costs	$2,108	$2,203	$4,311	

d. Economic Justification. The allocated annual benefits and costs of the recommended plan are as follows:

	Power	Fish	Total
Average Annual Benefits	$2,223,000	$10,259,000	$12,482,000
Average Annual Costs	$2,108,000	$2,203,000	$4,311,000

Comparing benefits to costs results in the following net benefits over costs and benefit-to-cost ratios:

	Power	Fish	Total
Net Annual Benefits	$115,000	$8,056,000	$8,171,000
Benefit-to-Cost Ratio	1.1	4.7	2.9

Since average annual benefits would exceed average annual costs for each project purpose as well as the total project, the proposed Wynoochee Hydropower/Fish Hatchery project would be economically justified. The average annual cost of energy produced by the hydropower facility would be 57 mills per KWH ($2,108,000 average annual cost divided by 36,900 MWH average annual energy output).

e. Power Marketability. Under Section 5 of the 1944 Flood Control Act (Public Law 534, 22 December 1944), power produced at Federal water resources projects must be marketed by a Federal power marketing agency. BPA, the marketing agency for Federal power in the Pacific Northwest, was requested on 6 January 1981 (appendix C) to determine the marketability of power to be generated by the recommended plan. The BPA responded on 12 February 1981 (appendix C) that, under critical water conditions, the region is faced with both energy and peak deficits every year in the coming decade and that resource additions which can serve to offset a segment of these forecasted deficits will, therefore, be marketable. BPA also stated that the power output of the project is needed and is generated by a renewable resource, its cost can be repaid from revenues of the Federal system within 50 years of completion, and the project merits approval conditional upon favorable cost-effective analysis being upheld in subsequent reports.

On 12 February 1982, BPA was requested (appendix C) to provide another letter of marketability. The BPA response on 6 July 1982 (appendix C) included the following statement on marketability:

"It is not possible for use to give a truly definitive answer to whether we would currently purchase or support the marketability of this project. Our most current load forecasts are outlined in the draft, "Bonneville Power Administration Forecasts of Electricity Consumption in the Pacific Northwest," dated April 1982. The high load growth projection is 2.5 percent annually from 1980-2000, a base case of 1.7 percent, and a low load growth projection is 0.8 percent per year, for the same period. Translating this load forecast into a load/resource balance for the region shows, for the base case, a potential surplus until the late 1980's followed by growing deficits in the 1990's. Under these circumstances, preliminary analyses we have performed indicate that long-term resources brought online in the near future would need to have a levelized 1982 dollar cost of 30-40 mills/kilowatthour or less in order to be economically desirable. A later online date would yield a larger number increasing to full avoided cost when the project would be coming online at a time of expected deficit rather than surplus. Special arrangements for either structuring the debt service or special early year sales outside the Region, or a combination, might also be explored."

To determine the levelized 1982 cost for Wynoochee power to compare with the 30-40 mills/KWH cost stated by BPA, the Corps capital costs, escalated to June 1982 costs, were converted to a level stream of real payments BPA would be required to make to acquire the Wynoochee power resource. This financial conversion procedure is outlined in the Technical Support Document for the Proposed BPA Near-Term Resource Policy Statement (20 July 1982). Using an 11 percent repayment interest rate for the 50-year repayment period, a 6 percent inflation rate, and a 3 percent real discount rate for the 100-year economic project life, the levelized 1982 cost for Wynoochee power was calculated by the BPA Division of Power Resources Planning to be 33 mills/KWH.

Since energy production from the recommended plan would be economically desirable in the near future with a levelized 1982 cost of 33 mills/KWH and be online in 1988, a time of forecasted energy deficit, the power production from the Wynoochee hydropower/fish hatchery project is considered marketable.

4.26 Effects of Recommended Plan. The principal beneficial environmental impact of the recommended plan would be the enhancement of the anadromous sport, Indian, and commercial fisheries in the Grays Harbor area, the Chehalis River Basin, and in the northern Pacific Ocean. The principal adverse environmental impacts would be the permanent loss of approximately 50 acres of wildlife habitat due to construction of the hatchery and associated facilities, the elimination of anadromous fish runs in the Wynoochee River upstream of Wynoochee Dam, and reduced instream flows in the 6,800-foot reach of the Wynoochee River between

the existing weir and the hatchery outlet during extreme low flow periods due to operation of the hydropower/fish hatchery plan. To the extent possible, final hatchery plans would be designed to minimize the loss of vegetation. Hatchery grounds would be revegetated with plant species of high wildlife value. Four acres of land immediately adjacent to the hatchery would be improved to provide a winter food source for elk and a vegetation buffer zone would be maintained around the perimeter of the hatchery. The specific impacts of the satellite fish station would be assessed during PP&E when the exact location of the station is determined. Mitigation for the loss of the upstream anadromous fish runs has been incorporated as part of the hatchery production. Impacts associated with low instream flow conditions in the reach between the weir and the hatchery outlet are potential reduced water quality, esthetics, and aquatic habitat with resulting effects on fish and wildlife which utilize the area. An analysis of instream flow conditions for the hydropower/fish hatchery plan has indicated that the impacts would not be significant. The Washington Departments of Ecology, Game, and Fisheries have agreed that instream flows for the reach would be determined in PP&E when hatchery details, including the scope and design of the satellite fish station and management flexibility, are determined. The hydropower facility would have negligible environmental impacts. The switchyard would be landscaped to reduce esthetic impacts. The 22-mile buried transmission line would be placed within the existing power right-of-way adjacent to Donkey Creek Road from Wynoochee Dam to the Promised Land Substation and would have minor environmental impacts. Pursuant to Section 7(c) of the Endangered Species Act, a biological assessment was performed by the Seattle District, Corps of Engineers, in the winter 1980, to verify eagle use of the Wynoochee area and to evaluate potential impacts on this species as a result of implementation of the recommended plan. The biological assessment concluded that the Wynoochee hydropower/fish hatchery plan would not adversely impact the local, regional, or national bald eagle population and would not jeopardize its continued existence. In a letter dated 20 July 1981 (see appendix B), the FWS expressed their concurrence with the biological assessment. In compliance with the Clean Water Act of 1977, a Section 404(b)(1) evaluation of the impacts of instream fill activities associated with the recommended plan was conducted and is presented in appendix A. For the hydropower/fish hatchery plan features discussed in appendix A, a Section 404(r) exemption will be obtained to meet the requirements of the Clean Water Act. Since the location and design of the satellite fish station has not yet been determined, any necessary Section 404 actions required for construction of the station will be accomplished during PP&E. Under the Washington State Coastal Zone Management Program, established pursuant to the Coastal Zone Management Act, the shorelines of the Wynoochee River are designated "shorelines of statewide significance." Local management programs include regional and county plans, prepared by the Grays Harbor Regional Planning Commission and Grays Harbor County, respectively. Under the county program, the plan area is designated "conservancy." The recommended plan is consistent witht the shoreline

designations of all of these programs and so satisfies consistency with state and national coastal zone management requirements. Prior to construction of the recommended plan, the local sponsor will obtain a Shoreline Management permit in compliance with the State Shoreline Management Progam. The effects of the recommended plan on particular resources recognized by Federal policies are presented in table 4. A complete discussion of the environmental impacts associated with the recommended plan is presented in the EIS.

4.27 The principal beneficial socioeconomic impacts of the recommended plan would be the contribution of 11.3 MW of capacity and 36,900 MWH per year of energy to the Pacific Northwest power needs and approximately 87,000 adult spring chinook salmon (Phase I, 35,200; Phase II, 51,800) and 40,500 adult steelhead (Phase I only) to the annual anadromous sport, Indian, and commercial fish harvest in the Chehalis River Basin, Grays Harbor area, and northern Pacific Ocean. Total fish enhancement would be 118,660 adult fish (Phase I, 29,200 salmon and 37,660 steelhead; Phase II, 51,800 salmon). Other beneficial impacts include increased utilization of the existing fish collection facility associated with Wynoochee Dam and short-term construction and long-term project operation employment opportunities. The principal adverse socioeconomic impacts of the recommended plan are the loss of existing dispersed recreation use in the hatchery site area and potential problems associated with the provision of public services for the construction workers and project operation staff and families (for example, schools, fire and police protection, and transportation). A complete discussion of the socioeconomic impacts associated with the recommended plan is presented in the EIS.

4.28 Implementation Alternatives. Three alternative ways to implement the recommended plan were considered: (1) Federal hydropower and Federal hatchery development, (2) Federal/non-Federal hydropower and Federal fish hatchery development, and (3) non-Federal hydropower and Federal fish hatchery development. The primary differences between the implementation alternatives were whether BPA or a non-Federal entity (i.e., Grays Harbor PUD) would market the power output and whether there would be Federal multiple-purpose hydropower/fish hatchery development or Federal single-purpose fish hatchery development. Multiple-purpose Federal hydropower/fish hatchery development with non-Federal involvement in the hydropower (implementation alternative 2) was desired by the local public because the power output of the project could be marketed in the local area by the Grays Harbor PUD without jeopardizing Federal fish hatchery development. In response to the public's desire, the Corps and PUD expressed an intent to enter into a Federal/non-Federal hydropower partnership. On 22 February 1982, the PUD withdrew (see appendix C) its intent to be local sponsor due to its inability to guarantee to finance the project at a future date. There is no expressed interest in non-Federal hydropower development at Wynoochee Dam at this time. As a result of the PUD withdrawal, Federal hydropower/fish hatchery development (implementation alternative 1) is recommended; the proposed project still has strong public and agency support.

TABLE 4

EFFECTS OF THE RECOMMENDED PLAN ON
RESOURCES OF PRINCIPAL NATIONAL RECOGNITION

Types of Resources	Principal Sources of National Recognition	Measurement of Effects		Reference to EIS and Appendixes
Air quality	Clean Air Act, as amended (42 U.S.C. 1857h-7, et seq.)	No effect		Para. 4.02a(1)
Areas of particular concern within the coastal zone	Coastal Zone Management Act of 1972, as amended (16 U.S.C. 1451, et seq.)	No effect		Para. 4.02f(3)
Endangered and threatened species critical habitat	Endangered Species Act of 1973, as amended (16 U.S.C. 1531, et seq.)	No effect		Para. 4.02b(4)
Fish and wildlife habitat	Fish and Wildlife Coordination Act (16 U.S.C 661, et. seq.)	(1) 50 acres of wildlife habitat lost (primarily rain forest vegetation).	(4) Use by anadromous fish of 4 miles of Wynoochee River above the existing dam foregone.	Para. 4.02b and appendixes D and E
		(2) Resident fish habitat reduced in 6,800 feet of river during extreme low flows.	(5) Anadromous fish runs in Chehalis River Basin, Grays Harbor area, and in northern Pacific Ocean enhanced. Contribution of approximately 81,000 adult spring chinook and 37,660 adult steelhead-to the sport, commercial, and Indian fishery after construction of Phase II portion of hatchery.	
		(3) Aquatic productivity of Wynoochee River below the hatchery potentially increased.		
Flood plains	Executive Order 11988, Flood Plain Management	No effect		Para. 4.02f(3), table EIS-2
Historic and cultural properties	National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.)	Not present in the plan area.		Para. 4.02e, table EIS-2
Prime and unique farmlands	Council on Environmental Quality Memorandum of August 1, 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act	Not present in the plan area.		Table EIS-2
Water quality	Clean Water Act of 1977 (33 U.S.C. 1251, et seq.)	(1) Potential, but minimal, reduction in water quality in reach of Wynoochee River between existing dam and hatchery outlet during certain periods of the year.	(3) Hatchery discharge may result in increased aquatic productivity and an alteration in aquatic benthic community in the area near the effluent outlet. A possible beneficial impact.	Para. 4.02a(2); 4.02f(3); tables EIS-2 and EIS-3; appendix A; appendix B, sections 1 and 2
		(2) Short-term impacts to water quality due to project construction.		
Wetlands	Executive Order 11990, Protection of Wetlands	2 acres of sedge marsh lost.		Para. 4.02b(1), 4.02f(3), tables EIS-2 and EIS-3
Wild and scenic rivers	Wild and Scenic Rivers Act, as amended (16 U.S.C. 1271, et seq.)	No effect		Para. 4.02f(3)

4.29 Non-Federal Cost Sharing. Non-Federal cost sharing would be in two parts:

(1) The State of Washington's responsibility for a part of the fish hatchery to fulfill its mitigation obligation under the 28 July 1977 Memorandum of Agreement with the Corps.

(2) State of Washington's participation in the fish hatchery as local sponsor responsible for a share of the sport fishery cost under existing cost-sharing laws.

a. State of Washington's Previous Mitigation Responsibility. As discussed in paragraph 4.13, the State of Washington has a previous mitigation responsibility for steelhead spawning habitat losses associated with the existing Wynoochee Lake Project under the 28 July 1977 Memorandum of Agreement between the WDG and the Corps of Engineers. The portion of the fish production from the fish hatchery necessary to meet the State's obligation is 1,700 fish or 1.3 percent of the 127,500 adult fish produced from the fish hatchery. One and 3/10ths percent of the fish hatchery costs result in a first (investment) cost of $485,000 and an annual operation, maintenance, and replacement (OM&R) cost of $17,000. The state would probably pay these costs with funds provided to the WDG by the Corps under the 28 July 1977 Memorandum of Agreement.

b. Non-Federal Cost-Sharing Requirements Under Existing Laws. The Federal Water Project Recreation Act (Public Law 89-72, 9 July 1965) and Section 177 of the Water Resources Development Act of 1974 (Public Law 93-251, 7 March 1974) require non-Federal cost sharing for 25 percent of the separable first costs and 100 percent of the separable annual OM&R costs attributable to the recreation (sport) fish enhancement portion of the fish hatchery. The Federal Government pays 75 percent of the separable recreation (sport) fishery first costs, 100 percent of the joint recreation (sport) fishery first and annual cost, and 100 percent of the separable and joint commercial/Indian fishery first and annual costs. These cost sharing percentages exclude the previous State of Washington mitigation responsibility. There is no non-Federal cost-sharing requirement for hydropower under existing law.

Since there is no difference between the cost for raising commercial fish and the cost of raising sport fish in the fish hatchery, a use of facilities suballocation of fish hatchery cost between the commercial and sport fisheries can be used. This suballocation distributes cost based on the percentage of commercial and sport fish, instead of the established practice of suballocation based on the percentage of commercial and sport benefits. Based on the number of commercial and sport fish that would be harvested (see table 2), the distribution of enhancement fish harvest is as follows:

	Phase I	Phase II	Total
Commercial	47,680 fish (71.3%)	49,530 fish (95.6%)	97,180 fish (81.9%)
Sport Fishery	19,180 fish (28.7%)	2,300 fish (4.4%)	21,480 fish (18.1%)
TOTAL	66,860 fish (100.0%)	51,800 fish (100.0%)	118,660 fish (100.0%)

The fish harvest numbers were provided by the WDF and WDG based on actual salmon and steelhead catch figures (see appendix C).

Seventy-one and 3/10ths percent of Phase I enhancement fish harvest, hence 71.3 percent of the Phase I fish enhancement cost, is attributable to the commercial fishery; 28.7 percent of the Phase I enhancement fish harvest, hence 28.7 percent of the Phase I fish enhancement cost, is attributable to the sport fishery. For Phase II, 95.6 percent of the fish enhancement cost is attributable to the commercial fishery and 4.4 percent is attributable to the sport fishery. The average annual commercial and sport fish enhancement benefits would exceed the average annual commercial and sport fish costs, respectively, based on the above cost percentages. The sport cost percentage for each phase was applied to the separable fish cost for each phase as derived in the separable costs-remaining benefits cost allocation to determine the separable first and annual sport fish enhancement costs to be cost shared. The non-Federal cost-sharing requirements for fish enhancement under the existing laws are as follows:

	Separable Sport Costs	Non-Federal Cost-Sharing Percentage	Non-Federal Share for Fish Enhancement
Investment (First) Costs			
Phase I	$5,275,000 (28.7% of $18,380,000)	25%	$1,319,000
Phase II	$19,000 (4.4% of $425,000)1/	25%	$5,000
Total			$1,324,000

Annual OM&R Costs	Separable Sport Costs	Non-Federal Cost-Sharing Percentage	Non-Federal Share for Fish Enhancement
Phase I	$186,000 (28.7% of $648,000)	100%	$186,000
Phase II	$2,000 (4.4% of $43,000)2/	100%	2,000
Total			$188,000

1/Discounted 20 years at 7-5/8 percent; undiscounted = $1,855,000.
2/Discounted 20 years at 7-5/8 percent; undiscounted = $185,000.

c. State of Washington Participation. In the 23 April 1980 letter from the governor of the State of Washington requesting the Corps to study the feasibility of a fish hatchery in conjunction with hydropower development of Wynoochee Dam, the governor stated that it is the intent of the state to act as local sponsor of the hatchery (appendix C). Accordingly, on 26 October 1981 the Corps (appendix C) formally requested a letter from the State of Washington advising of the State of Washington's intent to act as a local sponsor of the fish hatchery portion of the recommended plan. The recommended plan includes and is contingent upon the following:

(1) The Corps of Engineers, as owner and operator of the Wynoochee Lake Project and planned owner and operator of the proposed appurtenant hydropower facility, providing a water supply of adequate volume (up to 190 c.f.s.) and temperature to the fish hatchery intake structure within the operational constraints of the Wynoochee Lake Project.

(2) A Federal fish agency accepting ownership of the fish hatchery from the Corps of Engineers and assuming responsibility for the management of the fish hatchery and the Federal government's share of the annual operation, maintenance, and replacement (OM&R) costs attributable to the fish hatchery.

(3) The State of Washington fulfilling its obligation under the signed Memorandum of Agreement dated 28 July 1977 (Construction of Fish Hatchery Facilities for Prevention of Natural Spawning Areas for Anadromous Trout Occasioned by Construction of Wynoochee Lake Project) by providing funds for accomplishing said construction and subsequent OM&R as part of the proposed fish hatchery. The Memorandum of Agreement dated 28 July 1977 may need to be amended or supplemented, as legally required, to reflect this change in fulfilling the state obligation.

The responsibilities under present law of the State of Washington as local sponsor of the fish hatchery are as follows:

(1) Provide a cash contribution equal to the allocated first costs attributable to the fish hatchery for constructing a part of the fish hatchery to fulfill the state's obligation under the signed Memorandum of Agreement dated 28 July 1977 (as amended or supplemented as legally required), a contribution presently estimated at $485,000.

(2) Provide a cash or in-kind annual contribution for the life of the fish hatchery equal to the annual OM&R costs attributable to the fish hatchery for operating, maintaining, and replacing a part of the fish hatchery to fulfill the state's obligation under the signed Memorandum of Agreement dated 28 July 1977 (as amended or supplemented as legally required), an annual contribution presently estimated at $17,000.

(3) Provide a cash contribution equal to 25 percent of the separable Phase I first cost attributable to the recreation (sport) enhancement portion of the fish hatchery, a contribution presently estimated at $1,319,000.

(4) Provide a cash or in-kind annual contribution for the life of the fish hatchery equal to 100 percent of the separable Phase I annual OM&R costs attributable to the recreation (sport) enhancement portion of the fish hatchery, an annual contribution presently estimated at $186,000.

(5) Prior to Phase II construction, provide a cash contribution equal to 25 percent of the separable Phase II first cost attributable to the recreation (sport) enhancement portion of the fish hatchery, a contribution presently estimated at $5,000 (discounted value).

(6) After Phase II construction, provide a cash or in-kind annual contribution for the life of the fish hatchery equal to 100 percent of the separable Phase II annual OM&R costs attributable to the recreation (sport) enhancement portion of the fish hatchery, an annual contribution presently estimated at $2,000 (discounted value).

(7) Enter into a Memorandum of Understanding with the sponsoring Federal fish agency regarding fish hatchery operation, maintenance, and replacement.

(8) Obtain any necessary permits.

(9) Hold and save the United States free from damages due to the construction and subsequent operation and maintenance of the fish hatchery, except where such damages are due to the fault or negligence of the United States or its contractors.

The governor of the State of Washington replied to the Corps letter on 20 November 1981 (appendix C). He stated that the combined project is important to the State of Washington and expressed the State of Washington's intent to act as local sponsor of the fish hatchery subject to funding by the State Legislature. The Governor has been informed of the reduction in the cost-sharing figures since his letter of 20 Nobember 1981 which were required due to changes in the recommended plan based on comments received on the draft feasibility report. The total State of Washington cost-sharing responsibility would be a first cost cash contribution of $1,809,000 (Phase I, $1,804,000; Phase II, $5,000, discounted) and a annual OM&R cash or in-kind contribution of $205,000 (Phase I, $203,000; Phase II, $2,000, discounted). All other first and annual OM&R costs would be paid by the United States. A summary of Federal and non-Federal cost sharing of the recommended plan is presented in table 5.

4.30 Federal Sponsorship of Fish Hatchery. The U.S. Army Corps of Engineers would construct and operate the combined hydropower/fish hatchery project. A Federal fish agency, either NMFS or FWS, would own and manage the fish hatchery. Accordingly, the Corps formally requested a letter from both NMFS and FWS (see appendix C) advising of their intent to act as Federal sponsor of the fish hatchery portion of the recommended plan. The responsibilities of the Federal sponsor of the fish hatchery are as follows:

a. Become owner and manager of the proposed Wynoochee fish hatchery.

b. Provide, for the life of the fish hatchery, 100 percent of the separable Phase I annual OM&R costs attributable to the commercial enhancement portion of the fish hatchery and 100 percent of the joint Phase I annual OM&R costs attributable to the fish hatchery, a total annual amount presently estimated at $486,000.

c. After Phase II construction, provide for the life of the fish hatchery, 100 percent of the separable Phase II annual OM&R costs attributable to the commercial enhancement portion of the fish hatchery and 100 percent of the joint Phase II annual OM&R costs attributable to the fish hatchery, a total annual amount presently estimated at $41,000 (discounted value).

d. Enter into a Memorandum of Understanding with the State of Washington regarding fish hatchery operation, maintenance, and replacement.

A summary of a Federal and non-Federal cost-sharing of the recommended plan is presented in Table 5.

On 18 June 1981 (appendix C), the Northwest Regional Director of the NMFS endorsed the proposed fish hatchery on the condition that any NMFS financial and administrative responsibility for project operation and maintenance be subject to specific authority and appropriation from Congress. The FWS has not replied to the Corps' request.

TABLE 5

FEDERAL AND NON-FEDERAL COST SHARING
OF RECOMMENDED PLAN
(October 1981 Prices in $1,000)

	Hydropower	Fish Enhancement (Phase I)	Fish Enhancement (Phase II)1/	Sub-Total	State of Washington Previous Mitigation Responsibility	Total
First Costs:						
Estimated Federal Cost	23,420	17,761	420	41,601	0	41,601
Corps of Engineers	0	0	0	0	0	0
Federal Fish Agency						
Estimated Non-Federal Cost						
State of Washington	0	1,319	5	1,324	485	1,809
Total First Cost	23,420	19,080	425	42,925	485	43,410
Average Annual Costs:						
Operation and Maintenance						
Estimated Federal Cost	253	0	0	253	0	253
Corps of Engineers	0	446	40	486	0	486
Federal Fish Agency						
Estimated Non-Federal Cost						
State of Washington	0	171	2	173	16	189
Replacement						
Estimated Federal Cost	68	0	0	68	0	68
Corps of Engineers	0	40	1	41	0	41
Federal Fish Agency						
Estimated Non-Federal Cost						
State of Washington	0	15	0	15	1	16
Total Average Annual Cost	321	672	43	1,036	17	1,053

1/Future costs discounted 20 years at 7-5/8 percent.

SECTION 5. STUDY COORDINATION AND PUBLIC INVOLVEMENT

5.01 Study Coordination and Public Involvement Framework. Agency coordination and public involvement were conducted throughout the study to inform the agencies and public about the study, gather data, request and receive comments, and seek sponsorship. Formal coordination letters were sent to the state and Federal agencies having jurisdiction by law or special expertise. A notice of intent to prepare a draft EIS was published in the Federal Register on 30 June 1980. The public involvement and scoping process involved meetings held with Federal, state, and local agencies; various organizations and groups; Indian tribes; and individuals. In addition, the Corps was represented on the Grays Harbor Fishery Enhancement Task Force and presented a statement at the Grays Harbor PUD public meeting in Aberdeen on 6 March 1980. The study announcement was distributed in July 1980; study brochures were distributed in April and November 1981, a public information meeting was held in Aberdeen on 18 May 1981, and a final public meeting was held in Aberdeen on 15 December 1981. The official transcript of the final public meeting is on file in the office of the Seattle District, Corps of Engineers. (See appendix B for details.)

5.02 Summary of Views. Based on the study coordination and public involvement, especially through agency coordination and at the public meetings, there is strong public support for integrated development of the hydropower facility and the enhancement fish hatchery, with no expressed opposition to either.

5.03 Coordination with Key Agencies.

a. State of Washington. The WDF and WDG were involved in the initiation of the fish hatchery portion of the study, design of the fish hatchery, resolution of issues relating to anadromous fish runs and fishery management, fish hatchery benefit computations, project mitigation, and cost sharing of the fish hatchery portion of the recommended plan. In addition, WDG was involved in the fulfillment of the State of Washington's responsibility for mitigation of previous steelhead spawning habitat losses associated with the existing Wynoochee Lake project under the 28 July 1977 Memorandum of Agreement with the Corps of Engineers. Washington Department of Ecology (WDE), the state agency responsible for coordinating water resource projects, was primarily involved in the discussions of instream flows between the existing overflow weir and the outlet of the fish hatchery during periods of extreme low flow. WDE has agreed that the determination of instream flows would be made in PP&E when the details of the fish hatchery are formulated. The analysis of instream flows associated with the implementation of the Wynoochee hydropower/fish hatchery plan is presented in Section 2 of appendix H. WDE has stated that a water right under state law is required to operate the recommended plan. In response, the Corps notified WDE that it does not need to obtain state water rights for operation of a congressionally authorized hydropower/fish hatchery project at Wynoochee Dam. The State of Washington has expressed its intent to act as local sponsor of the fish hatchery (see paragraph 4.29c). The state is continuing to develop a coastal fisheries management plan which will aid in design of the fish hatchery plan during PP&E.

During public review of the draft feasibility report/EIS, WDF expressed major concerns regarding the spring chinook salmon brood stock availability for the hatchery and the impacts of hatchery-reared fish on existing native runs in the Wynoochee River watershed and in streams outside the Chehalis River system. These concerns were shared by FWS. Extensive coordination was accomplished with the fisheries agencies and modifications were made to the hatchery plan to resolve their concerns. These modifications include phased construction of the salmon portion of the hatchery, reduction in the number and potential location of the satellite fish stations, and the planned production of only native spring chinook salmon and steelhead in the hatchery at this time. For further details regarding these modifications, refer to paragraphs 4.09h and 4.09j of the feasibility report, paragraphs 2.02b(1) and 4.02b(3) of the EIS, and to the responses to specific comments made by WDF and FWS in appendix B. A letter from WDF (26 April 1982) expressing their support of the hatchery as currently planned is included in the comments and responses section of appendix B. During review of the draft feasibility report, WDG had concerns regarding wildlife impacts of the recommended plan and regarding the number of mitigation fish that the State of Washington is responsible for under their mitigation obligation for the existing Wynoochee Lake project. At the recommendation of WDG, two 2-acre elk mitigation pastures, a vegetation barrier around the hatchery, and a revegetation scheme involving rapidly growing plant species of high wildlife value have been added to the recommended plan to reduce project-related impacts to wildlife. Refer to paragraph 4.13 of the feasibility report, paragraphs 2.02b(1) and 4.02b(2) of the EIS, and responses to specific comments from WDG in appendix B.

b. National Marine Fisheries Service (NMFS). NMFS was requested to express its intent to become the owner and manager of the Wynoochee fish hatchery. In a letter dated 18 June 1981, the Northwest Regional Office of NMFS (see appendix C) expressed its indorsement of the Wynoochee fish hatchery on the condition that any NMFS financial and administrative responsibility for project operation and maintenance be subject to specific authority and appropriation from Congress. Other coordination has been conducted with NMFS to respond to their concerns expressed in a comment letter on the Fish and Wildlife Coordination Act (FWCA) report prepared for the recommended plan. As a result of discussions among the Corps, WDG, WDF, and NMFS, to resolve these concerns, NMFS prepared a revised comment letter to the FWCA report (see appendix D).

c. Bureau of Indian Affairs and Indian Tribes. Throughout the Wynoochee hydropower/fish hatchery study, coordination was conducted with the Bureau of Indian Affairs, Confederated Tribes of the Chehlis Reservation, Quinault Indians, and Hoh Indians. The coordination with the Indians focused on both cultural resources and fisheries and included an opportunity for input into the conceptual hatchery management planning report prepared by Professor S.B. Mathews (1981). The Chehalis and Quinault Tribes have been supportive of the hydropower/fish hatchery

plan as indicated by their statements at the final public meeting. The comment letter furnished by the Chehalis Tribe on the draft Wynoochee hydropower/fish hatchery report/EIS is provided in appendix B. The Hoh Tribe representatives have voiced no opinion. Coordination with the BIA and Indian tribes will continue throughout PP&E as the hatchery design details and management plan are developed.

d. U.S. Fish and Wildlife Service (FWS). The FWS was requested to express its intent to become the owner and manager of the Wynoochee fish hatchery; to date no response has been received. The FWS is responsible for preparing the FWCA report, which is required under the FWCA. The major impacts of the Wynoochee hydropower/fish hatchery plan that were identified in the final FWCA report were the impacts of hatchery produced fish on the remaining anadromous fish runs, the loss of anadromous fish upstream of the existing Wynoochee Dam, and the loss of wildlife habitat at the fish hatchery site. The FWS recognizes that with well-planned hatchery management strategies, the impacts of hatchery-released fish on the native fish runs can be minimized and that hatchery development at Wynoochee Dam offers a potential solution to unmet mitigation needs associated with the existing Wynoochee Lake project as well as much needed fishery enhancement for the drainage. Since preparation of the final FWCA report in July 1981, the Corps has continued to cooperate with the FWS regarding modifications to the plans presented in the draft feasibility report/EIS (see FWS comments and Corps responses in Appendix B). Generally, the FWS is in agreement with the concept of the Wynoochee fish hatchery given the development of the final hatchery design and a state fisheries management plan and appropriate studies during the hatchery monitoring program.

The final FWCA report is presented in appendix D. The FWS provided recommendations for the hydropower portion alone, the fish hatchery portion alone, and the combined hydropower/fish hatchery plan. The Corps basically concurs with the recommendations provided. However, under the hatchery alone, the FWS recommends maintenance of the anadromous fish runs above Wynoochee Dam making use of the existing downstream fish passage facility. The Corps believes that this would not be successful and that the most practical means of accomplishing mitigation for the existing Wynoochee Lake project as well as making fullest use of the enhancement opportunity at Wynoochee Dam is to incorporate mitigation for loss of the upstream runs into the fish hatchery production. Detailed Corps responses are provided below to the recommendations for the recommended combined hydropower/fish hatchery plan.

FWS Recommendation 1. Fish production at the proposed facility should emphasize protection of native Grays Harbor stocks, and should be compatible with long-range management goals of WDF and WDG.

Corps Responses 1. Concur. It is the intent of the hatchery portion of the proposal to emphasize protection of native Grays Harbor stocks and to be compatible with long-range management goals of the WDF and WDG.

In a letter dated 20 November 1981, the Governor of the State of Washington provided the Corps a letter of intent to become the local sponsor of the hatchery, stating the project is important to the State of Washington. The Corps views this letter as indication that enhancement of the anadromous fish runs in the Chehalis River Basin is a high state priority and that the Wynoochee hatchery offers the state an opportunity to achieve a portion of a recognized need. This concern has been extensively coordinated with state fisheries agencies and a hatchery plan developed to insure this protection. This concern will continue to be a major criteria during hatchery design in PP&E.

FWS Recommendation 2. Funds for a comprehensive, long-term examination of anadromous fish restoration needs and potentials in the Chehalis drainage be included in your authorization request in order to maximize fish production benefits from the proposed hatchery over the project life.

Corps Response 2. Concur. Examination of anadromous fish restoration needs and potentials in the Chehalis River and Grays Harbor drainage in order to maximize fish production benefits is included in the recommended plan. A monitoring program (see paragraph 4.22) is included in the recommended plan because of the need to monitor development of the severely depressed spring chinook salmon fishery and determine when Phase II hatchery construction should occur. Additionally, the fisheries agencies recommended a monitoring program because of a number of interrelated biological factors which include postconstruction water quality monitoring of the hatchery effluent, assessment of the effects of the effluent on the biota of the Wynoochee River and of any consequent increased in salmonid and resident fish natural production downstream of the hatchery outlet, and evaluation of fishery contribution rates and hatchery managment strategies of Wynoochee hatchery released fish for the purpose of maximizing harvest with the least impacts on wild stocks, including minimization of competition, predation, and disease. Information from the monitoring program would provide continual input to fisheries management of the Chehalis River Basin and Grays Harbor area as well as provide important data on salmonid production for application in other watersheds. The details of the monitoring program for the Wynoochee hatchery would be formulated in coordination with state and Federal fisheries agencies, Indian tribes, and interested public during PP&E to complement a state fisheries management plan.

FWS Recommendation 3. Maintenance flows between Wynoochee Dam and the hatchery outfall be included as a project feature.

Corps Response 3. The recommendation is acknowledged. WDE, WDF, and WDG have concurred that instream flows in the subject reach would be established during PP&E when design details are developed. Flow in the Wynoochee River in the 6,800-foot reach between the existing overflow weir and the hatchery outlet could become extremely low should the full complement of water be supplied to the hatchery during a time of minimum flows (190/140 c.f.s.) from the reservoir. The impacts of a low flow in

that reach would primarily be reduced visual esthetics and reduced aquatic habitat with consequent impacts on fish and wildlife. There appears to be 20 c.f.s. inflow into this reach probably due to groundwater springs and seepage; therefore, it is not expected that the reach would go dry during extreme low flow periods. Coordination regarding the instream flow issue has been ongoing with the WDE, WDG, and WDF and all parties, as stated, have agreed that the determination of instream flows would be made in PP&E when the details of the hatchery and its management are formulated. A concrete weir in the river just upstream of the powerhouse tailrace would assure water in the 250-foot reach of the river between the main dam and the weir. Downstream of the hatchery outlet, the river discharge would be the same as that without a hatchery and powerhouse project.

FWS Recommendation 4. As presently proposed, water flow and quality be maintained at preproject levels to avoid adverse impact to downstream fishery values.

Corps Response 4. Concur. No adverse impacts to downstream fishery values are expected to result from the recommended plan. Downstream of the hatchery outlet the river discharge would be the same as that without a hatchery and powerhouse project. Water supply to the hatchery and the operation of the powerhouse would not result in a change to the existing operational mode of Wynoochee Dam, and river discharge frequency in the Wynoochee River would not change from existing conditions. The powerhouse would operate as a baseload plant and would not be operated for peaking. Accordingly, no flow-related adverse impacts to downstream fishery values would occur.

Short-term increases in suspended sediment and turbidity would occur in the Wynoochee River and reservoir during instream construction activities associated with the recommended plan. Although increases in turbidity may result in temporarily exceeding the Washington State water quality standard, the effect on water quality is not considered significant due to the short term, localized nature of the impact. The construction contractor(s) would be required to utilize methods which would minimize turbidity. Cofferdams would be used for instream construction of the hatchery supply pipeline crossings, the hatchery outlet channel, and the powerhouse outlet structure to minimize impacts to water quality.

The powerhouse intake would be a selective withdrawal structure to maintain existing project water quality from reservoir releases. The hatchery effluent could affect water quality by the addition of nutrients to the Wynoochee River with resulting increases in aquatic productivity and an alteration in the aquatic benthic community. The impact may be beneficial to downstream fishery value because aquatic productivity in the Wynoochee River is rather low naturally.

As a project feature of the hatchery, a pollution abatement pond would be constructed for the treatment of the water from the raceways and rearing ponds during cleaning. Additionally, when chemotherapeutics are

used in large doses, the water would be routed to the pollution abatement pond. The hatchery would be operated to meet the effluent limitations established by the Environmental Protection Agency for suspended and settleable solids, and the limitations for other parameters (biological oxygen demand, nitrates, ammonia, fecal coliforms, etc.) as determined by the WDE in cooperation with the WDG and WDF. Water quality monitoring would be accomplished at the outlet, and if allowable limits were approached, provision would be made for treatment of the effluent water prior to release to the river. The carcasses of returning adult salmon and steelhead used for spawning or surplus to spawning needs would be sold commercially under WDG and WDF policies or disposed of in an approved landfill. These procedures, as required by Federal law, would eliminate water quality impacts generated from large quantities of carcasses decomposing in the Wynoochee River. Funds received by the state from the sale of fish carcasses would be used specifically for the improvement of anadromous fish runs in the Chehalis River Basin. All domestic wastes from the hatchery and residences would be treated by a septic tank system.

FWS Recommendation 5. As presently proposed, natural vegetation destruction be minimized at the project site and revegetation accomplished when feasible.

Corps Response 5. Concur. To the extent possible, the Wynoochee hydropower/hatchery plan would be designed to reduce the loss of vegetation. Hatchery grounds would be seeded with native grass species and the area would be revegetated with plant species of high wildlife value such as those recommended by WDG (see table EIS-1). The water supply pipeline to the hatchery would be buried minimizing its permanent impact on vegetation. Following construction, the pipeline corridor would be revegetated where practicable with plant species of high wildlife value. The satellite fish station would be sited to minimize vegetation losses and revegetated as necessary. Construction of the underground powerhouse, the surface switchyard, and the buried transmission line would have minor impacts on vegetation. Further, the construction contractor would be required to replace vegetation losses in temporary construction easements, and in temporary stockpiling and staging areas. The wildlife mitigation area adjacent to the hatchery would have a buffer area to provide necessary seclusion and increase wildlife usage.

e. U.S. Forest Service (USFS). The USFS is the owner of most of the fish hatchery site and has jurisdiction over most of the transmission line corridor through either ownership, easements, or use agreements with private landowners. The primary concerns of the USFS regarding the recommended plan are the loss of dispersed recreation and wildlife habitat at the fish hatchery site and esthetic and timber resource impacts in the transmission line corridor. These impacts and measures to mitigate or minimize them are discussed in the EIS and in appendix B in response to their comments on the draft feasibility report and EIS. Specific analyses of elk habitat and dispersed recreation losses associated with the hydropower/fish hatchery plan are presented in

sections 4 and 5 of appendix H, respectively. A buried transmission line alternative was selected based on preliminary BPA studies. This alternative is the least environmentally damaging and is consistent with the USFS policy requiring burial of lines on national forest land. A detailed analysis of transmission line alternatives will be conducted by BPA during PP&E. Coordination has been conducted with the USFS and will continue throughout PP&E and project construction to insure that conflicts with the various uses of the plan area are minimized to the extent possible and to develop a memorandum of understanding regarding implementation of the plan on a national forest land.

f. Environmental Protection Agency. EPA's primary concern is related to the impact of project construction and operation on water quality and any potential project related impacts on the use of Wynoochee Lake and the upstream reach of the Wynoochee River as a viable habitat for resident fishery. These impacts and measures to minimize water quality effects are discussed in the EIS. An evaluation of baseline Wynoochee River and Lake Water quality data is presented in section 1 of appendix H. The overall resident fishery in Wynoochee Lake and River system upstream of the reservoir is expected to improve by implementation of the recommended plan due to the elimination of competition between resident fish and juvenile salmon and steelhead.

g. Bonneville Power Administration. BPA was requested to determine the marketability of power to be generated by the recommended plan. BPA's response is discussed in paragraph 4.25e. BPA was also requested to conduct a preliminary analysis of transmission line alternatives and worked with the USFS and Corps to develop an economically feasible alternative which minimizes environmental impacts. Both aerial and buried lines were studied. A detailed analysis of transmission line alternatives will be conducted by BPA during PP&E. In addition, BPA has encouraged implementation of the enhancement fish hatchery.

h. Public Utility District No. 1 of Grays Harbor County, Washington. Coordination was maintained with the Grays Harbor PUD throughout the study because of the PUD's interest in developing the hydropower potential of Wynoochee Dam (see paragraph 3.06a). The Corps presented a statement at the PUD's public meeting on 6 March 1980 on the Federal interests that must be protected in the event of non-Federal hydropower development at Wynoochee Dam. A preliminary FERC permit was granted to the PUD in April 1981 to study hydropower development of Wynoochee Dam. Several meetings were held with the PUD and their consultant, R. W. Beck and Associates, to discuss each other's plans and interests, share data, and reduce unnecessary duplication of effort. The PUD supported non-Federal involvement in the hydropower of Wynoochee Dam in combination with Federal development of the fish hatchery. Based on the public's desire for the power to be marketed in the local area, a hydropower partnership was proposed between the Corps and the PUD. On 17 August 1981, the Corps requested a letter of intent from the PUD

(appendix C). On 5 October 1981 the PUD stated (appendix C) its willingness to act as local sponsor for all the costs allocated to the hydropower facility, subject to a satisfactory agreement being reached on the concerns of the PUD. Particular areas of concern by both the Corps and the PUD were ownership, control of operation and maintenance, transmission line, and financial arrangements. On 22 February 1982, the PUD withdrew its intent to be local sponsor due to its inability to guarantee to finance the project at a future date. The PUD, as local sponsor of the hydropower facility, would have marketed the power output of the proposed hydropower facility at Wynoochee Dam and paid 100 percent of the hydropower costs. The PUD surrendered its preliminary FERC permit on 1 July 1982. There is no expressed interest in non-Federal hydropower development at Wynoochee Dam at this time. Discussions between the PUD and the Corps regarding the fish hatchery location and future hydropower development at the Oxbow site were also held (see appendix G).

i. City of Aberdeen, Washington. Coordination was maintained with the city of Aberdeen throughout the study because of its contractual water supply interests and temporary interest in developing the hydropower potential of Wynoochee Dam. The city of Aberdeen supports hydropower and fish hatchery development at Wynoochee Dam. Further discussions will be held with the city of Aberdeen to discuss any items of mutual interest.

5.04 Coordination of Draft Report. The draft feasibility report and draft EIS were distributed for review and comment to approximately 300 agencies, groups, and individuals prior to the final public meeting on 15 December 1981. Strong support for the project was expressed at the meeting. Subsequent to the final public meeting, the fisheries agencies provided detailed comments on the draft report/EIS and requested changes in the recommended plan to resolve their concerns. In addition, the Grays Harbor PUD withdrew from the proposed Federal/non-Federal hydropower partnership due to its inability to guarantee to finance the project. Specific responses to these and other comments are presented in appendix B.

Major changes to the recommended plan in response to the public and agency comments are as follows:

a. Greater emphasis was placed on spring chinook salmon and native steelhead.

b. The hatchery plan was revised for construction of the salmon portion of the fish hatchery in two phases instead of one phase, with the second phase constructed up to 20 years after the first phase.

c. The hatchery plan was revised to include only one satellite fish station on the lower Skookumchuck River in the Chehalis River Basin instead of two stations on coastal rivers.

d. Wildlife mitigation for losses due to fish hatchery development was added.

e. The hydropower facility would be a Federal facility operated by the Corps of Engineers and power would be marketed in the region by BPA instead of locally by the Grays Harbor PUD. This change shifted most of the non-Federal costs shown in the draft report/EIS to Federal costs.

f. Cost estimates were revised to reflect changes b, c, and d above.

g. Cost sharing requirements for the State of Washington were reduced due to change f above and minor changes in cost sharing procedures.

h. Conclusions and recommendation were revised to reflect all changes to the recommended plan.

In addition, numerous minor changes were made throughout the feasibility report and EIS in response to specific comments.

SECTION 6. DIVISION OF RESPONSIBILITY, CONCLUSIONS, AND RECOMMENDATION

6.01 Division of Responsibility. Under traditional cost sharing requirements, the cost of the hydropower portion of the proposed Wynoochee Hydropower/Fish Hatchery project would be 100 percent Federal; no elements of local cooperation for hydropower development are required. Under traditional cost sharing requirements, the cost of the recreation (sport) fish enhancement part of the fish hatchery portion of the proposed Wynoochee Hydropower/Fish Hatchery project would be cost-shared with the State of Washington; no elements of local cooperation for commercial/Indian fish enhancement are required.

6.02 However, the Administration is reviewing project cost sharing and financing across the entire spectrum of water resource development functions and has submitted proposed legislation to Congress for navigation projects. The basic principle governing the development of specific cost sharing policies is that whenever possible the cost of services produced by water projects should be paid for by their direct beneficiaries. It also is recognized that the Federal Government can no longer bear the major portion of the financing of water projects. New sources of project financing, both public and private, will be sought.

6.03 While specific policies applicable for the Wynoochee Hydropower/ Fish Hatchery project have not yet been established, non-Federal interests can expect that, under the current Administration's financing and cost sharing principles, the level of their financial participation will need to be significantly greater than in the past.

6.04 Conclusions. The recommended plan as presented in this report is the most cost-effective alternative plan for meeting the study planning objectives. The integrated hydropower/fish hatchery project would be economically justified. Measures have been incorporated into the plan to minimize impacts to the extent practicable. The plan has a net benefit to the environment, the enhancement of anadromous fisheries. The energy generated by the hydropower facility would be marketed by the Bonneville Power Administration to satisfy a portion of the region's total energy needs and revenues from power production would repay hydropower construction costs. A Federal/non-Federal partnership for hydropower development with 100 percent local cost sharing was initiated with the Grays Harbor Public Utility District but they withdrew its intent due to its inability to guarantee to finance the project at a future date. There is no expressed interest in non-Federal hydropower development at Wynoochee Dam at this time. The fish hatchery would meet a portion of the state's fishery enhancement needs and could be constructed in two phases, with the second phase constructed up to 20 years after the first phase. State and Federal fish agencies desire phased fish hatchery development because concerns associated with brood stock development and species interactions could delay full fish hatchery

utilization and the realization of fish benefits. Accordingly, phased fish hatchery construction would have greater economic justification than initial complete fish hatchery construction. The Governor, State of Washington, strongly supports combined hydropower and fish hatchery development at Wynoochee Dam and has expressed the intent of the state to act as local sponsor for its share of the fish hatchery. The Pacific Northwest Regional Director, National Marine Fisheries Service (NMFS), has, as an expression of his agency's intent to be owner and manager of the fish hatchery and be responsible for the Federal share of the annual costs of the hatchery, endorsed the fish hatchery on the condition that any NMFS financial and administrative responsibility for project operation and maintenance be subject to specific authority and appropriation from Congress. There is strong agency and public support for development of both the hydropower facility and the fish hatchery, with no expressed opposition to either.

6.05 Recommendation. I have carefully considered the economic, environmental, and social ramifications of providing hydropower and fish hatchery facilities at the existing Wynoochee Lake Project, Washington, and find that such development is feasible and in the overall public interest. I recommend that an integrated hydropower/fish hatchery facility at the existing Wynoochee Lake Project capable of generating approximately 36,900 megawatt-hours of electrical energy per year and producing approximately 405,000 pounds of anadromous fish smolts annually be authorized for Federal construction, operation, maintenance, and replacement in accordance with the recommended plan presented in this report. The fish hatchery could be constructed in two phases (first phase, approximately 296,000 pounds; second phase, approximately 109,000 pounds). This recommended authorization includes financial and administrative authorization for sponsorship of the fish hatchery by a Federal fish agency and provides for utilization of waters to operate the recommended plan. This plan is subject to such modifications thereto as in the discretion of the Chief of Engineers may be advisable and subject to cost sharing and financing arrangements with a responsible non-Federal entity which are satisfactory to the President and Congress. Under existing cost sharing requirements, the total first cost to the United States is presently estimated at $41,601,000 and the total annual operation, maintenance, and replacement cost to the United States is presently estimated at $848,000.

NORMAN C. HINTZ
Colonel, Corps of Engineers
District Engineer

NPDPL-PF (Sep 82) 1st Ind
SUBJECT: Wynoochee Hydropower/Fish Hatchery, Washington, Interim Feasibility Report and Final Environmental Impact Statement

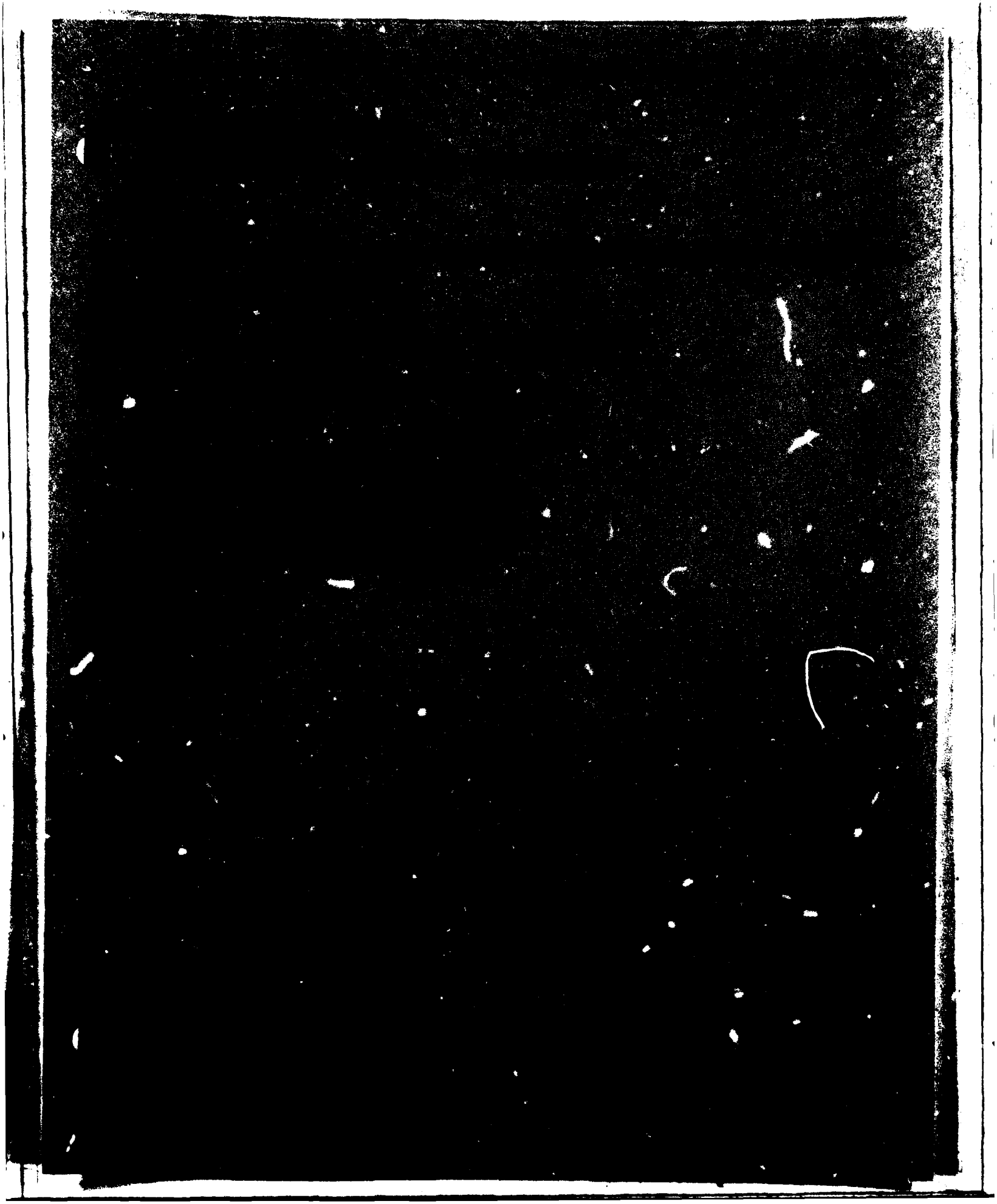
DA, North Pacific Division, Corps of Engineers, P.O. Box 2870,
Portland, OR 97208 10 September 1982

TO: Chief of Engineers

1. I concur in the conclusions and recommendations of the District Commander.

2. The benefits and costs of the recommended plan were updated from the October 1981 price level to October 1982. With application of the current federal interest rate of 7-7/8 percent, the estimate of annual charges increases from $4,311,000 to $4,684,000 and the average annual benefits increase from $12,482,000 to $12,893,000. The benefit-to-cost ratio decreases from 2.9 to 2.8.

JAMES H. HIGMAN
Colonel, Corps of Engineers
Acting Commander



FINAL
ENVIRONMENTAL IMPACT STATEMENT

Wynoochee Hydropower/Fish Hatchery Study

The responsible agency is the U.S. Army Corps of Engineers.

Abstract: The Seattle District has investigated the development of hydropower and fish enhancement opportunities at the existing Wynoochee Dam on the Wynoochee River in Grays Harbor County, Washington. The final alternative plans considered were no action and an integrated hydropower facility and enhancement fish hatchery. The hydropower/fish hatchery plan is recommended based upon its performance in addressing the identified public concerns and its net positive contributions to National Economic Development and Environmental Quality. This plan consists of the construction of an 11.3-megawatt (MW) hydropower addition to Wynoochee Dam and a 405,000-pound salmon and steelhead fish hatchery downstream of Wynoochee Dam. The total investment cost of the plan is $43,410,000; the benefit-to-cost ratio is 2.9. The principal beneficial impacts of the plan would be the enhancement of the anadromous sport, Indian, and commercial fisheries in the Grays Harbor area, the Chehalis River basin, and in the northern Pacific Ocean by the contribution of 118,660 adult spring chinook salmon and steelhead to the annual harvest; and the contribution of 11.3 MW of capacity and an average of 36,900 megawatt hours of energy per year to the Pacific Northwest power needs. The principal adverse impacts are associated with the permanent loss of approximately 50 acres of wildlife habitat, the elimination of anadromous fish runs in the Wynoochee River upstream of Wynoochee Dam, reduced flows in a 6,800-foot reach of the Wynoochee River, and a change in the existing dispersed recreation use of the hatchery site. Measures have been incorporated into the recommended plan to reduce adverse impacts to the extent practicable. There is strong agency and public support for development of both the hydropower facility and the fish hatchery.

Send your comments to the District Engineer by _____. If you would like further information regarding this final environmental impact statement (EIS), please contact Ms. Karen Northup, U.S. Army Corps of Engineers, Seattle District, Post Office Box C-3755, Seattle, Washington 98124, commercial telephone (206) 764-3624, FTS telephone 399-3624.

NOTE: Information, displays, maps, etc. discussed in the Wynoochee hydropower/fish hatchery feasibility report are incorporated by reference in the EIS.

FINAL
ENVIRONMENTAL IMPACT STATEMENT
Wynoochee Hydropower/Fish Hatchery Study

Summary

1. Major Conclusions and Findings. The recommended plan is an integrated hydropower/fish hatchery project on the Wynoochee River at Wynoochee Dam capable of generating approximately 36,900 megawatt hours (MWH) of electrical energy per year and producing approximately 405,000 pounds of anadromous smolts annually. The plan is the most effective alternative plan for meeting the study planning objectives. Total investment cost of the integrated plan would be $43,410,000 (October 1981 prices); the benefit-to-cost ratio is 2.9. The annual operation, maintenance, and replacement costs of the plan are estimated at $1,053,000. The hydropower facility would be constructed by the Corps of Engineers and the power produced would be marketed by the Bonneville Power Administration (BPA). The hatchery would result in the contribution of 127,500 adult spring chinook salmon and steelhead to the annual harvest. Of that total, 118,660 adult fish represent the enhancement portion of the hatchery and 8,840 represent the mitigation portion of the hatchery. The plan includes provisions for one satellite fish station in the Chehalis River system, primarily for collection of spring chinook salmon brood stock. The hatchery has the potential of improving fish runs in other streams in the Chehalis River and Grays Harbor area through a program involving outplanting of Wynoochee hatchery-reared fish. The hatchery was sized to utilize the available 190 cubic feet per second water supply, divided equally between salmon and steelhead. The hatchery would be constructed in two phases. Phase I, the initial construction, would contribute 35,200 spring chinook salmon and 40,500 steelhead to the annual harvest. Phase II, to be constructed up to 20 years later, would contribute an additional 51,800 spring chinook adults to the annual harvest. Phased construction would accommodate a gradual buildup of spring chinook salmon brood stock from the extremely depressed native spring chinook run. Following construction by the Corps of Engineers, the hatchery would be owned and managed by a Federal fish agency which would cost share operation, maintenance, and replacement with the non-Federal sponsor of the hatchery. The State of Washington has expressed its intent to act as local sponsor; the Northwest Regional Office of the National Marine Fisheries Service has expressed an interest in becoming the Federal sponsor. The principal beneficial impacts of the plan would be the enhancement of the anadromous sport, Indian, and commercial fisheries in the Grays Harbor area, the Chehalis River Basin, and in the northern Pacific Ocean; and the contribution of 11.3 megawatts of capacity and 36,900 MWH of energy per year to the Pacific Northwest power needs. The principal adverse impacts would be the permanent loss of approximately 50 acres of wildlife habitat, the elimination of anadromous fish runs in the Wynoochee River upstream of

Wynoochee Dam, reduced flows in a 6,800-foot reach of the Wynoochee River between the existing overflow weir and the fish hatchery outflow, and the change of the existing dispersed recreation use of the hatchery site. Measures have been incorporated into the plan to minimize impacts to the extent practicable. The plan has a net benefit to the environment, the enhancement of anadromous fisheries. There is strong agency and public support for development of both the hydropower facility and the fish hatchery, with no expressed opposition to either.

2. Area of Controversy. There was one primary area of controversy associated with the recommended plan. The U.S. Forest Service (USFS) has expressed concerns regarding the hatchery site selection and impacts to elk winter range and dispersed recreation use, and concerns relative to the impacts of the transmission line corridor. In response to the USFS concerns, additional elk and recreation analyses were performed and results incorporated into the feasibility report/environmental impact statement. A buried transmission line along the existing power right-of-way adjacent to the road from Wynoochee Dam 22 miles to the Promised Land Substation was chosen by the Corps of Engineers based on preliminary BPA studies. BPA would be responsible for the transmission line. The transmission line is not included in the recommended plan; however, impacts of a buried transmission line are addressed in the discussion of the impacts of the recommended plan. This line would have minimal environmental impacts and is consistent with the USFS's national policy requiring buried transmission lines on national forest lands. The detailed analyses required to definitively determine the economics and operational advantages or disadvantages of a buried transmission line as opposed to an alternative aerial transmission line would be conducted during further BPA studies. A supplemental environmental document would be prepared during PP&E to address the transmission line alternatives and their impacts and would be distributed for public and agency review and comment. An aerial line, if selected, would be designed to minimize environmental impacts, including placement of the line to minimize timber production losses and esthetic impacts to the extent possible. Extensive coordination with the USFS would be necessary to avoid significant conflicts in current land use along the transmission corridor.

3. Unresolved Issues. There are no unresolved issues associated with the Wynoochee hydropower/fish hatchery plan.

4. Relationship to Environmental Requirements.[1/] The relationship of the Wynoochee hydropower/fish hatchery plan to environmental requirements is summarized in the following table. Implementation of the plan would

1/The relationship of the satellite fish station to the environmental requirements is not included in this discussion. Compliance of the satellite fish station would be accomplished in PP&E when the siting and design of the station are determined.

require a change in the current land use classification of the hatchery site by the USFS. Presently, the hatchery site is classified as a visual resource and, as such, is on a 200-year timber rotation. A memorandum of understanding with the USFS regarding implementation of the hydropower/fish hatchery plan on national forest land would be completed in preconstruction planning and engineering (PP&E). Full compliance with the requirement for a State National Pollution Discharge Elimination System permit for the hatchery outlet would be accomplished just prior to construction of the hydropower/fish hatchery plan when the permit is obtained. Full compliance with the state instream flow requirements would be accomplished in PP&E studies when the instream flows would be determined through coordination with the State of Washington. Full compliance with the Clean Water Act would be achieved by filing of the final EIS with EPA and authorization of the recommended plan by Congress. Full compliance with the Coastal Zone Management Act would be accomplished just prior to construction when the Shoreline Management permit is obtained by the local sponsor in compliance with the State Shoreline Management Program. The recommended plan is in full compliance with all other environmental statutes and requirements.

RELATIONSHIP OF THE WYNOOCHEE HYDROPOWER/FISH HATCHERY PLAN TO ENVIRONMENTAL REQUIREMENTS

Environmental Requirements	Compliance
Archeological and Historic Preservation Act, as amended by PL 96-515, December 12, 1980, 16 U.S.C. 469, *et seq.*	Full compliance
Clean Air Act, as amended, 42 U.S.C. 7401, *et seq.*	Full compliance
Clean Water Act, as amended, 33 U.S.C. 1251, *et seq.*	Partial compliance
Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1451, *et seq.*	Partial compliance
Endangered Species Act of 1973, as amended, 16 U.S.C. 1531, *et seq.*	Full compliance
Estuary Protection Act, 16 U.S.C. 1221, *et seq.*	Not applicable
Federal Water Project Recreation Act, as amended, 16 U.S.C. 4601-12, *et seq.*	Full compliance
Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661, *et seq.*	Full compliance

Environmental Requirements	Compliance
Land and Water Conservation Fund Act of 1965, as amended, 16 U.S.C. 4601-4, et seq.	Not applicable
Marine Protection Research and Sanctuary Act of 1972, as amended, 33 U.S.C. 1401, et seq.	Not applicable
National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321, et seq.	Full compliance
National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470, et seq., as amended by PL 96-515, December 12, 1980	Full compliance
Rivers and Harbors Act of 1899, as amended, 33 U.S.C. 401, et seq.	Full compliance
Watershed Protection and Flood Prevention Act, as amended, 16 U.S.C. 1001, et seq.	Not applicable
Wild and Scenic Rivers Act, as amended, 16 U.S.C. 1271, et seq.	Full compliance
Executive Order (E.O.) 11988, Flood Plain Management, 24 May 1977	Full compliance
E.O. 11990, Protection of Wetlands, 24 May 1977	Full compliance
Analysis of Impacts on Prime and Unique Farmlands (CEQ Memorandum, 30 August 1976)	Full compliance
Timber Resource Management Plan, Shelton Cooperative Sustained Yield Unit, U.S. Forest Service, Olympic National Forest, 1978	Partial compliance
State Shoreline Management Plan	Full compliance
State National Pollution Discharge Elimination System Permit	Partial compliance
State Instream Flow Requirements	Partial compliance
Grays Harbor Regional Comprehensive Plan	Full compliance

Environmental Requirements	Compliance
Grays Harbor County Management Plan	Full compliance
Report of the Grays Harbor Fishery Enhancement Task Force, adopted by the Grays Harbor Regional Planning Commission, 28 August 1980	Full compliance
Memorandum of Understanding With the U.S. Forest Service regarding the Wynoochee Lake Project	Partial compliance

FINAL
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WYNOOCHEE HYDROPOWER/FISH HATCHERY STUDY

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SECTION 1. NEED FOR AND OBJECTIVES OF ACTION

1.01 Study Authority. As presented in paragraph 1.01 of the feasibility report, this study was conducted under the authority of the House of Representatives Chehalis River Basin study resolution adopted on 19 April 1946. This study was also conducted in response to Section 203 of the River and Harbor Act of 1962 and in accordance with the Fish and Wildlife Coordination Act of 1958, as amended.

1.02 Public Concerns and Planning Objectives. Energy and anadromous fishery resource needs in the Pacific Northwest have increased considerably since Wynoochee Dam was authorized for construction. Average annual energy deficits in the West Group Area (Pacific Northwest) are forecast to range from 8,960,000 megawatt hours (MWH) (1,023 average annual megawatts (MW)) in 1982-1983 to 26,160,000 MWH (2,986 MW) in 1988-1989 to 20,320,000 MWH (2,320 MW) in 1992-1993, according to the 1982 Northwest Regional/Sum-of-Utilities (SOU) Forecast (Pacific Northwest Utilities Conference Committee (PNUCC), May 1982). The demand for anadromous fish by commercial, Indian, and sport fishermen has exceeded the available depressed stocks and the remaining natural spawning and rearing areas available for producing anadromous fish have proven to be insufficient to meet the increasing demand. Accordingly, the primary public concerns and, therefore, the primary planning objectives addressed by this study are the development of the hydropower potential and fish enhancement opportunities at Wynoochee Dam, Washington, to meet a portion of the identified energy and anadromous fishery resource needs. In formulating plans to meet the objectives, a wide range of criteria was considered. These criteria and additional details regarding the need for and objectives of the study are presented in section 2 of the feasibility report.

SECTION 2. ALTERNATIVE PLANS

2.01 Plans Eliminated from Further Study.

a. Preliminary Studies.

(1) Development of Hydropower at Wynoochee Dam. Studies of hydropower were limited to the existing Wynoochee Dam project site and included engineering, economic, and environmental considerations. Seven powerhouse locations, with various penstock configurations, were considered during preliminary studies. The evaluation of these configurations is presented in paragraph 3.02a of the feasibility report and in Appendix G. Hydropower design options were dropped from further study if the alternative (1) presented a potential hydraulic and operational constraint on the operation of the spillway of the Wynoochee Dam, (2) would operate with relatively high loss in net power head when compared to the other alternatives, (3) would result in insufficient room or access for construction of the feature, or (4) would include a pipeline along the rock canyon bottom below known overburden slide areas. All but two hydropower design options, a surface powerhouse and an underground powerhouse on the right bank downstream of Wynoochee Dam, were eliminated from further study because they fell into one or more of the above stated constraint categories.

(2) Fish Enhancement at Wynoochee Dam. Three possible structural alternatives to enhance the anadromous fish runs were examined in the vicinity of Wynoochee Dam during preliminary studies: spawning channels, rearing ponds, and a fish hatchery. The evaluation of these alternatives is discussed in paragraph 3.02b of the feasibility report and in appendix G. Construction of a new fish hatchery was considered to be the most viable fish enhancement alternative primarily because it would provide optimum use of the opportunity at Wynoochee Dam in terms of production and efficiency. The other alternatives would create only minor enhancement benefits not in keeping with the growing fishery demands and would not take advantage of the full opportunity available for fish production at Wynoochee Dam. Refer to appendix G for a discussion of the unique factors that make construction of an enhancement fish hatchery at Wynoochee Dam attractive.

Three alternative sites are available for location of the fish hatchery in the vicinity of Wynoochee Dam. The preferred site is the lower level site (elevation 615 feet) located on the right bank 3,000 feet downstream of the dam (see plate 2). A hatchery constructed on this site would result in less hydropower head loss if the fish hatchery has a direct pipeline connection to a hydropower facility. For additional detail regarding the hatchery siting, refer to paragraph 3.02b of the feasibility report and appendix G.

b. Detailed Studies.

(1) Development of Hydropower at Wynoochee Dam. Of the two powerhouse alternatives, the surface powerhouse was eliminated from consideration during detailed studies due to potential costs associated with geotechnical problems (refer to paragraph 3.03a of the feasibility report and appendix F). The underground powerhouse site was selected as the preferred site and was considered alone and in combination with a fish hatchery as discussed below. A 1,200 cubic feet per second (c.f.s.) powerhouse was selected based on net power benefits and energy production (refer to 3.03b of the feasibility report).

(2) Transmission Line. Various transmission line alternatives and routes were considered as discussed in paragraph 4.09d of the feasibility report. A buried transmission line within the existing power right-of-way along Donkey Creek Road was chosen by the Corps of Engineers based on preliminary Bonneville Power Administration (BPA) studies. This alternative is considered the least environmentally damaging plan by the Corps of Engineers and is consistent with the U.S. Forest Service (USFS) policy requiring burial of transmission lines on national forest land. The detailed analyses required to definitively determine the economics and operational advantages or disadvantages of a buried transmission line as opposed to an alternative aerial transmission line will be conducted during further BPA studies. The BPA, which would be responsible for construction, operation, and maintenance of the transmission line, would be responsible for the final decision as to type of line and location. That decision would be made in cooperation with the Corps of Engineers and the USFS. A supplemental environmental document would be prepared during PP&E to address the transmission line alternatives and their impacts and would be distributed for public and agency review and comment. An aerial line, if selected, would be designed to minimize environmental impacts, including placement of the line to minimize timber production losses and esthetic impacts to the extent possible. Extensive coordination with the USFS would be necessary to avoid significant conflicts in current land use along the transmission corridor.

(3) Fish Enhancement at Wynoochee Dam. Two hatchery design options for development of the hatchery at the preferred site were examined in detail. One option would take the water supply for the hatchery directly from the dam; the other would take the water supply from the tailrace of a hydroelectric powerhouse located below the Wynoochee Dam. Detailed studies showed an economic advantage in development of a combined hydropower and fish hatchery project. Environmental studies concluded no significant difference between hatchery only and a combined hydropower/hatchery plan. The combined plan was selected as the preferred alternative and, after evaluation against the without condition (no action), was selected as the plan that would best meet the objectives of energy production and fish enhancement. The fish hatchery was sized at 190 c.f.s. to provide the maximum opportunity for fish enhancement development. As a result of concerns expressed by state and Federal

fisheries agencies, the salmon portion of the hatchery would be constructed in two phases. Initial construction of a smaller salmon portion of the hatchery would allow a gradual buildup of spring chinook salmon brood stock utilizing a small local native run. Phase II would be constructed up to 20 years later. Phased construction would minimize impacts of the fish hatchery on native fish runs in the Chehalis River system. For additional information regarding plan formulation, refer to section 3 of the feasibility report and appendix G.

2.02 Final Plans.

a. Alternative Plan 1: No Action (Without Conditions). Under the no-action alternative (the most probable future without Federal action), no Federal action would be taken at the existing Wynoochee Dam to develop hydropower or to enhance the anadromous fishery within the Chehalis River Basin. There is a possibility of non-Federal hydropower development; however, there is no expressed interest at this time. There are no proposals for complete non-Federal development of an enhancement fish facility at the dam. Energy conservation programs and efforts by fisheries agencies to improve the fishery would continue. In accordance with the Pacific Northwest Electrical Power Planning and Conservation Act, the BPA must give highest priority to cost effective conservation programs. These programs will be undertaken by public and private utilities and state and local governments with BPA's technical assistance and financial backing. The probability of the region being without sufficient resources to meet electrical needs has caused power planners to focus on smaller renewable resource projects as well as conservation methods. Both structural and conservation methods are considered necessary to relieve the potential energy deficits in the Pacific Northwest.

Management and fish habitat improvement measures are within the jurisdiction of the fisheries agencies. Measures include rigorous management of the fisheries to effect maximum sustained yield and fish habitat improvements by changes in streams such as removing silt from gravel, controlling flood runoff, improving vegetative coverage of the watershed, providing vegetative cover over streams, removing barriers to upstream movement of anadromous fish, and improving water quality. Some stream areas could be improved by providing ideal spawning grounds through the removal of undesirable gravels and replacement with desirable substrate or, similarly, through provision of spawning channels adjacent to the stream. These methods are now being employed or planned where practicable by the agencies and will continue with or without implementation of a structural alternative such as a hatchery. However, the increasing need for anadromous fish cannot be completely met by habitat improvement and management measures alone.

b. Alternative Plan 2: Combined Underground Hydropower and Enhancement Fish Hatchery (National Economic Development Plan/Environmental Quality Plan/Recommended Plan). The recommended plan is the construction of an 11.3-MW and 36,900-MWH hydropower addition to Wynoochee

Dam and a 405,000-pound salmon and steelhead fish hatchery downstream of Wynoochee Dam. The underground powerhouse would be located on the right bank of the Wynoochee River under an existing visitors parking lot 200 feet downstream of the Wynoochee Dam. The site of the fish hatchery is a flat meander bench on the right bank of the river 3,000 feet downstream of the Wynoochee Dam (refer to plate 2).

(1) Design Features. The hydropower facility would operate as a run-of-river plant, producing baseload energy from the releases of the Wynoochee Dam. A multilevel intake structure to the powerhouse penstocks would be built in the reservoir to maintain preproject water quality releases. The penstock would be tunneled beneath the grout curtain under the dam to the underground powerhouse located 200 feet downstream of the dam. The powerhouse would have a capacity of 11.3 MW and produce 36,900 MWH of average annual energy from three commercially available units of 1.7, 4.8, and 4.8 MW. The small unit would utilize the 190/140 c.f.s. minimum flow from the existing project, and the total hydraulic capacity of the powerhouse would be 1,200 c.f.s. The tailrace would exit from the right canyon wall about 400 feet downstream of the dam, approximately 100 feet downstream of the USFS bridge. A transmission line, constructed by the BPA, would transmit the power to the Grays Harbor Public Utility District's (PUD) Promised Land Substation, approximately 22 miles southwest of the study area on Highway 101, for distribution within the BPA system. The transmission line would follow the existing power right-of-way adjacent to the road between Wynoochee Dam and the substation. The transmission line is not included in the recommended plan; however, impacts of a buried transmission line are addressed in the discussion of the impacts of the recommended plan.

Water supply to the hatchery would be via a 2,400-foot gravity feed pipeline from the hydropower outlet/fish hatchery intake structure. Supply available to the hatchery would be up to 190 c.f.s., except in May and June when it may drop to a minimum of 140 c.f.s. The hatchery would be constructed in two phases because of the expected delay in developing a viable run from the extremely depressed spring chinook salmon utilizing a small local population for hatchery brood stock. Phase I, the initial construction, would utilize 135 c.f.s. of the total available water supply of 190 c.f.s. (95 c.f.s. for steelhead, 40 c.f.s. for spring chinook salmon). Phase II of the hatchery would utilize an additional 55 c.f.s. of the available water supply for salmon production and construction could be accomplished up to 20 years later depending upon the development of the spring chinook salmon run and fisheries management decisions. Phase II would involve construction of additional fingerling raceways, rearing ponds, an adult spring chinook holding pond, two residences, and the additional water distribution system. The total steelhead portion of the hatchery would be developed in Phase I.

The total hatchery complex would include a hatchery building, two series of raceways, four 2-acre rearing ponds for steelhead, five 1/2-acre holding and rearing ponds for salmon, two holding ponds for steelhead,

six residences for operators, a service building, a visitor facility, and access roads. The existing adult fish collection facility for the Wynoochee Dam project would be utilized for collection of adult prespawning fish (see figure 2 of the feasibility report for location of facility). With the construction of the hatchery, transport of adult salmon and steelhead above Wynoochee Dam for upstream spawning would be discontinued. The hatchery, appurtenant facilities, and water supply pipeline would occupy approximately 55 acres. Construction of one satellite fish station within the Chehalis River system is included in the plan. This station could include an adult fish attraction, collection, and holding system and a juvenile salmon acclimation pond, or could just be an adult collection facility for spring chinook salmon and possibly steelhead brood stock for the hatchery. A potential site for a spring chinook collection facility is on the lower Skookumchuck River.

Concrete aggregate for construction of the powerhouse and fish hatchery would be taken from the hatchery site. Rock borrow may be obtained from a nearby quarry 0.5 mile west of the Wynoochee Dam. Construction of the hydropower portion of the recommended plan and Phase I of the fish hatchery would be concurrent and would take approximately 2 years to complete. Phase I would contribute 35,200 adult spring chinook salmon and 40,500 adult steelhead to the annual harvest. Phase II, to be constructed up to 20 years later, would contribute an additional 51,800 adult spring chinook to the annual harvest. Additional information regarding engineering features and construction is found in paragraphs 4.09 and 4.17 of the feasibility report. Also refer to plates 2 and 3 and appendix E.

(2) Environmental Features. The major environmental feature of the recommended plan is the fish hatchery, which has been designed to produce 189,000 pounds of spring chinook salmon smolts and 216,000 pounds of steelhead smolts. The hatchery would result in an enhancement of the anadromous fish runs in the Grays Harbor area, the Chehalis River Basin, and in the northern Pacific Ocean. The hatchery was sized based on a gravity feed water supply of 190 c.f.s. available at the Wynoochee Lake project and divided equally for the production of salmon and steelhead. Spring chinook and steelhead were selected as the anadromous species to be raised at the hatchery. Spring chinook is a hard-to-raise species but as a group is the most seriously depressed of the anadromous salmonids in the State of Washington. The Wynoochee site is capable of offering one of this species' key environmental requirements, an abundance of cool water through the summer for both adult holding and juvenile rearing. Utilizing spring chinook salmon results in less production and more conservative benefit figures than other salmon species and thus is a good test of hatchery feasibility, although, potentially other salmon species, in addition to spring chinook salmon, could be raised at the hatchery. The rearing of other species/strains of salmon at the Wynoochee hatchery is not planned at this time because of possible impacts on wild runs. A management plan for the hatchery would be developed in PP&E by the fisheries agencies in coordination with Indian tribes and other interested groups. The plan would be periodically

updated, and would determine management strategies involving the potential use of other salmon species/strains. Steelhead, native to the Chehalis River system, are proposed for spawning brood stock in the Wynoochee hatchery; however, depending upon the management strategies developed, it is possible that other steelhead strains may also be reared in the hatchery.

The Wynoochee hatchery could be utilized not only to enhance production in the Wynoochee River but also to improve production in other streams within the Chehalis River and Grays Harbor watershed through an outplanting program involving a simple release of juvenile fish and/or construction of a satellite fish station. The satellite fish station could include an adult attraction, collection, and holding system and an acclimation pond for rearing and imprinting juvenile salmon, as described in paragraph 4.09j of the feasibility report, or could be utilized as a collection facility for hatchery brood stock. One such station has been included as a feature of the recommended plan. The specific location of this station and the details of its management would be developed in PP&E by the resource agencies in close coordination with the Indian tribes. A possible location for the satellite fish station is on the lower Skookumchuck River where it would be used for the collection of spring chinook salmon brood stock for the hatchery and possibly to aid in an outplanting program for juvenile salmon. The satellite fish station would not be utilized for the rearing and release of steelhead, but could possibly be used for the collection of some adult steelhead for hatchery brood stock. The concept of the hatchery management is further discussed in section 3 of appendix H, which includes a summary of the results of a study conducted by Mathews (1981) under contract with the Seattle District, Corps of Engineers.

Many environmental features of the recommended plan were designed to insure the successful operation of the hatchery facility, minimize project impacts on the environment, and monitor the effectiveness of the fish hatchery in its role in the management of the total regional fishery. Environmental features to insure the successful operation of the hatchery facility include a bypass pipe in the powerhouse to supply water to the hydropower outlet/fish hatchery intake structure when the powerhouse units would be shut down, a pipe from the existing overflow weir downstream of the dam to the fish hatchery intake structure to supply water to the fish hatchery when the powerhouse complex would be completely shut down, and a 12-inch pressure pipeline leading directly from deep within the reservoir to the adult salmon holding pond to provide cold water holding conditions for adult spring chinook prior to spawning (refer to appendix E). A multilevel intake structure is included in the plan to provide selective withdrawal capability for temperature control to maintain the existing project water quality control capability.

Environmental features which serve to minimize the potential water quality impacts of the recommended plan include a pollution abatement/ settlement pond for holding effluent from the fish hatchery raceways while

they are being cleaned or when prophylactics are used, a singlepass water use design for the hatchery, and provision of a septic tank system for the hatchery residents. During construction, all surface runoff water from disturbed areas would pass through settling ponds to minimize suspended sediment load to the river. Cofferdams would be used for instream construction of the hatchery supply pipeline crossing and the hydropower outlet/fish hatchery intake structure, and the reservoir would be drawn down for construction of the powerhouse intake structure in the dry. Following construction, water quality at the hatchery outlet would be monitored to insure compliance with the Environmental Protection Agency (EPA) criteria. Scheduling of a shutdown of the entire powerhouse complex would normally occur only when the two existing sluices through the dam were not in use to avoid a possible nitrogen supersaturation problem in the fish hatchery water supply as a result of sluiceway discharges.

Water supply to the hatchery would be via a gravity flow system which minimizes the energy requirement to operate the hatchery and eliminates the need for emergency water supply pumping equipment necessary at most hatcheries. The pressure line directly from the reservoir providing cold water to the prespawning adult spring chinook salmon holding ponds could also provide fire protection, washdown lines, and irrigation water for the residential and hatchery grounds. Both the powerhouse and the fish hatchery water supply pipeline would be buried. The existing access road to the hatchery site would be utilized. The transmission line would be buried and would utilize the existing power right-of-way adjacent to the existing road between Wynoochee Dam and the Promised Land Substation. Areas disturbed by project construction would be revegetated with plant species of high wildlife value (see table EIS-1 for suggested species listing) and a vegetation barrier would be planted around the edge f the hatchery. Further, two 2-acre pastures to be constructed adjacent to the hatchery are included in the plan to provide a winter food source for elk (see paragraph (3) below). These project features contribute to reducing the esthetic and terrestrial wildlife habitat impacts associated with the recommended plan. Potential impacts to wild fish stocks in the Chehalis River basin would be reduced by management of the hatchery on a wild stock basis, which is consistent with the current management philosophy of the state and Federal fish agencies. Local stocks of spring chinook salmon and steelhead would be utilized in the hatchery. To minimize hatchery impacts on native fish runs, the hatchery would be constructed in two phases to allow for the gradual buildup of spring chinook brood stock utilizing the small local population (see paragraphs 2.01b(3) and 2.02b(1) of the environmental impact statement (EIS)). The degree of run timing and harvest conflicts with other species that could potentially be raised at the Wynoochee hatchery can be minimized by the proper choice of stocks as summarized in section 3 of appendix H. The development of the harvest management and outplanting strategy would be a continuing effort among the various fish agencies and interested public throughout PP&E and actual hatchery operation.

TABLE EIS-1

PLANTS OF HIGH WILDLIFE VALUE
FOR REVEGETATION OF DISTURBED AREAS[1/]

Species	Pounds/Acre
Winter Wheat (Triticum aestivum L.) (flat areas)	40
Cereal Rye (Secale cereale) or Gray Oats (Avena sp.) (steep slopes and cut banks)	40
Hairy Vetch (Vicia hirsuta L.)	8
Sweet Clover (Melilot alba L.)	5
Kentucky Blue Grass (Poa sp.)	4
Birds Foot Trefoil (Latus corniculatus L.)	2
Red Clover (Trifolium pratense L.)	2
Subterranian Clover (Trifolium subterranian L.)	2
Cats Bar (Hypochaeris radicata L.)[2/]	.5
Oxeye Daisy (Cheysanthemum leucontheamum L.)[2/]	.5
Smooth Hawks Beard (Crepis capillaris L. (Walle))[2/]	.02
Woodland Phacelis (Nemoralis greene)[2/]	.02
Firewood (Epilobium angustifolium L.)[2/]	.02

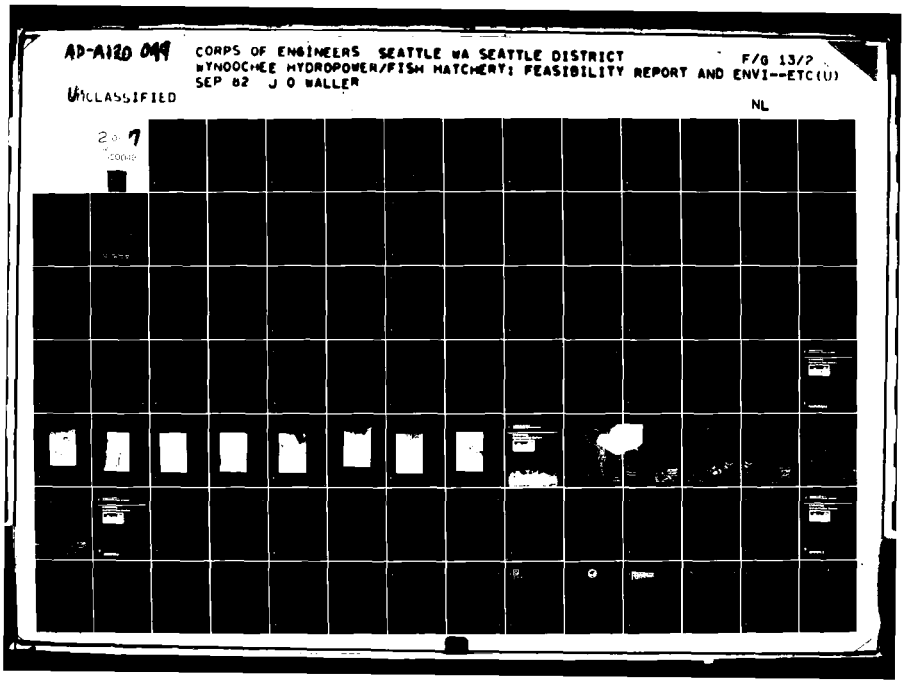
1/Suggested draft list furnished by Washington Department of Game (WDG). These plants provide immediate growth, thereby limiting erosion potential and provide a good food source for wildlife.

2/Use as availability dictates.

(3) Mitigation. As discussed in paragraph 4.13 of the feasibility report, part of the hatchery production would be utilized to mitigate for the termination of the use of anadromous fish spawning habitat upstream of the Wynoochee reservoir due to implementation of the recommended plan. The estimated number of fish that could be accommodated by that habitat is 1,500 coho salmon adults and 570 steelhead adults. Another portion of the hatchery production would be used for mitigation of previous steelhead spawning habitat losses associated with the existing Wynoochee Lake project; the estimated number of fish that could be accommodated by that habitat was 1,700 steelhead adults. This latter mitigation is the responsibility of the State of Washington under the 28 July 1977 Memorandum of Agreement with the Corps of Engineers. The two mitigation portions of the hatchery would total approximately 5.6 percent and 1.3 percent of the total annual hatchery contribution to the harvest, respectively. The mitigation production would be included in the Phase I portion (see table 2 of the feasibility report). The remaining production, which is not attributable to mitigation, is considered the enhancement portion of the fish hatchery. That production represents 93.1 percent or 118,660 of the total hatchery contribution of 127,500 adult fish to the annual harvest.

In addition to fish mitigation, two 2-acre elk pastures to be constructed adjacent to the hatchery are included in the plan. These pastures would be vegetated with the appropriate plant species to provide a winter food source for elk and thus reduce the impacts of hatchery-related losses of elk habitat. Because the pastures would be located on the hatchery site itself, no additional land acquisition would be necessary.

(4) Division of Responsibilities. The Corps of Engineers would be responsible for construction, operation, maintenance, and replacement (OM&R) of the hydropower facility. BPA would be responsible for construction and OM&R of the transmission line and for marketing the energy output from the powerhouse. Operation and hourly discharge patterns of the existing Wynoochee Dam would not be altered. Production of power at Wynoochee Dam would be subordinate to all other authorized project purposes, including the production of fish. Following construction of Phase I of the hatchery, including the satellite fish station, by the Corps of Engineers, title to the hatchery would be turned over to a Federal fish agency, which would become the hatchery owner and manager. Through contract with the hatchery owner, operation of the hatchery would be accomplished by the Washington Department of Fisheries (WDF) and the WDG for salmon and steelhead, respectively. The two 2-acre elk mitigation pastures would be managed by hatchery personnel on a 5-year crop rotation basis. OM&R funding for the hatchery and the elk pastures would be cost shared between the Federal fish agency and the State of Washington, the local sponsor for the hatchery. For details regarding operation and maintenance of the recommended plan, refer to paragraphs 4.19 through 4.23 of the feasibility report.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WYNOOCHEE HYDROPOWER/FISH HATCHERY: FEASIBILITY REPORT AND ENVI--ETC(U)
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A postconstruction monitoring program for the fish hatchery has been incorporated into the recommended plan to monitor the effectiveness of fish production from the hatchery, the effectiveness of the hatchery management strategy, and the effects of the hatchery on anadromous fish production in the region, and to minimize the potential adverse effects of disease and competition or predation on native fish runs due to hatchery-released fish. Information from the monitoring program would provide continual input into the management of the Chehalis River Basin and Grays Harbor area fisheries as well as provide important data on salmonid production for application in other watersheds. The details of the monitoring program would be formulated in coordination with state and Federal resource agencies, Indian tribes, and other interested parties during PP&E. Implementation of the monitoring program would be the responsibility of the Federal fish agency that becomes the hatchery owner and of WDF and WDG who would operate the hatchery. Funding for the program would be part of the annual hatchery OM&R costs of the fish hatchery. Additional information regarding the monitoring program is provided in paragraph 4.22 of the feasibility report.

(5) Economics and Cost Sharing. The total investment cost of the recommended plan would be $43,410,000 (October 1981 price level), of which $23,420,000 would be the cost of the hydropower facility and $19,990,000 the cost of the hatchery. The average annual power benefits of the hydropower facility would be $2,223,000. Total average annual enhancement benefits of the hatchery would be $10,259,000. The hydropower benefit-to-cost ratio is 1.1; the fish hatchery benefit-to-cost ratio is 4.7; the total project benefit-to-cost ratio is 2.9. The Corps of Engineers would construct the recommended plan, operate the hydropower facility, and provide 100 percent of the first hydropower costs; 100 percent of the annual operation, maintenance, and replacement (OM&R) hydropower costs; 75 percent of the separable recreation (sport) fishery first costs; 100 percent of the separable commercial/Indian fishery first costs; and 100 percent of the joint fishery first costs. The Bonneville Power Administration would market the power in the Pacific northwest and repay the power costs from power revenues. A Federal fish agency (to be identified) would become owner and manager of the fish hatchery and provide 100 percent of the separable commercial/indian fishery annual OM&R costs and 100 percent of the joint fishery annual OM&R costs. The State of Washington has expressed its intent to act as local sponsor of the fish hatchery and provide 25 percent of the separable recreation (sport) fishery first costs, 100 percent of the separable recreation (sport) fishery annual OM&R costs, and 100 percent of the costs associated with fulfilling its previous mitigation responsibility for the existing Wynoochee Lake project. A description of the economics and Federal and non-Federal cost-sharing responsibilities of the recommended plan is presented in paragraphs 4.25 and 4.29 of the feasibility report. Refer to appendix C for information regarding the benefits analysis and cost-sharing coordination accomplished for the recommended plan.

2.03 Comparative Impacts of Alternative Plans. A comparison of the impacts of the final plans for the Wynoochee hydropower/fish hatchery feasibility study is presented in table EIS-2.

TABLE EIS-2

COMPARATIVE IMPACTS OF ALTERNATIVES
WYNOOCHEE HYDROPOWER/FISH HATCHERY PLAN

Category	Base Condition	Alternative Plan 1 - Without Condition - Most Probable Future Without Federal Action	Alternative Plan 2 - Combined Underground Hydropower and Enhancement Fish Hatchery
PLAN DESCRIPTION			
Major Features	Existing Wynoochee Lake project which consists of a 177-foot-high dam, mitigation lands for elk habitat inundated by the reservoir, and a fish collection and trucking program for anadromous fish. Plan area is generally located within the Olympic National Forest and involves Wynoochee River and nearby river systems.	Non-Federal hydropower development possible but no expressed interest at this time. Plan by Grays Harbor PUD would have included surface powerhouse and aerial transmission line. Fish habitat improvement measures and fishery management by state fisheries agencies.	Intake structure; penstock; 11.3-megawatt (MW) capacity underground powerhouse; switchyard; draft tubes and tailrace tunnel; hydropower outlet/fish hatchery intake structure; fish hatchery water supply pipeline; 405,000-pound fish hatchery, including residences and upgraded access road; one satellite fish station. Transmission line would be responsibility of BPA.
Plan Outputs	Wynoochee Lake project provides 70,000 acre-feet of total storage and is presently operated for city of Aberdeen industrial water supply, winter flood control, and fisheries. No hydropower is currently provided. Anadromous fish mitigation has not been successful. In general, natural anadromous fish runs in the Pacific Northwest have been adversely impacted by logging, pollution, and water resources development. In particular, the fish runs in the Chehalis River Basin and Grays Harbor area have declined.	Slight reduction in regional energy deficit. Provide 10.4-MW capacity which may produce approximately 35,900 MW hours of energy per year. Some improvement of anadromous fish runs if other enhancement programs are implemented.	Slight reduction in regional energy deficit. Provide 11.3-MW capacity which produces 36,900 MW hours of energy per year. Major enhancement of anadromous fishery; 118,660 adult spring chinook salmon and steelhead annual contribution to anadromous fish harvest.
Investment Costs	Not applicable.	Not available.	Federal - $41,601,000 Non-Federal - $1,809,000
Annual Operation, Maintenance, and Replacement Costs	Not applicable.	Not available.	Federal - $848,000 Non-Federal - $205,000
Benefit-to-Cost Ratio	Not applicable.	Not determined.	Hydropower - 1.1 Fish Hatchery - 4.7 Combined Plan - 2.9
ENVIRONMENTAL QUALITY EFFECTS			
Wetlands (Executive Order 11990)	353 acres in the Wynoochee drainage.	Minor impact depending upon fish habitat measure utilized.	Loss of 2 acres due to hatchery construction. Potential of additional losses with construction of satellite fish station.

TABLE EIS-2 (con.)

Category	Base Condition	Alternative Plan 1 - Without Condition - Most Probable Future Without Federal Action	Alternative Plan 2 - Combined Underground Hydropower and Enhancement Fish Hatchery
Water Quality and Supply	The reach of Wynoochee River in the plan area is classified an AA stream by the State of Washington water quality standards. 190 c.f.s. minimum flow from Wynoochee Dam.	With hydropower development utilising surface powerhouse, potential reduction in quality of 1,000-foot reach of Wynoochee River between dam and hydropower outlet. Water would be ponded in this reach when reservoir release requirements are no greater than that quantity of water diverted to the powerhouse. Short-term water qualit impacts associated with potential construction of non-Federal hydropower and habitat improvement measures.	Potential water quality impact in 6,800-foot reach of the Wynoochee River between the weir and the hatchery outlet if extreme low flows occur (April-September). Impacts would primarily be reduced visual esthetics and reduced aquatic habitat. Potential water quality reduction in 250-foot reach between dam and the existing overflow weir. Water would be ponded in this reach when reservoir release requirements are no greater than the quantity of water diverted to the powerhouse. Impacts to water quality would not be significant. Hatchery discharge may result in increased aquatic productivity and an alteration in the aquatic benthic community in the area near the effluent outlet; a possible beneficial impact because aquatic productivity in this river rather low naturally. Provisions for water supply withdrawals at R.M. 8.1 would not be affected. Short-term impacts to water quality would be associated with project construction. A multilevel intake structure would maintain existing project water quality from reservoir releases.
Noise	Plan area located within Olympic National Forest. Human related noise is associated with logging operations, low density recreation, and operation of Wynoochee Lake project. Area is largely forested and undeveloped.	Increased noise associated with potential construction of non-Federal hydropower facility. Long-term impact should be minimal.	Increased noise associated with project construction. Long-term permanent increase in noise levels and traffic due to project operation, residences, and increased recreational fishery.
Air Quality	High level of air quality.	Short-term associated with potential construction of non-Federal hydropower.	Short-term associated with construction. Long-term associated with increased traffic.
Flood Plain (Executive Order 11988)	Wynoochee Valley flood plain.	Minor potential impact from implementation of fish habitat improvements.	Minor potential impact from construction of satellite fish station.
Threatened and Endangered Species	Bald eagle is known to exist in the study area; no reported nesting in the area of the Wynoochee Lake project.	Continued existence of bald eagle would not be expected to be jeopardised; although, use in the area could decrease with decreasing available food supply (anadromous fish).	Continued existence of bald eagle would not be jeopardized. Threatened and endangered species analysis for the satellite fish station would be accomplished in preconstruction planning and engineering (PP&E)

Category	Base Condition	Alternative Plan 1 - Without Condition - Most Probable Future Without Federal Action	Alternative Plan 2 - Combined Underground Hydropower and Enhancement Fish Hatchery
Wildlife	Resident and migratory elk and deer; numerous small mammal and bird species.	Temporary disruption during potential construction of non-Federal hydropower and habitat improvement measures.	Temporary disruption during construction. Long-term permanent changes in habitat due to hatchery construction. Permanent losses would total approximately 50 acres of rain forest vegetation, of which 25 acres are considered old growth and constitute critical elk winter range. Without mitigation, big game use of the hatchery site would be lost. Use would be reduced in the area around the hatchery due to increased human disturbance. Two 2-acre elk mitigation pastures adjacent to the hatchery are included in the plan to provide a winter food source and thus reduce adverse impacts associated with loss of elk habitat. Hatchery would be designed to reduce loss of vegetation; grounds would be revegetated. A vegetation buffer zone would be planted around the hatchery edge. Construction of the satellite fish station would impact wildlife due to loss of approximately 5 acres of habitat and increased human disturbance. Loss of habitat associated with buried transmission line and powerhouse would be minor. Hatchery water supply pipeline would be buried and the corridor revegetated. Reduced habitat in the 6,800-foot reach between the existing overflow weir and the hatchery outlet during critical low flow periods would have minimal impact on wildlife. Impacts to wildlife during ponding in the reach from the Wynoochee Dam to the existing weir would be negligible.
Fish	Resident game species include cutthroat and rainbow trout and whitefish. Anadromous species in the Wynoochee River include coho, chum, fall chinook, and a few spring chinook salmon, and steelhead and searun cutthroat trout.	Minor fish improvement. Mitigation facilities for impacts on fish runs could be needed with possible non-Federal hydropower development.	Enhancement of anadromous fish runs in Grays Harbor area, in the Chehalis River Basin, and in the northern Pacific Ocean. Provides opportunity for improvement of anadromous fish runs in other streams within the Chehalis River and Grays Harbor watershed through development of a satellite fish station and implementation of an outplanting program. Anadromous fish runs above Wynoochee Dam would be terminated; the resident fishery in Wynoochee Lake should improve. Potential adverse impacts on resident fishery in the 6,800-foot reach of the Wynoochee River between the existing overflow weir and the hatchery outlet from reduced aquatic habitat during critical low flow periods (Apr-Sept). Impacts to fish as a result of ponding in the reach from the dam to the existing overflow weir would be negligible. Impacts to existing wild runs would be minimized by two-phased construction of the hatchery portion of the plan.

Category	Base Condition	Alternative Plan 1 - Without Condition - Most Probable Future Without Federal Action	Alternative Plan 2 - Combined Underground Hydropower and Enhancement Fish Hatchery
Cultural Resources	No evidence of cultural resources found in the plan area.	No impact to any known cultural resources.	No impact to any known cultural resources. Cultural resources reconnaissances for the transmission line and satellite fish station would be accomplished in PP&E.
Prime and Unique Farmlands	None in Wynoochee River valley.	No impact.	No impact.
Wild and Scenic Rivers Value	The West Fork of the Humptulips River is listed on the nationwide rivers inventory and would be crossed by the transmission line under alternative plans 1 and 2.	Esthetic impact associated with an aerial line.	No impact expected from construction of a buried transmission line. The line would be routed under bridges over stream crossings.
Mineral Resources	Mineral prospects and developments exist in the Wynoochee River Basin for manganese, sand and gravel, and foundry sands. The general location of the hatchery site suggests the potential for placer gold.	No significant impact on any known mineral resource deposits.	No significant impact on any known mineral resource deposits. Local borrow sources would not be significantly depleted by project construction.
REGIONAL ECONOMIC DEVELOPMENT EFFECTS			
Employment	Employment in Grays Harbor County is dependent upon four basic industries: forest products, tourism, fishing, and agriculture.	Short-term construction employment opportunities.	Short-term construction and minor long-term project operation employment opportunities.
Community Development, Cohesion, and Public Services	Plan area is located 35 miles from the nearest full service community of Montesano. Limited public services are provided by the logging community of Griedale, which is located 3 miles from the Wynoochee Lake project residences.	Beneficial impact from potential provision of local power to the Grays Harbor area.	Minor beneficial impact on community development due to enhanced fisheries and resulting increased use of fisheries associated businesses. Increased pressure on existing public services in the plan area.
Net Income to Region	Major contributors to regional economy are forest industry, fisheries, tourism, and agriculture.	Minor beneficial contribution from provision of local power and from minor fish improvements.	Positive contribution to regional economy as a result of major enhancement of anadromous fish available for harvest.
Displacement of People, Businesses, and Farms	Not applicable.	No impact.	No impact.
Safety and Well-Being	Not applicable.	Moderate contribution from provision of energy; minor contribution from fish habitat improvement measures.	Moderate contribution from provision of energy; major contribution to fishing livelihood in Chehalis River Basin and Grays Harbor area.
Long-Term Productivity	Plan area contains significant forest and water resources which contribute to its long-term productivity to man and to fish and wildlife.	Makes use of a renewable resource for energy production; provides minor fish habitat improvements.	Makes use of a renewable resource for energy production with minimal environmental impacts; provides for major fish enhancement in the Chehalis River Basin and Grays Harbor area.

TABLE EIS-2 (con.)

Category	Base Condition	Alternative Plan 1 - Without Condition - Most Probable Future Without Federal Action	Alternative Plan 2 - Combined Underground Hydropower and Enhancement Fish Hatchery
Recreation	Plan area includes developed campgrounds and a trail system managed by the U.S. Forest Service and day use facilities managed by the Corps of Engineers as part of the Wynoochee Lake project. Dispersed recreation use of the area is popular and includes use of the hatchery site at an average rate of 300 visitor days per year.	Minor, due to some potential increase in recreational fishery. Potential short-term disruption to area recreational activities if non-Federal hydropower is developed.	Major increase in area recreational fishery. Loss of hunting use of hatchery site. Change in dispersed recreation character of the hatchery site from overnight camping and water-related activities to hatchery visitation and limited picnicking and hiking. Short-term disruption to area recreational activities during project construction.
Property Values and Tax Revenues	Most of the plan area is under Federal ownership and thus is removed from the tax base. Some land is under the private ownership of Simpson Timber Company and ITT Rayonier.	An aerial transmission line would result in adverse impacts due to some removal of private lands for use as the transmission corridor if non-Federal hydropower is developed. No impact is expected if the transmission line is buried.	No impact expected.
Energy	The existing Wynoochee Dam provides the opportunity for hydropower development.	May contribute approximately 35,900 MW hours of energy to the Grays Harbor area.	Contributes 36,900 MW hours of energy to the Pacific Northwest.
OTHER SOCIAL EFFECTS			
Esthetics	Plan area setting includes evidence of man's impact on the landscape combined with the natural character of the rain forest, steep canyon gorges, and the Wynoochee River.	Short-term effects during potential construction of non-Federal hydropower. Long-term effects due to powerhouse, switchyard, and transmission line.	Short-term effects during construction. Long-term effects due to hatchery, satellite fish station, switchyard, and by hatchery operation resulting in low flows in the reach of Wynoochee River between existing overflow weir and hatchery outlet in certain times of the year and ponding in reach between dam and existing weir. Instream flows will be determined during FP&E. Terrestrial esthetic impacts would be reduced by vegetation plantings. A buried transmission line would have minimal esthetic impact.
Energy Requirements and Energy Conservation	Both structural and conservation methods are considered necessary to relieve the potential energy deficits in the Pacific Northwest.	Would contribute energy to Grays Harbor area and provide station power to existing dam if non-Federal hydropower is developed.	Would provide station power to the existing dam and proposed fish hatchery. The energy requirement of this alternative is minimized by use of a gravity feed water supply pipeline to the hatchery instead of pumping water directly from river at hatchery site.
Land Use	Land use in plan area consists primarily of national forest, logging, and the Wynoochee Lake project.	Extent of impact would depend upon transmission line alternative.	Construction of fish hatchery would result in a change in land use classification of the hatchery site from its current designation under the U.S. Forest Service timber management plan of "visual variety A." Powerhouse, switchyard, and a buried transmission line would have minimal

SECTION 3. AFFECTED ENVIRONMENT

3.01 Study and Plan Areas. The study area for the Wynoochee hydropower/fish hatchery study is the Chehalis River Basin and Grays Harbor area in west central Washington. This area includes the Wynoochee River Basin and the plan area in the immediate vicinity around the Wynoochee Dam, 35 road miles north of Montesano, Washington (refer to paragraphs 1.03 and 1.04 and figures 1 and 2 of the feasibility report). Wynoochee Dam, constructed from 1969 to 1972, is a concrete and earthfill dam at river mile (R.M.) 51.8 of the Wynoochee River, a tributary of the Chehalis River in Grays Harbor County, Washington.

3.02 The satellite fish station included in the recommended plan would most likely be located in the upper Chehalis River Basin. A potential location within the Chehalis River Basin for the satellite fish station is on the lower Skookumchuck River. The detailed design and siting of this facility would be accomplished during PP&E when the details of the hatchery and its management are formulated through coordination with resource agencies, Indian tribes, and other interested parties. Anadromous fish runs in other streams within the Chehalis River and Grays Harbor watershed could be improved through a program involving outplanting of Wynoochee hatchery-reared salmon and steelhead. The exact rivers where fish would be planted and the numbers per plant would be determined as part of the development of the hatchery management plan. Refer to paragraph 4.09j of the feasibility report, paragraph 2.02b(1) and (2) of the EIS, and section 3 of appendix H, for additional information regarding the satellite fish station.

3.03 Environmental Conditions. The Wynoochee River originates on the southern slopes of the Olympic Mountains within the Olympic National Forest. At R.M. 62, it plunges over Wynoochee Falls and meanders approximately 5 miles before entering the full pool reservoir area of the Corps of Engineers' Wynoochee Lake project at R.M. 57.2. Downstream of the dam, located at R.M. 51.8, the river flows through alternating gorges and open brushy bottomland and at R.M. 27 opens into a 1/2-mile-wide valley. The lower mile of the river crosses the Chehalis River flood plain and is under tidal influence. The confluence of the Wynoochee River with the Chehalis River is approximately 13 miles upstream of the mouth of the Chehalis River which flows into Grays Harbor.

3.04 The reach of the Wynoochee River in the plan area lies within the boundaries of the Olympic National Forest. Water within this reach is regulated by Wynoochee Dam for provision of water supply for the Aberdeen-Hoquiam industrial area in Grays Harbor, for irrigation of Wynoochee Valley farmland, for winter flood control, and for fish enhancement measures. The surface water quality is classified as Class AA (stipulating management of the water resources quality for potable water use, fishing, swimming, and fish and shellfish reproduction and rearing) by the State of Washington.

3.05 Vegetation of the area is that typical of a northwestern rain forest, with western hemlock being the climax species and Douglas fir the subclimax species. Wildlife includes a diversity of mammalian species, including Roosevelt elk, Columbia black-tailed deer, and numerous bird species, including the bald eagle, federally listed as threatened in Washington State. Anadromous fish that spawn in the Wynoochee River include coho, fall chinook, and chum salmon; and cutthroat and steelhead trout, contributing to the commercial, Indian, and sport fishery in the region. Spring chinook salmon utilized the river at one time; however, the run is now nearly nonexistent. Resident fish include cutthroat and rainbow trout and whitefish. Suckers, squawfish, and other nongame species are also present. An average of about 5,000 coho salmon, 2,500 chum salmon, 2,000 fall chinook salmon, 4,300 steelhead trout, 3,300 searun cutthroat trout, and a few spring chinook salmon enter the Wynoochee River annually. Chum salmon spawn primarily in the lower 40 miles of the river. Spring chinook salmon spawn in the main river above the Wynoochee Lake project. (About eight spring chinook were seen in the first year of operation of the Wynoochee fish collection facility; then the run dropped to zero. In 1979, spring chinook were again seen at Wynoochee, returning from hatchery plants made by the WDF.) Approximately 75 percent of the fall chinook salmon spawn in the lower 40 miles of the river, with the remaining spawning in the lower reaches of Carter and Shaefer Creeks. Steelhead and searun cutthroat trout spawn in the main river and tributaries from tidewater to the upstream limit of migration at R.M. 62 above Wynoochee Dam. Lands in the vicinity of the plan area are primarily owned and managed by the USFS for recreation, wildlife, and timber production.

3.06 Significant Resources.

a. Physical Features of the Plan Area. The most significant physical features of the plan area are the Wynoochee River and the Wynoochee Lake project. The present topography of the area has resulted from a long period of erosion by the river forming a deep rock canyon, and from the dam which impounded the river to create a 1,170-acre lake. The func-tioning of the Wynoochee River and Wynoochee Lake project contributes to the provision of significant resources to the region, including fish and wildlife habitat, water supply for industrial use and irrigation, and recreation. Preservation of the current good water quality and regulation of streamflows are essential for maintaining a balance among the various uses of the Wynoochee River. To provide for a balanced program, the existing Wynoochee Lake project includes both fish passage and operational features to reduce adverse impacts on anadromous fish runs. These features include multilevel withdrawal passages in the dam to permit selective withdrawal of water from the reservoir for temperature control and passage of salmonid smolts; a concrete overflow weir located approximately 250 feet below the dam to regulate tailwater depth to assure that downstream adult steelhead migrants exit the conduit under water to minimize injuries; and a concrete barrier dam 2.2 miles downstream of the dam where adult salmon and steelhead are

collected, transferred to fish haul trucks, and released in the river above the lake to spawn naturally. The existing Wynoochee Lake project is operated to reduce discharges in the lower reaches during winter floods, to augment natural flows during the dry summer season for industrial water supply and irrigation, and to improve fish rearing habitat and fish migration. Refer to paragraphs 1.04 through 1.06 of the feasibility report for additional information regarding the existing Wynoochee Lake project.

b. Biological/Ecological Features of the Plan Area. The most significant biological/ecological features of the plan area are the vegetation, the river, and the fish and wildlife which depend on those featuresfor their habitat. The Wynoochee plan area lies within the western hemlock vegetation zone. The canopy is dominated by mixed stands of western hemlock (the climax species) and Douglas fir, interspersed with large stands of bigleaf maple. The subcanopy is largely dominated by vine maple. The shrub layer is composed of vine maple, cascara, and snowberry in relatively open areas and is virtually nonexistent under closed canopy. The herb layer, which is relatively diverse, especially in the more open areas, is dominated by sword fern and wood sorrel. These species comprise the rain forest community which provides food, cover, and breeding sites for a variety of birds and mammals. A small sedge marsh is found within the plan area on the hatchery site. The marsh is approximately 2 acres in size and consists of open water surrounded by stands of sedges and bulrushes. Vegetation along the river's edge beyond the canyon downstream of the Wynoochee Dam consists primarily of a red alder community growing on gravel bars. Clearing of land associated with construction of the Wynoochee Lake project and with logging has resulted in opening up the canopy in some areas within the plan area and has permitted increased sunlight penetration. As a result, understory vegetation along the margins of cleared areas and along the reservoir shoreline has increased. This transition vegetation is diverse in plant life supportive to wildlife.

At present, there are both resident and migratory elk and deer in the plan area, which forms a complete range, having summer, spring, fall, and winter food supplies mixed with protective cover and water. As part of the Wynoochee Lake project, approximately 1,030 acres of rangeland are maintained as mitigation for elk and deer habitat lost by formation of Wynoochee Lake. Bald eagles have been sighted in the plan area during 9 months of the year; most sightings have been during the winter. Bald eagles may be feeding on spawned-out fish carcasses, particularly those in the reach of the river available to anadromous fish. The nearest reported active nest is located in the Olympic National Forest along a tributary of the Middle Fork Satsop River, about 10 miles from the existing Wynoochee project. A pair of bald eagles has frequently been sighted in the vicinity of Little River, about 5 miles south of the reach of the Wynoochee River within the plan area. The pair is suspected to be nesting in the area, but no nest has been reported. Only one night roost is known from the general vicinity and it is located on the Skokomish Indian Reservation about 20 miles east of the plan area.

The operation of Wynoochee Dam guarantees higher summer flows in the river downstream of the damsite than those under natural pre-Wynoochee Dam conditions. To mitigate the blockage by the dam of anadromous fish runs up the Wynoochee River, coho and spring chinook salmon and steelhead and cutthroat trout are collected 2.2 miles downstream of the dam at R.M. 49.6, trucked upstream, and released to spawn naturally in the river above the Wynoochee reservoir. Upstream migration is naturally blocked at R.M. 61 by Wynoochee Falls. Downstream passage facilities are included in Wynoochee Dam. Studies by WDG, WDF, and the Corps of Engineers have shown the runs of anadromous fish have declined since construction of the dam. Accordingly, the state agencies have requested improved mitigation. However, further negotiations have been deferred because, as mutually agreed, the proposed fish hatchery would fully mitigate fish runs to the pre-Wynoochee Lake project condition.

In addition to mitigation for the blockage of anadromous fish runs, the Wynoochee Lake project also included mitigation for the loss of steelhead spawning habitat due to inundation by the reservoir. To provide for that mitigation, the Flood Control Act of 1962 (Public Law 87-876), as amended by Public Law 93-251, dated 7 March 1974, authorized the Corps of Engineers to transfer to the State of Washington, as part of the costs for the existing Wynoochee Lake project, "an amount not to exceed $696,000 for construction of fish hatchery facilities for prevention of loss of natural spawning areas for anadromous trout occasioned by the project construction." Since there was no appreciable spawning of salmon within the inundated area of the reservoir, there was no mitigation for salmon. The WDG is responsible for fulfilling the mitigation agreement for steelhead by developing and operating hatchery facilities to release sufficient steelhead smolts to increase the number of returning adult fish by 1,700 fish over the natural run. Problems in obtaining water supply have arisen which have prevented the intended expansion of the Aberdeen hatchery by the WDG, and only interim measures to produce steelhead have been undertaken. To date, the WDG has implemented temporary rearing pens in Lake Aberdeen for rearing a portion of the steelhead necessary to mitigate for the existing Wynoochee Dam.

c. Historic and Prehistoric Features of the Plan Area. In 1966, a cultural resource reconnaissance was conducted of the existing Wynoochee Lake project site. On 17 June 1980, a reconnaissance of the Wynoochee hydropower/hatchery plan area was conducted by the Corps of Engineers. Neither reconnaissance found evidence of prehistoric or historic cultural resource sites. Further, a letter dated 20 June 1980 from the Deputy State Historic Preservation Officer (see appendix B) indicated that no archeological or historic resources within the plan area are listed on the National or State Registers of Historic Places or the State Inventory of Historic Places.

d. Socioeconomic Features of the Plan Area. Significant socioeconomic features of the plan area include its timber production potential and the regulation of the river by the Wynoochee Dam for a variety

of human uses, including recreation, flood control, irrigation, and industrial water supply. No use of the river is made for domestic water supply. Both raw timber and water supply are provided by the plan area for the Aberdeen-Hoquiam industrial area which is dominated by the forest products industry. Salmon which migrate through the plan area contribute to the commercial and sport fisheries in the Pacific Ocean, the commercial gillnet fishery in Grays Harbor, and the Indian and sport fisheries in the Chehalis and Wynoochee Rivers. The steelhead and searun cutthroat trout contribute to the Indian and sport fisheries in the Chehalis and Wynoochee Rivers and resident fish contribute to the sport fishery in the Wynoochee Valley.

Downstream of the plan area, the flood plain of the Wynoochee Valley consists of some of the most productive bottomlands in Grays Harbor County. Wynoochee Dam can provide up to 35 c.f.s. for future irrigation needs. The dam also provides an opportunity for hydropower development.

Within the plan area, provision for recreation activities such as dam visitation, camping, picnicking, boating, swimming, and trails has been made. The esthetic setting of the plan area consists of evidence of man's impact on the landscape, including the Wynoochee Dam and support facilities, a campground and trail system, paved roads, and logging, combined with the natural undeveloped character of the rain forest, steep canyon gorges, and the Wynoochee River.

SECTION 4. ENVIRONMENTAL IMPACTS OF FINAL ALTERNATIVE PLANS

4.01 Alternative Plan 1: No Action. Under the no-action plan, there would be no Federal hydropower or enhancement fish hatchery development at Wynoochee Dam. There is a possibility of non-Federal hydropower development at Wynoochee Dam as discussed in paragraphs 3.06a and 5.03h of the feasibility report; however, there is no expressed non-Federal interest at this time. Energy conservation programs and renewable resources development by public and private utilities and state and local governments would continue. Fish habitat improvement measures and fishery management by state fisheries agencies would also continue. Although the enhancement fish hatchery site has been recognized as a quality site by non-Federal entities, there are no proposals for complete non-Federal development of an enhancement fish hatchery at Wynoochee Dam. Without a major enhancement program, fish runs are expected to remain status quo or to show only minor improvement within the Chehalis River Basin with resulting impacts on the available commercial, Indian, and recreational fisheries and potential annual economic losses in harvest value.

4.02 Alternative Plan 2: Combined Underground Hydropower and Enhancement Fish Hatchery (National Economic Development Plan/Environmental Quality Plan/Recommended Plan).

a. Physical Impacts and Their Significance.

(1) Air Quality, Noise, and Traffic. Increased noise and exhaust emission levels are unavoidable during project construction. Construction activities, including heavy equipment operation, stripping, stockpiling of soil materials, and clearing and disposal of vegetation, would cause temporary impacts to air quality due to exhaust emissions and dust. These impacts are of short duration and are not considered significant. Dust would be minimized by sprinkling haul roads and construction areas with water, as necessary.

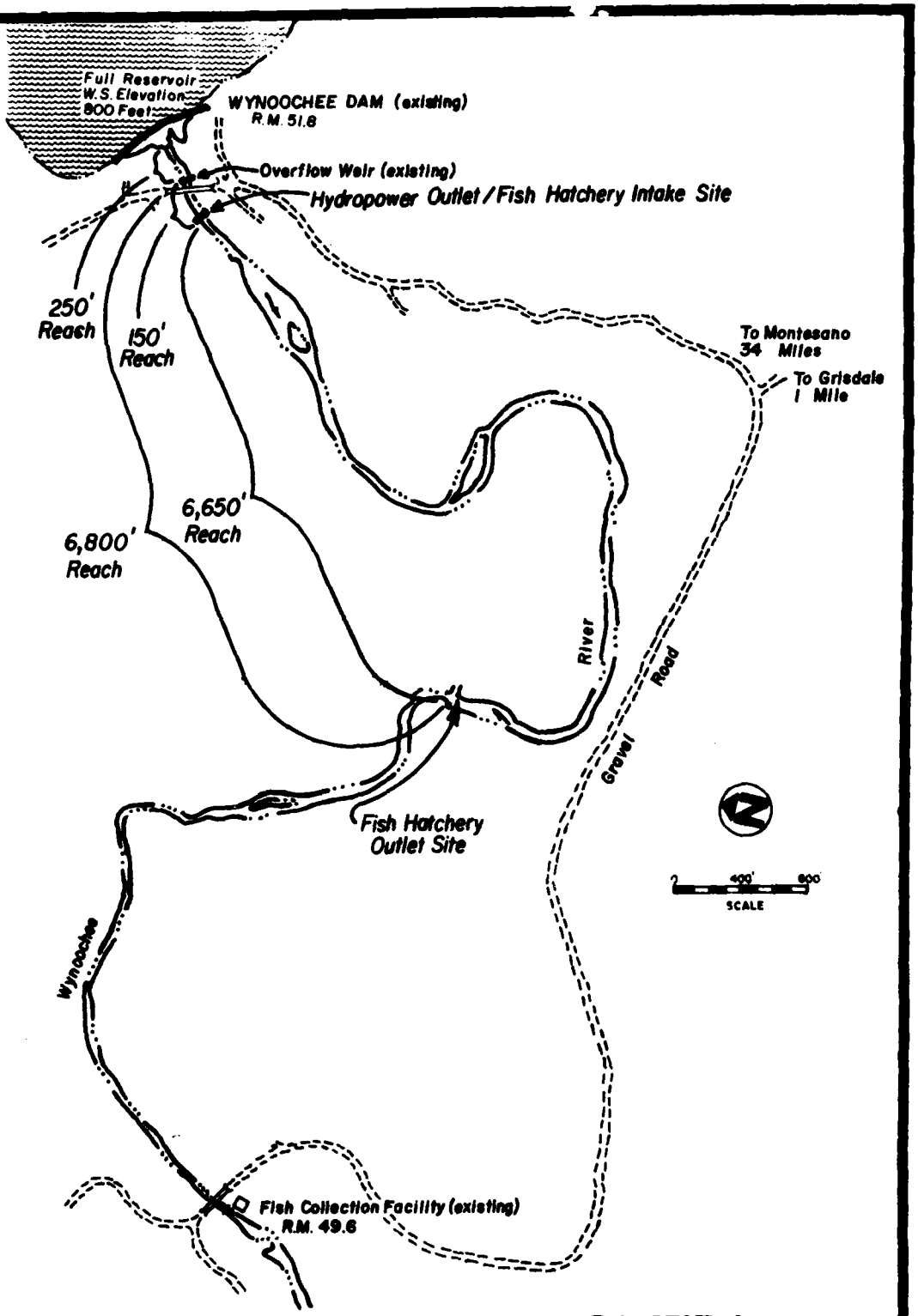
The completed plan would result in long-term permanent increases in noise levels and traffic due to operation activities, residences in the plan area, and increased recreational fishery; however, the impacts that would be imposed upon existing activities in the area are not expected to be significant. Further, any noise from the project would be buffered by the surrounding rain forest. Minor long-term impacts to air quality from exhaust emissions and dust associated with increased vehicular activity in the plan area would result from plan implementation. Continued coordination with the USFS and Simpson Timber Company regarding road easements and use standards during project design and construction should minimize any short-term construction and long-term project operation-related impacts to traffic movement in this area of the Olympic National Forest. The existing access road to the hatchery site would be improved and utilized for access to the hatchery.

(2) Water Quality and Supply. The Wynoochee hatchery is designed for a water supply of 190 c.f.s. Except for the months of May and June, 190 c.f.s. is the operational minimum flow from the existing Wynoochee Dam. In May and June, the operational minimum flow may drop to 140 c.f.s. However, no constraints on hatchery operation due to the potential water supply reduction from 190 to 140 c.f.s. have been identified by the fisheries agencies because flexibility in hatchery operation would allow for reduced water supply during May and June. The powerhouse is designed to utilize the 190/140 c.f.s. minimum flow from the existing project up to a hydraulic capacity of 1,200 c.f.s. Water supply to the hatchery and the operation of the powerhouse would not result in a change to the existing operational mode of Wynoochee Dam. River discharge frequency in the Wynoochee River would not change from existing conditions. The powerhouse would operate as a baseload plant and would not be operated for peaking. Accordingly, there is no anticipated stranding of juvenile fish from river fluctuations due to operation of the powerhouse.

Discharge from the reservoir that is not passed through or around the powerhouse would be discharged from the existing dam's spillway, sluiceways, and/or multilevel outlets. Flows from the powerhouse that are not passed to the hatchery would be discharged to the Wynoochee River via a tailrace tunnel structure located about 400 feet downstream of Wynoochee Dam. The existing concrete overflow weir in the river just upstream of the powerhouse tailrace would assure water in the river between the main dam and the weir. The water supply system to the hatchery is designed with an intake structure at the hydropower outlet, which is supplied with water from the powerhouse and dam discharges. Accordingly, should the powerhouse be shut down for any reason, water supply to the hatchery would not be interrupted.

Due to the diversion of up to 1,200 c.f.s. of reservoir releases to the hydropower facility, the water in the 250-foot reach (refer to figure EIS-1) of the Wynoochee River from the dam to the existing weir would be ponded rather than flowing when releases from the reservoir are 1,200 c.f.s. or less and that quantity is discharged through the powerhouse. This condition would occur in the late spring through summer months and could last throughout the entire year. As a result of ponded conditions, chemical elements and biological organisms would increase, although some dilution would be expected as a result of seepage from the reservoir. When the reservoir release exceeds 1,200 c.f.s. and the water is forced out of the ponded area and into the mainstream of the Wynoochee River, the temperature and dissolved elements would be rapidly diluted and would have no significant impact on the overall water quality of the reach of the Wynoochee River between the dam and the hatchery outlet and no measurable impact on the ambient hatchery outflow conditions.

Flows in the Wynoochee River in the 6,800-foot reach (refer to figure EIS-1) between the existing overflow weir (located approximately 150 feet upstream of the hydropower outlet/fish hatchery intake structure) and the hatchery outlet could become extremely low should the full



WYNOOCHEE HYDROPOWER/ FISH HATCHERY PLAN AREA

(Showing Referenced River Reaches)

FIGURE EIS-1

complement of water (190/140 c.f.s.) be supplied to the hatchery during a time of minimum discharge (190/140 c.f.s.) from the reservoir.1/ The critical period when discharge from the reservoir may only be 190 c.f.s. is April through September; the critical period when discharge could drop to 140 c.f.s. is May through June. During the spring refill period (April-May) for the reservoir, the Grisdale streamgage located 2,000 feet downstream of Wynoochee Dam appears to record approximately 20 c.f.s. more streamflow than the Wynoochee Lake project releases according to operational controls. This flow is probably due to groundwater inflow from seeps and springs. Because of this flow, it is generally not anticipated that the reach of the river between the existing overflow weir and the hatchery outlet would be dry should the supply to the hatchery ever equal the total discharge of the powerhouse. During extremely low flow periods, under the "worst case" condition of no flow in the reach between the existing overflow weir and the outlet other than the 20 c.f.s. probably due to groundwater springs and seepage, the river would resemble a small channel with a wide gravel and rock streambed and pools possibly formed in shallow holes, providing habitat for a small aquatic community of algae and invertebrates. Any shallow water communities would be scoured as soon as reservoir releases are increased. The low flow condition would be temporary and of short duration and would not be expected to result in significant impacts from nuisance algal growth, odor problems, or low dissolved oxygen levels. Some stranding and subsequent mortality of resident fish could occur during a reduction in stream discharge. Decomposition of fish carcasses would cause some minor organic nutrient loading to the river. Any contribution would be diluted in the Wynoochee River below the hatchery outlet.

In addition to low flows when the full 190/140 c.f.s. minimum discharge from the reservoir is supplied to the hatchery, the 150-foot reach (refer to figure EIS-1) between the existing overflow weir and the hydropower outlet/fish hatchery intake structure would be receiving no discharge from the Wynoochee Dam when releases from the reservoir are 1,200 c.f.s. or less and that quantity is diverted to the powerhouse. This condition could potentially occur throughout most of the year. During times when the minimum discharge from the reservoir may be 190/140 c.f.s. (April through September), the 150-foot reach could receive some inflow from ground water springs and seepage. During times when minimum reservoir discharge exceeds 190 c.f.s. and all reservoir releases (up to 1,200 c.f.s.) are diverted to the powerhouse, any flow above 190 c.f.s. would be released to the river at the hydropower outlet/fish hatchery

1/Throughout Section 4 of the EIS, instream flow impacts are discussed for the total hatchery (Phase I and Phase II). Prior to construction of the second phase, up to 20 years after the first phase, an additional 55 c.f.s. (Phase II water supply) would be available in the reach between the hatchery intake/powerhouse outlet and the hatchery outlet during periods of time when minimum discharge from the dam is 190 c.f.s. During periods when the minimum discharge is 140 c.f.s., something less than 55 c.f.s. would be available depending upon the operation of the hatchery. Therefore, during Phase I, impacts would be less than those described for the full hatchery development.

intake structure and would create a backwater effect in the 150-foot reach. It is, therefore, expected that impacts associated with lowflows in the 150-foot reach would essentially be the same as those associated with low flows in the 6,650-foot reach (refer to figure EIS-1) of the Wynoochee River from the hydropower outlet/fish hatchery intake structure to the hatchery outlet. For purposes of impact discussion, the 150-foot reach plus the 6,650-foot reach are treated as one 6,800-foot reach from the existing overflow weir to the hatchery outlet.

Coordination has been ongoing with the State of Washington including the Washington Department of Ecology (WDE), WDF, and WDG regarding the instream flow issues in the above referenced 6,800-foot reach. The determination of an instream flow requirement is based primarily on fish, wildlife, navigation, recreation, water quality and esthetic considerations. In this case, another consideration in determining an instream flow would be the impacts of any flow requirement on the hatchery operation and production capability. Until the hatchery details and management are determined in PP&E, establishment of an instream flow would be premature and could have jeopardized making full use of the available water supply in design of the hatchery in the feasibility planning stage. WDG, WDF, and WDE have agreed that instream flows for the reach of the Wynoochee River between the Wynoochee Dam and the hatchery outlet would be determined during PP&E. Refer to section 2 of appendix H for additional details regarding the instream flow analysis performed for the Wynoochee hydropower/fish hatchery plan.

As presented in section 1 of appendix H, the water quality of the Wynoochee River in the plan area is good and very suitable for a hatchery water supply. During the project construction period, water quality would be impaired. Construction of the powerhouse intake and outlet structures would result in short-term, localized increases in suspended sediment and turbidity in the reservoir and river in the area of the construction site. The powerhouse intake structure would be sited on a bench at elevation 720 feet on the right bank adjacent to the upstream side of the dam. For ease of construction and to minimize impacts to water quality, the reservoir level would be drawn down to elevation 720 feet (note that low pool is 700 feet and full pool is 800 feet) and the powerhouse intake constructed in the dry. The intake facility would be made from precast structures to minimize the time of construction and time the reservoir would be drawn down. The drawdown for construction of the intake structure would not jeopardize meeting minimum flows in the river. A cofferdam would be used for construction of the powerhouse outlet structure to minimize impacts to water quality.

Short-term localized increases in suspended sediment and turbidity would occur in the Wynoochee River during instream construction of the hatchery supply pipeline and the hatchery outlet channel. Surface water runoff from the hatchery construction site may also cause an increase in turbidity of the river. Although increases in turbidity may result in exceeding the Washington State water quality standard, the effect on water

quality is not considered significant due to the short-term, localized nature of the impact. The construction contractor(s) would be required to utilize methods which would minimize turbidity. Cofferdams would be used for instream construction of the hatchery supply pipeline crossings and the hatchery outlet channel. Pursuant to Section 404 of the Clean Water Act of 1977, a water quality and ecologic evaluation of the proposed construction activities involving fill into waters of the United States and adjacent wetlands has been accomplished and has identified no significant environmental effects resulting from instream construction activities (refer to Section 404(b)(1) evaluation in appendix A). A Section 404(r) exemption for hydropower/fish hatchery features will be obtained to meet the requirements of the Clean Water Act. Any necessary Section 404 actions required for construction of the satellite fish station would be accomplished during PP&E when siting and detailed design of such a station are conducted.

The powerhouse intake would be a multilevel intake structure to maintain the existing project water temperature control capability from reservoir releases. The hatchery effluent could affect water quality of the Wynoochee River. With the hatchery, organic waste solids consisting of fecal material, dead fish, and unconsumed food and debris would increase the biochemical oxygen demand of the effluent receiving waters. Nitrogen and phosphorus residue from the feed used may also cause an increase in those constituents in the effluent receiving waters. The cumulative effect may be an increase in aquatic productivity and an alteration in the aquatic benthic community in the area near the effluent outlet. The impact may be beneficial because aquatic productivity in the river is rather low naturally.

As a plan feature of the hatchery, a pollution abatement pond would be constructed for treatment of the water from the raceways and rearing ponds during cleaning. The chemotherapeutics that are routinely used as drips or baths at hatcheries include potassium permanganate ($KMnO_4$), Hyamine 3500 (a quaternary ammonium compound), formalin, and diquat (a herbicide). Use of diquat could potentially result in some loss of aquatic vegetation downstream of the hatchery outlet; however, this would not be expected to occur if label requirements for use are followed. Additionally, when chemotherapeutics are used in large doses, the waters would be routed to the pollution abatement pond.

The hatchery would be operated to meet the effluent limitations established by the EPA for suspended and settleable solids, and the limitations for other parameters (biological oxygen demand, nitrates, ammonia, fecal coliforms, etc.) as determined by the WDE in cooperation with the WDG and WDF. Water quality monitoring would be accomplished at the outlet, and if allowable limits were approached, provision would be made for treatment of the effluent water prior to release to the river.

The carcasses of returning adult salmon and steelhead used for spawning or surplus to spawning needs would be sold commercially under WDG and

WDF policies or disposed of in an approved landfill. Funds received by the state from the sale of fish carcasses would be specifically used for the improvement of anadromous fish runs in the Chehalis River basin. These procedures, as required by Federal law, would preclude impacts to the water quality of the Wynoochee River. All domestic wastes from the hatchery and residences would be treated by a septic tank system. The powerhouse would not need to have its own septic tank due to its proximity to the existing visitor center restrooms and septic tank. Water uses downstream of the project are fish spawning and rearing, irrigation withdrawals, and industrial water withdrawal by the city of Aberdeen. No municipal or irrigation water withdrawals are presently in existence or planned. There would be no expected mosquito breeding or other vector problems associated with the fish hatchery ponds.

(3) Mineral Resources. The recommended plan would have no significant impact on any known mineral resources. According to the Bureau of Mines, the general location of the hatchery suggests that the site may contain placer gold. This possibility would be investigated in PP&E and, should gold be found in economically valuable concentrations, its removal by private industry may be permitted prior to hatchery construction.

Local borrow sources would be utilized for construction of the recommended plan and would not be significantly depleted. The fish hatchery site would serve as a source of concrete aggregate for the construction of the hydropower facility. Riprap for the area of the hatchery site subject to severe erosion (see plate 2) may be obtained from a nearby quarry 0.5 mile west of the Wynoochee Dam. Approximately 20,000 cubic yards of rock from excavation can be disposed of in the concrete aggregate borrow excavation and/or used for site grading at the fish hatchery site. To the extent possible, precast structures would be utilized in construction of the plan.

b. Biological/Ecological Impacts and Their Significance.

(1) Vegetation. The construction site for the underground powerhouse is under the existing visitors parking lot for the Wynoochee Dam. Accordingly, construction of the powerhouse would result in negligible removal of natural vegetation. Construction of the surface switchyard would also result in negligible impact to vegetation. Should temporary staging and stockpiling areas result in removal or disturbance of natural vegetation, the areas would be planted after use with plant species of high wildlife value.

The 22-mile buried power transmission line would be placed within the existing power right-of-way adjacent to Donkey Creek Road from Wynoochee Dam to the Promised Land substation near U.S. Highway 101. Vegetation along the road is Olympic rain forest, large areas of which are managed forest lands and have been disturbed by logging practices. The buried transmission line would result in minor loss of vegetation and is considered the least environmentally damaging transmission line alternative. An alternative aerial line designed to minimize vegetation losses

to the extent possible would require clearing of an approximate 12- to 15-foot corridor along Donkey Creek Road and topping or selective removal of adjacent danger trees. Preliminary estimates are that a maximum of 25 percent of the 22-mile route from the dam to the substation would be located away from the road. Using a design to minimize vegetation losses, it is estimated that an 83-foot corridor or approximately 99 acres of forest would be cleared. Measures to reduce the impacts of this lost habitat could include planting within the corridor to accelerate habitat restoration. The USFS values the timber resource losses associated with taking forest land out of production as approximately $28,000 per mile per year. Refer to the EIS summary and paragraph 2.01b(2) of the EIS for additional information regarding the transmission line.

Construction of the hatchery and appurtenant facilities (e.g., residences) would result in the loss of approximately 55 acres (50 acres at the hatchery site; 5 acres along the pipeline corridor) of Olympic rain forest vegetation consisting of two primary vegetation associations: (1) bigleaf maple (Acer macrophylum)/western hemlock (Tsuga heterophylla) and (2) bigleaf maple/sword fern (Polystichum munitum). Due to selective logging of the area in the past, the hatchery site provides a more diverse habitat than a typical mature western rain forest in which the screening effect of hemlocks and bigleaf maples effectively prevents sunlight from reaching the forest floor and thus prevents the growth of a diverse understory. The hatchery would be constructed adjacent to the Wynoochee River on a low elevation bench forested predominantly by deciduous bottomland species. Away from the river at higher elevations next to the hatchery location, vegetation is principally mature coniferous forest. The USFS has classified the area of the hatchery location as old growth forest.1/ The project associated loss of habitat at the hatchery site would adversely impact the local wildlife community as well as the migratory big game which utilize the hatchery site as winter range.

To the extent possible, hatchery plans would be designed to reduce the loss of vegetation, including use of the existing access road to the site. The 2,400-foot pipeline from the powerhouse to the hatchery would be buried, minimizing its permanent impact on vegetation. A specific revegetation plan would be developed during PP&E for the hatchery grounds, pipeline corridor, transmission lines, and any other areas disturbed by the hydropower/fish hatchery plan. A suggested listing of plants high in wildlife value for use in revegetating disturbed areas is presented in table EIS-1. Further, the construction contractor would be required to replace vegetation losses in temporary construction easements. The satellite fish station would require approximately 5 acres for its construction. The specific impact of this construction on vegetation would be assessed during PP&E when the exact location of the station is determined.

1/Old growth forest is defined by USFS (Shelton Ranger District) as a stand of trees dominated by coniferous trees which are an average age of 334 years old. Stands will usually contain a multilayered canopy and trees of several age classes.

Wetland areas occur within the hatchery site and vicinity. The ponds and other hatchery facilities, including the satellite fish station, would be sited to avoid wetland areas to the extent possible. Construction of some of the hatchery ponds would result in the probable loss of a 2-acre sedge marsh or 0.2 percent of the total acreage of wetlands estimated in the Wynoochee drainage. The impacts resulting from this loss are not considered to be significant. During PP&E, the possibility of enlarging the proposed settling pond and allowing natural wetland vegetation to establish will be examined.

The aquatic benthic community in the Wynoochee River near the hatchery effluent outlet would be expected to change as a result of increased aquatic productivity (refer to paragraph 4.02a(2) of the EIS). This impact may be beneficial because the aquatic productivity in the river is rather low naturally. Impacts of hatchery effluent on surface waters and aquatic vegetation would be monitored as previously discussed. During low flow periods, aquatic habitat in the 6,800-foot reach between the existing overflow weir and the hatchery outlet would be reduced. In terms of the total productivity of the system, this would not result in significant impacts.

(2) Wildlife. Project-related impacts to wildlife would result from temporary disruption during construction of the powerhouse, switchyard, transmission line, pipeline, satellite fish station, hatchery, and associated facilities and from long-term permanent changes in habitat. Wildlife usage at the underground powerhouse and switchyard sites is negligible and any impacts from construction would be negligible. Impacts to wildlife from construction of the buried transmission line would not be significant. The buried line would be designed to minimize environmental impacts to the extent possible and construction techniques would be utilized that avoid or minimize environmental damage. Where permitted, revegetation of the transmission line would be accomplished. Both beneficial and adverse wildlife impacts would occur from an alternative aerial transmission line. Adverse impacts would result from the loss of habitat associated with clearing for the transmission corridor with subsequent impacts on local wildlife populations. Beneficial impacts would result from opening up the forest canopy and providing increased forage for big game mammals, such as deer and elk. Reestablishment of some vegetation could be accelerated by planting within the corridor. Adverse impacts to big game could result from attraction of these animals to the corridor along the Donkey Creek Road with a potential for an increase in road kills.

During construction, the removal of vegetation and other activities would drive away most resident wildlife species at the hatchery site and within the pipeline corridor. Losses of habitat at the hatchery site would total approximately 50 acres of rain forest, including 2 acres of sedge marsh. Five acres of habitat would be lost due to construction of the water supply pipeline; however, the pipeline would be buried and the corridor revegetated with rapid growing plants of high wildlife value (see table EIS-1).

Usage of the hatchery site by big game mammals (i.e., deer and elk) would be adversely impacted due to loss of habitat with potential resulting decreases in numbers of both resident and migratory populations. The USFS has classified the area of the hatchery site as elk winter range and has expressed particular concern for the losses of elk habitat associated with construction of the fish hatchery. The elk population in the Shelton Ranger District is currently thought to be limited by the carrying capacity of the winter range below 1,500-foot elevation, which is further limited by the amount of old growth, the preferred winter habitat. A specific analysis was performed to determine the extent of the impact to elk winter range from construction of the Wynoochee hydropower/fish hatchery plan. The significance of the impact was examined on a local (Wynoochee drainage[1/]) as well as a Shelton Ranger District-wide[2/] basis. For the purposes of this analysis, an estimate of 50 percent of the hatchery site or 25 acres has been considered old growth, or critical elk winter range. Two to three small bands of elk (approximately 10 elk total) are estimated to utilize the area of the hatchery site as part of their winter range, although no specific population studies have been performed. The loss of 50 acres of elk winter range represents 0.3 percent and 0.1 percent of the estimated winter range in the Wynoochee drainage basin and Shelton Ranger District, respectively. The loss of 25 acres of old growth represents 0.4 percent and 0.2 percent of the critical winter range in the Wynoochee drainage basin and Shelton Ranger District, respectively. Without mitigation, the loss of winter range would eliminate elk use of the hatchery site.

According to the USFS, an additional 100 acres of winter range would be secondarily impacted by the increased human and vehicular disturbance associated with the hatchery complex. The impact would be an expected reduction in use of the area by elk. Under the existing condition, the hatchery site lies within areas of secondary impact as a result of the Wynoochee Lake project, the existing hatchery site access road, and the recreational use of the site. The construction of the hatchery would contribute to the reduced availability of the habitat surrounding the hatchery site to some unknown extent. Secondary impacts would be minimized by planting a vegetative buffer zone (blackberry/multifloral rose combination) around the hatchery complex and, where possible, by leaving stands of trees in wind-firm areas.

Considering both primary and secondary impacts, the total elk impact area associated with hatchery construction would be 150 acres or 1.0 percent and 0.4 percent of the total winter range in the Wynoochee drainage basin and Shelton Ranger District, respectively. In the context of the overall carrying capacity of the Shelton Ranger District and the Wynoochee drainage basin, impacts to elk winter range may not be significant. However, as logging of winter range continues over the next

1/Total Wynoochee drainage is 37,649 acres.
2/Shelton Ranger District of the Olympic National Forest is 112,874 acres administered by the USFS and consists of the Wynoochee and Skookumchuck River Basins.

10 years in the Shelton Ranger District and the availability of critical winter range becomes greatly reduced, the impact to elk of losing the hatchery site may increase in the future. In addition, the flat bottomland habitat of the hatchery site is high quality winter habitat for elk and has a higher carrying capacity than the steeper side slopes which is also considered elk winter habitat. Therefore, loss of the habitat on the hatchery site is more significant than an overall calculation of average winter habitat loss would indicate. To partially mitigate for the habitat-related losses of elk habitat associated with construction of the fish hatchery, two 2-acre elk pastures are included in the recommended plan. These pastures would be planted with species of high food value to elk and would serve to provide a winter food source. The pastures would be located adjacent to the hatchery and would be maintained by hatchery personnel. The exact siting of the pastures and the planting scheme would be developed during PP&E. For additional detail regarding the elk impacts, refer to section 4 of appendix H.

Some wildlife usage (e.g., songbirds, small mammals) would return at the hatchery site following construction; however, the total habitat provided would be reduced, and to some unknown extent, the resident wildlife populations would be decreased. Additionally, increased human disturbance due to residences, project operation, and traffic would permanently affect the use of the hatchery site by wildlife. To reduce adverse impacts to wildlife usage, a vegetation barrier would be planted along the hatchery edge. WDG has suggested that a blackberry/rose vegetation zone be planted and maintained. The detailed planting plan for the buffer zone would be developed during PP&E. Although local wildlife populations would be reduced due to the project, the continued existence of the impacted species in the plan area would not be jeopardized by these losses.

Wildlife usage in the 250-foot reach of the Wynoochee River from the dam to the existing weir is negligible, thus direct impacts to wildlife as a result of the potential ponding of this reach due to implementation of the hydropower/fish hatchery project would not be significant. Project related low flows in the 6,800-foot reach of the Wynoochee River between the existing overflow weir and the hatchery outlet would adversely impact small mammal and waterfowl populations directly through a reduction in available aquatic habitat and indirectly through a reduction in the food supply of those wildlife species that rely on aquatic organisms for their sustenance. The overall impact to wildlife populations within the plan area would not be significant. Big game mammals would not be expected to be impacted by the potential low flow condition. Fur harvest, upland-game hunting, and waterfowl hunting in the plan area are minor and would not be significantly impacted by any impacts to wildlife populations as a result of low instream flow in this reach. For additional information, refer to section 2 of appendix H.

(3) Fish. The recommended plan would result in a major enhancement of the anadromous fishery in the Grays Harbor area, Chehalis River

basin, and in the northern Pacific Ocean. It is estimated that the annual harvest from the hatchery would result in 87,000 spring chinook salmon adults (Phase I and Phase II) and 40,500 steelhead adults. Grays Harbor appears to be a fertile estuary and salmonid runs are much reduced from historical levels. A rearing and release strategy involving broad planting in terms of time, space, and species would tend to minimize any potential for causing an overload on the salmonidproducing environment from too many fish at once. Many streams could be planted from the centrally located Wynoochee site with relatively short haul distances and thus several other rivers within the Chehalis River Basin and Grays Harbor watershed could be enhanced as well as the Wynoochee River. The recommended plan includes provision for one salmon satellite fish station as discussed in paragraph 4.09j of the feasibility report and paragraph 2.02b(2) of the EIS. Adult salmon would be collected at the station and held until transport to the Wynoochee hatchery for spawning. Progeny of these fish could then be returned to the satellite fish station for rearing and imprinting and eventually released as smolts into their native stream. Some smolts could also be outplanted through a simple release program into other streams within the Chehalis River and Grays Harbor watershed. The siting and final design of this facility would be determined in PP&E by the Federal and state fish agencies in coordination with the Indian tribes and non-Indian fishing interests.

If properly planned, the release of hatchery fish could have minimal adverse impact on existing fish stocks and fisheries. Possible adverse impacts include predation by hatchery fish on native fry, competition by hatchery fish for food and/or space needed by native runs, the introduction of non-endemic diseases, and the promotion of overharvest if hatchery and nonhatchery runs overlap and are indistinguishable in the river fisheries. In response to concerns of the Federal and state fisheries agencies, the hatchery plan includes phased construction of the salmon portion of the fish hatchery, a satellite fish station within the Chehalis River basin, and the planned production of only native spring chinook salmon and steelhead in the hatchery. These features of the hatchery plan contribute to the elimination of potential disease problems associated with interregional stock transfers; reduce the potential adverse impacts of hatchery-reared fish on wild stocks; and minimize harvest management conflicts.

Phased construction of the hatchery, as discussed in paragraph 2.02b(1) of the EIS, involves initial construction of a smaller salmon portion of the hatchery to accommodate utilization of the small local population of spring chinook salmon within the Chehalis River Basin and to permit a gradual buildup of hatchery brood stock. The remainder of the salmon portion would be constructed up to 20 years later depending upon brood stock availability. The full steelhead portion of the hatchery would be constructed as part of Phase I. WDG has indicated that they anticipate no problem obtaining sufficient native steelhead brood stock for initial full development.

A potential site for the satellite fish station within the Chehalis River system is on the lower Skookumchuck River for the collection of spring chinook salmon brood stock for the hatchery and possibly to aid in the outplanting program for juvenile salmon. Some steelhead brood stock may also be collected. No steelhead rearing or release would occur at the satellite fish station.

The fisheries agencies propose to utilize the spring chinook salmon run from the Skookumchuck River, a tributary to the Chehalis River, as a source of spawning stock for the Wynoochee hatchery. The rearing of other species/strains of salmon at Wynoochee hatchery is not planned at this time because of possible impacts on wild fish runs. Steelhead, native to the Chehalis River system, are proposed for spawning stock in the Wynoochee hatchery. Native spring chinook and steelhead are the two species with minimum potential for run timing conflicts of Wynoochee hatchery released fish with native stocks. Native runs for both are so low that harvest management could effectively be designed for targeting on hatchery stocks with high terminal rates of harvest. The hatchery site is above the traditional fishing areas in the basin, thus permitting maximum harvest of the fishery. Further, the site is especially adaptable to rearing of spring chinook salmon, a highly desirable species to the fisheries agencies because production of this species would not impact management of the natural wild salmon stocks and because spring chinook salmon runs are extremely depressed. The rearing of other strains/species of salmonids would be dependent upon management plans yet to be developed by the fisheries agencies and would be the responsibility of the hatchery owner and operators. Currently, the state manages the Grays Harbor runs on a wild stock basis and expects the same philosophy to prevail in management of the Wynoochee hatchery. In general, selection of stocks should include consideration of the following concerns: (1) the need to restrict harvest rates on natural stocks to biologically optimal rates for such stocks; (2) the desire to rebuild native stocks; (3) the maintenance of the genetic integrity of wild stocks, and (4) the avoidance of the spread of disease through inter-regional stock transfers. A conceptual plan for management of the Chehalis River Basin fishery should Wynoochee hatchery be constructed has been developed with input from the state and Federal resource agencies and Indian tribes. A summary of the recommendations resulting from the conceptual plan is presented in section 3 of appendix H. The details of such a plan would be formulated during PP&E to insure maximum efficiency of the hatchery with minimal impacts on native fish stocks. Assessment of the plan's effectiveness would be part of the postconstruction monitoring program.

Potential disease problems are an important consideration in development of the hatchery management strategies and would play a critical role in the development of the hatchery design, including species/stock selection, siting of the satellite fish station, and development of the outplanting program in PP&E and throughout hatchery operation. Prophylactic measures could be implemented such as disease-free certification of

stocks brought to the hatchery and use of well-cooked fish food, as well as the appropriate control measures should a disease be contracted. In addition, the hatchery should employ a pathologist. The U.S. Fish and Wildlife Service (FWS) has recommended that baseline disease studies on any river proposed for outplanting be accomplished during PP&E. The potential for disease problems associated with the hatchery plan has been minimized by utilizing only local stocks and by restricting the satellite fish station and outplanting program to within the Chehalis River and Grays Harbor watershed thus avoiding the spread of disease through interregional stock transfers.

With implementation of the Wynoochee hydropower/fish hatchery plan, the Wynoochee Lake project mitigation program of transporting adult salmon and steelhead above Wynoochee Dam would be discontinued, resulting in the loss of the remaining natural production of salmon and steelhead upstream of the dam. As discussed in paragraph 2.02b(3) of the EIS and paragraph 4.13 of the feasibility report, mitigation for that loss as well as the mitigation obligation of WDG for steelhead under the existing Wynoochee Lake project would be part of the hatchery production. Since the mitigation for steelhead and salmon losses associated with the existing Wynoochee Lake project has not been successful, the Wynoochee hatchery offers an opportunity to incorporate that mitigation into the fish hatchery plan. Of the total estimated annual harvest contribution of 127,500 adult spring chinook salmon and steelhead that could result from the hatchery, 8,840 adults are considered mitigation fish and 118,660 adults are enhancement fish (66,860 in Phase I plus an additional 51,800 in Phase II).

The overall resident fishery in Wynoochee Lake and River system upstream of the reservoir should improve by implementation of the recommended plan due to elimination of competition between resident fish and juvenile salmon and steelhead. Under existing conditions, some resident fish (largely cutthroat trout) pass through Wynoochee Dam to the river below. With the recommended plan, some fish would be expected to also pass through the turbines of the powerhouse and, of the fish that pass through the reservoir to the downstream Wynoochee River, fewer survivals would result than under the existing conditions.

As described in paragraph 4.02a(2) of the EIS, with operation of the hatchery (Phase I and Phase II), during certain times of the year, exceedingly low flows in the reach of the Wynoochee River between the dam and the hatchery outlet would result in the loss of fish habitat. Existing fish use of the reach consists of use by resident fish species and use as a transportation corridor by juvenile anadromous outmigrants which have passed through the sluiceway or through the existing multi-level outlets in Wynoochee Dam. Adult anadromous fish are currently collected in the fish collection facility at R.M. 49.6 and transported above the dam to spawn. Resident game fish in the reach between the Wynoochee Dam and hatchery outlet are rainbow and cutthroat trout, most

of which are thought to have passed through Wynoochee Dam from the reservoir. Nongame species, such as suckers and squawfish, which are typical of those found in other Pacific Northwest streams, can be expected to occupy this reach of the Wynoochee River.

With implementation of the Wynoochee hydropower/fish hatchery plan, and subsequent termination of the anadromous fish runs above Wynoochee Dam, the reach between the dam and the hatchery outlet would no longer be utilized as a transportation corridor for juvenile anadromous outmigrants. Other than use by juvenile outmigrants, fish use of the 250-foot reach of the Wynoochee River from the dam to the existing overflow weir is negligible. Thus impacts to fish as a result of ponding in this reach under low flow conditions associated with the recommended plan would be negligible.

Under the worst case condition of no flow to the reach other than approximately 20 c.f.s. inflow probably due to groundwater springs and seepage, reduced streamflow in the Wynoochee River between the existing overflow weir and the hatchery outlet would limit resident fish populations through a reduction in available aquatic habitat. Existing resident populations are thought to be small, and although they would be locally impacted by reduced flows, in terms of the resident fish populations of the Wynoochee River as a whole, impacts would not be significant. With provision of adequate flow, the potential exists for utilizing the reach between the existing overflow weir and the hatchery outlet for spawning and rearing of anadromous fish. This potential would be investigated during the determination of instream flows (refer to section 2 of appendix H).

Construction plans for the project include development of construction methods for the powerhouse intake structure to minimize the extent and duration of lake drawdown during construction and thus to reduce downstream effects on the fishery and aquatic ecosystem from low discharge during construction. Accordingly, the impact to the fishery and aquatic ecosystem would be minor. Use of cofferdams to construct the hydropower outlet/hatchery intake structure and for placement of the water supply pipeline where it crosses the Wynoochee River would have temporary impacts on resident fish. As discussed in paragraph 2.02b(2) of the EIS, the plan is designed to insure a failsafe water supply to the hatchery. The operation of the plan for hydropower would be subordinate to all project purposes, including fish production. For additional detail regarding construction and operation activities, refer to paragraphs 4.17 through 4.22 of the feasibility report.

(4) Threatened and Endangered Species. The only threatened and endangered species known to occur in the plan area is the American bald eagle, whose use of the area as a wintering habitat has been observed (refer to letter dated 23 January 1981 from FWS, appendix B). Operation of the recommended plan could potentially affect the eagle in at least two ways: (1) discontinued use of the reach above the Wynoochee Dam for

natural steelhead and salmon production would result in the loss of a potential food source (spawned-out fish) to the eagle, and (2) increasing the spawning run below the dam could result in increased use of this reach of the river by the eagle, as some hatchery fish would spawn in the river below the hatchery collection facility. The expected result is a redistribution of wintering eagle use from upstream to downstream areas below Wynoochee Dam. Any potential adverse impacts to eagles wintering in the plan area would be offset by the net enhancement of the eagle food resource as a result of the hatchery. A few potential perching trees would be impacted by construction; bald eagle sightings have been recorded for one of those trees. No known nests or roosts would be directly impacted by the recommended plan, although the food resource distribution of nesting or roosting birds would be altered. Pursuant to Section 7(c) of the Endangered Species Act, a biological assessment was performed by the Seattle District, Corps of Engineers, in the winter 1980, to verify eagle use of the Wynoochee area and to evaluate potential impacts on this species as a result of implementation of the recommended plan. The biological assessment concluded that the Wynoochee hydropower/fish hatchery plan would not adversely impact the local, regional, or national bald eagle population and would not jeopardize its continued existence. In a letter dated 20 July 1981 (see appendix B), the FWS expressed their concurrence with the biological assessment. Within the letter, the FWS recommended that all efforts be made to preserve bankside standing timber for use as perch trees, human access be limited immediately below the dam and the collection facilities to reduce disturbance to feeding bald eagles during the fall-winter salmon runs, and the Corps continue monitoring bald eagle numbers and distribution in the plan area. Every effort would be made to preserve vegetation in the plan area, including maintenance of the known bald eagle perch tree below Wynoochee Dam. Human access to the reach of the Wynoochee River between the dam and the collection facility is currently limited in much of the area due to topography. The determination of the actual limits of public access would be the responsibility of the Federal owner of the hatchery and the State of Washington. The Corps will continue eagle counts as part of the existing Wynoochee Lake project. The USFS also maintains records of eagle sitings in the plan area. The possibility of returning some fish carcasses to the Wynoochee River to serve as a direct food source for bald eagles and as an indirect nutrient source for other fisheries would be considered in coordination with the FWS during PP&E.

Threatened and endangered species requirements for the satellite fish station would be accomplished during PP&E when the station is sited. The results of any necessary biological assessment would be coordinated with the FWS.

c. Historic and Prehistoric Impacts and Their Significance. Implementation of the recommended plan would have no significant impact on the cultural resources of the plan area. A cultural resources reconnaissance of the site of the satellite fish station would be accomplished

in PP&E when the location of the site is determined. Depending upon the final location of the transmission line, some additional cultural resources reconnaissance may also be necessary along the transmission line corridor.

d. Socioeconomic Impacts and Their Significance.

(1) Energy and Fish Production. The principal beneficial socioeconomic impacts of the recommended plan would be the contribution of the 11.3 MW of capacity and 36,900 MWH per year of energy to the Pacific Northwest power needs and approximately 87,000 adult spring chinook salmon and 40,500 adult steelhead (total 127,500 adult fish) to the annual anadromous fish harvest in the Grays Harbor area, Chehalis River Basin, and in the northern Pacific Ocean. Energy from the project would be marketed by the BPA. The anadromous fish enhancement (total 118,660 adult fish) from the project would constitute a major contribution to the commercial, Indian, and sport fisheries, the demands of which have exceeded the available depressed stocks in the State of Washington.

(2) Esthetics. Short-term esthetic impacts to the plan area would be realized during construction of the recommended plan and attendant clearing, stripping, stockpiling, and staging. Long-term permanent esthetic impacts would be incurred by the transmission line, powerhouse switchyard, the hatchery and associated facilities, and by hatchery operation during certain periods of the year resulting in low flows in the 6,800-foot reach of the river between the existing overflow weir and the hatchery outlet. The primary esthetic impact from the powerhouse would be from the powerlines leaving the switchyard. The impact would not be significant. The perimeter of the switchyard would be landscaped to minimize its visual impact. The buried transmission line would be adjacent to the existing road and would have minimal esthetic impact. An alternative aerial transmission line along the existing Donkey Creek Road from Wynoochee Dam to the Promised Land Substation (see figure 1 in feasibility report) would conflict with the USFS's special classification of the route as a visual resource. On the first approximately 14 miles of the 22-mile route, the USFS has easements or use agreements with the private landowner along Donkey Creek Road. New easements and agreements would have to be arranged if an aerial line were located along this road. For the last 8 miles of the route, the USFS owns a 100-foot scenic corridor on both sides of Donkey Creek Road and, in keeping with their policy of buried lines on national forest land, would not permit placement of an aerial line within that corridor. The line would have to be placed away from the road with the tradeoff being a loss of productive timber land. These considerations would be a part of any future detailed transmission line studies.

Visual impacts due to the water supply pipeline would be minimized by burial of the pipeline and native plant revegetation of the pipeline corridor to accelerate natural revegetation. The existing access road to the hatchery site would be utilized. Visual impacts of the hatchery

itself and the satellite fish station would be offset by landscape plantings. The hatchery area would be illuminated at night to provide for operation and to discourage vandalism. Lights would be shielded and would not create any significant esthetic problems; further, the hatchery location is several miles from any major thoroughfare. Long-term noise impacts of the recommended plan would be minimal.

During low flow periods (potentially April-September) associated with operation of the Wynoochee hydropower/fish hatchery plan, visual esthetics in the reach of the Wynoochee River from the dam to the hatchery outlet would be altered from the existing condition of a flowing river. Water would be ponded in the 250-foot reach from the Wynoochee Dam to the existing overflow weir and a small stream with a wide gravel and rock streambed and possibly some pools formed in shallow holes would exist in the 6,800-foot reach from the existing overflow weir to the hatchery outlet. Some stranding of resident fish that utilize this reach can be expected during low flow periods. Access to river views are limited in this reach of the Wynoochee River and consist of views primarily from the hatchery site, the road on the left bank across from the hatchery site, the Wynoochee Dam, the Wynoochee Lake project visitors center, and the USFS road bridge south of Wynoochee Dam. Under the worst case condition, views of the river from the hatchery site on the right bank, from the road above on the left bank, and from the USFS bridge would be that of an exposed rock and gravel streambed with a small stream resulting from approximately 20 c.f.s. probably due to groundwater springs and seepage. Adverse esthetics from nuisance algae and odors in pools that may form along the streambed are not expected to occur.

The 250-foot reach of the Wynoochee River between the dam and the existing overflow weir would only be visible from the dam, the existing visitors center, and the USFS bridge. The esthetic impact would primarily be a change from a flowing to a ponded condition throughout most of the year and would not be significant. Refer to section 2 of appendix H for additional information.

(3) Recreation. The principal beneficial recreation impact of the recommended plan would be the enhancement of the recreational anadromous fishery in the Grays Harbor area, Chehalis River Basin, and in the northern Pacific Ocean. The increased fisheries would also result in an increased utilization of fishery support businesses and facilities in the area and an increased use pressure on existing day-use and overnight camping facilities in the Shelton Ranger District and on existing public access areas in the reach of the Wynoochee River downstream of the hatchery. Secondary impacts to wildlife could result as fishermen seek their own access sites. One or more fisherman access sites could be provided below the hatchery. However, the plans and locations of these sites would be the responsibility of the hatchery owner and operator. The operation of the Wynoochee Dam does not result in safety hazards to recreationists and its operation would not be altered with the addition of the hydropower/fish hatchery plan.

The 50-acre hatchery site is owned and managed by the USFS and under their timber management plan is classified as "visual variety A" with the objective of maintaining a visually pleasing landscape. According to USFS estimates, the Wynoochee hatchery site is customarily used for dispersed recreation[1/] activities at an average rate of 300 visitor days per year.[2/] USFS personnel of the Shelton Ranger District estimate that the majority of users reside within a 100-mile radius, with many families and individuals customarily using a particular, or "favorite," site each visit. The USFS has stated that the hatchery offers a fairly unique recreation opportunity as it is one of the few water-related dispersed recreation areas within the Wynoochee drainage. Implementation of the recommended plan would permanently impact recreation use of the hatchery site. The nature of the impact would be a change in the recreational character of the site from that of an undeveloped camping and day-use site to an area dominated by the hatchery and its associated visitor facilities. Hunting, overnight camping, and water-related activities would be precluded by hatchery construction. Fishing in the reach of Wynoochee River from the existing fish collection facility to Wynoochee Dam is currently not permitted, but may be permitted sometime in the future. The hatchery complex would provide some day-use recreation opportunities such as sightseeing and would provide limited visitors' facilities. The area around the hatchery grounds would still be available for hiking and picnicking, and fishing opportunities in the 2 miles of the Wynoochee River that lie within the Shelton Ranger District below the hatchery site would be greatly enhanced by the hatchery. In addition to the 2 miles of public fishing in the Shelton Ranger District, the 49 miles of Wynoochee River downstream of the Shelton Ranger District could be open to public fishing unless restricted by the fisheries management agencies. Resident recreational fishing should also increase in Wynoochee Lake where WDG and Simpson Timber Company currently have a cooperative resident fish stocking program because of the increased recreational fishing demand. Visitors who currently utilize the hatchery site as a camping area may seek out new dispersed recreation areas in the vicinity or may be displaced to other customarily used dispersed recreation areas with resulting increased use pressure and secondary impacts to wildlife resources. Some visitors may be completely displaced from the Wynoochee drainage if they are unable to find comparable water-related dispersed recreation opportunities within the drainage. The 300 visitor days use of the hatchery site represents 1/3 of 1 percent (0.353 percent) of the total dispersed recreation

1/Dispersed recreation activities include driving for pleasure, hiking, fishing, hunting, photography, rock collecting, berry picking, overnight camping outside of the developed campgrounds, picnicking, woodcutting, and water-related activities, such as wading, tubing, and swimming.

2/U.S. Forest Service treats a visitor day as a 12-hour period in which a visitor is engaged in a recreational pursuit. Twenty-four hours equal 2 visitor days.

use in the Shelton Ranger District (see appendix H). The reduction in recreation use of the hatchery site as a result of hatchery construction and the loss and possible displacement of some of the existing dispersed recreation activities are not considered significant adverse impacts.

At the request of the Shelton Ranger District, an analysis was undertaken of replacing dispersed recreation use of the hatchery site at two alternate sites that would offer water-related recreation located about 1 mile downstream and is presented in section 5 of appendix H. As a result of that analysis, development of the two alternate dispersed recreation sites has not been included as part of the recommended plan. Further, because dispersed recreation use at the hatchery site represents 1/3 of 1 percent of the total dispersed recreation use in the Shelton Ranger District, additional analysis of alternate sites to replace that portion of the use that would be lost due to construction of the fish hatchery was not considered justified.

Depending on the season, construction activities could inconvenience visitors to the Wynoochee Dam area due to curtailment of some activities (such as boating and swimming) during construction of the hydropower/fish hatchery intake system and from traffic congestion. These impacts would be minor and short term. During construction of the hydropower facility under the existing parking lot at the visitors center for the Wynoochee Lake project, alternative visitors parking would be provided. Other than minor short-term impacts associated with the powerhouse, buried transmission line, and switchyard construction, the hydropower facility would have no impacts on recreation. No impacts to recreation are expected from the potential low flow condition resulting from operation of the hydropower/fish hatchery plan. Subject to the siting of the satellite fish station, no significant adverse impacts to recreation are expected as a result of construction.

(4) Employment and Public Services. Associated with the recommended plan are short-term construction and long-term project employment opportunities. Project design provides for six permanent residences to house personnel who would operate the hatchery (see plate 2). Domestic water supply to those residences would be from wells. Sewage would be handled by a septic tank system. The pressure line providing cold water to the adult holding ponds at the hatchery could also provide for fire protection and irrigation waters for the residential and hatchery grounds. Power to the existing dam and proposed hatchery would be provided as station power from the hydropower facility. Potential problems associated with a remote area, such as the Wynoochee plan area, would be involved in the provision of public services (e.g., schools, shopping, snow removal, police and fire protection, and transportation) to the construction workers and project operation staff and families. For supplies, gas, and other services, current residents at the existing Wynoochee Lake project travel to and from Montesano, 35 miles away, the closest full service community. Three miles from the project is the logging community of Grisdale which has a public elementary school. For

high school students in the plan area, the Quinault School District provides bus service to and from the high school in Montesano. Increased pressure on the limited services provided at the Wynoochee Lake project would undoubtedly occur with implementation of the recommended plan. Currently, the road to the plan area serves Wynoochee Dam, and recreation and logging activities under a use agreement with the Simpson Timber Company. Potential use conflicts could occur as a result of construction activities and the increased use of this road from the residences and the increased recreational fishery associated with the recommended plan. Maintenance of this road is currently accomplished by Simpson Timber Company and could become a problem in the future as logging of the old growth is completed in the next ten years and Simpson Timber Company activities in the area are reduced. With or without the hydropower/fish hatchery plan, access to the existing Wynoochee Lake project must be maintained. Should maintenance by Simpson Timber Company discontinue, maintenance would have to be accomplished by the Corps as part of the existing Wynoochee project operation and maintenance. Coordination with the local community, USFS, and private landowners, including Simpson Timber Company and ITT Rayonier, would occur during PP&E to insure that adverse social impacts and future conflicts associated with the varying uses of the plan area are minimized.

e. Energy Impacts and Their Significance. The hydropower portion of the plan would have a capacity of 11.3 MW and produce 36,900 MWH of energy per year. Operation of the hatchery would involve energy demands for trucking fish from the collection facility to the hatchery, from hauling fish to and from the satellite fish station, and from other routine operational procedures. Because of its unique topographic arrangement downstream of the existing dam, the Wynoochee hatchery would not require the high energy and expensive emergency generating facilities usually found necessary at modern hatcheries. At the Wynoochee site, energy needs would be minimized by use of a gravity feed system of providing water supply to the hatchery instead of pumping water directly from the river at the hatchery site. Maintenance of the project would be accomplished primarily by hand labor and would involve cleaning trashracks at the intake and outlet structures, cleaning the raceways and rearing ponds of the hatchery, cleaning the facilities at the satellite fish station and maintaining landscape plantings.

Energy would be used in project construction; however, through construction practices utilizing the most cost-effective methods, conservation measures would be incorporated. Construction activities involving energy usage would include hauling of materials from borrow sources; construction of the powerhouse and hatchery, associated facilities, and roads; and vegetation clearing. Materials utilized for construction are committed during the life of the project. Fuel resources are committed permanently. Indirectly, through construction practices utilizing the most cost effective methods, conservation measures, such as high loading efficiency and maximum usage of onsite materials, would be incorporated. Materials would come from local borrow sources, minimizing haul distance,

and, therefore, fuel consumption. Local sources of construction material are considered adequate and would not be significantly depleted by the demands of the project. Other conservation measures that could be utilized by the construction contractor are maximum usage of the local labor force and encouragement of carpooling.

f. Relationship of the Recommended Plan to Existing Land Use Plans, Policies, and Controls.

(1) Existing Land Use. Existing land use in the plan area consists of national forest, under the jurisdiction of the USFS; logging; and the Wynoochee Lake project, owned and operated by the Corps of Engineers. The proposed hatchery site is primarily on Federal land managed by the USFS. The site is classified by the USFS as a visual resource and as such, the area is maintained on a 200-year timber rotation. Construction of a hatchery on that site would require a change in its land use and classification. A buried transmission line would have minimal impact on existing land use. An alternative aerial line would conflict with the existing classification of the route as a visual resource and would impact existing timber resources. The recommended plan would not constrain the operation of the existing Wynoochee project and its authorized purposes for industrial water supply to the city of Aberdeen, winter flood control, fisheries, and irrigation. The recommended plan would not impact logging operations nor would it affect the Shelton Cooperative Sustained Yield Unit Agreement between the USFS and Simpson Timber Company. As discussed in paragraph 4.02d(4) of the EIS, coordination with the USFS, Simpson Timber Company, and ITT Rayonier would occur during PP&E to insure that any potential conflicts with the varying uses of the plan area lands and road easements are minimized. Additionally, a memorandum of understanding between the USFS and the Corps of Engineers regarding use of national forest land for development of the recommended plan is necessary.

The recommended plan would preclude passage of anadromous fish over the dam and thus would impact part of the existing mitigation program for the Wynoochee Lake project. This mitigation would be incorporated into the fish hatchery. Construction of the plan would also preclude the existing dispersed recreation use of the hatchery site and would increase use pressure on existing camping facilities as discussed in paragraph 4.02d(3) of the EIS. The hydropower operation would be subordinate to all other purposes and the facility would operate as a run-of-river plant producing baseload energy from the reservoir releases. Reservoir releases would be made by the Corps of Engineers to meet the congressionally authorized purposes of the existing Wynoochee Lake project and the water quality and quantity needs of the fish hatchery.

(2) Land Use Plans, Policies, Studies, and Projects. A Federal/non-Federal partnership for Wynoochee hydropower development was initiated with the Grays Harbor PUD but the PUD withdrew its intent to be local sponsor due its inability to guarantee to finance the project at a

future date. There is no expressed interest in non-Federal hydropower development at Wynoochee Dam at this time.

The Grays Harbor PUD has also conducted preliminary studies of the feasibility of hydropower development at the Oxbow damsite located 8 miles downstream of the hatchery site. At this time, development of hydropower at the Oxbow damsite is not economically feasible, although it is conceivable that it would be justified in the future. Coordination with the PUD occurred regarding the compatibility of the recommended plan with development of hydropower at Oxbow. There would be no conflict between the hydropower portion of the plan and a hydropower dam at the Oxbow damsite. The hatchery, as currently sited, would require a dam and reservoir project at the Oxbow site to have a reservoir elevation 20 feet lower than the preferred elevation of 635 feet. The conflict between the Oxbow Dam and Wynoochee fish hatchery could potentially be resolved by placement of the hatchery on an intermediate level bench site (elevation 635 feet), as discussed in appendix G, and collecting fish downstream of Oxbow Dam. Federal and state fisheries agencies and various interest groups believe that the development of the Oxbow site could jeopardize the Wynoochee hatchery. If it is determined that the Oxbow site will be developed, the Corps would consider the alternative fish hatchery site during PP&E.

Fish in the Wynoochee River Basin are currently managed by the State of Washington on a wild stock basis. As discussed in paragraph 4.02b(3) of the EIS, a conceptual plan for management of the Chehalis River Basin fishery should the Wynoochee hatchery be constructed has been developed with input from the state and Federal resource agencies and Indian tribes. One of the objectives of the plan is to insure maximum efficiency of the hatchery while minimizing impacts on native fish stocks. The final details of such a plan would be developed during PP&E.

The Grays Harbor Fisheries Enhancement Task Force was formed in response to widespread concern by the Grays Harbor Regional Planning Commission to investigate methods of enhancing the depleted Grays Harbor anadromous fish runs. This task force is made up of representatives of Federal and state fish and wildlife agencies, local municipalities, Indian tribal councils, and sport and commercial fishing groups. The task force is supportive of the recommended plan. The hydropower/fish hatchery proposal is consistent with the Grays Harbor Regional Comprehensive Plan and county comprehensive zoning ordinances.

The city of Aberdeen signed a contract with the Washington Public Power Supply System on 11 June 1980 for a water supply of 62 c.f.s. flow in the Wynoochee River. The recommended plan would not impact this contract.

WDG is responsible for developing and operating hatchery facilities for mitigating the loss of 1,700 adult steelhead as a result of construction of the Wynoochee Lake project. Funds in the amount of $696,000 were

provided for this purpose to the State of Washington under a Memorandum of Agreement dated 28 July 1977. To date, the WDG has implemented temporary rearing pens in Lake Aberdeen for rearing a portion of the steelhead necessary to mitigate for the dam. If the Wynoochee fish hatchery is authorized, a portion of the fish hatchery would be used by the State of Washington to fulfill its obligation.

As previously discussed under paragraph 4.02d(2) of the EIS, the recommended plan would impact the existing USFS classification of the hatchery site and, if an alternative aerial transmission line is selected, would impact both timber resources and the existing classification of the transmission line route as a scenic corridor. A buried transmission line has been chosen by the Corps of Engineers and would be consistent with USFS policies (see paragraph 2.01b(2) of the EIS). A memorandum of understanding is necessary between the Corps and the USFS regarding use of the national forest land for plan implementation. The Corps has been working with the USFS to resolve their concerns relative to the Wynoochee plan, leading to the eventual development of the memorandum of understanding.

(3) Laws, Regulations, and Controls. The principal laws, controls, and regulations which apply to land and water use in the plan area are the Coastal Zone Management Act, Executive Orders 11988 and 11990, the Clean Water Act of 1977, and the Wild and Scenic Rivers Act. Under the Washington State Coastal Zone Management Program, established pursuant to the Coastal Zone Management Act, the shorelines of the Wynoochee River are designated "shorelines of statewide significance." Local management programs include regional and county plans, prepared by the Grays Harbor Regional Planning Commission and Grays Harbor County, respectively. Under the county program, the plan area is designated "conservancy." The recommended plan is consistent with the shoreline designations of all of these programs and so satisfies consistency with state and national coastal zone management requirements.

Prior to project construction, the State Shoreline Management Program requires the obtaining of permits by the local sponsor. The WDE reviews all projects which require local shoreline permits and, therefore, would review the permits granted for the recommended plan. The local sponsor would also be required to obtain a permit from WDE for any work in the designated flood zones and a State National Pollution Discharge Elimination System permit for the hatchery outflow. As agreed by the WDE, instream flows for the reach of the Wynoochee River between the dam and the hatchery outlet would be determined through coordination with the State of Washington during PP&E (refer to section 2 of appendix H).

Executive Order 11988 provides guidance regarding flood plain management. The recommended plan is located above the 100-year flood plain. The satellite fish station would have minor, if any, impact on the flood plain.

Executive Order 11990 directs Federal agencies to take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities. The recommended plan would result in the unavoidable loss of 2 acres of sedge marsh. The satellite fish station would be sited to avoid wetlands to the extent possible.

In compliance with the Clean Water Act of 1977, a Section 404(b)(1) evaluation of the impacts of instream fill activities associated with the recommended plan was conducted and is presented in appendix A. For the hydropower/fish hatchery plan features discussed in appendix A, a Section 404(r) exemption will be obtained to meet the requirements of the Clean Water Act. Since the location and design of the satellite fish station has not yet been determined, any necessary Section 404 actions required for construction of the station will be accomplished during PP&E.

The transmission line would cross the West Fork of the Humptulips River which is listed in the nationwide inventory of potential Wild and Scenic Rivers. The buried line would be routed under bridges over stream crossings and would not be expected to adversely impact the environmental values for which this river was placed on the inventory.

g. Adverse Environmental Impacts Which Cannot Be Avoided. During planning, efforts have been made to avoid adverse environmental impacts where possible. Unavoidable adverse impacts resulting from the recommended plan are summarized in table EIS-3.

h. Irreversible and Irretrievable Commitments of Resources which Would Be Involved in the Recommended Plan Should It Be Implemented. Labor, materials, energy, and capital used in preconstruction planning and project construction would be committed if the recommended plan is implemented. The land area occupied by the hydropower facility, switchyard, transmission line, hatchery, water supply pipeline, residences, and satellite fish station would be committed for the life of the project, if not indefinitely. Timber resources would be lost on the 50-acre hatchery site; fish and wildlife displaced by the plan would be permanently committed. The change in habitat quality and quantity, the fish and wildlife which depend on the habitat resources, and the natural landscape quality of the plan area would be committed by implementation of the recommended plan.

i. The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity. The recommended plan involves the use of a renewable resource to produce energy and anadromous fish which would contribute to the enhancement of the long-term productivity of the Washington coastal rivers and the northern Pacific Ocean. The loss of the productivity of the hatchery site as a timber resource and for use by wildlife; the termination of the use of the Wynoochee River above the dam for anadromous fish production; and the reduction in the aquatic habitat of the 6,800-foot reach

TABLE EIS-3

ADVERSE ENVIRONMENTAL IMPACTS WHICH CANNOT BE AVOIDED
WYNOOCHEE HYDROPOWER/FISH HATCHERY PLAN

Category	Impact	Measures to Avoid or Minimize Impact	Reference to EIS
Air Quality, Noise and Traffic	Short-term increases in noise and exhaust emission levels during project construction. Long-term increases in noise, traffic, and exhaust emissions due to operation activities, residences, and increased recreational fishery.	Dust would be minimized by sprinkling haul roads and construction areas with water as necessary. Landscaping around hatchery would act as noise buffer in addition to the surrounding rain forest. Continued coordination with USFS and Simpson Timber Company regarding road easements and use standards should minimize traffic impacts.	Paragraph 4.02 a(1)
Water Quality and Supply	Short-term increases in turbidity during construction. Long-term impacts due to low flows in 6,800-foot reach between existing overflow weir and critical hatchery outlet during periods of the year (April-Sept). Long-term impacts in 250-foot reach of Wynoochee River between the dam and the existing overflow weir. When reservoir releases are no greater than the quantity of water diverted to the powerhouse, this reach would be ponded. Long-term impacts associated with hatchery effluent.	Construction contractor would be required to utilize methods that minimize turbidity. Instream flow requirements would be determined during preconstruction planning and engineering (PP&E) through continued coordination with State of Washington. Approximately 20 c.f.s. probably due to ground water springs and seepage would provide some flow in the reach at all times. Seepage from the reservoir would provide some flow in the ponded area. Area would be flushed when reservoir releases exceed 1,200 c.f.s. (powerhouse capacity) or when powerhouse is shut down for maintenance. Increased aquatic productivity and an alteration in the aquatic benthic community in the area near the effluent outlet may be beneficial as aquatic productivity in the Wynoochee River is rather low naturally. Hatchery would be operated to meet effluent limitations. A pollution abatement pond would be constructed for treatment of the water from raceways and rearing ponds during cleaning and when chemotherapeutics are used in large doses. Domestic wastes would be treated by septic tanks. Carcasses of returning adult salmon and steelhead used for spawning or surplus to spawning needs would be sold commercially or disposed of in an approved land fill.	Paragraph 4.02 a(2)

TABLE EIS-3 (con.)

Category	Impact	Measures to Avoid or Minimize Impact	Reference to EIS
Vegetation	Construction of the hatchery and associated facilities would result in the permanent loss of approximately 50 acres of Olympic rain forest, 25 acres of which are considered old growth. Additionally, 2 acres of sedge marsh would be lost due to hatchery construction. Approximately 5 additional acres of of vegetation would be lost due to construction of the satellite fish station.	Impacts would be minimized by burial of transmission line and water supply pipeline and revegetation of the pipeline corridor with species of high wildlife value. Hatchery would be designed to reduce loss of vegetation; grounds would be reseeded and landscaped. A vegetation buffer zone would be planted around the hatchery edge. Hatchery facilities, including the satellite fish station, would be sited to avoid wetland areas to the extent possible.	Paragraph 4.02 b(1)
	During low flow periods, aquatic habitat in the 6,800-foot reach between the existing overflow weir and the hatchery outlet would be reduced.	Instream flow requirements would be determined during FP&E through continued coordination with State of Washington.	
Wildlife	Use of the hatchery site by big game mammals (elk and deer) would be reduced. Construction of the hatchery and associated facilities would result in the loss of 50 acres of elk winter range, 25 acres of which are being considered old growth or critical winter range. The critical range habitat loss represents 0.4 percent and 0.2 percent of the critical range in the Wynoochee Drainage and Shelton Ranger District, respectively. Use in the area around the site would be reduced due to increased human disturbance. Some wildlife usage (e.g., song birds, small mammals) would return to the hatchery site following construction; however, the total habitat available would be reduced, and, to some unknown extent, the resident wildlife populations would be reduced. Some minor impact to wildlife would result due to low flows in the 6,800-foot reach of the Wynoochee River between the existing overflow weir and the hatchery outlet during critical periods of the year (April-September). Construction of the satellite fish station would impact wildlife due to loss of approximately 5 acres of habitat and increased human disturbances.	To extent possible, habitat losses associated with the project would be reduced through project design, landscaping, and revegetation of disturbed areas with species of high wildlife value. Native vegetation on the hatchery site and the site of the satellite fish station would be retained where possible. A vegetation buffer zone would be planted around the hatchery edge. Two 2-acre elk pastures would be developed adjacent to the hatchery and would serve as a winter food source for elk.	Paragraph 4.02 b(2)

TABLE EIS-3 (con.)

Category	Impact	Measures to Avoid or Minimize Impact	Reference to EIS
Fish	Anadromous fish runs above Wynoochee Dam would be terminated.	Mitigation for the lost runs would be incorporated into the hatchery production.	Paragraph 4.02 b(3)
	Potential adverse impacts on resident fish in the 6,800-foot reach of the Wynoochee River between the overflow weir and the hatchery outlet during critical low flow periods (April-September).	Instream flow requirements would be determined with the State of Washington in PP&R. Approximately 20 c.f.s. probably due to ground-water springs and seepage would provide some flow in the reach at all times. With the provision of adequate flow, the potential exists for utilizing the reach between the existing overflow weir and the hatchery outlet for spawning and rearing of anadromous fish. This potential would be investigated during the determination of instream flows.	
	Potential adverse impacts on existing native fish stocks due to the release of hatchery fish.	Adverse impacts can be minimized by proper management strategies. Hatchery will be constructed in two phases to allow buildup of spring chinook brood stock using local stock. One satellite fish station would be constructed within the Chehalis River system to minimize potential disease problems from interregional stock transfers. Only native spring chinook salmon and steelhead are planned to be produced at the hatchery at this time. Selection of these species would minimize impacts of hatchery-released fish on wild stocks.	
Esthetics	Short-term effects during construction. Long-term effects due to change in hatchery site esthetics from natural rain forest character to hatchery and associated facilities. Long-term impacts from the satellite fish station associated with the hatchery and from the switchyard and transmission line associated with the powerhouse. Long-term impacts associated with project operation would result in low flows in 6,800-foot reach between existing overflow weir and hatchery outlet and ponding in 250-foot reach between dam and existing overflow weir.	Terrestrial esthetic impacts would be reduced by native grass seeding and landscape plantings. Transmission line and water supply pipeline would be buried. Approximately 20 c.f.s. probably due to ground-water springs and seepage would provide some flow in the reach between the hatchery outlet and existing overflow weir. Instream flow requirements would be determined in PP&R. Seepage from the dam would provide some dilution of ponded water. Ponded reach would be flushed when reservoir discharge exceeds 1,200 c.f.s. or when powerhouse is shut down for maintenance.	Paragraph 4.02 d(2)
Recreation	Short-term disruption to area recreational activities during project construction.	Coordination would occur among Simpson Timber, USFS, and Corps to minimize traffic congestion due to construction.	Paragraph 4.02 d(3)
	Hunting use of hatchery site would be lost. Overnight camping and water-related use of the site would be lost. Recreation use of the site represents 1/3 of 1 percent of the total estimated dispersed recreation use in the Shelton Ranger District.	Some recreational activities, such as hatchery visitation, limited picnicking, and hiking, would be available. The plan would result in a major increase in the area recreational fishery.	

TABLE EIS-3 (con.)

Category	Impact	Measures to Avoid or Minimize Impact	Reference to EIS
Public Services	Implementation of the plan would result in increased pressure on the limited public services in the immediate plan area. Nearest full service community is Montesano, 35 miles from the Wynoochee Lake project.	Energy to the immediate plan area would be provided by station power from the hydropower facility. Full service community of Montesano is 35 miles away. Coordination among Corps, various land owners, and local community would occur during PP&E to insure that adverse social impacts and conflicts associated with the various uses of the plan area are minimized.	Paragraph 4.02 d(4)
Land Use	Construction of fish hatchery would result in a change in land-use classification of the hatchery site from its current designation of "visual variety "A" under the USFS timber management plan.	Timber removed from hatchery site would be made available for sale. Project design and landscaping would minimize impacts to wildlife values to the extent practicable. Fish values of the area would be enhanced by the plan. The Corps and the USFS would enter into a memorandum of understanding regarding implementation of the plan on national forest land.	Paragraph 4.02 f(1) and (2)

of the river between the existing weir and the hatchery outlet are trade-offs involved in plan implementation. Mitigation for hatchery-related losses of elk winter range has been incorporated into the recommended plan. The existing anadromous fish mitigation program associated with Wynoochee Dam has not been successful. The state fish agencies have accepted termination of the runs above the dam and incorporation into the hatchery of mitigation for that lost production. Fish use of the 6,800-foot reach of the river between the existing overflow weir and the hatchery outlet site consists largely of use by juvenile outmigrants and by resident cutthroat and rainbow trout that pass through the dam from Wynoochee Lake. With implementation of the recommended plan, use of the reach by anadromous juvenile outmigrants would essentially be eliminated; however, with the provision of adequate flow, the potential exists for utilizing the reach between the existing overflow weir and the hatchery outlet for spawning and rearing of anadromous fish. This potential would be investigated during the determination of instream flows in PP&E.

SECTION 5. STUDY COORDINATION AND PUBLIC INVOLVEMENT

5.01 Study Coordination and Public Involvement. The study coordination and public involvement framework for this study is presented in section 5 of the feasibility report and in appendix B.

5.02 Remaining Coordination. Coordination will be ongoing with the interested public, including fisheries user groups and the Indian tribes, and with Federal, state, and local agencies, including the National Marine Fisheries Service (NMFS), FWS, EPA, USFS, BPA, WDF, WDG, WDE, city of Aberdeen, Grays Harbor PUD, and Grays Harbor Regional Planning Commission. The FWCA report has been prepared and is presented in appendix D. The final design of the hatchery, satellite fish station, hatchery management plan, and monitoring program, and determination of the instream flows would be accomplished through detailed coordination with the Federal and state fish agencies during PP&E. Hatchery planning would also be coordinated with the Indian tribes and other interested publics. The Corps of Engineers will continue to work with the USFS in development of a memorandum of understanding for implementation of the recommended plan within the Olympic National Forest. Close coordination will continue with the BPA in further analysis of the transmission line alternatives. The city of Aberdeen will be consulted in all matters affecting their contractual agreement for water supply from Wynoochee Dam. Should the recommended plan be authorized, additional coordination with resource agencies and interested public will take place during PP&E studies, preparation of plans and specifications, and construction.

5.03 Statement Recipients. The draft Wynoochee hydropower/fish hatchery feasibility report and EIS were listed in the Federal Register dated 11 December 1982 and were distributed to the public for a 45-day review ending 31 January 1982. At the request of the Grays Harbor PUD, the review period was extended to 28 February 1982. Comments received on the draft EIS are responded to in appendix B and revisions have been incorporated into the feasibility report/EIS where appropriate. A list of persons, groups, and agencies who received the draft report/EIS is presented in appendix B.

5.04 Public Views and Responses. As presented in section 5 of the feasibility report and in appendix B, throughout the study various Federal, state, and local agencies and groups have expressed strong support for the development of hydropower and fish enhancement facilities at Wynoochee Dam. Among these supporters are the NMFS, State of Washington, Grays Harbor PUD, city of Aberdeen, Grays Harbor Regional Planning Commission, Grays Harbor Fisheries Enhancement Task Force, Grays Harbor County Chapter of Trout Unlimited, Northwest Steelhead and Salmon Council of Trout Unlimited, Northwest Steelheaders, Grays Harbor Poggie Club, and Washington Environmental Council. The official transcript of the final public meeting, held 15 December 1981 in Aberdeen, Washington, is available in the office of the Seattle District, Corps of Engineers.

Since the final public meeting, as a result of comments received during public review of the draft feasibility report/EIS, modifications to the plan as presented in the draft report have been made. The major comments that resulted in modifications were received from Grays Harbor PUD, WDF, and WDG. The comments and the plan modifications resulting from the comments are summarized below. The full text of all comments received and all responses is presented in appendix B.

a. Grays Harbor PUD. Due to its inability to guarantee to finance the hydropower project at a future date, the Grays Harbor PUD has withdrawn its intent to participate with the Corps in the development of the hydropower portion of the recommended plan and surrendered its preliminary FERC permit. There is no expressed interest in non-Federal hydropower development at Wynoochee Dam at this time. Therefore, the hydropower portion of the integrated plan has been modified in the feasibility report/EIS from a Federal/non-Federal arrangement to 100 percent Federal development. Accordingly, the Corps of Engineers would construct, operate, and maintain the hydropower facility and the BPA would construct, operate, and maintain the transmission line and market the energy produced by the hydropower facility to satisfy a portion of the region's total energy needs. Revenues from the power production would repay hydropower construction costs. For additional information, refer to sections 4 and 6 of the feasibility report.

b. Washington Department of Fisheries. WDF expressed major concerns regarding the spring chinook salmon brood stock availability for the hatchery and the impacts of hatchery-reared fish on existing native runs in the Wynoochee River watershed and in streams outside the Chehalis River system. These concerns were shared by FWS. Modifications made to the hatchery plan to resolve these concerns include phased construction of the salmon portion of the hatchery, reduction in the number and potential location of the satellite fish stations, and the planned production of only native spring chinook salmon and steelhead in the hatchery at this time. For further detail regarding these modifications, refer to paragraphs 4.09h and 4.09j of the feasibility report, paragraphs 2.02b(1) and 4.02b(3) of the EIS, and to the responses to specific comments made by WDF and FWS in appendix B. As a result of these modifications and updated fisheries values furnished by WDG and WDF, the economics and cost sharing of the recommended plan have been revised as presented in paragraph 4.25 of the feasibility report and in appendix C.

c. Washington Department of Game. WDG had concerns regarding wildlife impacts of the recommended plan and regarding the number of mitigation fish that the State of Washington is responsible for under their mitigation obligation for the existing Wynoochee Lake project. At the recommendation of WDG, two 2-acre elk mitigation pastures, a vegetation barrier around the hatchery, and a revegetation scheme involving rapidly growing plant species of high wildlife value have been added to the recommended plan to reduce project-related impacts to wildlife. Refer to paragraph 4.13 of the feasibility report, paragraphs 2.02b(3) and 4.02b(2) of the EIS, and responses to specific comments from WDG in

appendix B. The cost sharing associated with the State of Washington previous mitigation responsibility as presented in the draft report has been revised to reflect the correct number of fish. Refer to table 5 of the feasibility report and to appendix C.

The recommended plan as modified according to the comments summarized above is recommended for Federal implementation in section 6 of the feasibility report. The plan best satisfies both the desires of the local community and the Federal and state agencies by providing the greatest economic benefit with a net environmental gain.

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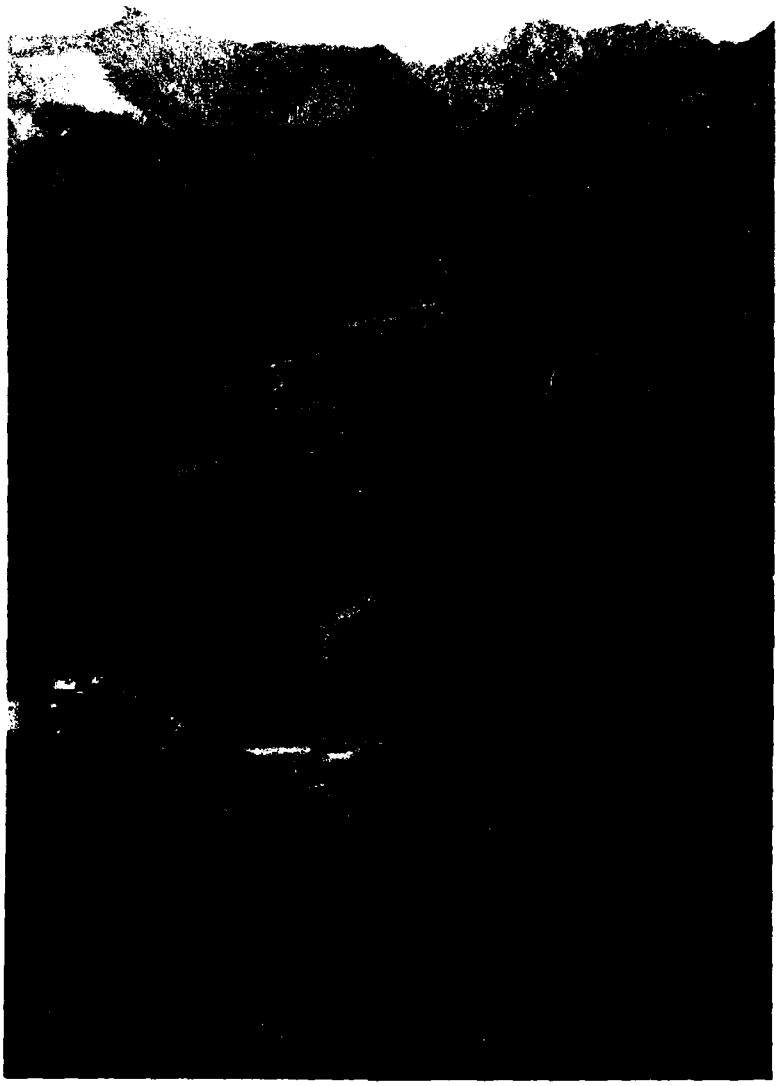
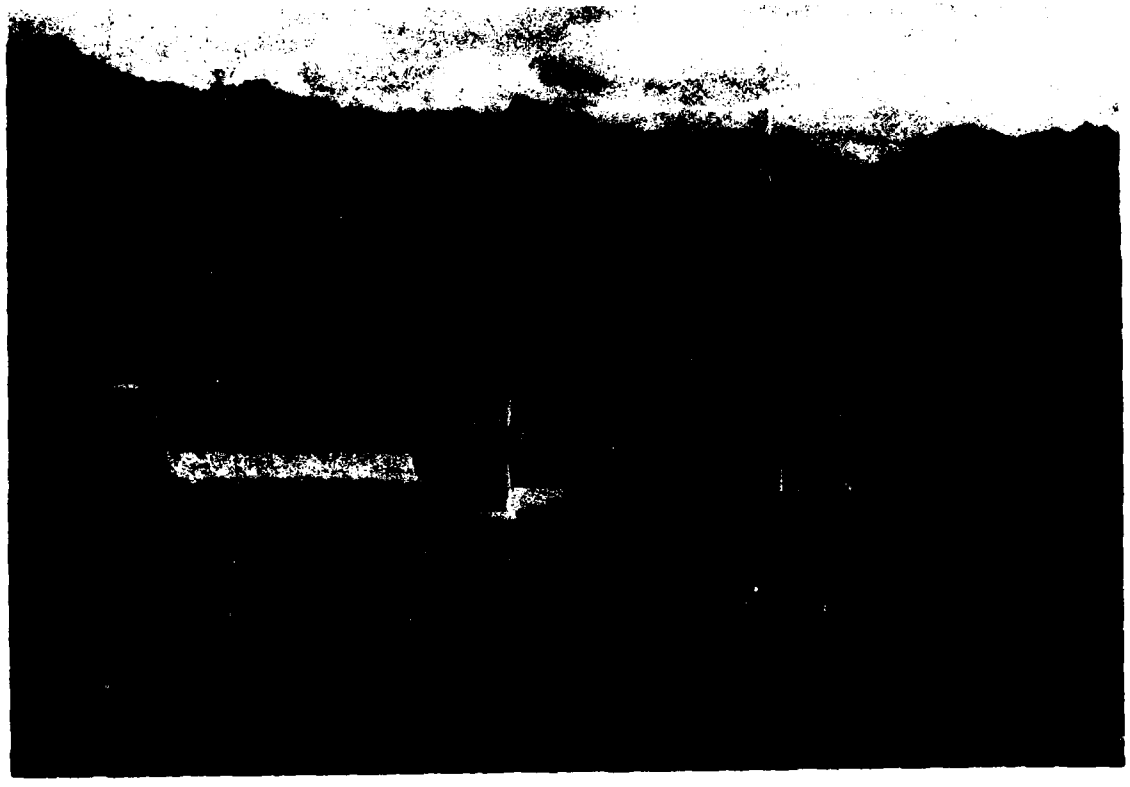


PHOTOGRAPH 1. WYNOOCHEE LAKE PROJECT, LOCATED IN FOOTHILLS OF OLYMPIC MOUNTAINS, 35 ROAD MILES NORTH OF MONTESANO, WASHINGTON.



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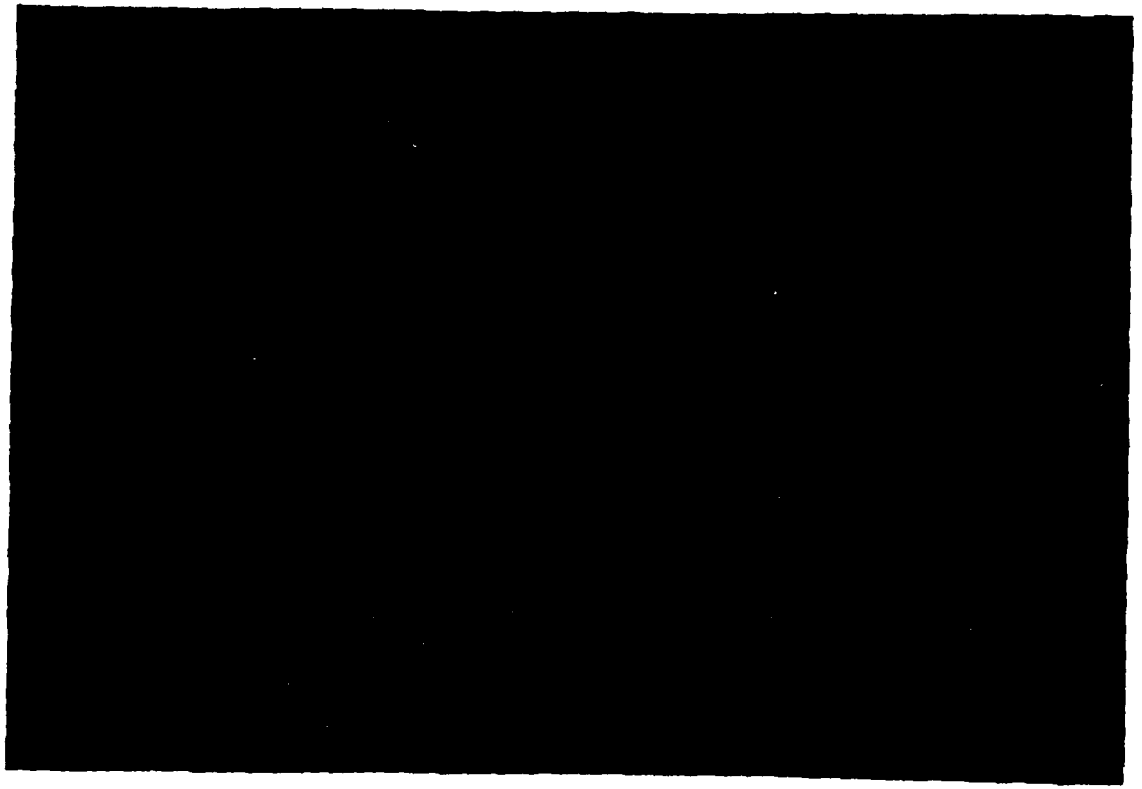
PHOTOGRAPH 2. WYNOOCHEE DAM, 177-FOOT-HIGH CONCRETE AND EARTHFILL DAM.



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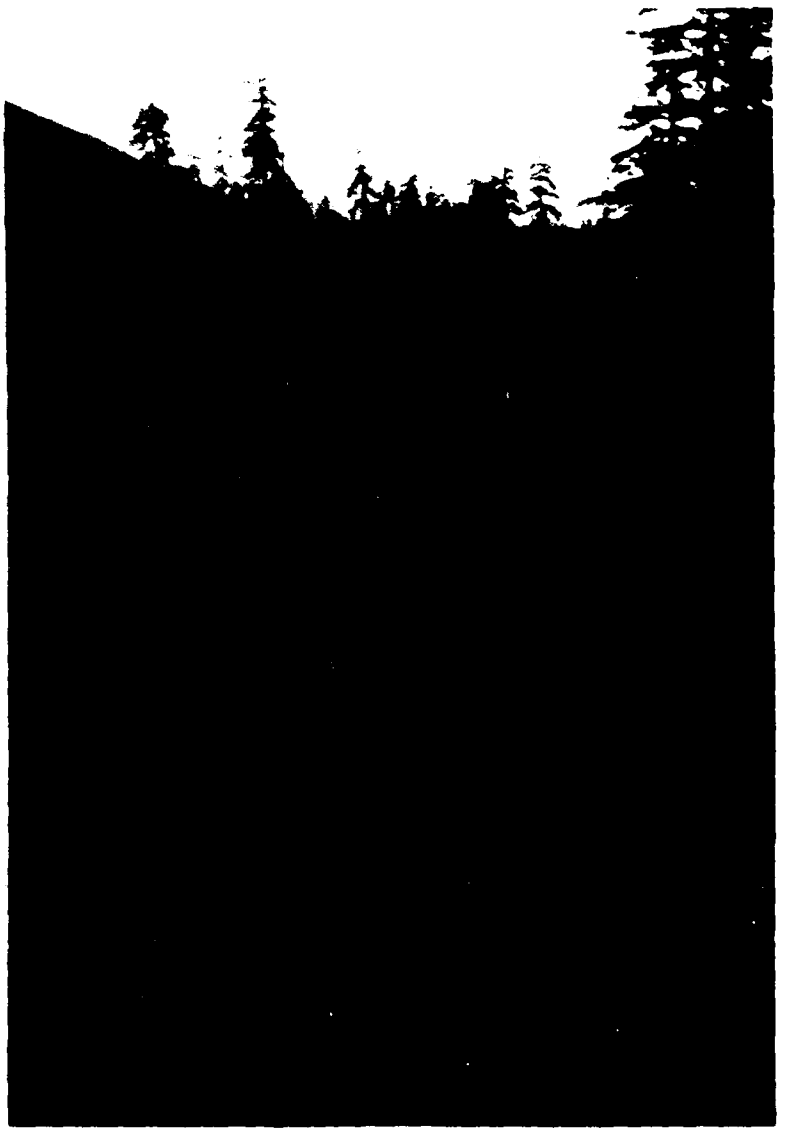
PHOTOGRAPH 3. WYNOOCHEE DAM AND VICINITY. PHOTOGRAPH SHOWS GENERAL LOCATION OF PROPOSED POWERHOUSE UNDER VISITORS CENTER PARKING LOT (UPPER LEFT) AND PROPOSED HYDROPOWER OUTLET/FISH HATCHERY INTAKE STRUCTURE IN ROCK CANYON 150 FEET DOWNSTREAM OF FOREST SERVICE BRIDGE (BOTTOM CENTER).

PHOTOGRAPH 4. ROCK CANYON IMMEDIATELY DOWNSTREAM OF WYNOOCHEE DAM (LOOKING DOWNSTREAM). PICTURE SHOWS GENERAL LOCATION OF PROPOSED POWERHOUSE UNDER VISITORS CENTER PARKING LOT (UPPER RIGHT) AND EXISTING OVERFLOW WEIR (CENTER) UNDER FOREST SERVICE BRIDGE.

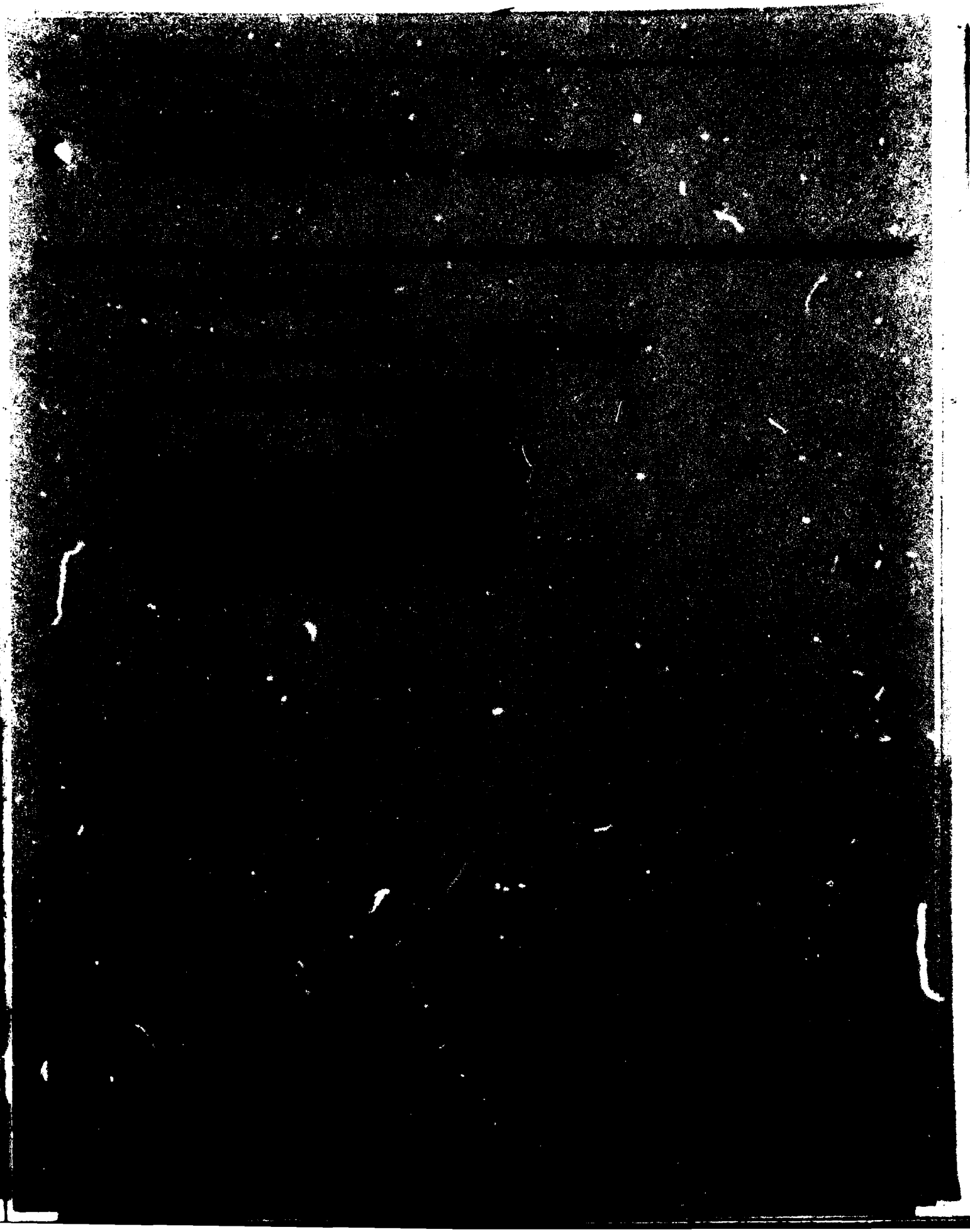
PHOTOGRAPH 5. LOWER END OF ROCK CANYON (LOOKING UPSTREAM TOWARDS DAM). PHOTOGRAPH SHOWS GENERAL LOCATION OF PROPOSED HYDROPOWER OUTLET/FISH HATCHERY INTAKE STRUCTURE IN ROCK CANYON 150 FEET DOWNSTREAM OF DAM (CENTER) AND PROPOSED FISH HATCHERY WATER SUPPLY PIPELINE ALONG RIVER BOTTOM IN ROCK CANYON (BOTTOM CENTER).



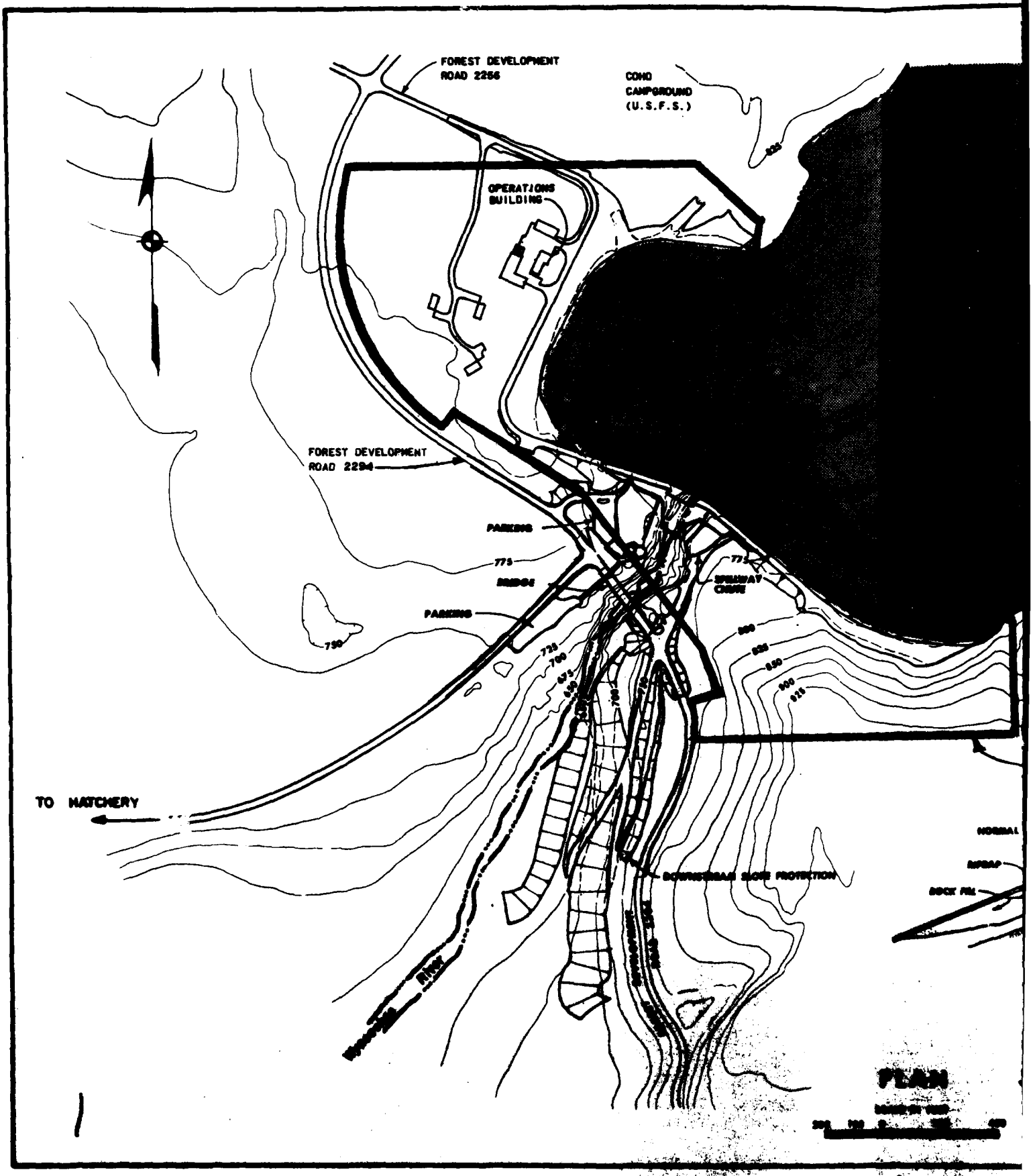
PHOTOGRAPH 6. WYNOOCHEE RIVER 1,000 FEET DOWNSTREAM OF WYNOOCHEE DAM (LOOKING DOWNSTREAM). PHOTOGRAPH SHOWS GENERAL LOCATION OF PROPOSED FISH HATCHERY WATER SUPPLY PIPELINE ALONG RIVER BOTTOM IN ROCK CANYON (LOWER CENTER) AND ALONG LEFT RIVER BANK (LEFT CENTER).

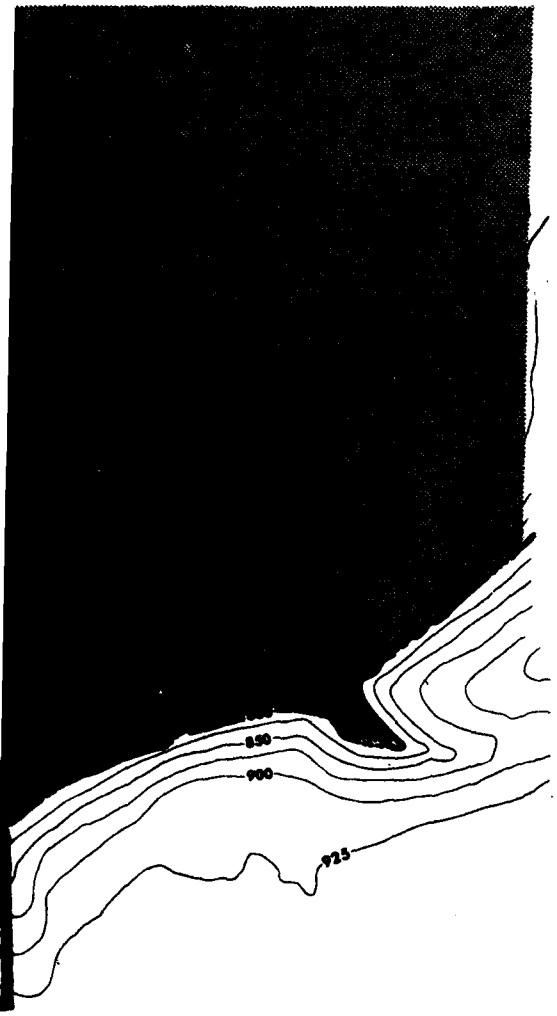
PHOTOGRAPH 7. SITE OF PROPOSED FISH HATCHERY, LOCATED 3,000 FEET DOWNSTREAM OF WYNOOCHEE DAM. WYNOOCHEE RIVER FLOWS IN FROM RIGHT, AROUND HATCHERY SITE ON MEANDER BENCH, AND OUT (DOWNSTREAM) AT TOP.

PHOTOGRAPH 8. FISH COLLECTION FACILITY LOCATED ON WYNOOCHEE RIVER 2.2 MILES DOWNSTREAM OF WYNOOCHEE DAM.

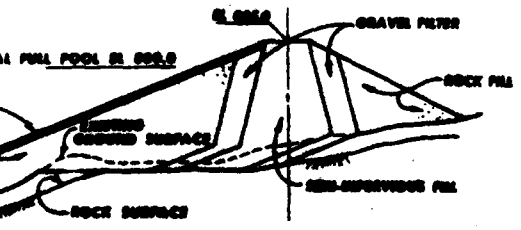


CORPS OF ENGINEERS





EXISTING PROJECT BOUNDARY



EMBANKMENT SECTION

SCALE IN FEET

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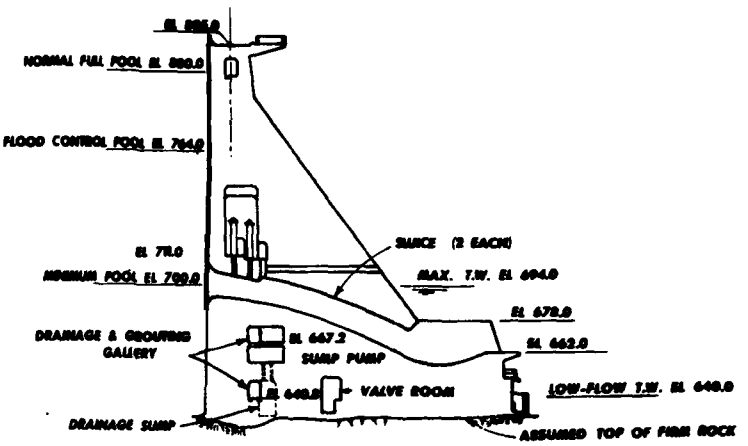

DAM SECTION

SCALE IN FEET

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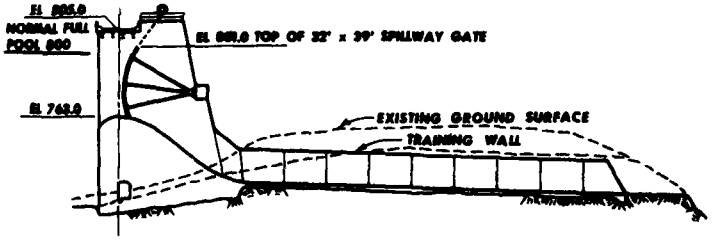


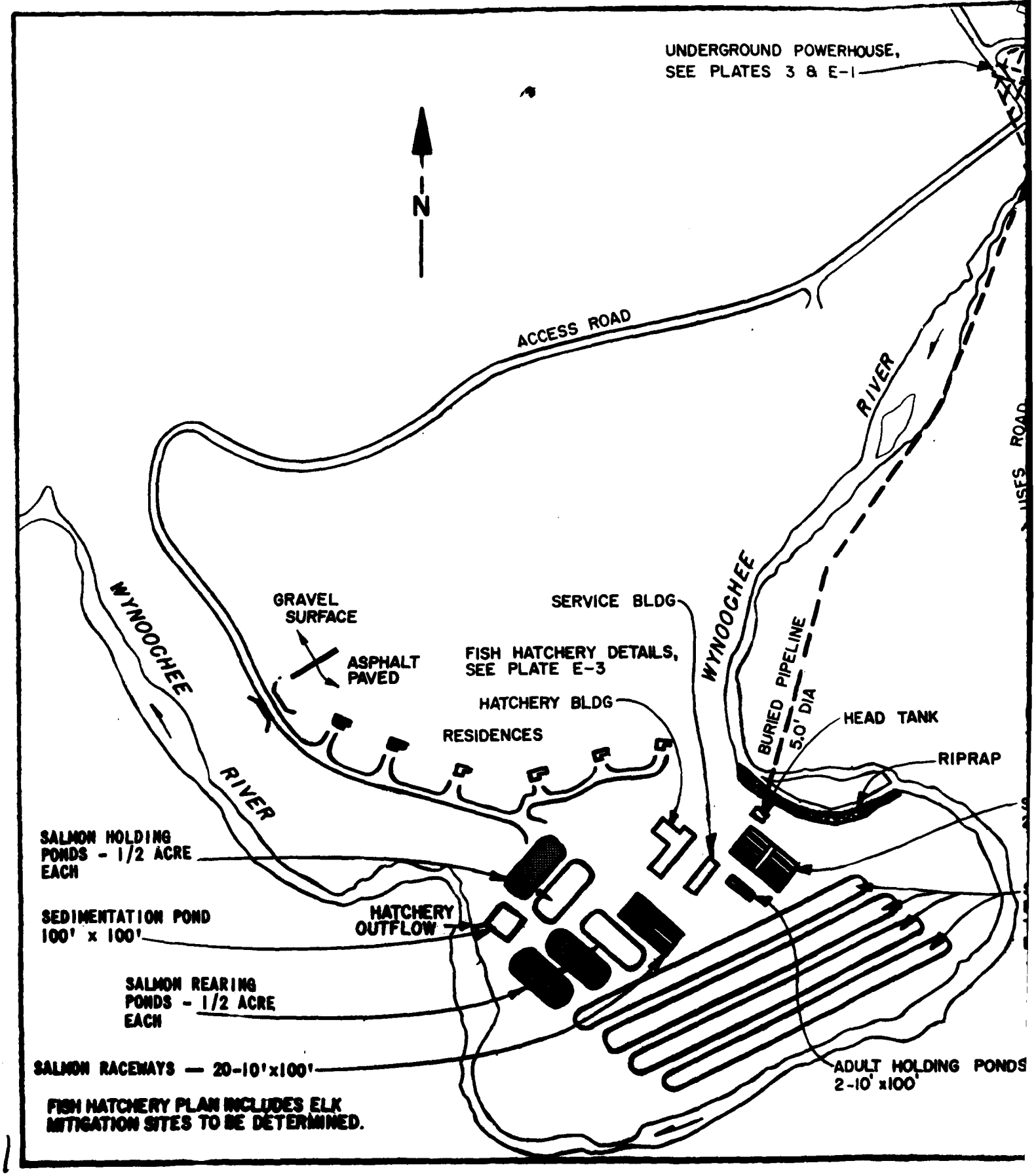
SPILLWAY SECTION

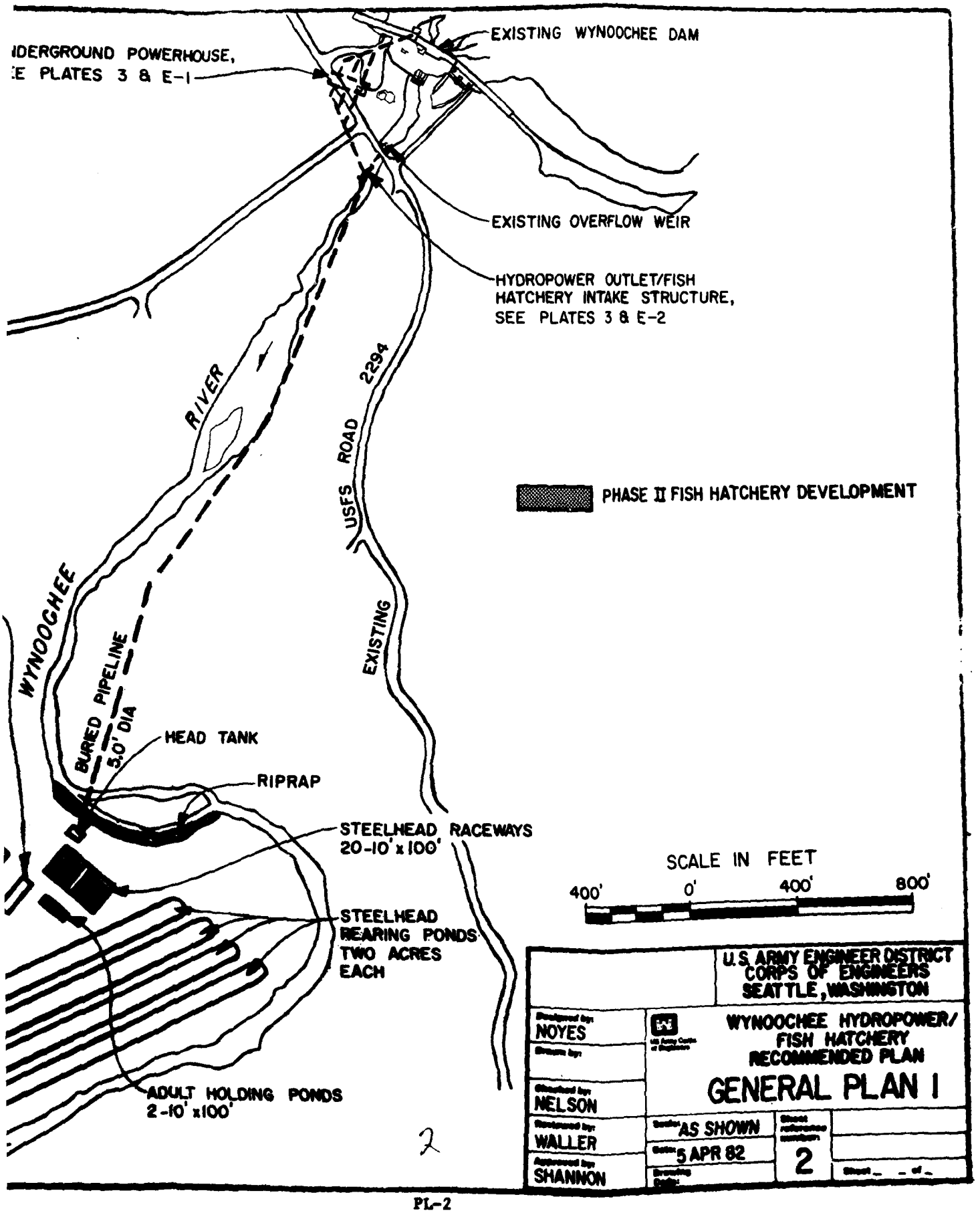
SCALE IN FEET

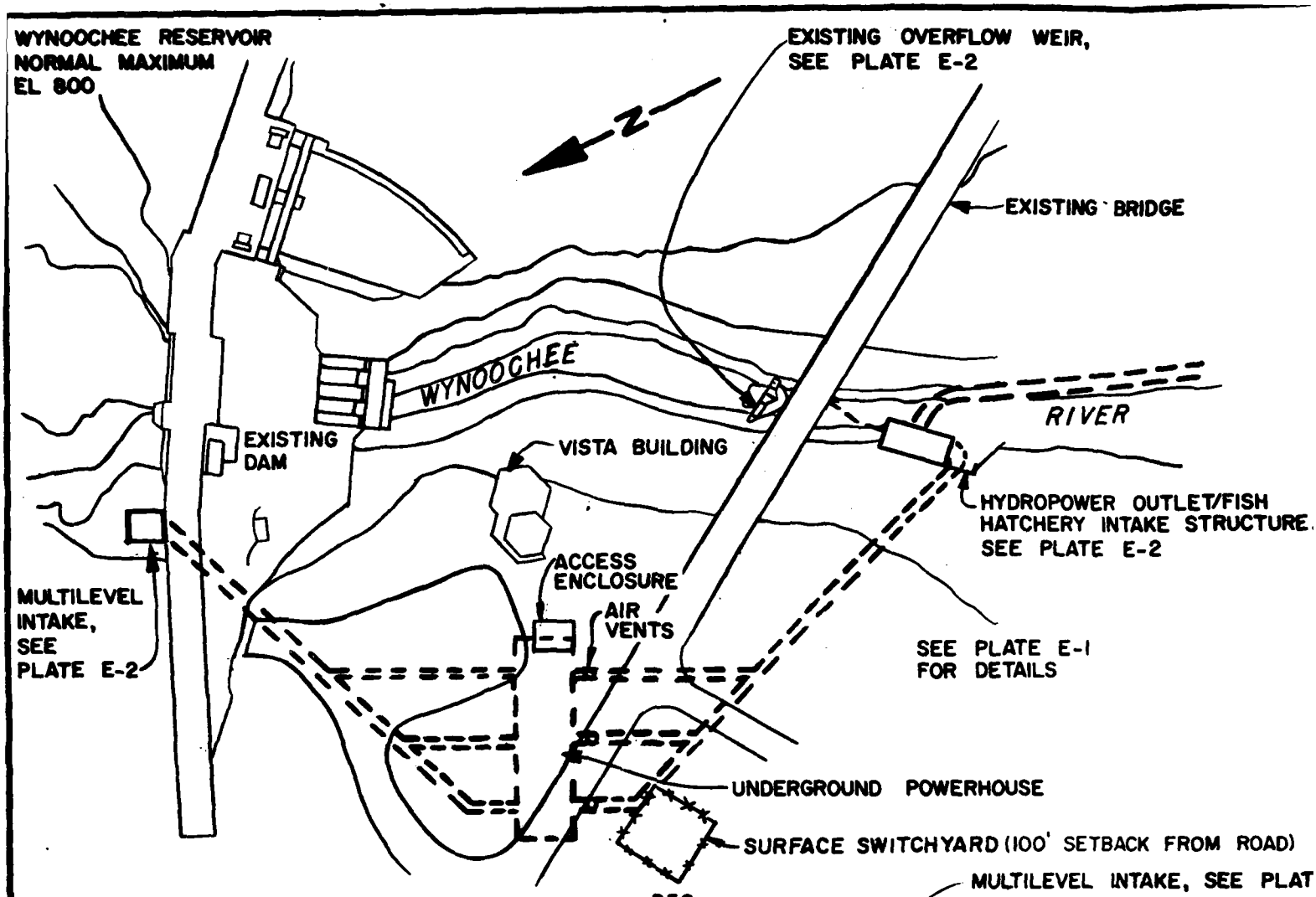
40 20 0 40 80

	U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS SEATTLE, WASHINGTON
Designed by NOYES	WYNOOCHEE HYDROPOWER/ FISH HATCHERY
Drawn by	WYNOOCHEE LAKE PROJECT (AS BUILT)
Checked by NELSON	
Traced by WALLER	Scale AS SHOWN
Approved by SHANNON	Date 20 NOV 81
	Sheet 1

2


UNDERGROUND POWERHOUSE,
SEE PLATES 3 & E-1
N
ACCESS ROAD
RIVER
WYNOOCHEE
WYNOOCHEE
RIVER
GRAVEL SURFACE
ASPHALT PAVED
SERVICE BLDG
FISH HATCHERY DETAILS,
SEE PLATE E-3
HATCHERY BLDG
RESIDENCES
BURIED PIPELINE
5.0' DIA
HEAD TANK
RIPRAP
SALMON HOLDING PONDS - 1/2 ACRE EACH
SEDIMENTATION POND 100' x 100'
HATCHERY OUTFLOW
SALMON REARING PONDS - 1/2 ACRE EACH
SALMON RACEWAYS — 20-10'x100'
ADULT HOLDING PONDS 2-10' x100'
FISH HATCHERY PLAN INCLUDES ELK MITIGATION SITES TO BE DETERMINED.

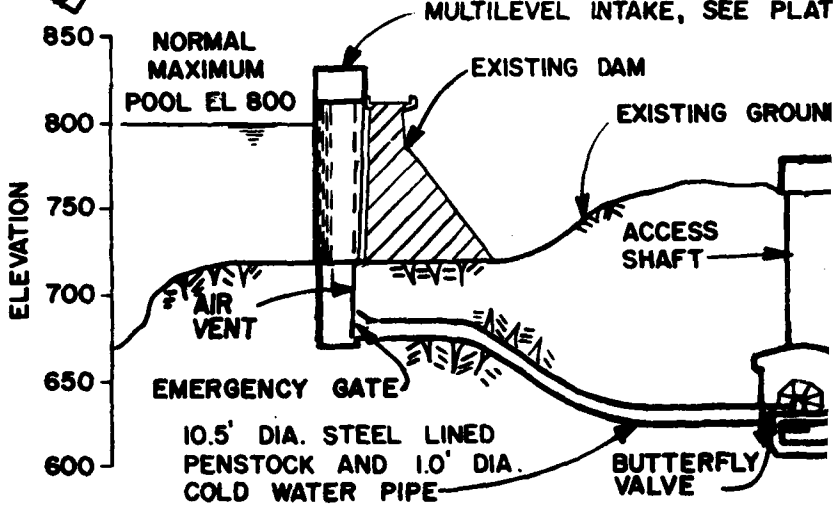

IDERGROUND POWERHOUSE,
E PLATES 3 & E-1
EXISTING WYNOOCHEE DAM
EXISTING OVERFLOW WEIR
HYDROPOWER OUTLET/FISH
HATCHERY INTAKE STRUCTURE,
SEE PLATES 3 & E-2
RIVER
USFS ROAD 2294
EXISTING
WYNOOCHEE
BURIED PIPELINE
3.0' DIA
HEAD TANK
RIPRAP
STEELHEAD RACEWAYS
20-10' x 100'
STEELHEAD
REARING PONDS
TWO ACRES
EACH
ADULT HOLDING PONDS
2-10' x100'
PHASE II FISH HATCHERY DEVELOPMENT
SCALE IN FEET
400' 0' 400' 800'
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SEATTLE, WASHINGTON
Designed by NOYES
Checked by NELSON
Reviewed by WALLER
Approved by SHANNON
WYNOOCHEE HYDROPOWER/
FISH HATCHERY
RECOMMENDED PLAN
GENERAL PLAN I
Scale AS SHOWN
Date 5 APR 82
2



DAM AND POWERHOUSE PLAN

SCALE: 1" = 100'

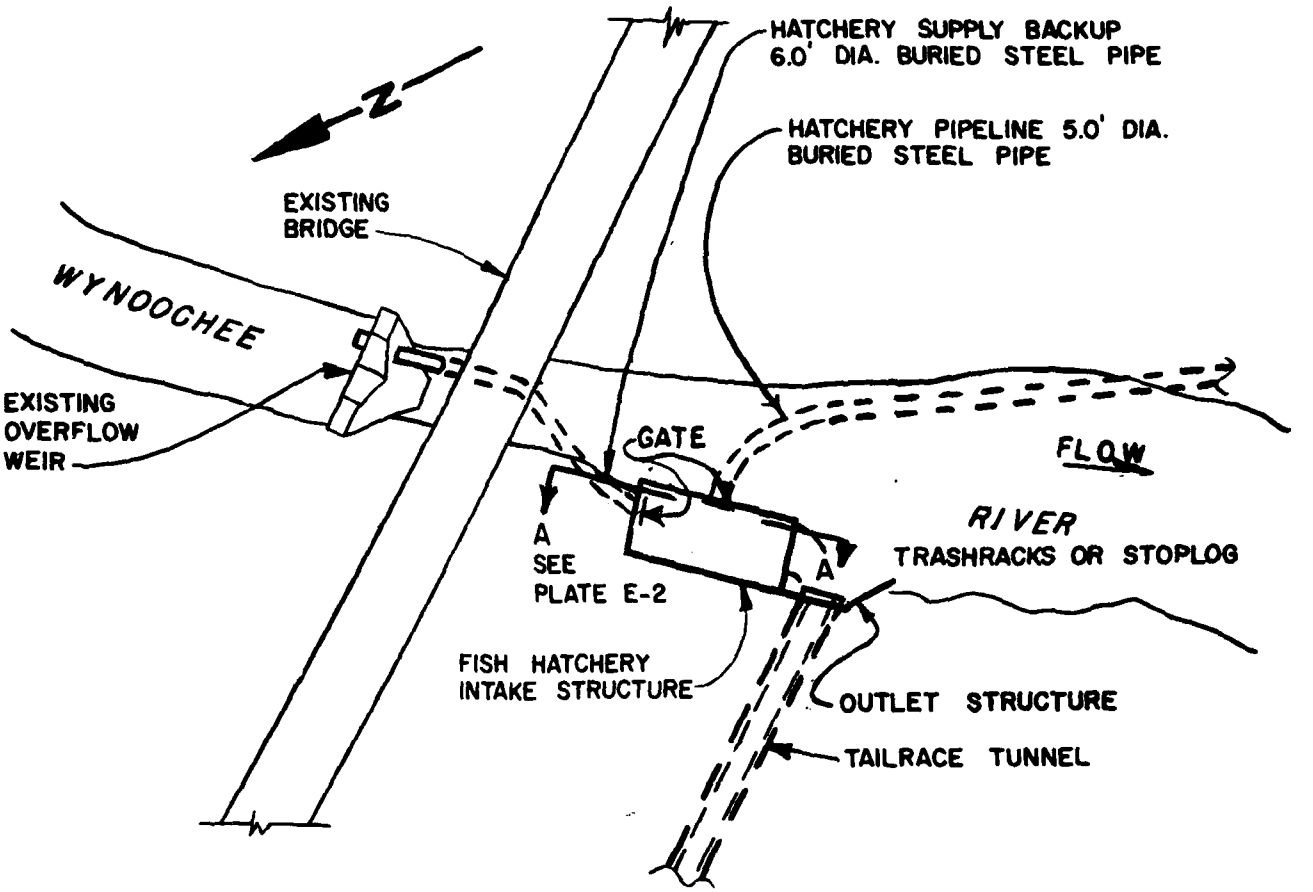
100' 50' 0' 100'



DAM AND POWERHOUSE SEC

SCALE: 1" = 100'

100' 50' 0' 100'

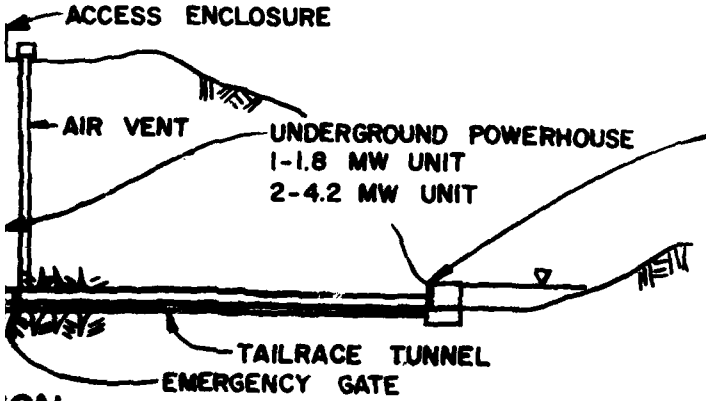


E-2

HYDROPOWER OUTLET/FISH HATCHERY INTAKE STRUCTURE

SCALE: 1" = 50'

50' 0 50'



ON

SEE PLATE E-1 FOR DETAILS

2

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

Designed by: NOYES	WYNOOCHEE HYDROPOWER/ FISH HATCHERY RECOMMENDED PLAN
Drawn by:	
Checked by: NELSON	GENERAL PLAN 2
Quantities by: WALLER	Scale: VARIES
Approved by: SHANNON	Date: 20 MAR 81
	Sheet reference number: 3
	Sheet _ of _

APPENDIX A

SECTION 404(b)(1) EVALUATION

TABLE OF CONTENTS

TABLE OF CONTENTS (con.)

SECTION 404(b)(1) EVALUATION
FOR PLACEMENT OF FILL MATERIAL INTO THE WATERS OF
THE WYNOOCHEE RIVER AND WYNOOCHEE LAKE AS PART OF THE
HYDROPOWER/FISH HATCHERY PLAN,
GRAYS HARBOR COUNTY, WASHINGTON

1. Introduction. The purpose of this evaluation is to display results of an analysis of the effects of placement of fill material into waters of the United States (specifically Wynoochee River and Wynoochee Lake) using guidelines promulgated pursuant to Section 404(b)(1) of the Clean Water Act. The factors, considerations, and analyses contained in the Section 404(b)(1) Guidelines (40 FR 230), dated 24 December 1980, are presented herein and evaluated.1/

2. Description of Proposed Discharge. The description of the proposed hydropower and enhancement fish hatchery plan, for which this 404 action is part, is presented in section 4 of the feasibility report. Aspects of the recommended plan that result in placement of fill material into the waters of the United States or adjacent wetlands include seven elements: (1) construction of the intake structure in the forebay of Wynoochee Reservoir (Wynoochee Lake), (2) construction of the hydropower outlet/fish hatchery intake structure in the Wynoochee River, (3) construction of the hatchery supply backup pipeline in the Wynoochee River, (4) construction of two water supply pipeline crossings to the fish hatchery in the Wynoochee River, (5) construction of the hatchery outflow channel in the Wynoochee River, (6) the placing of riprap along the Wynoochee River upstream of the hatchery site, and (7) filling of the wetland area with the construction of hatchery ponds. Any necessary Section 404 actions required for construction of the satellite fish station will be accomplished during preconstruction planning and engineering (PP&E) when siting and detailed design of the station is determined.

2.1 Need for Discharge. Development of the hydropower/fish hatchery plan would meet a portion of the increasing electrical energy needs and a portion of the increasing demand for anadromous fish in the Pacific Northwest. The construction of the plan requires some instream fill activities.

2.2 Location. Refer to plates 2 and 3 of the feasibility report for location of the discharge sites. The nearest town is Montesano, approximately 35 miles downstream of the discharge sites.

2.3 Description of Discharge Sites. The proposed fill sites would include the forebay of Wynoochee Reservoir, the Wynoochee River downstream of Wynoochee Dam, and a wetland area on the right bank of the Wynoochee River. The intake structure site would be in the forebay of the Wynoochee Reservoir on the right bank. The river sites would include

1/Throughout the evaluation, references to the appropriate paragraph in the Section 404(b)(1) Guidelines (40 FR 230) are provided in parentheses after each major heading.

the hydropower outlet/fish hatchery intake structure site approximately 500 feet downstream of Wynoochee Dam; the hatchery water supply backup pipeline site between the fish hatchery intake structure site upstream to the existing weir; two hatchery water supply pipeline crossing sites, a 200-foot crossing approximately 600 feet downstream of the dam and a 100-foot crossing approximately 3,000 feet downstream of the dam; the hatchery outflow channel site approximately 7,000 feet downstream of the dam; and the site for placement of riprap along a 700-foot reach of the river located approximately 3,000 feet downstream of the dam. The wetland area in which the hatchery ponds would be constructed is on a low level meander bench located approximately 5,000 feet downstream of the dam on the right bank of the river.

The sizes of the required disposal sites are as follows:

a. Construction of the intake structure would involve a site of approximately 360 square feet.

b. Construction of the hydropower outlet/fish hatchery intake structure would involve a site of approximately 800 square feet.

c. Construction of the hatchery water supply backup pipeline would involve a site of approximately 1,000 square feet.

d. Construction of the hatchery water supply pipeline crossings would involve two sites of approximately 1,000 and 500 square feet, respectively.

e. Construction of the hatchery outflow channel would involve a site of approximately 100 square feet.

f. The site for placement of riprap would involve approximately 21,000 square feet.

g. Construction of the hatchery ponds would involve a wetland site of approximately 2 acres.

2.4 Method of Discharge. The lake would be drawn down for dry construction of the intake structure. Cofferdams would be used for construction of the other concrete structures in the dry. Material would be placed using standard construction equipment and methodology.

2.5 Timing of Discharge. Construction time of the hydropower/fish hatchery project would be approximately 2 years. The general timing of each fill activity is presented in figure 4 of the feasibility report. The specific timing of such to avoid impacts to fish and wildlife resources would be coordinated with the resource agencies during PP&R.

2.6 General Characteristics of Material.

a. In construction of the intake structure, approximately 400 cubic yards of reservoir bottom material at the site of the structure would be placed onto adjacent upland areas. Approximately 100 cubic yards of concrete would be poured for the foundation of the intake structure. The intake structure would be precast and placed on the foundation.

b. In construction of the hydropower outlet/fish hatchery intake structure, riverbed material would be moved to upland areas and approximately 50 cubic yards of concrete would be poured into forms and the forms removed.

c. In construction of the hatchery supply backup pipeline (5-foot-diameter steel pipe), the pipe would be placed in a channel excavated in the river. Approximately 75 cubic yards of concrete would be poured over the pipe and about 20 cubic yards of the excavated river material would be placed over the concrete encased pipeline.

d. In construction of the hatchery supply pipeline, a channel would be dug at two river crossings for placement of the 5-foot-diameter steel water supply pipe. Approximately 50 cubic yards of concrete would be poured over the pipeline and about 25 cubic yards of the excavated river material would be placed over the concrete encased pipeline at each of the river crossings.

e. In construction of the concrete hatchery outflow channel, river material would be excavated for the forms, about 10 cubic yards of concrete poured for the channel, and about 10 cubic yards of site material would be used for backfill.

f. Approximately 3,000 cubic yards of riprap would be placed on a 700-foot reach of the right bank of Wynoochee River to protect the riverbank upstream of the hatchery site from erosion.

g. The hatchery ponds sited in the wetland area would be constructed of asphalt (approximately 100 cubic yards) with clean crushed rock (approximately 1,000 cubic yards) and site material (approximately 2,000 cubic yards) used for foundation, berms, and backfill.

2.7 Quantity of Material. See 2.6 above for material quantities.

2.8 Source of Material. The riprap and crushed rock would be obtained from a nearby borrow site and material removed from construction of the underground powerhouse. Concrete and asphalt would be obtained from nearby supplies. The remaining materials would be obtained from excavation at the site of construction.

2.9 Projected Life of Disposal Sites. The economic life of the hydropower and fish hatchery facilities would be 100 years; the physical life of both would be longer.

3. Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C).

3.1 Substrate (230.20). Permanent change in the reservoir bottom would occur from construction of the intake structure, in the river bottom from construction of the hydropower outlet/hatchery intake and hatchery outflow channel, and in approximately 700 feet of the river from the placement of the rock riprap. After placement of the hatchery supply pipeline in the river, the river bottom would be graded to preproject contours.

3.2 Suspended Particulates/Turbidity (230.21). Localized turbidity would be generated by project construction. The turbidity would cause a temporary reduction in light transmission immediately adjacent to the project site.

3.3 Water Quality (230.22). Temporary impacts to water quality in the Wynoochee River and Wynoochee Lake at the fill sites would occur due to localized turbidity. Refer to paragraph 4.02a(2) of the final EIS.

3.4 Current Patterns and Water Circulation (230.23). No measurable impact.

3.5 Normal Water Fluctuations (230.24). No impact.

3.6 Salinity Gradients (230.25). Not applicable.

4. Potential Impacts on Biological Characteristics of the Aquatic Ecosystem (Subpart D).

4.1 Threatened and Endangered Species (230.30). The proposed fill actions would not jeopardize the continued existence of any threatened or endangered species or modify or destroy critical habitat of those species. Refer to paragraph 4.02b(4) of the EIS.

4.2 Aquatic Food Web (230.31). The placement of fill material would eliminate approximately 2 acres of productive wetlands. This loss would have a negligible impact on the total food web production of the river.

4.2 Wildlife (230.32). The proposed fill activities would have no discernable impact on wildlife.

5. Potential Impacts on Special Aquatic Sites (Subpart E).

5.1 Sanctuaries and Refuges (230.40). There are no especially preserved sites within the plan area.

5.2 Wetlands (230.41). Construction of the hatchery ponds and outflow channel would require the loss of approximately 2 acres of wetland. The hydropower intake site, the hydropower outlet/hatchery intake site, sites for placement of hatchery water supply pipeline, and the site for riprap placement would not be located in a wetland area. Refer to paragraph 4.02b(1) of the EIS.

5.3 Mudflats (230.42). Not applicable.

5.4 Vegetated Shallows (230.43). Not applicable.

5.5 Coral Reefs (230.44). Not applicable.

5.6 Riffle and Pool Complexes (230.45). A permanent change in the river bottom would occur in the area of the hydropower outlet/hatchery intake structure and the hatchery outflow channel and in approximately 700 feet of the river from the placement of the rock riprap. These activities would alter the riffle/pool complexes in those areas, but would not have a significant impact on the total habitat structure of the plan reach of the Wynoochee River.

6. Potential Effects on Human Use Characteristics (Subpart F).

6.1 Municipal and Private Water Supplies (230.50). No impact.

6.2 Recreational and Commercial Fisheries (230.51). No significant impact. The timing of the lake drawdown for construction of the hydropower intake structure would be coordinated with the fisheries agencies to minimize impacts to the fisheries.

6.3 Water Related Recreation (230.52). No significant impact. Refer to 6.2 above.

6.4 Esthetics (230.53). The esthetics of the dam and powerhouse area would not be altered by the placement of fill. Degradation of esthetics due to hatchery rearing pond construction and placement of riprap along a 700-foot reach of the river would occur. Landscaping and vegetative restoration would be features of the project to minimize adverse esthetic impacts.

6.5 Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves (230.54). The fill activities would occur on lands within the Olympic National Forest. Prior to construction of the hydropower/fish hatchery plan, a memorandum of agreement between the U.S. Forest Service and the Corps of Engineers would be prepared regarding use of the national forest lands for implementation of the recommended plan. Refer to paragraph 4.02f(1) of the EIS.

7. Evaluation and Testing of Discharge Material (Subpart G).

7.1 General Evaluation of Dredged or Fill Material (230.60). The presence of contaminants in amounts that could be toxic to the aquatic community has not been identified nor suspected in the fill materials.

7.2 Evaluation of Chemical-Biological Interactive Effects (230.61(b)).

7.2.1 Exclusion of Material from Testing. The material would meet the exclusion criteria in that:

a. Other than the crushed rock, riprap, concrete, and asphalt, the material proposed to be placed into waters of the United States would be material from the site of discharge. The riprap and crushed rock would basically be free of particle size smaller than silt.

b. The presence of contaminants in amounts believed to be toxic to aquatic wetland communities has not been identified nor suspected in the riprap, crushed rock, or site material. The source of the material would be sufficiently removed from sources of pollution to provide reasonable assurance that the material would not be contaminated. The concrete and asphalt would be cured prior to coming in contact with the lake, river, or wetland waters.

7.2.2 Water Column Effects. No water column elutriate or bioassay tests were performed due to the projected minimal adverse impacts associated with proposed fill activities.

7.2.3 Effects on Benthos. No benthic bioassay tests were performed due to the projected minimal adverse impacts associated with proposed fill activities.

7.3 Comparison of Excavation and Discharge Sites (230.61(c)).

7.3.1 Total Sediment Chemical Analysis. Not applicable.

7.3.2 Biological Community Structure Analysis. Not applicable.

7.4 Physical Tests and Evaluation (230.61(d)). Not applicable.

8. Factual Determinations. (230.11)

8.1 Physical Substrate Determinations (230.11(a)). Permanent change will occur in approximately 360 square feet of reservoir bottom due to construction of the intake structure, in approximately 900 square feet of river bottom due to construction of the hydropower outlet/fish hatchery intake structure and hatchery outflow channel, in approximately 21,000 square feet of river bottom due to placement of riprap, and in approximately 2 acres of wetlands due to construction of the hatchery ponds. These changes would not create significant substrate impacts in terms of the plan area as a whole.

8.2 Water Circulation, Fluctuation, and Salinity Determinations (230.11(b)). The fill activities would have no effect on water fluctuation and salinity determinations and no significant effect on water circulation.

8.3 Suspended Particulate/Turbidity Determinations (230.11(c)). During construction, the turbidity standard may be exceeded for short time periods in the river and lake adjacent to the construction sites. This would not result in a significant impact to water quality.

8.4 Contaminants Determinations (230.11(d)). The presence of contaminants in amounts that could be toxic to the aquatic community has not been identified nor suspected in the fill material.

8.5 Aquatic Ecosystem and Organism Determinations (230.11(e)). Only insignificant impacts to the aquatic ecosystem are expected to occur as a result of the fill activities.

8.6 Proposed Disposal Site Mixing Zone Determinations (230.11(f)). A determination of mixing zone was not made due to projected minimal impacts to water quality from the fill activities.

8.7 Determination of Cumulative Effects on the Aquatic Ecosystem (230.11(g)). The proposed fill activities would not result in a signifi- cant contribution to cumulative impacts on the aquatic ecosystem.

8.8 Determination of Secondary Effects on the Aquatic Ecosystem (230.11(h)). The proposed fill activities would not result in significant secondary effects on the aquatic ecosystem.

9. Proposed and Alternative Actions to Minimize Adverse Effects (Subpart H).

9.1 Actions Concerning the Location of the Discharge (230.70). The proposed actions would best meet the project needs and minimize fill activity. Hatchery rearing ponds would be sited to minimize the filling of wetlands to the extent practicable.

9.2 Actions Concerning the Material To Be Discharged (230.71). The proposed actions would best meet the project needs and minimize fill activity.

9.3 Actions Controlling the Material After Discharge (230.72). Not applicable.

9.4 Actions Affecting the Method of Dispersion (230.73). Not applicable.

9.5 Actions Related to Technology (230.74). Construction of the hydropower facility and fish hatchery would employ procedures to minimize turbidity increases. These procedures would include construction in the day during lake drawdown, use of cofferdams, and use of a settlement pond for runoff from the construction site.

9.6 Actions Affecting Plant and Animal Populations (230.75). The hatchery ponds would be sited to minimize the filling of wetlands to the extent practicable. Specific timing of all fill activities to minimize adverse impacts to fish and wildlife resources would be coordinated with the resource agencies during PP&E.

9.7 Actions Affecting Human Use (230.76). Landscaping and vegetative restoration of disturbed areas are included as project features to minimize adverse esthetic impacts. The intake structure would be constructed of precast forms to minimize time of lake drawdown and effects on lake recreation activities, fish and wildlife resources, and downstream industrial water supply withdrawal requirements.

9.8 Other Actions (230.77). No significant degradation is anticipated as a result of the fill activities. All practicable actions to minimize adverse environmental impacts have been incorporated into the recommended plan.

10. Analysis of Practicable Alternatives (230.10(a)).

10.1 Identification and Evaluation of Practicable Alternatives. The proposed actions would best meet the project needs and minimize fill activities.

10.2 Evaluation of Alternatives to Discharge in Special Aquatic Sites. The proposed fill activities do not involve discharge into special aquatic sites.

11. Review of Conditions for Compliance (230.10).

11.1 Availability of Practicable Alternatives (230.10(a)). There are no practicable alternatives that would meet project needs and further minimize fill activities.

11.2 Compliance With Pertinent Legislation (230.10(b)).

11.2.1 State Water Quality Standards and Federal Toxic Effluent Standards (Section 307 of the Clean Water Act). During construction, the turbidity standard may be exceeded for short time periods in the river and lake adjacent to the contruction sites; however, the effect on water quality is not considered significant due to the short-term, localized nature of the impacts. The fill activities are in compliance with all other water quality standards and with the Federal Toxic Effluent Standards.

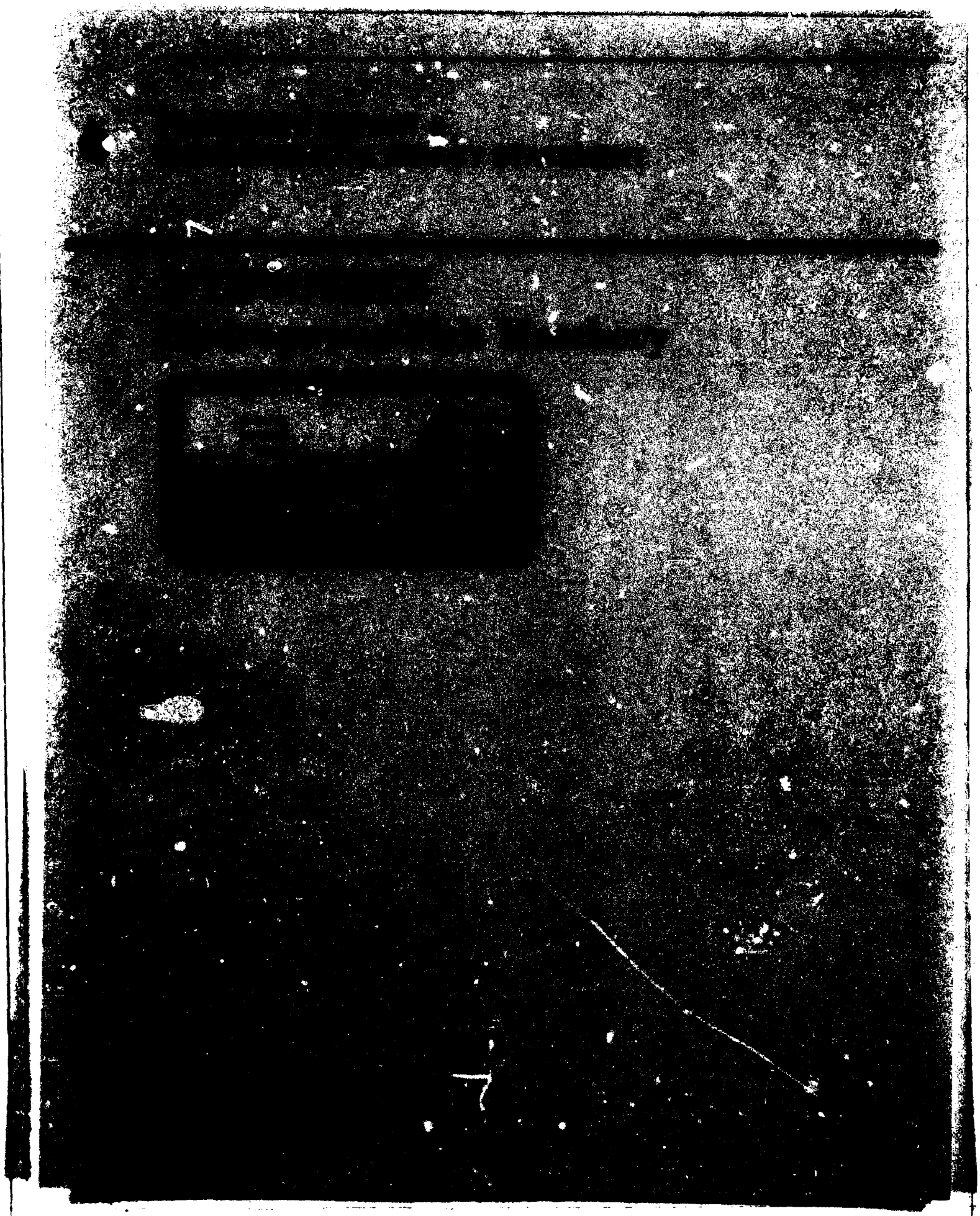
11.2.2 Threatened and Endangered Species (Endangered Species Act of 1973). The proposed fill activities are in compliance with the requirements of the Endangered Species Act.

11.2.3 Marine Sanctuaries (Marine Protection, Research, and Sanctuaries Act of 1972). Not applicable.

11.3 Potential for Significant Degradation of Water as a Result of the Discharge of Polluted Material (230.10(c)). The proposed fill activities would not result in the release of pollutants that would have significant adverse effects on human health or welfare; the aquatic ecosystem and wildlife dependent on this ecosystem; and recreational, esthetic, and economic values.

11.4 Steps to Minimize Potential Adverse Impacts on the Aquatic Ecosystem (230.10(d)). All appropriate and practicable measures to minimize potential adverse effects associated with the proposed fill activities have been included in the recommended plan.

12. Findings (230.12). The proposed work was evaluated in accordance with the objectives of the EPA's guidelines on the discharge of fill material into waters of the United States. The subject placement of fill material into waters of the Wynoochee River and Wynoochee Lake has been specified through the application of the Section 404(b)(1) guidelines. All considerations and objectives were examined with respect to the proposed actions. The project would conform with these objectives by minimizing or avoiding impacts on the environmental considerations and not significantly affecting fish and wildlife, water quality, and the ecology of the area. The proposed work complies to the maximum extent practicable with state and local laws, regulations, and codes. There are no identified major adverse environmental effects. The proposed fill activities are consistent with national policy, statutes, and administrative directives. The total public interest would best be served by performance of the work.



APPENDIX B

STUDY COORDINATION AND PUBLIC INVOLVEMENT

United States Senate

WASHINGTON, D.C. 20510

December 10, 1981

Colonel Norman Hintz
Seattle District Engineer
Army Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Colonel Hintz:

We strongly endorse the planning efforts of the Corps of Engineers to develop the Wynoochee Hydropower/Fish Hatchery project. The Wynoochee study is a good example of local, state, and federal authorities working together to develop a project that will provide both energy and fishery enhancement benefits to the region. There is no doubt that the energy and anadromous fishery resource needs of the Pacific Northwest have increased substantially over the last several years. This project will help to mitigate those problems.

We were pleased to learn that the public has been extensively involved in the development of this unique project and we look forward to reviewing the public comments that are received on the final feasibility study. Again, we commend the efforts of all the participants who have worked so hard to develop the Wynoochee project and we look forward to working with you to insure Congressional authorization at the earliest possible date.

Sincerely,

HENRY M. JACKSON
United States Senator

SLADE GORTON
United States Senator

DON BONKER
THIRD CONGRESSIONAL DISTRICT
STATE OF WASHINGTON

COMMITTEES:
FOREIGN AFFAIRS
CHAIRMAN, SUBCOMMITTEE ON INTERNATIONAL ORGANIZATIONS
MERCHANT MARINE AND FISHERIES
SELECT COMMITTEE ON AGING

Congress of the United States
House of Representatives
Washington, D.C. 20515

434 CANNON HOUSE OFFICE BUILDING
WASHINGTON, D.C. 20515
(202) 225-3536

DISTRICT OFFICES:
217 FEDERAL BUILDING
OLYMPIA, WASHINGTON 98501
(206) 753-5090

U.S. POST OFFICE
LONGVIEW, WASHINGTON 98632
(206) 636-5280

104 N. LAUREL STREET
PORT ANGELES, WASHINGTON 98362
(206) 457-0213

February 8, 1982

Colonel Norman Hintz
Seattle District Engineer
Army Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Hintz:

I want to add my voice to those who have already endorsed the planning efforts of the Corps of Engineers to develop the Wynooche Hydropower/Fish Hatchery project.

This study is a good example of cooperative, intergovernmental relations to develop a project that will provide both energy and fishery enhancement benefits. There is no doubt that the nergy and anadromous fishery resource needs of the Pacific Northwest have increased substantially over the last several years. This project will help to mitigate those problems.

I am pleased to learn that the public has been extensively involved in the development of this unique project, and I look forward to reviewing the public comments that are received on the final feasibility study. Again, I commend the efforts of all the participants who have worked so hard to develop the Wynoochee project and I look forward to working with you to ensure Congressional authorization at the earliest possible date.

Sincerely,

Don Bonker

DON BONKER, M.C.

GRAYS HARBOR FISHERIES ENHANCEMENT TASK FORCE

2109 Simpson Avenue, Suite 202
Aberdeen, Washington 98520

May 19, 1980

Colonel Leon K. Moraski
P.O. Box C-3755
Seattle, WA 98124

Dear Colonel Moraski:

Because of grave concerns over the apparent decline of the fisheries resource in the Grays Harbor area, the Grays Harbor Regional Planning Commission appointed the Grays Harbor Fisheries Enhancement Task Force in February 1980. This Task Force is broadly representative of the various user groups--industry, commercial, sports, and government. Since February we have studied, in depth, current enhancement efforts, water quality, and short and long range proposals to enhance fisheries. One such proposal discussed in detail was the possibility of a salmon and steelhead hatchery below Wynoochee Dam.

The Task Force is aware the Corps is currently undertaking studies on Wynoochee Dam hydropower, and it would appear that studies could be undertaken concurrently on a fish hatchery which could use the gravity flow supply of good quality water from the Wynoochee reservoir after it first generates hydroelectric power.

At our meeting of May 15, the Grays Harbor Fisheries Task Force unanimously urged that feasibility studies be undertaken for a salmon and steelhead hatchery at this site as this could provide an opportunity to reverse the declining fisheries in the Chehalis River Basin and Grays Harbor area. We believe that this project will substantially benefit our area.

Sincerely,

Jake Medcalf

JR:dc

cc: Grays Harbor Regional
Planning Commission

STATE OF WASHINGTON

Dixy Lee Ray
Governor

OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION

111 West Twenty First Avenue, Olympia, Washington 98504 (206) 753-4011

Date: June 20, 1980
In reply refer to:

Steven F. Dice, Chief
Environmental Resources Section
P. O. Box C-3755
Seattle, WA 98124

Re: Wynoochee Fish Hatchery Study

Dear Applicant:

We have reviewed the project materials forwarded to us for the above project and would like to make the following comments:

___*Insufficient information:* We will need: __a detailed narrative of the project elements; __a vicinity map; __a map of the project site and surrounding area showing topography, drainage, specific project boundaries, and indicating County, Section, Township, and Range; __line drawings of the project; __photographs of structures to be renovated or demolished.

XX *No resources known:* No properties are listed in the National or State Registers of Historic Places or the State Inventory of Historic Places which may be impacted by the project. Properties include archaeological and historic resources.

___*Project area* __has/__has not been surveyed for cultural resources.

___*Potential effects on unidentified resources:* There is reasonable probability that cultural resources exist in the project areas. __A cultural resources survey/ ___monitoring of the project area is recommended as part of project constructio

___*Resources present:* __no effect/__effect uncertain; see below for comment.

___*No adverse effect/__Adverse effect* on National Register property. See below for comment.

XX In the event that cultural materials are disclosed during construction, work in the immediate vicinity should be discontinued and this office notified.

Sincerely,

Jeanne M. Welch

Jeanne M. Welch, Deputy State
Historic Preservation Officer

md
Comments:

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Area Office
2625 Parkmont Lane S.W.
Olympia, WA 98502

January 23, 1981

Mr. Sidney Knutson, P.E.
Assistant Chief, Engineering Division
Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Mr. Knutson:

Your letter of June 17, 1980 requested a list of endangered and threatened species which may be present within the area of the proposed Fish Hatchery Enhancement and Hydroelectric Generating Facilities at Wynoochee Dam, Grays Harbor County, Washington. Our response of August 22, 1980 indicated no known endangered or threatened species were present in the area including the river reach upstream of the dam. This conclusion was determined after coordinating the request with the Washington Department of Game (WDG), Non-Game Program and WDG - Regional Office personnel in Aberdeen in addition to review of our own maps and data files.

Subsequent to those reviews we have been informed by members of your staff that confirmed records of bald eagle sitings (listed as threatened in Washington State) are available. Therefore we are supplying this new species list (Attachment A) as required by Section 7 (c) of the Endangered Species Act of 1973, as amended. Your requirements as outlined by the Act are listed in Attachment B.

Should your biological assessment determine that a listed species is likely to be affected (adversely or beneficially) by the project, your agency should request formal Section 7 consultation through this office.

Even if your biological assessment shows a "no affect" situation, we would appreciate receiving a copy of your assessment for our information. If you have any additional questions regarding your responsibilities under the Act, please contact Mr. Jim Bottorff, Endangered Species Team Leader, (206) 753-9440, FTS 434-9440 at the following address:

U. S. Fish and Wildlife Service
Endangered Species Team
2625 Parkmont Lane S.W., Bldg. B-3
Olympia, WA 98502

Your interest in endangered species is appreciated.

Sincerely,

Margaret J. Kolar

for Joseph R. Blum
Area Manager

Attachments
cc: Regional Director, Portland, OR (AFA-SE)
ES, Olympia
Washington Department of Game, Non-Game Program

LISTED AND PROPOSED ENDANGERED AND THREATENED
SPECIES, AND CANDIDATE SPECIES THAT MAY OCCUR
WITHIN THE AREA OF THE PROPOSED
ENHANCEMENT FISH HATCHERY AND
HYDROELECTRIC GENERATING FACILITIES
ASSOCIATED WITH WYNOOCHEE DAM IN
GRAYS HARBOR COUNTY, WA
Number 1-3-81-SP-10

LISTED

Bald Eagle (Haliaeetus leucocephalus)

PROPOSED

none

CANDIDATE

none

Washington Environmental Council

107 South Main Street
Seattle, Washington 98104
206-623-1483

January 24, 1981

Jerry L. Foy, Mayor
City of Aberdeen
200 East Market
City Hall
Aberdeen, WA 98520

Re: Development of hydropower on Wynoochee Dam

Dear Mayor Foy,

The Washington Environmental Council is concerned with the depressed condition of the anadromous fisheries on the Wynoochee River, due in part to the recent construction of the Wynoochee Dam. Now, three agencies, including the City of Aberdeen, have proposals for adding hydropower facilities to that dam.

The Army Corps of Engineers proposal includes a large fish hatchery, designed in cooperation with all concerned fisheries management agencies and user groups. We strongly support this proposal. We will oppose any further development on the Wynoochee River which does not consider the fisheries resources.

We urge you to cooperate with the Corps of Engineers; you could build the powerhouse with design features allowing the hatchery to be built at the same time by the Corps. We will urge the Federal Energy Regulatory Commission to include requirements for such design features in any license issued for a Wynoochee Dam project.

Sincerely,

Roger Leed, President
Washington Environmental Council

cc: U.S. Army Corps of Engineers
Federal Energy Regulatory Commission

May 18, 1981

Colonel Leon K. Moraski
Department of the Army
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

RE: Public Information Meeting
Monday, May 18, 1981
City Council Chambers, City Hall
Aberdeen, Washington
Wynoochee Hydropower/Fish Hatchery
Presentation Transcript

Colonel:

As President of the Northwest Steelhead and Salmon Council of Trout Unlimited, a national non-profit organization with a state membership of over 3,000 members and a national membership of over 20,000 members, it is my pleasure to announce that Trout Unlimited is heavily supporting the Wynoochee Hydropower/Fish Hatchery and has taken direct action toward making this project a national goal. We feel that it has taken 11 years to reach this point and urge that you move as quickly as possible. We would like to see the first concrete poured by 1984.

Furthermore, the following groups, organizations and other interested parties are supportive of this project:

Past Governor Dixie Lee Ray, current Governor John Spellman, Washington State Department of Fish and Game, Washington Environmental Council made up of in part; the Audobon Society, Isaacson Walton League, N.W. Fly Anglers, Sierra Club, Mountainers, Washington Fly Fisheries Club, Steelhead Trout Club of Washington, Federation of Fly Fisherman, Poggie Club and all Treaty Indian tribes who are members of the Washington Environmental Council.

In closing, the Corp's efforts must be commended for engineering a project which will have such a monumental impact to our fisheries resources.

Sincerely yours,

Jerry Pavletich, President
NORTHWEST STEELHEAD & SALMON COUNCIL OF TROUT UNLIMITED

JP:cw

Westport Charter Association
WCA
P.O. Box 654
Westport, Washington 98595

May 26, 1981

Col. Moraski
District Engineer
Seattle District, Corps Of Engineers
Box C3755
Seattle, Wash. 98124

Re: Wynoochee Hydropower/Fish Hatchery

Dear Col. Moraski;

Please accept this correspondence as a request that continue with the feasibility study on the Wynoochee Hydropower/Fish Hatchery feasibility study. Our organization is completely in favor of the project. We also suggest the following:

1) That early run Coho Salmon also be designed for in addition to Steelhead and Spring Chinook. They would be of much more benefit to the general public that uses the services of charter boats.

2) That you solicit the support of the National Marine Fisheries Service and the Dept. of Commerce rather than U.S. Fish and Wildlife and the Dept. of Interior. Interior has shown an excessive amount of bias toward Indian tribal points of view in the past decade to the detriment of all other users of the resource.

If we can be of any more assistance please contact us.

Thank you,

Mark Cedergreen, Commodore

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Area Office
2625 Parkmont Lane S.W.
Olympia, WA 98502

July 20, 1981

Refer to: 1-3-81-I-201

Colonel Leon K. Moraski
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

This is in response to your letter of July 6, 1981, that transmitted your biological assessment of the effects of the proposed Wynoochee Hydropower/Fish Hatchery (HP/FP) on the threatened bald eagle (Haliaeetus leucocephalus). You concluded that this project would not significantly impact this species.

It was stated in the assessment that the declining run of coho salmon above Wynoochee Lake will be eliminated with the project. Coho salmon (as well as steelhead trout) are presently collected at the fish collection facility downstream of the dam and trucked to the upstream release site. This remnant run has occasionally been supplemented with hatchery-reared fish. A small population (maximum of 6) of bald eagles have occasionally fed on spawned-out salmon carcasses associated with this run. As was pointed out in the assessment, eagles utilizing this seasonal food supply would be displaced. The premise was offered that increased salmon production with the hatchery in operation coupled with increased trout production in Wynoochee Reservoir due to decreased competition would offset the loss of the eagle's food supply upstream.

We take exception with the theory that lessened competition for food sources in the lake will increase available trout stocks that could be utilized by eagles. Competition between trout and salmon in Wynoochee Lake has not been identified as a limiting factor for trout production. The premise that more salmon carcasses will be available downstream appears to be valid. The majority of spawning will occur in the hatchery where the carcasses will be disposed of. However, as presently occurs, some spawning salmon stack up below the re-regulating dam and are not drawn into the fish collection facility. Larger runs of salmon due to hatchery production should create a larger source of in-river salmon carcasses downstream of the dam. Redistribution of eagles, according to available food resources, as occurs on the Skagit River, can be expected. Further credibility can be attached to this assumption through analysis of eagle sighting locations. The majority of recorded sightings in the Wynoochee Basin since construction of the dam have occurred downstream of the reservoir.

In consideration of these circumstances, we concur with the "no effect" conclusion of your biological assessment. No formal consultation, as described in Section 7(c) of the Endangered Species Act of 1973, 16 U.S.C. 1531, et seq., is required at this time. Should new information or project features arise that change the conclusions of your assessment or this letter of concurrence, then formal consultation should be considered.

In furtherance of Sections 2(c) and 7(a)(1) of the Act which mandates Federal agencies to utilize their authorities to carry out programs for the conservation of listed species, we recommend that:

1. All possible efforts be made to preserve bankside standing timber for use as perch trees. This should include the known perch tree immediately below the dam and known and potential sites near the fish collection facility. This should be reflected in the final project plans as a project feature.

2. Human access should be limited immediately below both Wynoochee Dam and the collection facilities to reduce disturbance to feeding bald eagles during the fall-winter salmon runs.

3. Eagles may extend their feeding area downstream of the collection facility due to upstream displacement and a larger supply of available salmon carcasses. Therefore, your agency should continue monitoring bald eagle numbers and distribution in the project area. This Service should be notified for assistance in developing a protection plan should any population shifts or increases in unprotected areas be observed.

We greatly appreciate your concern for endangered species and the coordination and efforts of your staff on this project.

Sincerely,

Margaret J. Kolar

for Joseph R. Blum
Area Manager

Attachments

cc: RO (AFA-SE)
ES, Olympia, WA
WDG, Non-Game Program
WNHP

JOHN SPELLMAN
Governor

DONALD W. MOOS
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Mail Stop PV-11 • Olympia, Washington 98504 • (206) 753-2800

October 28, 1981

Ms. Karen S. Northup
Environmental Resources Section
Seattle District Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Ms. Northup:

We have reviewed the draft language for the Wynoochee hydropower/hatchery project concerning instream resources impacts and minimum flow determination in post authorization studies. Generally, we find the language to be acceptable. Specific language modification suggestions are included in the enclosed draft.

You should consider including a statement that the explanation of impacts is for a "worse case" situation. These worse case impacts would occur if no minimum flow was maintained in the bypass reach, other than the 20 cfs inflow, during those periods when releases from the dam are only sufficient to supply the hatchery. If higher minimum flows are determined to be appropriate in post authorization studies, then the impacts on instream resources should be less than those stated for the worse case situation.

The language regarding deferral of minimum flow determination until post authorization studies is in line with our verbal agreement at the meeting of August 19, 1981.

Thank you for the opportunity to provide these comments at this early draft stage. We look forward to receiving the draft EIS. Contact Ken Slattery (459-6116) if you have any questions regarding our comments.

Sincerely,

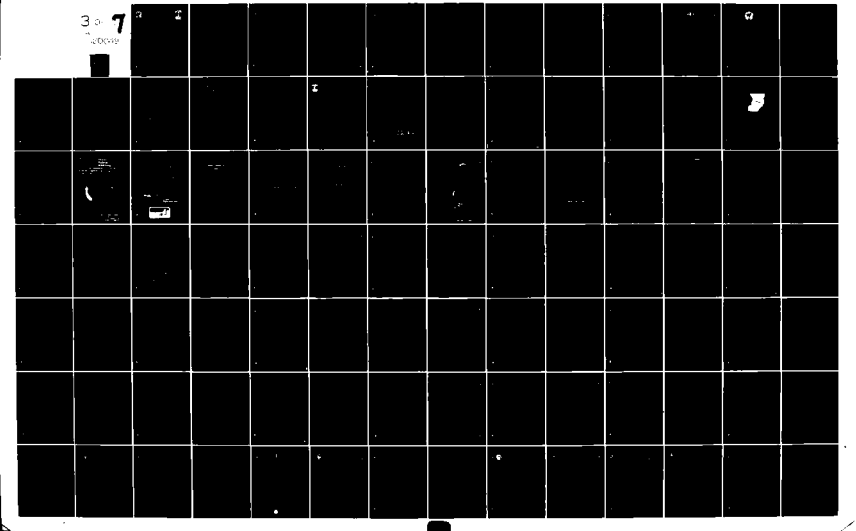
Ken Slattery for

Michael Hambrock, Supervisor
Water Resources Policy
Development Section

MH:tf

AD-A120 049 CORPS OF ENGINEERS SEATTLE WA SEATTLE DISTRICT F/G 13/2
WYNOOCHEE HYDROPOWER/FISH HATCHERY: FEASIBILITY REPORT AND ENVI--ETC(U)
SEP 82 J O WALLER

UNCLASSIFIED NL



GRAYS HARBOR CHAPTER

Northwest Steelhead & Salmon Council of Trout Unlimited

P.O. Box 1050

Aberdeen Washington 98520

December 8, 1981

Mr. James O. Waller
Hydropower Study Manager
Seattle District
U. S. Army Corp. of Engineers

RE: WYNOOCHEE HYDROPOWER/FISH HATCHERY FEASIBILITY STUDY

***

Ladies and Gentlemen, honored guests, fellow fishermen:

My name is Jim Nelson, President of the Grays Harbor Chapter of the Northwest Steelhead and Salmon Council. It is an understatement to say that we of the Grays Harbor Steelheaders are here to support the proposed project. For the past 10 years we have been working and will continue to work for the ultimate goal of a Steelhead Trout/Salmon Hatchery on the Wynoochee.

We as sports fishermen in Grays Harbor have been directly affected by all recent rulings dealing with our fisheries resource throughout our region. We have seen and have been directly impacted by the steady and deplorable decline in the sports fishery take of both Steelhead Trout and Salmon in Grays Harbor. To make matters worse, closures to inside river sports fishermen of salmon in Grays Harbor has now almost tipped the boat with no chance of uprighting itself. Yet, other users have felt this impact for an even longer period of time. We speak of the commercial interest so dependent on our fishery resource.

In the past commercial fishermen had told us what occurred this year would happen. We unfortunately took their warnings with a grain of salt and now look where we are. Now we are fighting for our own fishing allocations. However, this whole gloomy mess boils down to the fact that there are just fewer and fewer Salmon and Steelhead Trout returning to Grays Harbor.

I once spoke to one of our state Senators who told me that the majority of the people in our state are not interested in fishery issued because our depressed economy and unemployment were overshadowing all issues. Yet, Grays Harbor's economy and employment was once heavily dependent on our fisheries resource.

I spoke with a Grays Harbor business leader who advised that we had to get more energy into our area to entice outside business interests to look at us as a possible building area.

Yet, they have in our mind missed the boat. With the construction of the Wynoochee Hydropower/Fish Hatchery we can have our cake and eat it too. We can have further power available for homes, but more importantly, we can see a resurgence of our fisheries resource in Grays Harbor.

We would further like to comment on Stephen B. Matthew's Biological Report for Wynoochee Hatchery Management Plan. It was documented in his report that fall Chinook runs have not faired well at the Simpson Hatchery on the Satsop. However, as noted on Page 29 of this report, under Fall Chinook Mr. Mathews states: "Early (3-year old) returns from Humptulip's plants indicate probable good success there and potential for an egg source for Wynoochee."

We of the Grays Harbor Chapter of the Northwest Steelheaders make this proposal: we will capture, rear and release Humptulips Fall Chinook natives to insure a substantial brood stock for Wynoochee. If it is deemed necessary, we will do the same for early and late running Coho runs. We invite all users to join us in setting the groundwork to ensure that ample brood stocks are available when the hatchery comes on-line. We make this commitment knowing very well that our personal out-of-pocket cost will be great. But we are ready; ready to see that all commercial and non-commercial interest groups have not been left out in the cold because of a lack of viable brood stocks. Once this hatchery comes on-line, and several years down the road, we will once again see a fishing industry--both commercial and sports--which will have a real impact on Grays Harbor's economy of the future. No longer will out fisheries availability in our Grays Harbor area be calculated on Columbia and Canadian stocks. Our own returning adults will sustain our needs. The Wynoochee Hatchery will prove to be a most valuable economic tool for us all.

Furthermore, the location of this facility speaks for itself, and its water quality cannot be beat if we compare it to those established facilities. We can see a facility which will use all the new technology to insure maximum output without jeopardizing the need for quality control.

In closing, we thank the Army Corp of Engineers and our Grays Harbor P.U.D. for finally resolving construction and operating problems of the power generation units.

We would finally like to thank all of you who support this project. By the look of the size of this audience it's evident that our time has come.

Jim Nelson.

Grays Harbor Chapter
NORTHWEST STEELHEAD & SALMON COUNCIL
OF TROUT UNLIMITED
P. O. Box 1050
Aberdeen, WA 98520

JN:cw

***

FRIENDS OF THE EARTH

11 December 1981

Colonel Norman Hintz
District Engineer
Seattle District Corps
P.O. Box C-3755
Seattle, WA 98124

Dear Colonel Hintz:

We have learned that the Seattle District Corps of Engineers intends to hold a public hearing to receive public comment on the Wynoochee Hydropower/Fish Hatchery Feasibility Report & Draft EIS in Aberdeen, WA on December 15th.

Unfortunately, Friends of the Earth will not be participating in the public hearing due to violations by the Seattle District Corps of Engineers of Corps Regulations which implement the National Environmental Policy Act of 1970, as amended (42 U.S.C. 4371 et seg.).

Specifically the Corps Regs are clear:

"If a public meeting or hearing is held in connection with an EIS for a proposed action, the draft EIS will be made available to the public at least 15 days in advance of the meeting of hearing." (33 CFR 230.19(b) Public Meetings and Hearings)

Our office did not receive the Feasibility Report & Draft EIS until 9 December, while another recipient did not receive it until 10 December. With a 3 December date on the cover letter, the Corps did not meet its fifteen day regulatory requirement for public notification prior to the 15 December Aberedeen hearing. As it is, some members of the public now have only three working days in which to provide comments to the public hearing .

The intent of the Corps' NEPA regs is clear - to allow the public adequate time and information in which to provide careful and well-reasoned comments on projects proposed by the Corps of Engineers. Violations of the Regs, as the Corps has done, completely circumvents that intent.

This is not an isolated case. In the Revised Draft EIS for the Grays Harbor Widening and Deepening EIS dated September 1976, the Corps admitted that the EIS was not made available, "prior to the 3 June 1976 public meeting. However, it was mailed the day after the meeting. . ." p. 154)

We seriously question the commitment of the Seattle District Corps

Northwest office, 4512 University Way NE, Seattle, Washington 98105, (206)633-1681

of Engineers to follow its own regulations. What confidence does the public have that if these regulations are brushed aside that others will not suffer the same fate?

We would appreciate a written response detailing what the Seattle District Corps of Engineers intends to do to comply with 33 CFR Part 230.

Sincerely,

David E. Ortman
Conservation Representative

cc: The Honorable Senator Slade Gorton
The Honorable Don Bonker
Corps North Pacific Division
CEQ
Ken Weiner, Esq, Seattle, WA

NPSEN-PL-ER

7 JAN 1982

Mr. David E. Ortman
Conservation Representative
Friends of the Earth
4512 University Way Northeast
Seattle, Washington 98105

Dear Mr. Ortman:

This responds to your letter of 11 December 1981 in which you noted our public involvement procedures for Wynoochee Hydropower/Fish Hatchery study did not strictly follow the guidance in U.S. Army Corps of Engineers regulations. You requested a written response detailing our future compliance plans.

Seattle District planners are aware of the policy guidance to make draft environmental impact statements (EIS) available 15 days prior to public meetings or hearings. A special effort was made to make the draft EIS available during the Wynoochee study schedule. Unfortunately, as Ms. Karen Northup explained to you in a 10 December 1981 telephone conversation, and as I remarked at the public meeting on 15 December prior to reading your letter into the record, our good intentions were mildly upset by the "government shut down" which resulted from the budgetary standoff between the Congress and the President on 30 November. Specifically, reproduction of the draft feasibility report/EIS by the Government Printing Office was delayed beyond our original target date. Some reports and EIS's went out to the public on 2 December, but the majority were delayed until 3 December with most apparently being delivered by 7 December 1981. Despite the delay which resulted in the draft EIS being available fewer than 15 days prior to the public meeting, I decided to hold the meeting as scheduled on 15 December. The meeting had been announced by way of press releases and a public brochure which summarized the tentatively selected plan and was provided to all on the study mailing list a month in advance of the scheduled meeting. To delay a few days to comply with the letter of the regulations would have been cumbersome and expensive and would have moved the meeting nearer Christmas with an expected reduction in participation. Setting a new date in January would have delayed this report on a very viable project a month or more. Holding the meeting as scheduled was clearly in the public interest.

NPSEN-PL-ER
Mr. David E. Ortman

I firmly believe we have complied with the spirit of the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) rules, and our implementing regulations. The official public hearing record will be open until 31 January 1982, however, in the event you or anyone else has comments for the record.

Finally, let me assure you that our intent in planning was to act in the best public interest. If one thing is explicit in the CEQ rules, to which our NEPA regulations are subordinate, it is that good decisions (rather than good processes or reports) concerning the resources are the ultimate goal - a goal which I heartily endorse. I do not believe that a "trivial violation" (CEQ rule at 40 CFR 1500.3), such as the one discussed in your letter, stands in the way of achieving that goal.

Sincerely,

NORMAN C. HINTZ
Colonel, Corps of Engineers
District Engineer

Copy furnished:
(See next page)

NPSEN-PL-ER
Mr. David E. Ortman

Copy furnished:
Honorable Slade Gorton
United States Senate
Washington, D.C. 20510

Honorable Slade Gorton
United States Senator
2988 Federal Office Building
915 Second Avenue
Seattle, Washington 98174

Honorable Don Bonker
House of Representatives
Washington, D.C. 20515

Honorable Don Bonker
Representative in Congress
207 Federal Building
Olympia, Washington 98501

Division Engineer
U.S. Army Engineer Division,
North Pacific
Post Office Box 2870
Portland, Oregon 97208

Nicholas C. Yost, General Counsel
Council on Environmental Quality
722 Jackson Place Northwest
Washington, D.C. 20006

Kenneth S. Weiner, Esquire
IBM Office Building
1200 Fifth Avenue
Seattle, Washington 98101

Mayor's Office

City of Montesano
Home of the Tree Farm
MONTESANO, WASHINGTON 98563

December 15, 1981

Army Corp of Engineers
4735 E. Marginal Way South
Seattle, Washington 98134

Re: Wynooche Hydropower/Fish Hatchery

Gentlemen:

The original construction of the Wynooche Dam diminished fish runs by flooding prime spawning grounds and blocking access to the upper river. This reduced both a valuable resource and the economy of our communities, based on the fishermen who enjoy the sport.

As the process of determining the need for both the hydropower and fish hatchery projects continue I wish to go on record as supporting these projects and believe fish should be given equal consideration with power generation, prior to construction of any facility.

Sincerely,

Jack Sam Rottle

JACK SAM ROTTLE, Mayor
City of Montesano

JSR/ja

STATEMENT

OF

JERRY PAVLETICH

PRESIDENT

NORTHWEST STEELHEAD & SALMON COUNCIL

OF TROUT UNLIMITED

NATIONAL DIRECTOR

TROUT UNLIMITED

BEFORE

U. S. ARMY CORPS OF ENGINEERS

WYNOOCHEE HYDROPOWER/FISH HATCHERY

FEASIBILITY STUDY FINAL PUBLIC MEETING

DECEMBER 15, 1981

ABERDEEN, WASHINGTON

CITY COUNCIL CHAMBERS

Mr. Chairman, Corps members, ladies and gentlemen, my name is Jerry Pavletich, and I am President of the Northwest Steelhead and Salmon Council of Trout Unlimited and a Trout Unlimited National Director.

I am here today to speak in behalf of all our members and chapters in the state of Washington and the thousands of other Trout Unlimited members and chapters in all 50 states, Canada and New Zealand in favor and support of the proposed Wynoochee Hydropower and Fish Hatchery Project.

For the past ten years our organization has worked very hard to obtain support at the local, state and federal level for construction of a joint hatchery and hydro-electric facility on the existing City of Aberdeen sponsored Wynoochee Dam.

For the past three years the Grays Harbor Chapter has lobbied at the local level while State Council and Trout Unlimited have lobbied hard at both the state and national level--elected officials, other conservation and environmental organizations, interested resource agencies, commercial and tribal fishing groups. The support we have gathered for the Wynoochee Hydro-power and Fish Hatchery Project has been overwhelming.

So far our organization has obtained the support of Governor John Spellman, and we also have received strong support from this state's entire congressional delegation led by this District's own Congressman Don Bonker. Every state and federal agency that would be involved in the construction and/or operation of such a facility has also shown strong interest and support for the proposed Wynoochee Project. These groups have been joined recently by the Grays Harbor County Commissioners and the Mayor and Council of the City of Aberdeen. We have in addition gathered the support of the Washington State Environmental Council and its members along with all other sports fishing organizations and conservation groups. All commercial fishing organizations and treaty fishing tribes we have contacted have stated their support for the project.

The latest development, which will be much discussed at this hearing, in which the Grays Harbor P.U.D. and the U.S. Corps of Army Engineers have become partners in the hydro project with the Corps building the facilities and the P.U.D. selling the resulting power is the final foundation block which we strongly endorse and support. We believe this latest development truly makes the Wynoochee Hydro/Fish Hatchery Project viable and attainable in the very near future.

The proposed hatchery will be the largest salmon/steelhead hatchery in the world raising fish at a fraction of the cost of hatcheries now in operation. This is due to the high quality and constant temperature afforded by the water in the upper Wynoochee River above the existing dam. Low operating costs will exist because no expensive electrical pumping will be required to move the water to and through the hatchery. The water will move by gravity flow to the hatchery after powering the turbines in the power house. It is estimated that the Wynoochee Hatchery besides providing fish for other Washington coastal streams will provide upwards of 130,000 returning adult salmon and steelhead trout for sports and commercial harvest in Grays Harbor.

The Northwest Steelhead and Salmon Council and Trout Unlimited do not always support the construction of new hatcheries. Hatcheries are not always the solution for rebuilding or enhancing fish runs in rivers impacted by dams and environmental degradation. In the case of the Wynoochee, however, upwards of 30% of the natural spawning area was lost with the impounding of water. The project we are here tonight to discuss, the Wynoochee Hydro/Fish Hatchery facility, should have been built to mitigate for this loss while the present dam was being constructed.

We must not allow the current depressed economy and proposed operations and construction budget cuts deter us from pushing for a quick completion of the Wynoochee Project. The proposed plan is economically justified. The hydropower plant would produce $1.20 in average power benefits for every $1.00 in average annual power costs. The fish hatchery would produce almost $3.00 in average annual fish harvest benefits for every $1.00 in cost.

The construction of the Wynoochee Hatchery/Hydro Project will create many jobs for Harbor residents. The returning salmon and steelhead trout will not only create a tremendous recreational opportunity for Harbor residents and tourists, but will also enhance this area's commercial fishing and tourist industries. For our organization, however, the most important result will be the restoration of the magnificent Wynoochee salmon and steelhead trout runs.

Now, if I may Mr. Chairman, I would like to read into the record our suggestions for implementation in regard to the "Biological Report for Wynoochee Hatchery Management Planning - Sept. 1981 by Stephen B. Matthews."

Page 19 - Catch Trends Compared With State Totals

We believe the data quoted in this section is correct, and we support the statement on Page 20; quote "The Grays Harbor fisheries are apparently receiving a declining share of all important anadromous salmonoid species found there (Fig. 7). Perhaps then, this region should be considered high on the priority list for a large regional hatchery such as Wynoochee." end of quote.

Page 28 - Spring Chinook

We don't believe stocks not native to the Chehalis system should be brought into the Wynoochee Hatchery. The Northwest Steelhead & Salmon Council of Trout Unlimited suggests that the few remaining native spring chinook available in the Chehalis system be taken at existing trapping facilities at Wynoochee Dam, Simpson Springs Hatchery on the Satsop and on the Skoocumchuk River. These native spring chinook could then spawned raised to smolt size in net pens at Aberdeen Lake. Native adults would then be returning and available in numbers enough to stock the new hatchery. Our local chapters are willing to provide the manpower and funding for this project.

Page 29 - Fall Chinook

Quote; "Out of region plants (Puget Sound to Simpson) fall chinook have survived poorly." end of quote. Once again, we propose only the use of stocks native to the Chehalis system. We propose that native fall chinook now returning to the Wynoochee be taken at the trap at the dam and spawned and raised at either Simpson Hatchery on the Satsop or the Humptulips Salmon Hatchery. Again, our local chapters stand ready to assist in taking these native fall chinook in stream and assisting in the hatchery so there will be enough native fall chinook returning to the Wynoochee to stock the hatchery when completed.

And finally, our organization stands ready to help at any level to make the Wynoochee Hydro/Fish Hatchery not just a proposed project--but a reality.

Thank you for allowing us to participate.

Jerry Pavletich
State Council President
Northwest Steelhead & Salmon Council
T.U. National Director
2100 Bay Ave.
Aberdeen, WA 98520

JP:cw

***

FEDERATION of FLY FISHERS

January 13, 1982

Department of the Army
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, Wa. 98124

Attn. Dr. James O. Waller

Re: Wynoochee Hydropower/Fish Hatchery Project

Dear Dr. Waller:

The Federation of Fly Fishers is an international organization composed of individual members and affiliated membership clubs located throughout the world. There are over 250 member clubs within the United States. Our headquarters are in West Yellowstone, Montana.

We have followed your progress towards the goal of establishing a combination hydropower/hatchery on the upper Wynoochee River in Grays Harbor County, Washington. We have also participated in public meetings and studies by the attendance of our members, their individual input and discussion.

The activity of the Corps to build a hatchery capable of rearing close to 400,000 pounds of anadromous fish with a planned or estimated return of close to 120,000 fish to the Chehalis system is wholly supported by the Federation of Fly Fishers.

The return of adult salmon and steelhead reared by this hatchery will greatly increase the present runs and will have an economic impact on the Chehalis system as used by the various user groups including sports - recreational people and the commercial section.

Population increase, fish depletion, habitate damage and other detrimental impacts will be alleviated and mitigated by this hatchery and its production.

The power produced, while a small percentage of the area's needs, will supplement the growing needs of the area in a safe manner and with no adverse environmental detriments as long as a proper construction method and safeguards are followed.

The Federation as a whole very strongly desires to participate in any committee work required in the future concerning hatchery programs, mitigation projects, environmental studies, and volunteer assistance needed by any operators of the hatchery. We stand ready to assist you in this project in the future.

Very truly yours,

Starr Thurston
National Director

ST/rc

TROUT UNLIMITED

THE WYNOOCHEE

WHEREAS, Trout Unlimited's primary goal is to positively impact the coldwater resources of our Nation by a program of preserving, protecting, and improving that resource; and

WHEREAS, the present Wynoochee Dam has had a disastrous effect on the once bountiful salmon and steelhead populations that ran the Wynoochee; and

WHEREAS, the winter steelhead was known as one of the largest that ran the west coast rivers to spawn; and

WHEREAS, a proposed mitigation hatchery could instill an estimated five million dollars of steelhead and salmon resources to Indian, commercial, and recreational fishing; and

WHEREAS, the building of a powerhouse on the present in-place Wynoochee Dam and general conservation of energy will increase the power to the area and also provide gravity feed water to the proposed hatchery; and

WHEREAS, a second dam on the Wynoochee would further deplete the valuable steelhead and salmon runs and use more energy than an in-place power structure on the present dam; therefore be it

RESOLVED, that Trout Unlimited, assembled at its 21st Annual Meeting at Snowmass, Colorado, August 14-16, 1980, and represented by its National Board of Directors, finds the proposed new dam on the Wynoochee unacceptable as well as unnecessary; and be it further

RESOLVED, that this and other dams that are not cost effective and essential for national health and well-being remain unbuilt; and be it further

RESOLVED, that Trout Unlimited support full fisheries and wildlife mitigation of the losses of these resources from the present dam, particularly as they relate to the construction of a steelhead and salmon hatchery below the present dam.

1959-1981 "Over twenty years of trout and salmon conservation"
Washington, D.C. Headquarters • 116 Park Street, S.E. • Vienna, Virginia 22180 • (703) 281-1100

RESOLUTION NO. 81-16

WHEREAS, several entities are studying the possibility of building a power facility on the Wynooche River, and

WHEREAS, the construction of the original Wynooche Dam diminished the salmon and steelhead runs by flooding prime spawning grounds and blocking access to the upper river, and

WHEREAS, the Grays Harbor County Commissioners believe that the fish should be given equal consideration with power generation prior to construction of any facility, and

WHEREAS, construction of a power facility on the existing dam appears to be less of an impact to the environment than a new dam in a downstream location;

NOW, THEREFORE, BE IT RESOLVED, that the Grays Harbor County Commissioners encourage all entities of government to cooperate in a plan that would utilize the existing dam for power production and provide for a salmon/steelhead rearing facility located below the existing dam.

ADOPTED: February 9, 1981.

BOARD OF COUNTY COMMISSIONERS
FOR GRAYS HARBOR COUNTY

Chairman

Commissioner

Commissioner

ATTEST:

County Auditor and Ex-Officio
Clerk of the Board

B-31

City
of
Aberdeen

RESOLUTION NO. 1981- 52

A RESOLUTION SUPPORTING THE CONSTRUCTION OF A JOINT HATCHERY AND HYDRO-ELECTRIC FACILITY BELOW THE WYNOOCHEE DAM, AND

WHEREAS, the Wynoochee Dam, sponsored by the City of Aberdeen, has made a downstream hydro-electric facility and fish hatchery feasible on the Wynoochee River, AND

WHEREAS, the Mayor and the City Council believe that the City's investment in the Wynoochee Dam can be of additional public benefit by the construction of a hydro-electric facility and fish hatchery as is currently being considered by the Grays Harbor Public Utility District and the Army Corps of Engineers, AND

WHEREAS, hydro-electric generation on the Wynoochee River is economically feasible and would provide an additional, non-controversial, source of power, AND

WHEREAS, the proposed fish hatchery would enhance recreational opportunities and bolster the area's commercial fishing and tourist industries, NOW, THEREFORE

BE IT RESOLVED BY THE MAYOR AND THE CITY COUNCIL OF THE CITY OF ABERDEEN:

The City of Aberdeen supports the construction of a hydro-electric facility and fish hatchery on the Wynoochee River which would make further use of the reservoir of water impounded by the City sponsored Wynoochee Dam.

City
of
Aberdeen

PASSED AND APPROVED this 28th day of October.
1981.

Jack Werner
MAYOR

ATTEST:

Frances Peck
City Comptroller

City
of
Hoquiam

RESOLUTION NO. 3948

WHEREAS, the Seattle District, U. S. Army Corps of Engineers, initiated the Wynoochee Hydropower/Fish Hatchery Study in 1980 to determine the feasibility of developing the hydropower potential and fish enhancement opportunities at Wynoochee Dam; and

WHEREAS, the Corps of Engineers engineering, economic and environmental studies on this project are near completion with the draft report and environmental impact statement ready for public and agency review and distribution at the December 15, 1981 public meeting; now, therefore,

BE IT RESOLVED by the Mayor and City Council of the City of Hoquiam, Washington, in regular meeting duly assembled, as follows:

That the City of Hoquiam, subject to finalization of studies and determination of feasibility, endorse the Wynoochee Project.

ADOPTED by the Mayor and City Council Dec 14, 1981.

Mayor

ATTEST.

Finance Director

July 1980

STUDY ANNOUNCEMENT

WYNOOCHEE HYDROPOWER STUDY
WYNOOCHEE FISH HATCHERY STUDY

The Seattle District, U.S. Army Corps of Engineers, is conducting studies to determine the feasibility of two related projects in the vicinity of the existing Corps of Engineers' Wynoochee Lake project. One study addresses the addition of a small-scale hydropower facility to the dam. The other study addresses an enhancement fish hatchery downstream of the dam. Maps showing the location of the existing project, hatchery, and hydropower facility are inclosed.

Wynoochee Dam is a 177-foot-high concrete and earthfill dam located on the Wynoochee River at river mile 51.8, 35 miles north of Montesano in Grays Harbor County, Washington. The dam creates a 70,000 acre-foot reservoir for the city of Aberdeen's industrial water supply, winter flood control, fisheries, and irrigation.

The hydropower potential of the site, approximately 12 megawatts of installed capacity and 40,000 megawatt-hours of energy per year, is being evaluated in a feasibility study under authority of Section 203, Public Law 87-874. Based on preliminary studies of alternative hydropower facilities at the site, an underground powerhouse in the vicinity of the visitors center parking lot has been selected for further study. The proposed hydropower project will not change the accomplishment of the existing project purposes.

At the request of Governor Dixy Lee Ray, a study is also being conducted to determine the feasibility of a 465,000-pound salmon and steelhead trout hatchery located on a river bench approximately 3,500 feet downstream of Wynoochee Dam. Fish raised in this hatchery would be used to enhance the commercial, Indian, and sport fisheries in the Chehalis River Basin and Grays Harbor area. The fish hatchery study is being conducted under authority of the Chehalis River Basin Congressional Study Resolution and the Fish and Wildlife Coordination Act of 1958, Public Law 85-264, as amended by Public Law 89-72.

This particular site on the Wynoochee River offers a unique opportunity for a fish hatchery, with an abundant supply of good quality water via a short gravity pipeline from the dam. A conceptual hatchery design has been provided to us by the Washington State Departments of Fisheries and Game. Minimum flows from Wynoochee Dam would be used as the fish hatchery water supply. Should the hydropower facility be constructed, the fish hatchery water supply could be taken from the tailrace of the hydropower facility instead of directly from the dam. Potential conflicting uses of the Wynoochee River water resources will also be evaluated.

The two studies are being conducted separately but concurrently. The studies are scheduled for completion in the fall of 1981. If plans are found to be feasible, recommendations will be made in the final feasibility reports, and the final feasibliity reports and appropriate environmental reports will be submitted to Congress for authorization and funding of detailed design studies. Throughout the studies, we will maintain close coordination with various Federal, state, and local officials and agencies. A public meeting will be held near the conclusion of the studies to discuss the results of the studies and to receive public and agency comments.

We would like to receive your ideas and comments on the potential development of a small-scale hydropower facility and an enhancement fish hatchery at Wynoochee Dam. A postage-paid return mailer is inclosed for your use. Also, we would appreciate it if you would indicate whether you want to remain on the mailing list and correct your name and address if necessary. Please add names and addresses of the other people or groups whom you believe would be interested in our Wynoochee studies. I encourage you to return the mailer because your ideas and comments will provide valuable input to our studies. If you have any further questions, please contact Dr. James O. Waller, Study Manager, at telephone (206) 764-3473.

Thank you for your interest in our Wynoochee studies.

3 Incl
As stated

LEON K. MORASRI
Colonel, Corps of Engineers
District Engineer

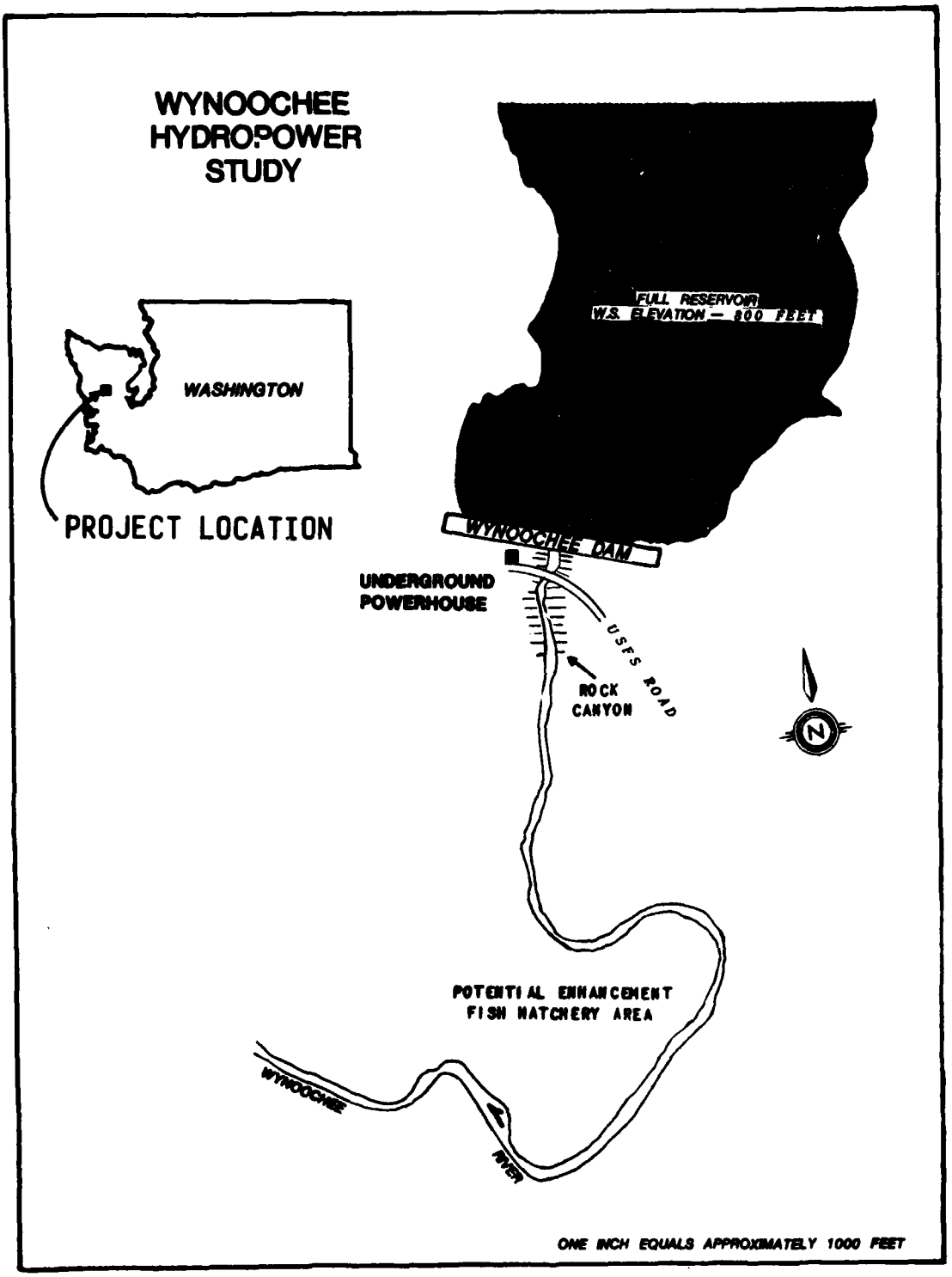

WYNOOCHEE
HYDROPOWER
STUDY
WASHINGTON
PROJECT LOCATION
FULL RESERVOIR
W.S. ELEVATION — 800 FEET
WYNOOCHEE DAM
UNDERGROUND
POWERHOUSE
USFS ROAD
ROCK
CANYON
N
POTENTIAL ENHANCEMENT
FISH HATCHERY AREA
WYNOOCHEE
RIVER
ONE INCH EQUALS APPROXIMATELY 1000 FEET

FIGURE 1

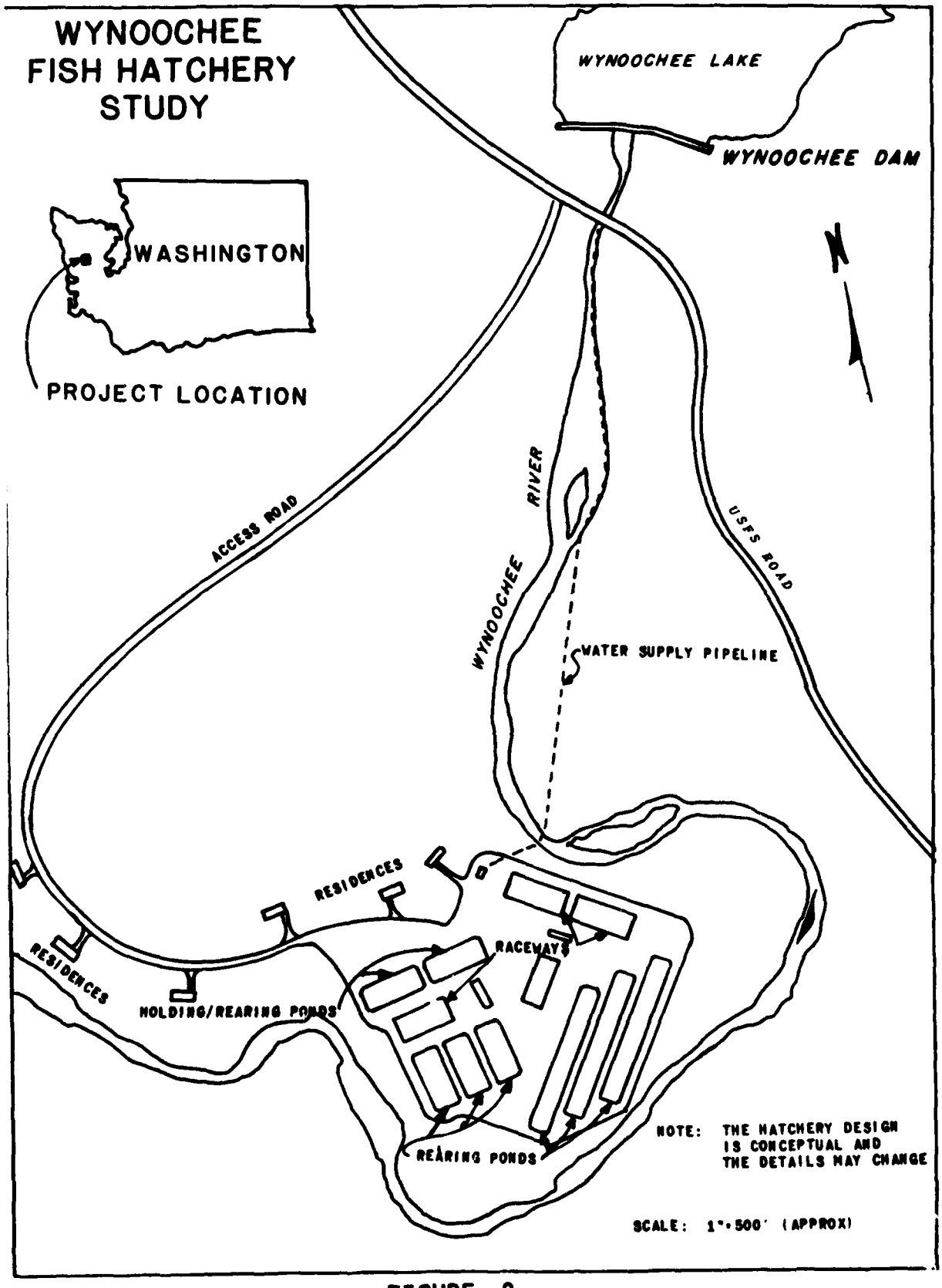

WYNOOCHEE
FISH HATCHERY
STUDY
WYNOOCHEE LAKE
WYNOOCHEE DAM
WASHINGTON
PROJECT LOCATION
N
ACCESS ROAD
WYNOOCHEE RIVER
USFS ROAD
WATER SUPPLY PIPELINE
RESIDENCES
RACEWAYS
RESIDENCES
HOLDING/REARING PONDS
REARING PONDS
NOTE: THE HATCHERY DESIGN IS CONCEPTUAL AND THE DETAILS MAY CHANGE
SCALE: 1"=500' (APPROX)

FIGURE 2

RETURN MAILER

Please continue to send me information on the Wynoochee Hydropower/Fish Hatchery studies:

YES ☐ NO ☐

Would you please correct your name and address if necessary and also help by giving us the names and address of any persons or organizations who you think may also be interested in the Wynoochee Hydropower/Fish Hatchery studies:

NAME AND ADDRESS

☐ CORRECTION ☐ NEW NAME AND ADDRESS

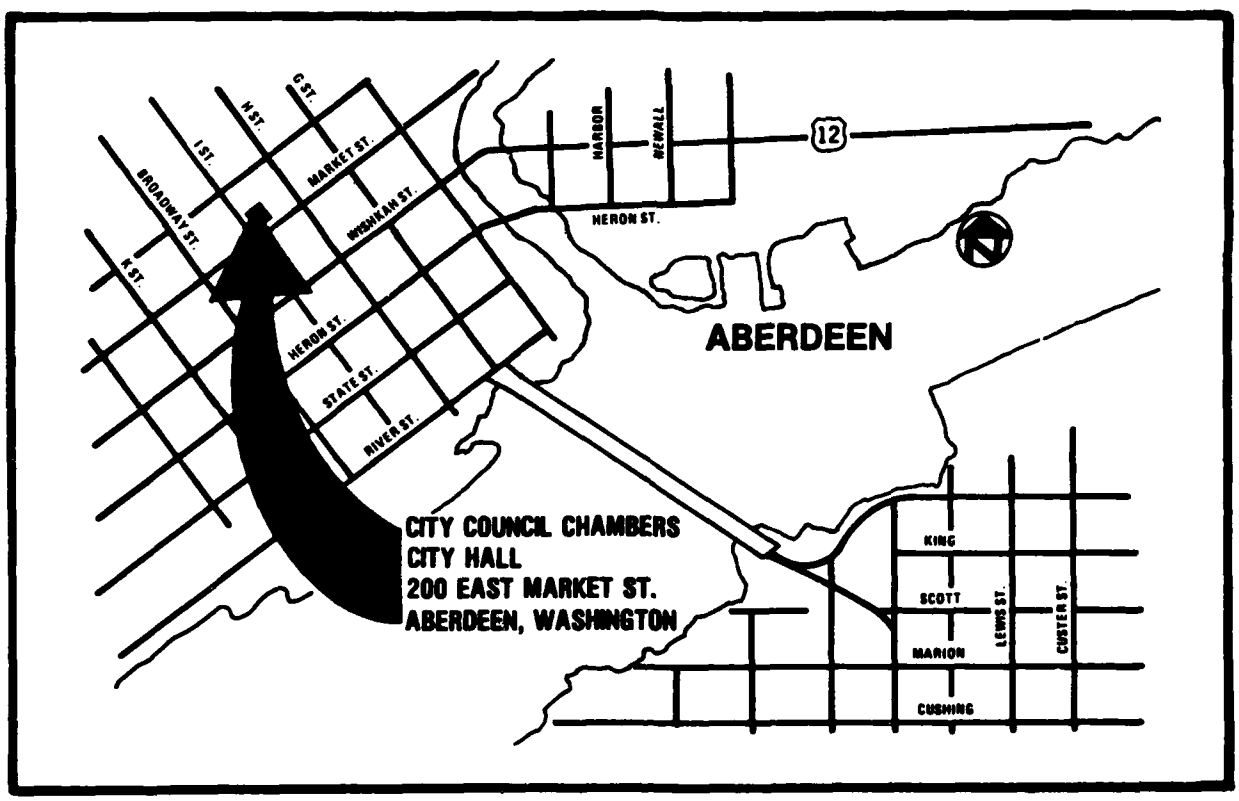
COMMENTS

Please fold this sheet so Corps address is on outside. Tape or staple edge closed. NO POSTAGE IS NECESSARY.

US Army Corps
of Engineers
Seattle District

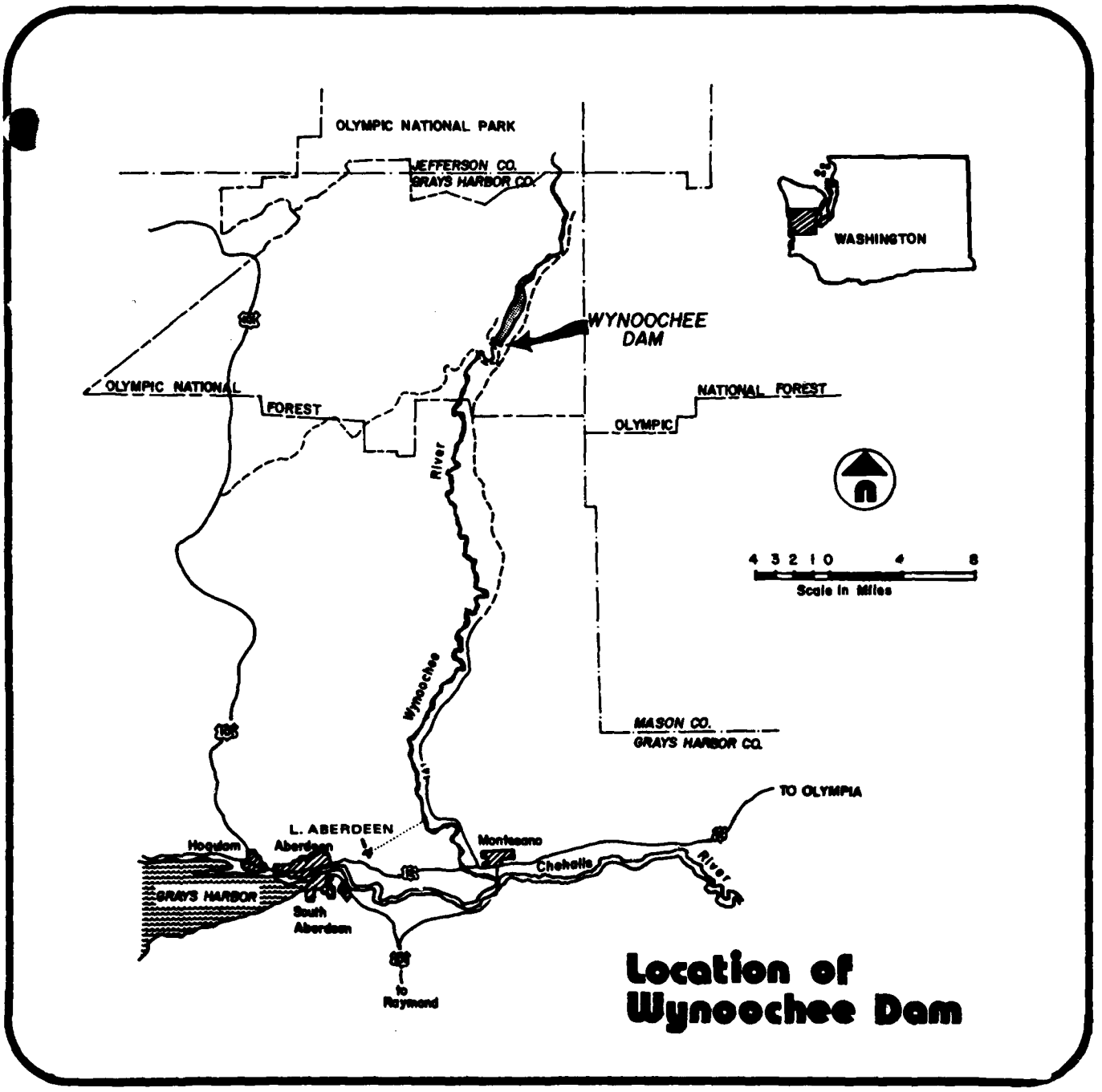
Final Public Meeting

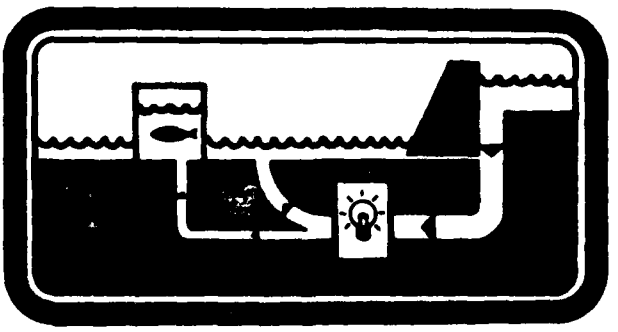
WYNOOCHEE HYDROPOWER/FISH HATCHERY FEASIBILITY STUDY



DATE: TUESDAY
15 DECEMBER 1981
7:30 p.m.

LOCATION: CITY COUNCIL CHAMBERS
CITY HALL
200 EAST MARKET STREET
ABERDEEN, WASHINGTON


OLYMPIC NATIONAL PARK
JEFFERSON CO.
GRAYS HARBOR CO.
WASHINGTON
WYNOOCHEE DAM
OLYMPIC NATIONAL FOREST
OLYMPIC NATIONAL FOREST
Wynoochee River
4 3 2 1 0 4 8
Scale in Miles
MASON CO.
GRAYS HARBOR CO.
TO OLYMPIA
L. ABERDEEN
Hoquiam
Aberdeen
Montesano
Chehalis River
GRAYS HARBOR
South Aberdeen
to Raymond
Location of Wynoochee Dam



WYNOOCHEE HYDROPOWER/FISH HATCHERY

FEASIBILITY STUDY

WHAT IS THE WYNOOCHEE HYDROPOWER/FISH HATCHERY FEASIBILITY STUDY?

The Seattle District, U.S. Army Corps of Engineers, initiated the Wynoochee Hydropower/Fish Hatchery Study in 1980 to determine the feasibility of developing the hydropower potential and fish enhancement opportunities at Wynoochee Dam. The study is being conducted under authorities provided by Congress and will be completed with a report to Congress in early 1982.

The 177-foot-high concrete and earthfill dam is located on the Wynoochee River 35 miles north of Montesano in Grays Harbor County, Washington. The Wynoochee Dam and Lake project was completed in 1972 and the project's congressionally authorized purposes are; city of Aberdeen industrial water supply, winter flood control, fisheries, and irrigation.

The Corps of Engineers has been conducting engineering, economic, and environmental studies on the proposed project over the last 2 years. Extensive agency coordination and public involvement has occurred throughout the study, including a public information meeting in Aberdeen on 18 May 1981. The study is nearing completion and the draft feasibility report and environmental impact statement (EIS) is being prepared for public and agency review. The draft report and EIS will be distributed prior to the 15 December final public meeting. The report and EIS will be finalized in early 1982 to incorporate public and agency comments and then submitted to Congress for their action.

WHAT HAPPENED AT THE PUBLIC INFORMATION MEETING?

A public information meeting was held in Aberdeen on 18 May 1981. Approximately 60 people attended the meeting. The Corps of Engineers presented the tentatively selected plan, an integrated underground hydropower and enhancement fish hatchery project. Strong support for the integrated hydropower/fish hatchery project was expressed at the meeting. There was a desire stated that the power output of the project should be marketed in the local area by the Grays Harbor Public Utility District (PUD) instead of regionally by the Bonneville Power Administration (BPA) as required by law.

WHAT HAS THE CORPS BEEN DOING SINCE THE PUBLIC INFORMATION MEETING?

At the time of the public information meeting, the Corps of Engineers had sent copies of the preliminary draft feasibility report and environmental assessment to its higher authority offices in Portland and Washington, D.C., for review and comment. Since the public information meeting, the Corps of Engineers has:

- o revised the draft feasibility report in accordance with higher authority comments,
- o prepared a draft EIS,
- o developed a hydropower partnership with the Grays Harbor PUD,
- o expanded the scope of the fish hatchery into a Washington coastal fish enhancement facility,
- o continued our public and agency coordination in an effort to resolve any conflicts,
- o continued coordination with the State of Washington and the Federal fish agencies on plan development and sponsorship affirmation, and
- o briefed the congressional delegation and a representative of President Reagan's administration on the proposed project.

WHAT ARE THE PURPOSES OF THE FINAL PUBLIC MEETING?

o To present the results and tentative recommendation of the Corps of Engineers' Wynoochee Hydropower/Fish Hatchery Study as presented in the draft feasibility report and EIS.

o To receive official public and agency comments on the draft feasibility report and EIS.

WHAT WILL HAPPEN AT THE FINAL PUBLIC MEETING?

Colonel Norman C. Hintz, new Corps of Engineers Seattle District Engineer, will conduct the meeting. Details of the Corps of Engineers tentatively selected plan will be presented, along with the preliminary conclusions and recommendation. Oral and written comments by the public and agencies will be welcomed. The meeting will be recorded and a transcript prepared.

WHAT COMES AFTER THAT?

The public meeting record will remain open for additional comments 30 days after the meeting. In early 1982, the draft feasibility report and EIS will be finalized and sent to Corps of Engineers reviewing offices in Portland and Washington, D.C. After approval, the report will be submitted to Congress for consideration. If Congress authorizes and funds Federal construction, advanced engineering and design studies would then be conducted by the Corps of Engineers, leading to project construction in the late 1980's.

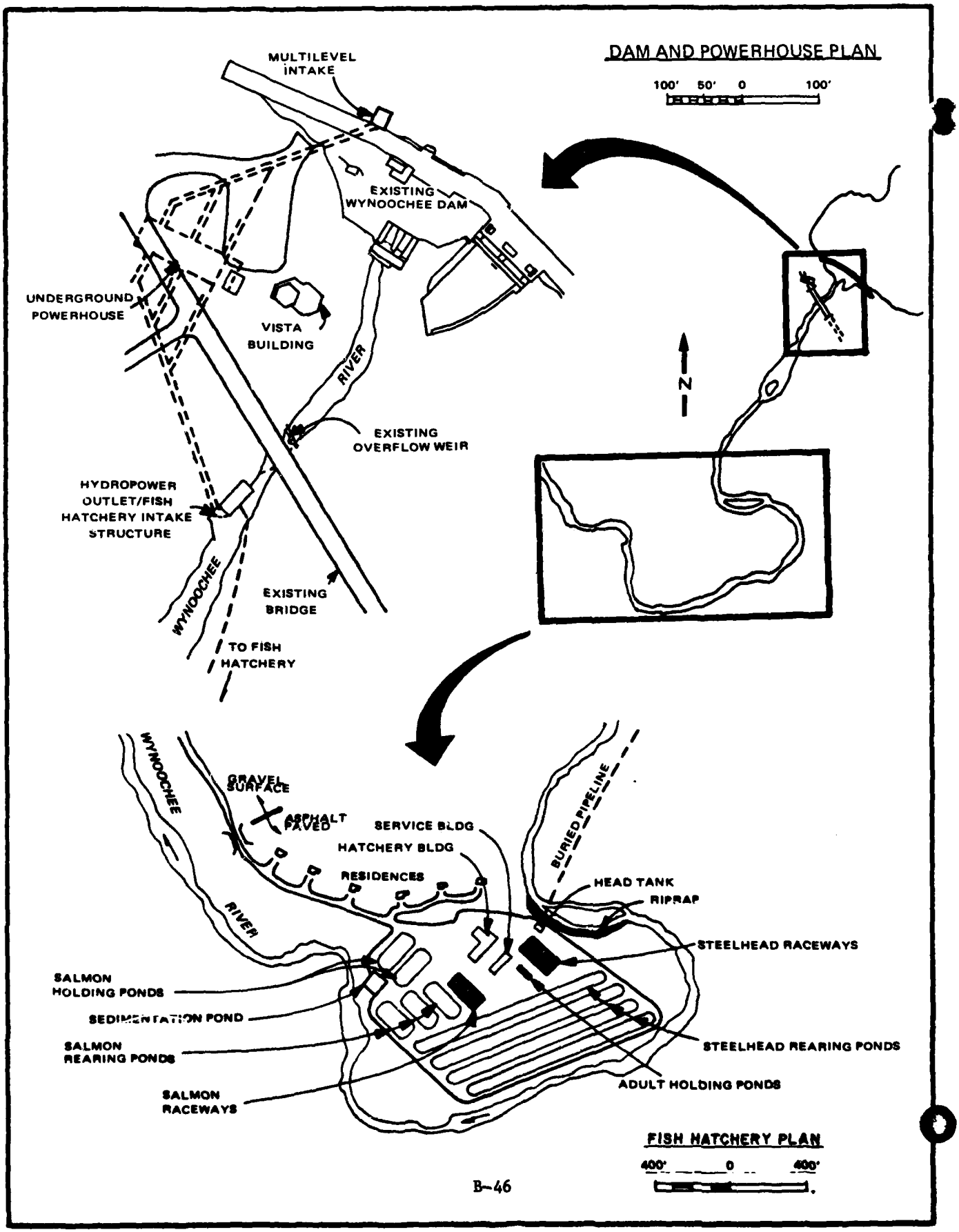
WHAT IS THE TENTATIVELY SELECTED PLAN?

The tentatively selected plan has not changed significantly since the public information meeting. The plan is an integrated 10.2 megawatt (nameplate) hydropower addition to Wynoochee Dam and a 396,000 pound fish hatchery for anadromous fish 3,000 feet downstream of the dam. The plan would produce 37,400 megawatt-hours of energy per year and add an estimated 118,500 adult salmon and steelhead to the annual anadromous fish harvest in the Chehalis River Basin, Grays Harbor area, other northern Washington coastal rivers, and northern Pacific Ocean.

The tentatively selected plan includes a multilevel intake structure to control the temperature of water taken from the reservoir, an underground powerhouse with three turbines, a fail-safe system to provide up to 190 cubic feet per second gravity-flow water supply to the fish hatchery, and a joint salmon and steelhead enhancement fish hatchery. Two satellite fish stations for enhancement of fish runs on other northern Washington coastal rivers have been added to the tentatively selected plan. The Grays Harbor PUD would construct a 22-mile buried transmission line from the dam to its Promised Land substation north of Aberdeen.

The Corps of Engineers would design and construct the combined hydropower/fish hatchery project, the Grays Harbor PUD would be local sponsor for the hydropower facility and market the power output, a Federal fish agency (National Marine Fisheries Service or Fish and Wildlife Service) would be the Federal sponsor for the fish hatchey, the State of Washington would be local sponsor for the fish hatchery, and the Washington Departments of Fisheries and Game would operate the fish hatchery under contract to the Federal fish agency.

The tentatively selected plan would operate as a fully integrated addition to the existing dam with no change in the existing project purposes. The hydropower operation would be subordinate to all other purposes and the hydropower facility would be operated as a run-of-river plant producing baseload energy from the reservoir releases. The fish hatchery would normally utilize the minimum flows from Wynoochee Dam after they passed through the powerhouse. The fish hatchery production would consist primarily of fish enhancement but would include fish production to mitigate for previous fish losses associated with the existing dam as well as losses associated with the combined hydropower/fish hatchery project. Final design, species selection, and details of the management and operation of the fish hatchery will be determined in advanced engineering and design as a coordinated effort among the Corps of Engineers, Federal and state fish agencies, user groups, Indian tribes, and interested parties.



WYNOOCHEE HYDROPOWER/FISH HATCHERY

HOW IS THE GRAYS HARBOR PUD INVOLVED IN THIS PLAN?

In response to the public's desire made known at the May 1981 public information meeting, the Corps of Engineers and Grays Harbor PUD have formed a hydropower partnership for the proposed hydropower facility at Wynoochee Dam. The PUD, as local sponsor of the hydropower facility, would market the power output and pay 100 percent of the hydropower construction cost and annual hydropower operation, maintenance, and replacement costs. This kind of Federal/non-Federal hydropower partnership would be a first of its kind and would require an exemption by Congress from the law that requires BPA to market power produced at Corps of Engineers projects in the Pacific Northwest. Several details of the hydropower partnership still have to be worked out by the Corps of Engineers and the PUD, including ownership, control of operations and maintenance, financial arrangements, and the transmission line. These details will be worked out in the next few months and will be included in the final feasibility report and EIS forwarded to Congress.

IS THE PLAN ECONOMICALLY JUSTIFIED AND ENVIRONMENTALLY SOUND?

The combined hydropower/fish hatchery project would cost $42,400,000 to construct at October 1981 prices, with $21,580,000 for the hydropower facility and $20,820,000 for the fish hatchery. The proposed plan is economically justified, producing $2.20 in average annual total benefits for every $1 in average annual total costs. The hydropower facility would produce $1.20 in average annual power benefits for every $1 in average annual power costs; the average annual cost of energy produced would be 5.3 cents per kilowatt hour. The fish hatchery would produce $2.90 in average annual fish enhancement benefits for every $1 in average annual fish costs.

The project would cause no significant adverse environmental impacts and would not have a significant impact on the human environment.

HOW WOULD THE COST OF THE TENTATIVELY SELECTED PLAN BE SHARED?

The Federal and non-Federal cost sharing under existing law is as follows:

	Construction	Annual Operation, Maintenance, and Replacement
Federal		
Corps of Engineers	$18,780,000 (fish)	
Federal Fish Agency		$679,000 (fish)
Non-Federal		
Grays Harbor PUD	21,580,000 (power)	341,000 (power)
State of Washington[1/]	2,040,000 (fish)	305,000 (fish)
TOTAL	$42,400,000	$1,325,000

1/Additional construction cost sharing by the State of Washington may be required if Congress approves former President Carter's proposed cost sharing policy.

WHAT IS THE CORPS OF ENGINEERS' PRELIMINARY RECOMMENDATION?

The Corps of Engineers preliminary recommendation to Congress will be that an integrated hydropower/fish hatchery project at Wynoochee Dam be authorized for Federal construction, operation, maintenance, and replacement. The preliminary recommendation will be made with the provisions that the Grays Harbor PUD and State of Washington will comply with the various requirements of non-Federal sponsorship, and a Federal fish agency will agree to be the owner and manager and sponsoring Federal agency for the fish hatchery. The recommendation will be finalized after public and agency review.

WHAT CAN YOU DO?

Your input to this study is needed to help insure that the public's concerns have been addressed and that a plan the public wants and supports has been selected and recommended. In addition, only strong support by the public, local and state governments, Federal agencies, and the U.S. congressional delegation from Washington State will insure that this proposed project is placed before Congress for timely authorization, funding, and construction. Your continuing interest in the Wynoochee hydropower/fish hatchery project is appreciated.

I invite you to participate in the final public meeting. The information presented in this brochure should help answer your questions on this study. Please come to the meeting to receive additional information, comment on the study, or ask questions.

We encourage comments on the tentatively selected plan and preliminary recommendation. Please provide your comments on the attached comments page, adding additional pages if needed. You can turn in your comments at the public meeting or return them to us by mail at any time. To mail your comments, please detach and fold the comments page so the Corps of Engineers address is on the outside, tape or staple it closed, and put it in the mail; no postage is necessary.

If you have questions on this study, please contact me by mail at Post Office Box C-3755, Seattle, Washington 98124, or by telephone at (206) 764-3473.

Please bring this announcement to the attention of anyone you know who may be interested in the Wynoochee Hydropower/Fish Hatchery Study.

James O. Waller

JAMES O. WALLER, Ph.D.
Hydropower Study Manager
Seattle District
U.S. Army Corps of Engineers

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BEFORE THE

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
ABERDEEN, WASHINGTON

DOCKET NO.

IN THE MATTER OF:

FINAL PUBLIC MEETING

RE

WYNOOCHEE HYDROPOWER/FISH HATCHERY STUDY

PLACE: Aberdeen, Washington

DATE: December 15, 1981

PAGES: 1-88

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BEFORE THE
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In the Matter of:

FINAL PUBLIC MEETING

RE

WYNOOCHEE HYDROPOWER/FISH HATCHERY STUDY

Council Chambers,
City of Aberdeen City Hall,
Aberdeen, Washington.

Tuesday, December 15, 1981.

Pursuant to Notice, the above-entitled matter came on for Hearing at 7:30 o'clock p.m.,

BEFORE:

COL. NORMAN C. HINTZ, District Engineer, Seattle District, Corps of Engineers

AND A PANEL CONSISTING OF:

DR. JAMES O. WALLER, Study Manager;

KAREN NORTHUP, Environmental Coordinator;

JACK THOMPSON, Fisheries Biologist;

And other Staff Members as hereinafter mentioned.

I N D E X

I N D E X - continued

LETTERS & RESOLUTIONS READ BY COL. NORMAN C. HINTZ:

LIST OF RECIPIENTS
OF
DRAFT FEASIBILITY REPORT
AND
DRAFT ENVIRONMENTAL IMPACT STATEMENT

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COMMENTS AND RESPONSES TO DRAFT FEASIBILITY REPORT AND DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

1. Introduction. The draft Wynoochee hydropower/fish hatchery feasibility report and draft EIS were listed in the 11 December 1981 Federal Register as available for public comment for a 45-day review ending 31 January 1982. Copies were mailed to the public on 3 December 1981. At the request of the Grays Harbor PUD, the review period was extended to 28 February 1982. The list of agencies, groups, and individuals who received the draft report/EIS is presented elsewhere in this appendix.

2. Commenting Agencies, Groups, and Individuals. Comments on the draft feasibility report and draft EIS were received from the following:

a. Federal Agencies:

(1) Environmental Protection Agency, Region X, Seattle, Washington, 28 January 1982 (response on page B-61).

(2) Department of Health and Human Services, Public Health Service, Center for Environmental Health, Atlanta, Georgia, 25 January 1982 (response on page B-61).

(3) Department of Commerce, National Marine Fisheries Service, Northwest Region, Seattle, Washington, 30 March 1982 (response on page B-62).

(4) Department of the Interior, Office of the Secretary, Pacific Northwest Region, Portland, Oregon, 25 February 1982:

(a) National Park Service (response on page B-63)
(b) Fish and Wildlife Service (response on page B-64)
(c) Bureau of Indian Affairs (response on page B-66)

(5) Department of Interior, Geological Survey, Water Resources Division, Tacoma, Washington, 9 December 1981 (response on page B-67).

(6) Department of Agriculture, Soil Conservation Service, Spokane, Washington, 23 December 1981 (response on page B-67).

(7) Department of Agriculture, Soil Conservation Service, Washington, D.C., 22 January 1982 (response on page B-67).

(8) Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, Oregon, 9 February 1982 (response on page B-67).

(9) Department of Energy, Bonneville Power Administration, Portland, Oregon, 26 February 1982 (response on page B-73).

(10) Department of Energy, Bonneville Power Administration, Portland, Oregon, 12 July 1982 (response on page B-75).

b. State of Washington, Olympia, Washington:

(1) Department of Ecology, 25 February 1982 (response on page B-77).

(2) Department of Game, 25 February 1982 (response on page B-78).

(3) Department of Fisheries, 25 February 1982 (response on page B-83).

(4) Department of Fisheries, 26 April 1982 (response on page B-89).

(5) Parks and Recreation Commission, 18 January 1982 (response on page B-90).

c. Local Agencies:

(1) Public Utility District No. 1 of Grays Harbor County, Aberdeen, Washington, 22 February 1982 (letter No. 2) (response on page B-90).

(2) Port of Grays Harbor, Aberdeen, Washington, 9 February 1982 (response on page B-91).

d. Groups/Individuals:

(1) Ernest Brannon, Associate Professor, School of Fisheries, University of Washington, Seattle, Washington, 7 January 1982 (response on page B-91).

(2) Confederated Tribes of the Chehalis Reservation, Oakville, Washington, 5 February 1982 (response on page B-92).

(3) Northwest Steelhead and Salmon Council of Trout Unlimited, Aberdeen, Washington, 10 February 1982 (response on page B-93).

(4) Grays Harbor Chapter, Northwest Steelhead and Salmon Council of Trout Unlimited, Aberdeen, Washington, 17 February 1982 (response on page B-94).

(5) The American League of Anglers, Washington, D.C., 27 January 1982 (response on page B-95).

Copies of the letters of comment are in paragraph 4 below.

3. Comments and Responses. Responses to the comments on the draft feasibility report and draft EIS are provided in the following paragraphs. Revisions to the feasibility report and EIS were made as appropriate.

a. Federal Agencies.

(1) Environmental Protection Agency.

Comment 1: Thank you for sending the above reports for the Environmental Protection Agency's (EPA) review. In general, EPA has no objections to the development of the proposed hydropower/fish hatchery project, and it appears that it would be beneficial to simultaneously construct these two facilities. The proposal also provided adequate mechanisms to resolve the remaining environmental questions including modeling to ensure adequate temperature control in the dam's discharge, controlling construction and operation related water quality impacts, setting of in-stream flows, selecting the transmission route and type, and monitoring water quality to ensure the success of any selected mitigation.

Response 1: No response is necessary.

Comment 2: We have one comment for your consideration. The reports recommend that the energy generated be marketed by Grays Harbor PUD, and that, in return, Grays Harbor PUD provide a cash contribution equal to the total hydropower facility cost. This would require an exemption from the power marketing provisions of the 1944 Flood Control Act. We suggest that the recommendations be expanded to state that if for any reason the PUD's participation is not possible, the project could still be constructed as proposed, if the energy and capacity were to be acquired by the Bonneville Power Administration under the terms of the Pacific Northwest Electric Power Planning and Conservation Act of 1980.

Response 2: The Grays Harbor PUD has withdrawn from the hydropower partnership with the Corps (reference paragraph 5.03g of the feasibility report). The hydropower portion of the integrated plan is now proposed for total Federal development which includes marketing by the Bonneville Power Administration (BPA) of the power produced from the hydropower facility.

Comment 3: From the standpoint of the Environmental Protection Agency's areas of concern and expertise, we are rating the Environmental Impact Statement LO-1 (LO - Lack of Objections; 1 - Adequate Information). This letter also constitutes our comments on the Section 404 (b)(1) analysis.

Response 3: No response is necessary.

(2) Department of Health and Human Services, Public Health Service.

Comment 1: The EIS does not address mosquito or other vector populations. Since there is a potential for mosquito breeding in the impounded water storage areas, the Final EIS should discuss beneficial or adverse effects of this project on mosquito or other vector

populations, their potential health threats, proposed or current control methods that may be used, kinds and volumes of pesticides that may be used, and anticipated application procedures.

Response 1: The proposed hydropower/fish hatchery plan does not involve any impounding to create reservoir storage areas. The reservoir associated with the existing Wynoochee Dam has existed since 1972 and has no known vector problems. There would be no expected mosquito breeding or other vector problems associated with the fish hatchery rearing ponds. A statement to this effect has been added to the EIS, paragraph 4.02a(2).

Comment 2: Page 38 of the EIS states the hydropower facility will not result in an impact on recreation. However, the Final EIS should include a discussion of the potential safety hazards to individuals engaged in recreational activities below the dam during releases of large volumes of water and also the mitigation measures that will be taken.

Response 2: As discussed in paragraph 4.09c of the feasibility report and paragraph 4.02a(2) of the EIS, there would be no change in the operation of the existing Wynoochee Dam as a result of implementation of the proposed hydropower/fish hatchery plan. The powerhouse would be operated as a baseload plant, would be subservient to all other project purposes, and would not be operated for peaking purposes. The operation of the Wynoochee Dam, primarily a water supply project, does not result in safety hazards to recreationists and would not with the hydropower/fish hatchery addition. Should the powerhouse be shutdown completely, discharges would be released from the dam into the 400-foot reach between the dam and the hydropower outlet/fish hatchery intake structure. This reach is currently not accessible to the public and would remain inaccessible with implementation of the recommended plan. A statement has been added to paragraph 4.02d(3) of the EIS to clarify your concern.

Comment 3: It is noted that the domestic wastes from the hatchery and residences would be treated by a septic tank system. The Final EIS should include a statement about the suitability of the soils for subsurface disposal at the proposed location.

Response 3: The existing Wynoochee Dam and associated structures and residences utilize acceptable septic tank treatment systems for domestic wastes. The soils in the area of the fish hatchery and hatchery residences are not appreciably different and no problems in developing acceptable septic tank treatment systems are anticipated.

(3) Department of Commerce, National Marine Fisheries Service.

Comment: These comments represent the views of the National Marine Fisheries Service. The formal, consolidated views of the Department of Commerce should reach you shortly.

We are aware that recently the State of Washington Department of Fisheries (WDF) has expressed concerns that the proposed Wynoochee Hatchery may have impacts on State management of local salmon stocks, and believe that such potential management problems need to be addressed in the EIS and subsequent project planning. As we understand that these problems are currently a subject of continuing consultation and modification between WDF and the Corps of Engineers, we will not comment on the specifics of the proposal at this time.

We assume that these issues can be resolved and as stated in our letter of June 18, 1981, we support development of the proposed Wynoochee Hatchery.

Response: The Corps has worked with the WDF over the past few months to resolve their hatchery concerns. Modifications to the hatchery plan have been accomplished and the WDF concerns have been satisfied. The major modification involves construction of the salmon portion of the hatchery in two phases over a period of up to 20 years, allowing for the gradual buildup and use of local spring chinook brood stock. Refer to paragraph 4.09h of the feasibility report and paragraphs 2.02b(1) and 4.02b(3) of the EIS and to responses to comments from WDF. A letter from WDF expressing their satisfaction and support of the plan as now described is presented in response b(4) below.

(4) Department of the Interior, Office of the Secretary.

(a) National Park Service.

Comment: The National Park Service indicates that the environmental impact statement is inadequate because it fails to discuss possible impacts on specific stocks of native wild fish, which are vital to the integrity of the ecosystems protected within Olympic National Park, located approximately 8 miles north of Wynoochee Dam.

There is also concern, specifically about the plan for extensive outplanting of hatchery fish in coastal rivers and streams and the proposals for "satellite fish stations" on rivers draining from Olympic National Park. Wild stocks of steelhead and salmon within the park have already been adversely impacted by current State of Washington, Indian Tribal, and Federal hatchery-based programs, and by the continued harvest of adult fish in commercial and recreational fisheries. It is felt that increased hatchery-based programs, such as the one proposed at Wynoochee, could eliminate or significantly interfere with the few runs of native wild fish that remain in the park. The potential for this impact, and possible mitigating measures, should be addressed in the final documents.

Response: The Corps of Engineers has been working since issuance of the draft EIS with the WDF to modify the hatchery plan to minimize such potential impacts. These modifications are discussed in paragraphs 2.02b(1) and 4.02b(3) of the EIS and in paragraphs 4.09h and 4.09j of the feasibility report. Specifically, they include phased construction of the salmon portion of the hatchery to allow use of the small

local spring chinook brood stock in the Chehalis River system, rearing of only spring chinook salmon in the salmon portion of the hatchery, reduction of satellite fish stations from two to one, and location of the satellite fish station in the Chehalis River watershed. With these modifications, WDF believes that the potential adverse impacts to native species due to hatchery salmon production can be effectively eliminated. WDG, utilizing native steelhead brood stock, believes that the system is capable of handling the increased steelhead production from the hatchery with minimal adverse impact to existing runs. Further, that portion of the Wynoochee River within the Olympic National Park is above natural blocks to anadromous fish. Accordingly, the fish population within the portion of the Wynoochee River in the Olympic National Park would not be affected by the recommended plan.

(b) Fish and Wildlife Service.

Comment 1: The Fish and Wildlife Service (FWS) indicates concerns about the hatchery portion of the proposed plan and feels these concerns need to be addressed in the draft environmental impact statement. On February 3, FWS met with members of your staff, Washington Departments of Fisheries and Game, and the National Marine Fisheries Service to discuss various issues in detail. Briefly, they shared the following concerns:

The hatchery has been planned and proposed without the benefit and necessity of a coastal harvest management plan agreed to by the State and Tribes.

Response 1: The State of Washington can support the plan as now proposed without the benefit of a coastal harvest management plan. The resource agencies will continue to work with the tribes to develop a management plan which may be completed prior to construction of the Wynoochee hatchery. As currently envisioned, the Wynoochee hatchery is thought by the state to be consistent with the expected management goal of managing the coastal streams for natural production.

Comment 2: No provision has been made for imprinting facilities in the upper Chehalis watershed needed to maintain historical distributions and fully use natural rearing habitat.

Response 2: The feasibility report/EIS, as revised through coordination with the fisheries agencies, includes a satellite fish station in the Chehalis watershed for collection of spring chinook salmon brood stock and possibly to aid in an outplanting program for juvenile salmon. The coastal satellite fish stations were deleted from the hydropower/fish hatchery plan at the recommendation of the Federal and state fish agencies.

Comment 3: The potential for the spread of disease pathogens has not been addressed as a possible serious constraint to a fish culture program of the type proposed.

Response 3: The hatchery plan as now proposed makes use of local spring chinook salmon and native steelhead stocks and does not involve satellite fish stations in rivers outside of the Chehalis River system. As a result, the potential for spread of disease pathogens has been reduced significantly. This has been addressed in paragraph 4.02b(3) of the EIS.

Comment 4: Lack of adequate broodstock supply has not been discussed as a limiting factor to production.

Response 4: WDF believes the phased construction of the salmon portion of the hatchery would accommodate a gradual buildup of spring chinook brood stock utilizing local Skookumchuck River stock, thus eliminating a brood stock problem for spring chinook. WDG believes that adequate local brood stock would be available to allow initial full development of the steelhead portion of the hatchery. The issue of adequate brood stock supply is discussed in paragraph 4.02b(3) of the EIS.

Comment 5: Fishery benefits are not properly cast in light of variability and lack of assurity.

Response 5: Based upon the hatchery plan as now proposed and on updated fisheries values furnished by the state, fishery benefits have been revised and are presented in paragraph 4.25b of the feasibility report, summarized in paragraph 2.02b(5) of the EIS, and provided in detail in appendix C. The state believes these new figures properly reflect the fishery benefits that could be expected from the Wynoochee hatchery as presented in the feasibility report/EIS.

Comment 6: Potential impacts to coastal wild stocks have not been adequately discussed.

Response 6: Refer to response to comments from National Park Service regarding impacts to wild stocks and to paragraph 4.02b(3) of the EIS.

Comment 7: At the meeting held February 3, it was agreed that your staff would make a effort to revise the draft environmental impact statement to reflect the suggested changes. A meeting will be set up again soon to discuss your efforts, after which supplemental comments will be provided for inclusion in the final environmental impact statement.

Response 7: Since publication of the draft EIS, the Corps has worked closely with the Federal and state fish agencies to revise the hatchery plan to satisfy their concerns to the extent possible. That coordination is discussed in paragraphs 5.03 and 5.04 of the feasibility report and EIS, respectively. No additional comments have been provided by the FWS.

(c) Bureau of Indian Affairs.

Comment 1: The Bureau of Indian Affairs (BIA) indicates that the anadromous fisheries resources, as well as the supportive environment in the project area are within the Usual and Accustomed Fishing Places of the Quinault Tribe. In addition, the proposed stocking in the Hoh, Queets, Humptulips and Quinault Rivers will affect the Usual and Accustomed Fishing Places of the Quinault, Hoh, and Quileute Tribes. These fisheries are the subject of trust property rights established by treaty and recognized in law. Therefore, the subject document should recognize the need to obtain the concurrence of the Secretary of the Interior (i.e., the BIA) as well as individual tribes with regard to the proposed actions. Failure to obtain these concurrences would constitute a abrogation of tribal property rights.

Response 1: During preconstruction planning and engineering (PP&E), as final details of the plan are developed, all necessary concurrences would be obtained from the BIA and the affected tribes prior to project construction. Note that satellite fish stations on such coastal streams as the Hoh, Queets, etc. are no longer included in the hatchery plan. Only one satellite fish station in the Chehalis River watershed is now being proposed. Refer to paragraph 4.09j of the feasibility report for additional information regarding the satellite fish station. Also refer to responses to WDF comments regarding the satellite fish station.

Comment 2: There has been considerable coordination between the CE (Corps of Engineers) and the affected tribes in the development of the subject document. In this regard you are commended for your efforts to communicate with the tribal entities. However, the document only recognizes the FWS and the State of Washington as participants in the planning effort with respect to fisheries aspects of the proposed project. In fact, neither the tribes nor the BIA are recognized as key agencies with respect to required coordination. The only recognition of communications with either the tribes or the BIA is the inclusion in the study mailing list. The final document should reflect the extent to which input was solicited from and provided by the affected Indian community.

Response 2: Section 5 of the feasibility report has been expanded to elaborate on the coordination that has occurred between the Corps and the BIA and Indian tribes regarding the proposed hydropower/fish hatchery plan.

Comment 3: One of the primary concerns of the tribes is the selection of species to be reared in the proposed hatchery. This issue should be coordinated closely with the tribes since this factor bears significantly on the other fisheries management efforts within the scope of the proposed action.

Response 3: The plan as now presented in the feasibility report/EIS recommends the rearing of native spring chinook salmon and steelhead in the hatchery. The state believes rearing of these species would be consistent with the goals for coastal harvest management and would have minimal impact on existing fish runs within the Chehalis River system. Coordination regarding species selection will continue with the tribes throughout PP&E as the final details of the hatchery are developed. For additional information regarding species selection, refer to paragraph 4.02b(3) of the EIS and section 3 of appendix H.

(5) Department of the Interior, Geological Survey.

Comment: We have reviewed the subject document and found it to be adequate in its assessment of the impact of the proposed action on the water resources of the area.

Response: No response is necessary.

(6) Department of Agriculture, Soil Conservation Service, Spokane, Washington.

Comment: The Soil Conservation Service has reviewed your draft feasibility report and environmental impact statement for the Wynoochee Hydropower/Fish Hatchery project. It would appear the concerns of the SCS have been addressed, and we have no comments to offer at this time.

Response: No response is necessary.

(7) Department of Agriculture, Soil Conservation Service, Washington, D.C.

Comment: We have reviewed the Review Draft feasibility report and environmental impact statement (EIS) for the Wynoochee Hydropower/Fish Hatchery Study. The project is located on USFS land with no agricultural land involved. The powerplant addition will be located underground; therefore, the environmental consequences would be minimal. The addition of the fish hatchery below the dam and powerplant should mitigate the loss of the anadromous fish spawning area destroyed by the lake.

We do not object to the District Engineer's preliminary recommendation for construction of an integrated hydropower/fish hatchery project.

Response: No response is necessary.

(8) Department of Agriculture, Forest Service.

Comment 1: Project Access - Forest Service Road No. 2200 is the main access to the project area. Our current Road Management Plan lists the road as inadequate to carry the existing traffic and with

high maintenance cost. Existing right-of-way deeds provide for timber traffic use to be first, prior and paramount during week days and recreation traffic use to be first, prior and paramount on Saturdays, Sundays and legal holidays. The road is maintained with timber dollars for timber traffic which includes large, slow moving, over width vehicles.

The construction workers, equipment, and supply traffic will likely be in conflict. They predict an increase in recreation traffic. The establishment of a community of workers living at the fish hatchery and powerhouse will increase the traffic on the road. This will include the use of school buses, private vehicles, moving vans, fish hauling trucks, etc.

We believe that the road right-of-way, construction and maintenance impacts should be discussed and potential costs evaluated in the EIS.

Response 1: The potential for conflicts among the various users of Forest Service Road No. 2200 does exist and has been recognized in the EIS, paragraph 4.02d(3). As discussed in that paragraph, coordination would be conducted with Simpson Timber Company and the USFS during construction to reduce that potential. As currently understood, at the end of the 10-year period of 1977-1986, logging activity on that road will decrease because the old growth forest will have been logged under the Shelton Cooperative Agreement. Assuming congressional authorization of the recommended plan and appropriation of PP&E funds by 1984 with subsequent construction funding, project construction could be initiated in 1986 (the end of the 10-year logging period). Construction would take approximately 2 years to complete (refer to paragraph 4.17 and figure 4 of the feasibility report). During that time, careful coordination would occur to minimize conflicts between the project construction and any ongoing logging activities.

The first hatchery returns would occur approximately 4 years after construction was completed. If construction was completed in 1988, then the first hatchery returns could be expected in 1992. Until that time, increases in recreation in the Wynoochee Valley due to the hydropower/fish hatchery plan are not expected.

With or without the recommended plan and the logging activity, access to the existing Wynoochee Lake project must be maintained. Currently, Simpson Timber Company maintains the road. According to a spokesman for Simpson Timber Company at the Grisdale Camp, the upper Wynoochee Valley road will probably continue to be used and maintained year-round beyond the year 2000, even if the Grisdale Camp is closed down. Should such maintenance discontinue, maintenance of the road would have to be accomplished by the Corps as part of the existing Wynoochee project operation and maintenance. This information has been added to paragraph 4.02d(4) of the EIS.

Comment 2: Water Quality - The EIS outlines the good and very suitable water quality for a fish hatchery. The draft report of the COE study, Source of Sediment to Grays Harbor Estuary, by Kehoe 1981,

lists the Wynoochee River as having far above average suspended sediment loads. As these two studies are in obvious conflict, further study is needed. Because there is a distinct possibility of a higher sediment load, a discussion and daylighting of potential filtration costs should be done in the EIS.

The running of 190/140 c.f.s. of water through this large hatchery could have a large downstream impact on water quality which in turn could impact Forest users. A "pollution abatement pond" might allow the discharge to meet permit standards during the low water months but data is not provided to assess this capability.

A more detailed discussion is needed in the EIS.

Response 2: The referenced report discussed sediment load conditions in the Wynoochee River before the Wynoochee Dam project. Those conditions are not necessarily indicative of today's conditions. The water quality evaluation accomplished for the current conditions is summarized in the EIS and is provided in detail in appendix H. The turbidity and settleable solids concerns were extensively evaluated with respect to fish culture activities. The settleable solids in water released from Wynoochee Dam are quite low because of the large settling basin effect created by the reservoir. Turbidity at the levels existing in the water releases are not expected to be of concern. Information on turbidity, temperature, and some other water parameters will continue to be evaluated through PP&E. A pollution abatement pond has been included in the hatchery design to insure water releases meet EPA standards. Monitoring of water quality would continue during hatchery operation and remedial measures would be taken as necessary.

Comment 3: Threatened and Endangered Species - The biological assessment of eagle use was extremely limited. Forest Service records show two-five bald eagles using the area at various times. The loss of their major food source above the dam will displace them. Food below the hatchery may increase some, but fishermen use may harass the eagles into leaving the area.

A more in-depth assessment of the impacts on this threatened species is needed.

Response 3: In accordance with the Corps' responsibilities under the Endangered Species Act (ESA), a biological assessment (BA) of the impacts of the hydropower/fish hatchery plan on eagle use was accomplished in June 1981 and is on file at Seattle District. Information obtained from the USFS regarding eagle use in the project area was utilized in the preparation of the BA. The feasibility report/EIS merely summarizes the conclusions of the BA. The BA was transmitted to the U.S. Fish and Wildlife Service (FWS), the agency responsible for administering the ESA. In a letter dated 20 July 1981 (presented in this appendix), the FWS expressed their concurrence with the BA's conclusion that the Wynoochee hydropower/fish hatchery plan would not adversely

impact the local, regional, or national bald eagle population and would not jeopardize its continued existence. The FWS also made several recommendations to assure eagle use preservation. These are discussed in paragraph 4.02b(4) of the EIS.

The BA recognizes that with the project, eagle use would be expected to be displaced to below the Wynoochee Dam and that fish use downstream of the barrier dam would be significantly higher in the Wynoochee River. Fish use between the dam and the hatchery could potentially increase if the fisheries agencies determine that available habitat exists there to permit some natural spawning and rearing of spring chinook salmon and steelhead. This would provide an additional food source for eagles. Harassment of bald eagles by fishermen and recreationists above the Wynoochee Dam does not appear to be a problem affecting bald eagle use under existing conditions and is not expected to become a significant problem with implementation of the recommended plan.

Comment 4: Fish Habitat and Fishing Opportunities - The EIS states "fishing opportunities in the Shelton Ranger District would be greatly enhanced by the hatchery and the expected increase in resident recreational fishing in Wynoochee Lake."

There is only an estimated 2 miles of public fishing water on the Wynoochee River below the proposed hatchery site. This is the water where fishing may be enhanced, depending on the species and timing of hatchery runs.

There is a nutrient problem in the reservoir, and stopping anadromous runs will increase this problem. Some improvements in resident fish can be expected through decrease in competition for food in the streams. At present, artificial stocking is needed to maintain a fair fishery in the reservoir.

The impacts of present flow releases and possible further release timing and amount of the anadromous runs from salt water to the hatchery has not been evaluated.

There seems to be many impacts in this area that need to be evaluated, coordinated and resolved.

Response 4: Paragraph 4.02d(3) of the EIS has been revised to specify that fishing opportunities would be enhanced in the 2 miles of Wynoochee River in the Shelton Ranger District below the Wynoochee hatchery site. In addition to the 2 miles of public fishing in the Shelton Ranger District, the 49 miles of river downstream of the Shelton Ranger District would be open to public fishing unless restricted by the fisheries management agencies.

The WDG and Simpson Timber Company currently have a cooperative resident fish stocking program in Wynoochee Lake because of the increased fishing effort by recreationists. This activity was coordinated with the USFS

and will likely continue to be coordinated annually as in the past; although the stocking program does not involve the Corps of Engineers. Mention of the stocking program has been added to paragraph 4.02d(3) of the EIS.

The hydropower/fish hatchery plan would not result in a change in the operation of the existing Wynoochee Dam. Since publication of the draft report/EIS, the Corps has worked extensively with the fisheries agencies to resolve their concerns regarding impacts of hatchery production on native anadromous fish runs in the Wynoochee River/Grays Harbor area. The plan has been revised to minimize potential adverse impacts, thus resolving the major concerns. Modifications include phased development of the salmon portion of the hatchery, use of only local native brood stock, and a change in the location and number of satellite fish stations. Refer to paragraphs 4.09h and 4.09j of the feasibility report and paragraphs 2.02b(1) and 4.02b(3) of the EIS and to responses to comments from the FWS and the WDF.

Comment 5: Elk Habitat - The quality of the winter elk habitat was not addressed. This flat bottomland has a much higher capacity and value than the steeper sideslopes. When the reservoir was constructed, 1,100 acres of bottomland range were eliminated. The Washington State Game Department estimated a loss of 250 head of elk or .22 elk per acre. The loss of 150 acres for the fish hatchery would mean a loss of 33 head of elk using the conversion. What is the cumulative effect of small losses and which ones should go unmitigated?

The impact should be discussed in real terms of quality loss and not overall averages which are meaningless.

Response 5: The elk analysis did incorporate information regarding the quality of the elk winter habitat on the hatchery site by examining the amount of critical old growth winter range. Additional wording regarding the quality of the flat bottomland has been added to paragraph 4.02b(2) of the EIS; however, the Corps does not agree that the elk figures for the relatively pristine pre-Wynoochee Dam reservoir site can be applied directly to the hatchery site and surrounding area without qualification. The hatchery site lies within areas of secondary impact as a result of the existing Wynoochee Lake project, the existing hatchery site access road, and the recreational use of the site. Further, not all of the 150-acre elk impact area associated with the recommended plan is flat bottomland habitat. The Corps estimates approximately 40 percent is bottomland habitat, the remainder being higher elevation with steep sided slopes. The Corps confined its analysis to losses of habitat, an approach considered more meaningful in view of the obvious problems with trying to assign a number of elk per acre to the hatchery site.

In view of concerns for impacts to elk, two 2-acre elk pastures have been incorporated into the recommended plan as partial mitigation for these impacts. This mitigation was recommended by the WDG. Other measures recommended by WDG have been incorporated to reduce wildlife

impacts. Refer to paragraph 4.02b(2) of the EIS and to responses to comments by the WDG.

Comment 6: Transmission Line - The transmission line is an integral part of this project. The option should be discussed in the EIS as well as the feasibility report. The impacts of the options are very significant.

The BPA study on the powerline options should be displayed in the EIS, impacts discussed, and mitigation measures developed for each alternative.

Response 6: The hydropower portion of the recommended plan is currently proposed for 100 percent Federal development since withdrawal by the Grays Harbor PUD from the partnership with the Corps. As discussed in sections 4 and 6 of the feasibility report, the power from the project would be marketed by the BPA who would have the ultimate responsibility of constructing the transmission line. The plan presented in the feasibility report/EIS is to install a buried transmission line because it is the least environmentally damaging alternative and is consistent with USFS policy requiring buried lines on USFS lands. As planned, the buried line would not require specific mitigation measures other than design of the line to minimize adverse impacts, revegetation where permitted in the transmission line corridor, and use of construction techniques to minimize environmental damage where possible. These measures have been included in paragraph 4.02b(2) of the EIS. Detailed analysis by BPA of the transmission line will occur during PP&E, as discussed in paragraph 2.01b(2) of the EIS.

Comment 7: Dispersed Recreation - The dispersed recreation opportunity at the proposed hatchery site is fairly unique in the Wynoochee drainage. It is a flat area slightly above the fairly well regulated river level. Recreation at this site should not be disregarded because it is a small percentage of total use. The use of averages for dispersed recreation ignores quality. Water-related dispersed recreation is of considerably higher value.

The evaluation in the EIS compares the dispersed recreation opportunities along the Wynoochee River with all dispersed recreation. The comparison should be to other water-related opportunities. When contemplating the picture after project completion, the need for public access increases. Additional evaluation is needed to determine how much public access is needed and what mitigating measures are necessary. Your statement concerning dispersed recreation attributed to the Forest Service in appendix H was made evaluating present plans and did not contemplate the recreation build-up predicted by the Corps of Engineers.

Response 7: The dispersed recreation opportunity at the hatchery site has not been disregarded. It has been extensively treated in the report as an opportunity that will permanently be impacted by implementation of the recommended plan and as a tradeoff of its

implementation. Additional statements have been added to paragraph 4.02d(3) of the EIS to elaborate upon USFS views regarding the site. The provision of public access sites below the hatchery will be the responsibility of the hatchery owner and operators. This is addressed in paragraph 4.02d(3) of the EIS.

(9) Department of Energy, Bonneville Power Administration (26 February 1982).

Comment 1: We have reviewed the draft environmental impact statement (EIS) on the Wynoochee Hydropower/Fish Hatchery Study and have no comment. However, we have attached a few technical suggestions that you may wish to consider.

(3) Fish, p. EIS-30; The concerns and problems associated with the tentatively selected fishery enhancement plan are comprehensively stated. However, it is not clear what operational objectives for the hatchery are expected. You may wish to clarify the following points:

Are the cited figures for adult fish, the expected annual harvest, or production potential?

Response 1: The cited figures for adult fish reflect annual harvest. Refer to paragraph 4.02b(3) of the EIS for additional clarification.

Comment 2: Have strategy plans been proposed for rearing and release times that will minimize any overload impact?

Response 2: Since preparation of the draft EIS, the hatchery plan has been modified to incorporate features that would minimize any potential overload impacts. These features include phased development of the salmon portion of the fish hatchery and production in the hatchery of only native steelhead and spring chinook salmon utilizing local brood stock. Other strategies, as necessary, would be developed during PP&E and throughout the life of the project by the hatchery owners and operators (the Federal and state fish agencies).

Comment 3: How will the siting and design of the two satellite fish stations be handled?

Response 3: Due to concerns by many agencies regarding the satellite fish stations, the number and proposed location of satellite fish stations have been reduced to one satellite fish station in the Chehalis River system. None are being proposed for the Washington coastal streams outside of the Chehalis watershed. The actual siting and design of the satellite fish station would be determined in coordination with the Federal and state fish agencies during PP&E. Refer to paragraphs 4.09j and 4.02b(3) of the feasibility report and EIS, respectively, for additional information.

Comment 4: Will rearing only occur at the satellite fish stations?

Response 4: Rearing of both steelhead and spring chinook would occur at the hatchery. The satellite fish station would be utilized to collect spring chinook salmon brood stock and possibly to aid in the outplanting program for juvenile salmon. Refer for further information to paragraph 4.09j of the feasibility report.

Comment 5: What is the impact to resident fish; are there detailed management or strategy plans to reduce the impact?

Response 5: The impacts to resident fish are discussed in paragraph 4.02b(3) of the EIS and generally are not considered to be significant. As discussed in paragraph 4.02a(2) of the EIS, instream flows for the reach of the Wynoochee River from the dam to the hatchery outlet would be determined in coordination with Federal and state fish agencies during PP&E. Refer also to section 2 of appendix H. Other than the postauthorization resolution of the instream flow issue, no detailed management or strategy plans are being recommended at this time to reduce impacts to resident fish.

Comment 6: Is there an estimated loss of resident fish due to turbines?

Response 6: Some residential fish losses could be expected since outflows would be released near the reservoir surface part of the year. The numbers are expected to be relatively low but cannot be quantified. The responsible fisheries agencies are aware of this possible loss and have weighed this loss against the enhancement benefits of the hatchery and have recognized it as a tradeoff.

Comment 7: Have minimum flows at the dam been suggested to increase outmigrant survival during historic low flow periods?

Response 7: No, because low flows during the outmigration period in the spring are sufficient for adequate fish transport.

Comment 8: How will the water supply for the hatchery be guaranteed?

Response 8: The water supply system to the hatchery is designed with an intake structure at the hydropower outlet, which is supplied with water from the powerhouse and dam discharges. Should the powerhouse be shut down for any reason, water supply to the hatchery would bypass the powerhouse and not be interrupted. Should the intake structure be shutdown for any reason, water supply to the hatchery would come directly from dam releases via a pipe from the existing overflow weir to the fish hatchery intake structure. In regard to the critical low flow periods (May-June) when discharge could drop to 140 c.f.s., the state agencies have identified no significant hatchery operational problems. Refer to paragraphs 4.09f of the feasibility report and 4.02a(1) of the EIS for additional information about hatchery water supply.

Comment 9: Transmission Lines; (a) p. 26, p. EIS-iii, and p. EIS-3 - The statement about USFS policy to require burial of transmission lines should be clarified with respect to specific areas under management for scenic values.

Response 9: The policy of the USFS was only verbally stated by the Olympic National Forest office and, although requested, no written policy was provided the Corps. The Corps understands that the USFS policy, or position, is that if the power output fits into a 69-kV transmission system, the line should be a buried cable within the USFS land designated as scenic. As discussed in paragraph 4.02d(2) of the EIS, the USFS has easements or use agreements with the private landowners on the first approximately 14 miles of the 22-mile transmission line route from the Wynoochee Dam to the Promised Land Substation. New easements and agreements would have to be arranged should a new transmission line be located along the road. For the last 8 miles of the route, the USFS owns a 100-foot scenic corridor on both sides of Donkey Creek Road, and in keeping with their expressed policy of buried lines on national forest land, the line would have to be buried if placed within this corridor.

Comment 10: p. 18 - The most recent deficit forecasts should be used wherever possible.

Response 10: The feasibility report/EIS have been revised to include the 1982 PNUCC SOU power forecast.

(10) Department of Energy, Bonneville Power Administration (12 July 1982).

Comment 1: In July 1981, Bonneville Power Administration (BPA) received a draft copy of the Feasibility Report and Environmental Assessment of Wynoochee Hydropower-Fish Hatchery Project. During discussion with Dr. James Waller of your office, we were asked to analyze the transmission alternatives. A preliminary analysis, which encompassed four alternatives, was completed in September 1981. Three of the alternatives, a 69-kV overhead transmission line, a 34.5-kV underground cable and a combination 34.5-kV overhead transmission line, and a 34.5-kV underground cable follow the Donkey Creek corridor and would be integrated into Grays Harbor PUD's 69-kV system at their Promised Land Substation. The fourth alternative was a 69-kV overhead transmission line that would be integrated at the Grays Harbor PUD's Montesano Substation. In the Feasibility Report and Draft Environmental Impact Statement the underground cable was shown as the preferred alternative, based on our preliminary studies. At that time, it was proposed that the U.S. Corps of Engineers (USCE) would construct the generating facilities at Wynoochee Dam, while Grays Harbor PUD would purchase the output and provide the transmission facilities.

In subsequent discussions with Dr. Waller, it was determined that a detailed analysis of the transmission alternatives would be necessary to

assist in the selection of the transmission route. This analysis began in November 1981, after a field study of the routes and following a meeting with USCE, the U.S. Forest Service (USFS) and Grays Harbor PUD. It was apparent from the preliminary analysis that the Montesano alternative could not be justified from an economic standpoint, due primarily to its much greater length and impacts. The alternatives that proceeded along Donkey Creek Road to the PUD's Promised Land Substation were to be analyzed. Since that time, Grays Harbor PUD has decided not to participate in the project, so they will no longer be involved in the construction of the transmission portion of the project.

As a result, construction by BPA may be the only means of integrating the output of Wynoochee. If requested by USCE, and the project is authorized by Congress, BPA would ultimately be responsible for the location and design of the integrating transmission. Any decisions we would make would be based on the transmission coverage in the project EIS, including the results of the economic, technical and environmental analysis. The transmission portion of the feasibility report and draft EIS is deficient in the evaluation of transmission alternatives. A separate EIS supplement on transmission will need to be completed before a Record of Decision (ROD) can be made. BPA is willing to complete this supplement, should we be required to construct.

Response 1: Power from the recommended plan would be marketed by BPA and BPA would be responsible for construction, operation, and maintenance of the transmission line. As discussed in paragraph 4.09d of the feasibility report and in the summary and paragraph 2.01b(2) of the EIS, a buried transmission line was chosen by the Corps of Engineers based on preliminary BPA studies. The buried line is considered the least environmentally damaging plan by the Corps of Engineers and impacts of the buried line are addressed in the EIS. However, BPA would be responsible for the final decision as to the type and location of the line. After the recommended plan is authorized by Congress, further detailed analyses of the transmission line would be accomplished by BPA during PP&E. At that time, a supplemental environmental document would be prepared to address the transmission line alternatives and their impacts.

Comment 2: To properly program and budget any BPA involvement, we will need to know, as soon as possible, whether the Corps wishes us to integrate the project and when Congressional authorization is expected to be received.

Response 2: Assuming congressional authorization of the recommended plan and appropriation of PP&E funds by FY 1984 with subsequent construction funding, project construction would be initiated in FY 1987. Following a 2-year construction period, power from the recommended plan is anticipated to be online in later 1988 for integration into the BPA system. BPA will be notified of any changes in the schedule.

b. State of Washington.

(1) Department of Ecology.

Comment 1: This letter is in response to your request for comments on the draft Environmental Impact Statement and Feasibility Report for the Wynoochee Hydropower/Fish Hatchery project. On behalf of the State of Washington, the following consolidated comments are provided.

First, I (Donald W. Moos, Director) wish to express support for the proposed Wynoochee Hydropower/ Fish Hatchery project. Based on the information provided to date, the project appears to be an environmentally sound approach for meeting the future demand of two sources; electric power and anadromous fish. The proposed facilities should further enhance the comprehensive, multipurpose development and utilization of the water resources of the Wynoochee River basin.

Response 1: No response is necessary.

Comment 2: The Departments of Game, Fisheries, and Ecology have previously agreed with the proposed approach of addressing the issue of minimum flows in the short reach of the Wynoochee River to be bypassed by the fish hatchery diversion. It is our understanding that the determination of minimum flow releases (if any are required in addition to the inflow known to occur in the bypassed reach) will occur during the advanced engineering and design phase of studies following Congressional authorization of the proposed project. Minimum flow needs will focus on fish and wildlife flow requirements as well as recreational, aesthetic and water quality flow requirements in the bypassed reach. Scoping and coordination of specific studies will occur with the assistance of the Department of Game, Fisheries, and Ecology.

Response 2: As discussed in paragraphs 5.03 and 4.02a(2) of the feasibility report and EIS, respectively, and in appendix H, section 2, the determination of instream flow requirements between the Wynoochee Dam and the hatchery outlet will be made during advanced engineering and design (now called preconstruction planning and engineering (PP&E)) in coordination with the State of Washington.

Comment 3: I understand that staff of the Corps and the Department of Ecology have exchanged correspondence regarding whether a state water right is needed for the project. I anticipate that an application for a state water right would be submitted at the appropriate time in this process.

Response 3: As stated in correspondence to the WDE on 11 February 1982, the Corps does not need to obtain water rights under state law for operation of a congressionally authorized hydropower/fish hatchery project at Wynoochee Dam.

Comment 4: Staff from Departments of Fisheries and Game have met with your staff to discuss concerns about the size of the hatchery and specific language in the draft EIS. It appears that the Corps has agreed to revise the language in the Final EIS to reflect the concerns of these agencies.

Response 4: As discussed in the following responses to WDG and WDF comments, the concerns of the agencies have been resolved and the appropriate text changes have been made throughout the feasibility report and EIS.

Comment 5: Finally, we appreciate the efforts of your staff to coordinate the Wynoochee Hydropower/Fish Hatchery study with state agencies. We also commend the Corps for its attempt to form an innovative partnership with Grays Harbor PUD. The Department of Ecology has coordinated the review of the draft Environmental Impact Statement with other state agencies. Their comment letters are attached.

Response 5: Responses to the other state agencies comments follow.

(2) Department of Game.

Comment 1: The Washington Department of Game has reviewed your feasibility report and draft environmental impact statement for the Wynoochee hydropower/fish hatchery. As you know, we strongly support this planned facility. This document is well done and includes most of Game's concerns. However, we have three concerns: (1) the state existing mitigation responsibility of 2.6 percent; (2) project impacts to wildlife; and (3) percentage of total steelhead run harvested by sport fishermen and man-days to harvest a steelhead.

The state existing mitigation responsibility is for 1,700 adult steelhead not 3,400 as reported on page 31. The difference between the 3,400 reported and the 1,700 actual figure was a misunderstanding between Game and the Corps on spawning escapement. This means the state only is responsible for one-half of the costs discussed. See page by page comments for more specific details.

Response 1: Concur. The existing mitigation responsibility is for 1,700 adult steelhead. The appropriate text, percentages, and cost share changes have been made throughout the feasibility report/EIS. Refer primarily to sections 4 and 6 of the feasibility report and to appendix C.

Comment 2: The tradeoff of fish for wildlife is not completely acceptable to Game. Revegetation of the disturbed area around the hatchery site and along the powerline will mitigate most impacts. We recommend a vegetation barrier (blackberry/multi-floral rose combinations) be planted and maintained around the edge of the hatchery, especially in areas adjacent to old growth forest.

Response 2: Planting of a vegetation barrier around the hatchery has been added to the recommended plan. Refer to paragraphs 4.12 and 4.02b(2) of the feasibility report and EIS, respectively.

Comment 3: On other edges of the hatchery, two small two-acre elk pastures should be developed and maintained with fertilization from settling pond solids. These would help elk by providing critically needed winter food.

Response 3: Two 2-acre elk pastures adjacent to the hatchery have been added to the recommended plan. Refer to paragraphs 4.12 and 4.13 of the feasibility report and paragraph 4.02b(2) of the EIS.

Comment 4: The rose/blackberry barrier and the elk pasture could be maintained easily by hatchery personnel. It may be possible to enlarge the proposed settling pond and allow natural wetland vegetation to grow to replace some of the losses caused by filling the two-acre wetland.

Response 4: This suggestion has been incorporated into the EIS, paragraph 4.02b(1), as a possibility for consideration in PP&E when the details of the various plan features, including the settling pond, would be developed.

Comment 5: If revegetation of disturbed areas and the three techniques mentioned above are accomplished, wildlife losses would be reduced considerably.

Response 5: All suggestions for reduction of wildlife losses have been incorporated into the recommended plan.

Comment 6: Game provided inaccurate information in our July 3 and July 24, 1981 letters to Jack Thompson and Steve Babcock. Total steelhead production remains at 52,900 adults. Since these fish will be planted and return to several rivers, the spawning escapement will increase and the catch per man will change. Spawning escapement will be 7,900. Harvest will be 45,000. Indian harvest will be 22,500, and 22,500 will be available for sport harvest. However, with fish planted in several rivers, only 80 percent of these, or 18,000, will be taken by sport fishermen. With fish planted in several rivers, it will take 6.18 days to catch a steelhead, not the 4.04 as discussed in the letter. This makes each fish worth $219.45 ($35.51 (fisherman day) times 6.18 days).

Response 6: Appropriate revisions have been made to the economics of the recommended plan. Refer to paragraph 4.25b of the feasibility report and appendix C, section 2.

Comment 7: Following are our specific comments on the feasibility report.

Page 17, under 3.05. Game does not plan to use the satellite fish stations for rearing or releasing steelhead. Some adult steelhead for hatchery broodstock may be taken at these stations. These satellite stations are also discussed in many other places throughout the report.

Response 7: In response to the recommendations of the fisheries agencies, we have reduced the number and location of satellite fish stations from two on Washington coastal rivers to one in the Chehalis River system, primarily for the collection of adult spring chinook hatchery brood stock. Where such is mentioned in the feasibility report/EIS, the fact that the satellite fish station would be used for salmon, and not for the rearing and release of steelhead, has been specified. Refer to paragraph 4.09j of the feasibility report and paragraphs 2.02b(2) and 4.02b(3) of the EIS.

Comment 8: Page 18, under No Action - Anadromous Fish. Statement says anadromous fish runs are expected to decline. Game is working on management of the steelhead resource and does not expect further run declines.

Response 8: The statement in table 1 of the feasibility report that the anadromous fish runs under no action are expected to continue to decline has been deleted. Refer also to paragraph 3.04b of the feasibility report.

Comment 9: Page 27, under F. During shutdowns, a combination of multilevel outlets may be required to be open part way to obtain proper temperature. This would be a change, since the existing operation requires each multi-level to be completely open when operating to provide protection for fish passing through the outtake.

Response 9: Concur. The six existing multilevel outlets in the dam could provide a wide range of temperature control for water release during any scheduled penstock shutdown. Single pipes could in most instances provide the proper temperature control. In the event more than one outlet was used, in a partially closed position, there would be no impact on downstream migration of anadromous fish since the runs upstream of the dam will terminate after hatchery construction. The few resident fish which may enter the system could be impacted; however, these fish would not be desirable in the hatchery water system and would have to be removed from the hatchery head tank. The operational changes would not adversely affect the structure and the primary purpose, to maintain desirable water quality, would be continued.

Comment 10: Page 31, under 41.3, Mitigation, and Table 2, under Previous State of Washington Mitigation Responsibility. The

state's previous mitigation responsibility was for 1,700 adult steelhead not 3,400 as stated. Therefore, the state responsibility is for 1.3 percent not 2.6 percent of the cost as reported.

Response 10: The appropriate changes have been made in the plan economics and are reflected in the feasibility report/EIS. Refer to table 2 of the feasibility report.

Comment 11: Page 33, first paragraph. Game substitutes steelhead for cutthroat because we don't have an adequate hatchery stock, not because of fish size as reported.

Response 11: Revisions to the feasibility report/EIS have been made to reflect that the substitution is based on lack of adequate brood stock. Refer to paragraph 4.13 of the feasibility report.

Comment 12: Page 56, Corps Response #5. Game has a list of plants which provide high wildlife value, which should be planted in disturbed areas where you recommend natural grasses. A draft of this list was provided to the Corps.

Response 12: The list of plants which provide high wildlife value has been added to the EIS as table EIS-1. A specific revegetation plan for disturbed areas using these species would be developed in PP&E. Refer to response 5 above and to paragraph 4.12 of the feasibility report and 2.02b(2) and 4.02b(1) of the EIS.

Comment 13: Page 60, under a. See page 31 above. The state obligation of $570,000 would be only $285,000 if only 1.3 percent of the hatchery is for previously funded mitigation fish.

Response 13: Appropriate changes have been made in project economics and reflected in the feasibility report/EIS. The State of Washington's previous mitigation responsibility cost share is now estimated as an investment cost of $485,000. Refer to paragraph 4.29a and 4.29c, and table 5 of the feasibility report and to appendix C.

Comment 14: Page 60, under b. Only 1.3 percent is for previous mitigation fish, so annual cost should be $13,500 not $27,000.

Response 14: Appropriate revisions have been made. The State of Washington's annual OM&R costs for previous mitigation responsibility is now estimated as $17,000. Refer to paragraph 4.29a and 4.29c, and table 5 of the feasibility report and to appendix C.

Comment 15: Following are our specific comments on the draft environmental impact statement. Page ii. Satellite fish station would not be used for steelhead.

Response 15: Clarification has been made on page ii of the EIS.

Comment 16. Page v. The project is not in full compliance with the Fish and Wildlife Coordination Act because of wildlife impacts. However, if suggestions listed earlier in this letter are followed, impacts will be insignificant.

Response 16: Suggestions have been incorporated as previously discussed.

Comment 17: Page 6, under (2), Environmental Features. Final species design will be made only for salmon species. Steelhead are planned for one-half the hatchery and 216,000 pounds will be reared.

Response 17: Due to comments also received from the WDF and modifications to the hatchery plan as a result of coordination with the Federal and state agencies, the report has been revised to specify that the hatchery is currently planned for spring chinook salmon and steelhead trout. Refer to paragraphs 2.02b(2) and 4.02b(3) of the EIS and section 3 of appendix H.

Comment 18: Page 9, first complete paragraph. The monitoring program will require use of at least one Game Department employee to monitor the steelhead program.

Response 18: Clarification has been made in paragraph 2.02b(4) of the EIS.

Comment 19: Page 15, 3.02. Rivers names are only examples of where steelhead will be planted. The streams where fish are planted and numbers planted per stream will be determined later.

Response 19: Clarification has been made in paragraph 3.02 of the EIS.

Comment 20: Page 16, 3.05. Dolly varden are not present.

Response 20: Correction has been made in paragraph 3.05 of the EIS.

Comment 21: Page 26, last paragraph. Game provided your staff a list of plants for disturbed areas, especially revegetation along the powerline. These plants provide excellent food and cover for wildlife. Not all these plants are native species.

Response 21: Paragraphs 4.02b(1) and 4.02b(2) of the EIS have been modified to reflect that these plants will be planted in disturbed areas to minimize adverse impacts to wildlife. The list of plants provided by WDG has been incorporated into the EIS as table EIS-1.

Comment 22: Page 27, second paragraph. A specific revegetation plan should be developed during advanced engineering and design for hatchery grounds, pipeline, transmission lines, and any other areas disturbed by the project.

Response 22: Development of a specific revegetation plan is planned for advanced engineering and design (now called PP&E). Refer to paragraphs 4.12 and 4.02b(1) of the feasibility report and EIS, respectively.

Comment 23: Page 37, second paragraph. Fishing may be permitted between the fish collection facility and the dam sometime in the future.

Response 23: Paragraph 4.02d(3) of the EIS has been revised to reflect that fishing may be permitted between the fish collection facility and dam sometime in the future.

Comment 24: These comments are provided for the draft statement. The Department of Game is continuing to work with the Corps and other resource agencies to provide information for the final impact statement and retains the ability to comment as this process continues. We strongly support this fish hatchery since it provides an excellent opportunity for enhancement of the steelhead resource in the local area.

Response 24: No response is necessary.

(3) Department of Fisheries (25 February 1982).

Comment 1: We have studied the Wynoochee Hydropower/Fish Hatchery Study Draft Feasibility Report and Environmental Impact Statement. The prospect of adding a significant increment to the State's sustainable harvest of Pacific salmon is certainly a very worthwhile objective, particularly for the Grays Harbor region which has endured far more than its share of depressed salmon runs and lost fishing opportunities. However, we have some concerns with the size and features of the project as currently described. We feel that these merit a temporary "holding" action in conjunction with additional biological and economic feasibility work. In our view, a somewhat smaller, phased-in enhancement effort would seem to be more appropriate.

Our primary rationale for the above recommendation stems from the Salmon and Steelhead Conservation and Enhancement Act of 1980 (PL 96-561). This act describes a comprehensive salmon enhancement planning process that will precede submission and consideration of individual projects seeking Federal funds. We doubt that Congress would give serious thought to any large salmon enhancement project at this time, regardless of its merits, until their own legally prescribed planning process is completed, nor do we believe such action to be appropriate. Further, the forwarding of a single major project proposal at this time implies a higher

inherent priority designation than other potential salmon projects in the Pacific Northwest. A number of such salmon enhancement proposals are presently on "hold" as various proponents await finalization of the comprehensive planning process. Thus, we are still several stops away from even being able to develop a priority listing of project proposals competing for a limited funding source. The Wynoochee project (at about six times the "normal" hatchery size) is of special concern since, if authorized by Congress, it would allocate an inordinate proportion of the entire Federal enhancement program to a single project in one region of the Pacific Northwest ($18.8 of $52.0 million for salmon and steelhead in the Washington conservation area). Even though this project might not be technically considered as coming under PL 96-561, it is unrealistic to think that funding of this project would not detract from funding of projects that were so submitted.

Furthermore, PL 96-561 specifies that the comprehensive plan include "such standards, restrictions or conditions as are necessary to assure that any project included in the plan contributes to the balanced and integrated development of the salmon and steelhead resources of the area". It goes on to define the objectives of those standards. The Wynoochee project has not been specifically analyzed with respect to those objectives nor, of course, have the standards been established.

Response 1: Through coordination with WDF, we have modified the salmon portion of the hatchery from initial full development to two phased development over a period of up to 20 years. As a result, the initial Phase I costs to the state are lower than identified in the draft feasibility report/EIS. Per agreement with the WDF staff, the Corps of Engineers is seeking authorization for the full hatchery development. This would allow for Phase II development of the salmon portion of the hatchery up to 20 years later without the need to go back to Congress for authorization.

Comment 2: We have a number of other important concerns which typically transcend your own proposal and track back to a general lack of adequate comprehensive planning for salmon enhancement per se. Some of these were addressed in only a general manner in your proposal. While some deference to "advanced engineering and design" is appropriate, we suggest that key biological issues at least be explored to the depth accorded engineering features of the project. These concerns are as follows:

As currently described, the project would produce 396,000 pounds of salmon and steelhead smolts annually. Most of these would be introduced into and impact the ecosystems of the mainstem Wynoochee River, the lower Chehalis River, and the Grays Harbor estuary. We doubt that significant impacts on existing salmonid resources can be avoided, regardless of the operational methodology employed. For example, a much smaller coho enhancement project at Tulalip Bay in Puget Sound appears to have seriously threatened the future viability of a major pink salmon

resource in the Stillaguamish River system. While this is admittedly an extreme case, it is only one of many examples of inter- and intraspecies conflicts that have recently been detected by Pacific coastal salmon management agencies.

Response 2: We have worked with staffs of the two state fish agencies and agreed to construct the hatchery in two phases. The first phase would produce about 80,000 pounds of outmigrant spring chinook salmon. The second phase would be constructed up to 20 years later and would produce an additional 109,000 pounds of spring chinook salmon. This would permit usage of local stock (from the Skookumchuck River) with a gradual build up of brood stock without having empty hatchery ponds. Full development of the steelhead portion of the hatchery would be included in the Phase I development. Additionally, only spring chinook salmon will be mentioned in the feasibility report; although species selection is obviously a state determination, not the Corps'. These modifications to the hatchery plan would minimize potential inter and intraspecies conflicts that have been detected by Pacific coastal salmon management agencies. Refer to paragraphs 4.09h and 4.09j of the feasibility report and to paragraphs 2.02b(1) and 4.02b(3) of the EIS.

Comment 3: The potential brood stock source for the project presents a major problem that needs to be addressed before proceeding further. The only dependable source of any magnitude for spring chinook brood stock will be WDF Cowlitz Hatchery returns. Even this source presents serious disease problems and genetic implications that will need to be addressed before it can be approved for transfer to the Grays Harbor region. (The greatest "risk" would be a quarantine of Cowlitz Hatchery during or immediately after construction of the Wynoochee project.)

We do not believe that the small, naturally-spawning spring chinook run in the upper Chehalis River would provide adequate brood stock for the project as presently described. However, the local Chehalis stock might be a viable source for a smaller, phased-in project which could "afford" the adverse benefit to cost impact of a rather prolonged brood stock build-up period. Again, a number of practical problems related to capture and holding would have to be worked out. Specifically, we recommend that the lower Skookumchuck River be given a serious consideration as a permanent adult trapping and juvenile release site for spring chinook.

Response 3: All mention of spring chinook salmon brood stock outside of the Chehalis River system has been deleted from the report. The project as now proposed with phased development accommodates the use of only local spring chinook salmon stock. Refer to paragraphs 4.09h and 4.09j of the feasibility report and to paragraphs 2.02b(1) and 4.02b(3) of the EIS.

Comment 4: The project, as currently described, offers some difficult or even impossible harvest management implications. Grays Harbor already has a harvest conflict between late-run coho and winter steelhead. The project could greatly exacerbate this problem and add some or all of the following new ones that already occur in varying degrees in other areas of the state:

spring chinook vs. winter steelhead (including spawn-outs)
spring chinook vs. summer steelhead
fall chinook vs. summer steelhead
early coho vs. fall chinook
early coho vs. summer steelhead

In addition to the above, there is an equally complex series of potential conflicts between hatchery and wild fish within the same species and race due to inherent and significantly different allowable harvest rates. (This disparity is amplified in "terminal areas" as stocks leave the mixed-stock ocean fisheries.)

Response 4: Spring chinook salmon and native steelhead are the only species mentioned in the report that are proposed for raising at the hatchery. Production of these species would minimize potential harvest management conflicts. Refer to paragraph 4.02b(3) of the EIS for a discussion regarding hatchery brood stock.

Although the feasibility report/EIS states spring chinook salmon and native steelhead are the species to be reared in the proposed Wynoochee hatchery, all fisheries management considerations relating to the hatchery and its operation (including the use of other species and strains of anadromous fish) rests with the Federal and state fisheries agencies. Fisheries management strategies and procedures may change in future years; consequently, the Wynoochee hatchery authorization is not intended to be specifically limited to production of spring chinook salmon and native (winter) steelhead only.

Comment 5: The economic justification for the fish hatchery portion of the projects appears to be somewhat misleading and overly optimistic. (In this case, we must comment mainly on our "own data".) The "Ocean Fisheries-Commercial" category, which you were provided in the November 6, 1980, letter from Brian Edie, contains a significant component of Canadian interceptions which should probably be deleted or at least presented separately in the various economic benefits computations (ocean commercial and sport catches by Pacific coastal states other than Washington are also included in the data). In addition, the harvest proportions between Washington Indian and non-Indian fishermen should be adjusted in the same manner as steelhead to reflect an expected 50:50 division of catch. We also recommend a 3.5% survival rate as being more realistic for Grays Harbor spring chinook. Finally, the projected freshwater harvest rate of 38% (7,000 catch; 11,000 escapement) would require optimum access and flow conditions. (Note: The

Department of Game will undoubtedly comment separately but a 25,000 steelhead sport catch with only a 2,900 fish escapement would, to our knowledge, assume a freshwater sport fishing rate that has never been achieved elsewhere).

Response 5: The economics of the hatchery plan have been recalculated using the updated figures provided by WDF staff and documented in the 13 April 1982 WDF letter. Refer to appendix C and to paragraph 4.25b of the feasibility report. Canadian interception has not been deleted, as agreed through coordination with WDF staff. This use of Wynoochee fish is thought to be offset by American fisheries harvesting salmon originating from Canadian streams.

Comment 6: We cannot support an approach which makes mitigation an inseparable component of an enhancement project that may or may not be funded by the Federal government. The three separate and distinct components are:

(a) a current unfulfilled mitigation responsibility from the existing project as generally outlined in your report;

(b) a potential mitigation responsibility from the proposed hydropower component; and

(c) a salmon resource enhancement proposal.

We believe that good-faith negotiations to resolve the existing mitigation responsibility (No. 1) should proceed in an expeditious manner, since substantial losses have accumulated since the early 1970's. We would be amenable to some form of interim solution pending possible combination with Nos. 2 and 3 at some later date However, the existing responsibility should be clearly separated from any future mitigation that is contingent upon the possibility of either the hydroelectric or enhancement projects being built.

Response 6: A mitigation report for the existing project going to Congress along with the hydropower/fish hatchery feasibility report would confuse the issue and cause delays in gaining authorization of the recommended plan which, as mutually agreed, would fully mitigate fish runs to the pre-Wynoochee Lake project condition.

Comment 7: The proposal for two satellite fish stations probably promises more than can ever be realistically achieved. We use "satellites" in our own fish cultural operations but primarily as a means of increasing the rearing capacity beyond that of the "mother" station

during certain critical time periods. Your proposal does not increase rearing capacity but rather relies upon trapping native brood stock at other coastal sites, rearing the progeny at the Wynoochee Hatchery, and then returning them to the same off-station sites for acclimatization and subsequent release. We see two basic problems with this concept. One is somewhat unique to the coastal region and this is the extremely heavy freshets that preclude holding any type of effective adult trapping facility in virtually all medium- to large-sized streams. We have experienced continuing difficulty in obtaining brood stock for the fall chinook rearing programs at our coastal hatcheries since most fish spawn downstream from sites where permanent trapping facilities can be maintained. To date, we have been unable to identify any promising coastal sites for the dependable trapping of spring or summer chinook populations.

Our second concern is more of a general nature and concerns the proposed "balancing" of natural and hatchery production implied in your proposal. We have yet to see this concept adequately explained as an attainable hypothesis, much less achieved in actual practice for a larger river system. There are a number of feasible, cost-effective ways of supplementing natural populations such as fry plants in under-utilized stream rearing areas, off-station smolt plants, hauling returning adults off-station, marine rearing pens in inlets with numerous small tributaries, etc. It is important to realize, however, that all these methods have severe limitations due to such factors as costs, disease, access problems, and unavailability of suitable brood stock. Basically, it is not feasible to effectively supplement an entire naturally spawning population in any river system as big as the Queets or Hoh. If the salmon populations in only one or two tributaries are supplemented, then the lower allowable fishing rate for the remaining tributaries still prevails and the end result is simply excess spawners in the same one or two tributaries.

In view of the above concerns, we recommend that the satellite station proposal be examined in somewhat greater detail by your staff, particularly with respect to the Skookumchuck River as recommended earlier.

Response 7: Any reference to two satellite stations on the coast of Washington has been deleted and, as recommended by the fisheries agencies, the plan has been modified to include one satellite station in the Chehalis watershed primarily for the purpose of collecting brood stock (spring chinook salmon) and for possible outplanting of salmon. Refer to paragraph 4.09j of the feasibility report and to paragraphs 2.02b(1) and 4.02b(3) of the EIS. As noted in response 2 above, the report will reference the use of only local spring chinook brood stock in the salmon portion of the hatchery.

Comment 8: The report is somewhat vague on two important questions. A Federal agency is designated as the "manager" but it is unclear whether this is as an active on-site manager (Quilcene) or as an overall operations manager (WDF-operated Columbia River hatcheries).

Response 8: Paragraph 4.21 of the feasibility report has been revised to more clearly state that the state will operate and maintain the hatchery under contract with the Federal fishery agency that becomes the hatchery owner.

Comment 9: The second question is status of a future dam at the "Oxbow" site. General feasibility of this second dam should be assessed as well as potential impacts on operational features of the Wynoochee project.

Response 9: Preliminary studies accomplished on the development of the Oxbow Dam site indicate that it is not feasible. Construction of the Wynoochee hydropower/fish hatchery plan would further reduce its feasibility due in part to the expected high costs that would be associated with mitigation of impacts to the hatchery. We have stated in appendix G that if the Oxbow Dam site development was found to be feasible prior to construction of the hydropower/fish hatchery plan, the hatchery could be moved to the higher elevation bench, thus allowing for the Oxbow reservoir. Many agencies and interest groups have stated that development of the Oxbow Dam site could jeopardize the Wynoochee hatchery. A statement to that effect was added to paragraphs 5.03g and 4.02f(2) of the feasibility report and EIS, respectively. Should Oxbow Dam site development be found feasible, the detailed assessment of its impacts on the Wynoochee hydropower/fish hatchery project would be accomplished at that time and the results and necessary mitigation provided the Federal licensing agency.

Comment 10: In summary, we feel that the concerns expressed indicate the need for a temporary "holding" action in conjunction with some additional feasibility work on the Wynoochee proposal. In our view, a somewhat smaller initial salmon enhancement effort on the Wynoochee as consistent as possible with full development of the site might ultimately stand a better chance of successfully competing with other worthwhile projects for limited Federal funds. Again, we wish to be positive and conclude that virtually all of the concerns mentioned could be resolved via a comprehensive planning process as described in PL 96-561. We would welcome the opportunity to discuss this and any other areas of interest with you and your staff.

Response 10: The project has been modified to the extent that WDF no longer believes that a temporary "holding" action is necessary. In a letter dated 26 April 1982 (see (4) below), WDF stated that such an action would be unnecessary.

(4) Department of Fisheries (26 April 1982).

Comment: My staff has kept me well briefed on your recent efforts to finalize the Wynoochee Hydropower/Fish Hatchery Feasibility Report. In examining the expected modifications to your earlier draft report, I am satisfied that my previous concerns and questions are being

accommodated to the fullest extent practicable. It is particularly gratifying that you are now considering a phased-in approach which could take advantage of the local spring chinook broodstock. We will be able to actively support the project as it is currently envisioned.

In my February 25 letter, a temporary holding action was proposed. In retrospect, this will be unnecessary due to the extraordinary efforts of your staff in addressing a number of complex, interrelated technical issues in a short time frame. We genuinely appreciate the positive receptive attitude exhibited by the Corps of Engineers in this matter.

Response: No response is necessary.

(5) Parks and Recreation Commission.

Comment: The staff of the Washington State Parks and Recreation Commission has reviewed the above-noted document and finds that it will have no effect on properties under the management or control of the Washington State Parks and Recreation Commission.

Response: No response is necessary.

c. Local Agencies.

(1) Public Utility District No. 1 of Grays Harbor County.

Comment: By this letter, Public Utility District No. 1 of Grays Harbor County (PUD) submits its formal comments on the Review Draft of the Wynoochee Hydropower/Fish Hatchery Feasibility Report and Draft Environmental Impact Statement (FR/DEIS) and the December 15, 1981 Final Public Meeting. Your cooperation in extending the deadline for submittal of the response is acknowledged and greatly appreciated. As you are aware, the PUD has, in the last few weeks, been heavily occupied by the unrest of our ratepayers which has been brought on principally by the financial difficulties surrounding the WPPSS Nuclear Project Nos. 4 and 5. Thus our consideration of the Wynoochee Dam Project has not been as expedient as we all would have hoped. Unfortunately, those same circumstances now lead us to the conclusion that the PUD cannot at this time consider involvement in the addition of hydroelectric facilities at Wynoochee Dam.

We recognize that the loss of the PUD's support puts the Corps of Engineers in a difficult position with regard to preparation of the feasibility report and EIS since the FR/DEIS has been based on a partnership arrangement with the PUD. It would appear that your options at this time would be to restructure your plans based on a Federal-only development or on a future partnership with the PUD. Should you choose the latter course, we request that you explain in the final documents that the PUD has not committed itself to any future partnership and that you

address the PUD's comments on the partnership arrangement which are contained in Exhibit A and the PUD's comments on the FR/DEIS which are contained in Exhibit B, which are enclosed.

Response: The hydropower portion of the recommended plan is 100 percent Federal as now presented in sections 4 and 6 of the feasibility report. Should a partnership with the PUD become a reality in the future, the comments in exhibits A and B would be addressed in detail during PP&E.

(2) Port of Grays Harbor.

Comment: The Port of Grays Harbor wishes to reaffirm its support for a joint hydropower/fish hatchery project on the Wynoochee River. We have reviewed both the draft EIS and Feasibility Study, and concur with the findings and preliminary recommendation to go ahead with an integrated hatchery and power generating facility at the Wynoochee Dam.

Response: No response is necessary.

d. Groups and Individuals.

(1) Ernest Brannon, Associate Professor, School of Fisheries, University of Washington.

Comment: I have reviewed the Wynoochee Hydropower/Fish Hatchery Feasibility Study and support the project as a timely and necessary step in the rehabilitation of Washington's salmonid resources. As energy needs increase and smaller hydro projects are developed, the opportunity to effectively combine fish and power production is critical. Hatcheries continue to be the most important rehabilitation tool for coho and chinook salmon in Washington, but they must be viewed as a tool and not the entire solution to revive the resource. Hatcheries should work to supplement natural populations within each river system. The Wynoochee Hatchery project proposes a hatchery development plan that can place primary emphasis on the needs of the Wynoochee River system, using stocks native to the system and providing the only major opportunity to initiate a sustaining management program integrating hatchery production with the production capacity of the natural stream.

Two other components of the plan give it further distinction. Firstly, the use of satellite facilities with stocks native to their sites is a progressive step if never compromised. Secondly, and a very important step, is the opportunity to interface research with hatchery programming which can correct a deficiency in hatchery management that has existed since hatcheries were started. Much can be gained in the Wynoochee hydropower/fish hatchery project toward the enhancement and efficient utilization of our resources. I strongly support the program.

Response: No response is necessary.

(2) Confederated Tribes of the Chehalis Reservation.

Comment 1: Again the Chehalis Tribes wishes to express our support of the Wynoochee Dam Hydro Power Fish Hatchery Project. However-

Looking at the environmental impact statement again, we see an important component of the new hatchery operation would be off-station rearing adult capture facilities. Candidate sites identified in your report include the Humptulips, Quinault, Queets and Hoh Rivers. We see little reason to make plants into either the Humptulips or Quinault Rivers, both of which are heavily planted by existing hatcheries. We understand certain salmonid species from the Hoh river were examined by the U.S. Fish and Wildlife Service and found to be infected with disease organisms which have not been found in the Chehalis system. More importantly, little mention is made of the upper Chehalis watershed as a candidate.

Recent conservation closures of our fisheries indicate a need for enhancement in the upper Chehalis. During the past year, all or part of our Spring Chinook, Fall Chinook, Coho and Steelhead fishing seasons were curtailed for conservation. Small numbers of Chum were caught.

Off station plants of salmonid smolts without a period of rearing at the planting site will not guarantee returns past the mouth of the Wynoochee River. Therefore more thought should be applied to spawning and rearing distribution throughout the upper Chehalis watershed.

Response 1: The hydropower/fish hatchery plan has been revised in the feasibility report/EIS to include one satellite fish station in the Chehalis River system for salmon. Fish stations are no longer being proposed for rivers outside the Chehalis watershed. Refer to paragraphs 4.09j and 4.02b(3) of the feasibility report and EIS, respectively, and to the letters of comment from WDF and FWS who shared your concerns regarding the satellite fish stations.

Comment 2: Therefore we support the concept of increased enhancement of Chehalis salmon and steelhead stocks. We do have some concerns regarding proposed operation and management of any enhancement project in the Grays Harbor and Chehalis River drainage. Large scale salmon and steelhead enhancement in the lower Chehalis coupled with hatchery harvest rates in Grays Harbor fisheries would soon deplete the remaining upriver native runs our Tribe is dependent on.

Response 2: As discussed in paragraph 4.09h of the feasibility report and paragraph 2.02b(1) of the EIS, the salmon portion of the hatchery has been revised at the request of WDF to a two phase development over a period of up to 20 years. The report has also been revised to reflect that, at this time, only spring chinook salmon (utilizing local Chehalis brood stock) and native steelhead are planned for

raising at the hatchery. The state believes that the plan as now proposed would be consistent with the coastal fisheries management plan that has yet to be developed and would have minimal adverse impact on native runs.

Comment 3: We are concerned about the selection of brood stock for enhancement projects, in the Chehalis system. Low success rates of previous salmon and steelhead enhancement project in the Chehalis system may be attributable to selection of foreign stock. We believe native Chehalis River stock are more adapted to the watershed and Grays Harbor Estuary and could survive at a higher rate. Fish runs have been on the decline, but in the last couple years have stabilized. Unknown if ecology has reduced pollution or fish have adapted.

Response 3: The plan has been revised to use only native steelhead trout and spring chinook salmon brood stock. Refer to responses to comments from WDF and FWS and to paragraph 4.02b(3) of the EIS.

Comment 4: Therefore the Chehalis Tribe would like to be a part of the program.

Response 4: Coordination will continue with the Chehalis Tribe on all aspects of hatchery planning and construction.

(3) Northwest Steelhead and Salmon Council of Trout Unlimited.

Comment 1: We would once again like to go on record as opposing any attempt by the Grays Harbor PUD to push for the construction of another dam on the Wynoochee River. All support that has been gathered from the community and the various organizations supporting the Corps proposed joint hydropower/fish hatchery is lost when construction of another dam is ever mentioned.

Response 1: We have expanded paragraph 5.03h of the feasibility report, paragraph 4.02f(2) of the EIS, and appendix G to include the fact that various Federal and state agencies and interest groups believe that construction of the Oxbow Dam could jeopardize the Wynoochee hatchery.

Comment 2: The Northwest Steelhead and Salmon Council and Trout Unlimited support the project concept proposed by the Army Corps of Engineers of a hydropower facility to be built on to the existing dam and a joint salmon/steelhead hatchery approximately one-thousand yards downstream of the existing dam.

Response 2: No response is necessary.

Comment 3: Thank you for allowing us this opportunity. Keep in touch. We are willing to do all we can to assist you in bringing this project to a speedy and successful conclusion.

Response 3: Coordination will continue with the Northwest Steelhead and Salmon Council on all aspects of hatchery planning and construction.

(4) Grays Harbor Chapter, Northwest Steelhead and Salmon Council of Trout Unlimited.

Comment 1: Inasmuch as the Grays Harbor Chapter of the Northwest Steelhead & Salmon Council of Trout Unlimited has already gone on record supporting the present project plan we believe that several other points of concern should be introduced for inclusion into the final Environmental Impact Statement (EIS).

Primarily, we are diametrically opposed to this project or any other project if a dam located at the Oxbow or any other location on the Wynoochee is constructed.

Response 1: The Oxbow Dam site is discussed in paragraphs 5.03h and 4.02f(2) of the feasibility report and EIS, respectively, and in appendix G. The fact that various Federal and state agencies and interest groups believe that construction of the Oxbow Dam would jeopardize the Wynoochee hatchery has been added to these discussions.

Comment 2: We urge the Corps of Engineers to discourage any further dam construction on the Wynoochee and recommend to the Corps that those stream and/or rivers with known problems with IHN (infectious hematopoietic necrossis) be withdrawn from consideration as a possible enhancement area to be used along with the proposed hatchery.

Response 2: Potential disease problems associated with the fish hatchery will be reduced by use of local stocks of spring chinook salmon and steelhead and placement of the satellite fish station within the Chehalis watershed.

Comment 3: Furthermore, we would suggest additional terminology be inserted at EIS-30, (3) Fish, end of paragraph 1 to read: "and nonIndian fishing interest". We believe that our input is as important as any other organization, department or governmental body.

Response 3: Paragraph 4.02b(3), last sentence, of the EIS, has been revised as suggested.

Comment 4: Last, we suggest that a few of the non-chemically treated fish carcasses be returned to the Wynoochee and other logical rivers to help promote supplemental food for other anadromous fish and Bald Eagle populations.

Response 4: This suggestion has been added to paragraph 4.02b(4) of the EIS as a possibility for consideration in PP&E when the details of hatchery management would be developed.

(5) The American League of Anglers.

Comment 1: The American League of Anglers, an affilitation of national and regional sport fishing organizations as well as individual anglers, supports the U.S. Army Corps of Engineers' proposed Hydropower/Fish Hatchery project at Wynoochee Dam in Washington. The American League of Anglers is a proponent of utilizing already existing dams to produce hydropower as long as fisheries losses are minimized with mitigation and enhancement measures an integral part of the projects. The U.S. Army Corps of Engineers proposal for the Wynoochee River is an admirable example of this policy.

The ALA and affiliate organizations are vitially concerned about the salmon and steelhead resources of Washington State and the Pacific Northwest. The once bountiful populations of salmon and steelhead have been drastically diminished, and the ALA supports a variety of measures for enhancing this valuable resource. The cost-effecive Hydropower/Fish Hatchery proposal will significantly contribute to this end by adding salmon and steelhead to several of Washington's coastal rivers, Grays Harbor and the northern Pacific Ocean.

Response 1: No response is necessary.

Comment 2: We appreciate having the opportunity to comment and would like to be kept informed of the progress of this study.

Response 2: All interested parties will be kept informated of the progress of the proposed Wynoochee hydropower/fish hatchery project.

4. Letters of Comment. The letters of comment on the draft feasibility report and draft EIS follow.

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION X
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

REPLY TO ATTN OF: MS/443

JAN 28 1982

Colonel Norman C. Hintz, District Engineer
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

Subject: Wynoochee Dam Hydropower/Fish Hatchery, Draft Feasibility Report (DFR) and Draft Environmental Impact Statement (DEIS)

Dear Colonel Hintz:

Thank you for sending the above reports for the Environmental Protection Agency's (EPA) review. In general, EPA has no objections to the development of the proposed hydropower/fish hatchery project, and it appears that it would be beneficial to simultaneously construct these two facilities. The proposal also provides adequate mechanisms to resolve the remaining environmental questions including modeling to ensure adequate temperature control in the dam's discharge, controlling construction and operation related water quality impacts, setting of in-stream flows, selecting the transmission route and type, and monitoring water quality to ensure the success of any selected mitigation.

We have one comment for your consideration. The reports recommend that the energy generated be marketed by Grays Harbor PUD, and that, in return, Grays Harbor PUD provide a cash contribution equal to the total hydro power facility cost. This would require an exemption from the power marketing provisions of the 1944 Flood Control Act. We suggest that the recommendations be expanded to state that if for any reason the PUD's participation is not possible, the project could still be constructed as proposed, if the energy and capacity were to be acquired by the Bonneville Power Administration under the terms of the Pacific Northwest Electric Power Planning and Conservation Act of 1980.

From the standpoint of the Environmental Protection Agency's areas of concern and expertise, we are rating the Environmental Impact Statement LO-1 (LO - Lack of Objections; 1 - Adequate Information). This letter also constitutes our comments on the Section 404 (b)(1) analysis.

We appreciate the opportunity to review these reports. If you would like to discuss our comments, please contact Judi Schwarz of the Environmental Evaluation Branch. She can be reached at (206) 442-1096.

Sincerely,

L Edwin Coate

for John R. Spencer
Regional Administrator

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
Atlanta, Georgia 30333
(404) 262-6649

January 25, 1982

Colonel Norman C. Hintz
District Engineer
Seattle District, Corps of Engineers
Department of the Army
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Hintz:

We have reviewed the Feasibility Report and Draft Environmental Impact Statement (EIS) for the Wynoochee Hydropower/Fish Hatchery, Grays Harbor County, Washington. We are responding on behalf of the Public Health Service.

The EIS does not address mosquito or other vector populations. Since there is a potential for mosquito breeding in the impounded water storage areas, the Final EIS should discuss beneficial or adverse effects of this project on mosquito or other vector populations, their potential health threats, proposed or current control methods that may be used, kinds and volumes of pesticides that may be used, and anticipated application procedures.

Page 38 of the EIS states the hydropower facility will not result in an impact on recreation. However, the Final EIS should include a discussion of the potential safety hazards to individuals engaged in recreational activities below the dam during releases of large volumes of water and also the mitigation measures that will be taken.

It is noted that the domestic wastes from the hatchery and residences would be treated by a septic tank system. The Final EIS should include a statement about the suitability of the soils for subsurface disposal at the proposed location.

Thank you for the opportunity of reviewing this EIS. Please send us a copy of the Final EIS when it becomes available. If you should have any questions about our comments, please contact Mr. Lee Tate of my staff at FTS 236-6649.

Sincerely yours,

Frank S. Lisella, Ph.D.
Chief, Environmental Affairs Group
Environmental Health Services Division
Center for Environmental Health

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E.
BIN C15700
Seattle, WA 98115

MAR 30 1982

F/NWR5:AG:MET

Colonel Norman C. Hintz
District Engineer, Seattle District
Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Colonel Hintz:

The National Marine Fisheries Service has reviewed the draft Feasibility Report/Draft Environmental Impact Statement for the Wynoochee Hydropower/Fish Hatchery Project in Grays Harbor County, Washington.

In order to provide as timely a response to your request for comments as possible, we are submitting the following comments to you directly, in parallel with their transmittal to the Department of Commerce for incorporation in the Departmental response. These comments represent the views of the National Marine Fisheries Service. The formal, consolidated views of the Department should reach you shortly.

We are aware that recently the State of Washington Department of Fisheries (WDF) has expressed concerns that the proposed Wynoochee Hatchery may have impacts on State management of local salmon stocks, and believe that such potential management problems need to be addressed in the EIS and subsequent project planning. As we understand that these problems are currently a subject of continuing consultation and modification between WDF and the Corps of Engineers, we will not comment on the specifics of the proposal at this time.

We assume that these issues can be resolved and as stated in our letter of June 18, 1981, we support development of the proposed Wynoochee Hatchery.

Sincerely,

Harvey M. Hutchings
for H. A. Larkins
Regional Director

United States Department of the Interior

OFFICE OF THE SECRETARY

PACIFIC NORTHWEST REGION
500 N.E. Multnomah Street, Suite 1692, Portland, Oregon 97232

February 25, 1982

ER 81/2599

Colonel Norman C. Hintz
Corps of Engineers
Seattle District
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Hintz:

The Department of the Interior has reviewed the draft Feasibility Report and draft environmental statement, Wynoochie Dam, Hydropower and Fish Hatchery, Grays Harbor County, Washington. The following comments represent the concerns of this Department. Bureaus of this Department are willing to cooperate with you in resolving these issues.

Recreational and Cultural Resources

The National Park Service indicates that the environmental impact statement is inadequate because it fails to discuss possible impacts on specific stocks of native wild fish, which are vital to the integrity of the ecosystems protected within Olympic National Park, located approximately 8 miles north of Wynoochee Dam.

There is also concern, specifically about the plan for extensive out-planting of hatchery fish in coastal rivers and streams and the proposals for "satellite fish stations" on rivers draining from Olympic National Park. Wild stocks of steelhead and salmon within the park have already been adversely impacted by current State of Washington, Indian Tribal, and Federal hatchery-based programs, and by the continued harvest of adult fish in commercial and recreational fisheries. It is felt that increased hatchery-based programs, such as the one proposed at Wynoochie, could eliminate or significantly interfere with the few runs of native wild fish that remain in the park. The potential for this impact, and possible mitigating measures, should be addressed in the final documents.

Fish and Wildlife Resources

The Fish and Wildlife Service (FWS) indicates concerns about the hatchery portion of the proposed plan and feel these concerns need to be addressed in the draft environmental impact statement. On February 3, FWS met with members of your staff, Washington Departments of Fisheries and Game, and the National Marine Fisheries Service to discuss various issues in detail. Briefly, they shared the following concerns:

1. The hatchery has been planned and proposed without the benefit and necessity of a coastal harvest management plan agreed to by the State and Tribes.

2. No provision has been made for imprinting facilities in the upper Chehalis watershed needed to maintain historical distributions and fully use natural rearing habitat.

3. The potential for the spread of disease pathogens has not been addressed as a possible serious constraint to a fish culture program of the type proposed.

4. Lack of adequate broodstock supply has not been discussed as a limiting factor to production.

5. Fishery benefits are not properly cast in light of variability and lack of assurity.

6. Potential impacts to coastal wild stocks have not been adequately discussed.

At the meeting held February 3, it was agreed that your staff would make an effort to revise the draft environmental impact statement to reflect the suggested changes. A meeting will be set up again soon to discuss your efforts, after which supplemental comments will be provided for inclusion in the final environmental impact statement.

Tribal Rights

The Bureau of Indian Affairs (BIA) indicates that the anadromous fisheries resources, as well as the supportive environment in the project area are within the Usual and Accustomed Fishing Places of the Quinault Tribe. In addition, the proposed stocking in the Hoh, Queets, Humptulips and Quinault Rivers will affect the Usual and Accustomed Fishing Places of the Quinault, Hoh, and Quileute Tribes. These fisheries are the subject of trust property rights established by treaty and recognized in law. Therefore, the subject document should recognize the need to obtain the concurrence of the Secretary of the Interior (i.e., the BIA) as well as individual tribes with regard to the proposed actions. Failure to obtain these concurrences would constitute the abrogation of tribal property rights.

There has been considerable coordination between the CE and the affected tribes in the development of the subject document. In this regard you are commended for your efforts to communicate with the tribal entities. However, the document only recognizes the FWS and the State of Washington as participants in the planning effort with respect to fisheries aspects of the proposed project. In fact, neither the tribes nor the BIA are recognized as key agencies with respect to required coordination. The only recognition of communications with either the tribes or the BIA is the inclusion in the study mailing list. The final document should reflect the extent to which input was solicited from and provided by the affected Indian community.

One of the primary concerns of the tribes is the selection of species to be reared in the proposed hatchery. This issue should be coordinated closely with the tribes since this factor bears significantly on the other fisheries management efforts within the scope of the proposed action.

Thank you for the opportunity to review and comment on the draft feasibility report and the draft environmental impact statement. We look forward to working with you for the purpose of resolving these concerns.

Sincerely,

Charles S. Polityka

Charles S. Polityka
Regional Environmental Officer

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division
1201 Pacific Avenue - Suite 600
Tacoma, Washington 98405

December 9, 1981

District Engineer
U.S. Army Corps of Engineers
Seattle District
P.O. Box C-3755
Seattle, Washington 98124

Dear Sir:

Subject: Review of feasibility report and draft environmental impact statement for Wynoochee Hydropower/Fish Hatchery

We have reviewed the subject document and found it to be adequate in its assessment of the impact of the proposed action on the water resources of the area.

J. R. Williams

J. R. Williams
Inquiries Officer

cc:
Regional Hydrologist, Menlo Park
Attn: L.E. Newcomb
EIAP, M/S 760, Reston, VA

United States Department of Agriculture

Soil Conservation Service

Room 360
U.S. Courthouse
Spokane, Washington 99201

December 23, 1981

James O. Waller, Ph.D.
Hydropower Study Manager
Seattle District
U.S. Army Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Dr. Waller:

The Soil Conservation Service has reviewed your draft feasibility report and environmental impact statement for the Wynoochee Hydropower/Fish Hatchery project. It would appear the concerns of the SCS have been addressed, and we have no comments to offer at this time.

Thank you for the opportunity to review your report.

Sincerely,

LYNN A. BROWN
State Conservationist acting

cc: F. Easter, AC, SCS, Olympia AO
A. Springer, DC, SCS, Montesano FO

United States Department of Agriculture
Soil Conservation Service
P.O. Box 2890
Washington, D.C.
20013

JAN 2 8 1982

Colonel Norman C. Hintz
District Engineer
Department of the Army
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Hintz:

We have reviewed the Review Draft feasibility report and environmental impact statement (EIS) for the Wynoochee Hydropower/Fish Hatchery Study. The project is located on USFS land with no agricultural land involved. The powerplant addition will be located underground; therefore, the environmental consequences would be minimal. The addition of the fish hatchery below the dam and powerplant should mitigate the loss of the anadromous fish spawning area destroyed by the lake.

We do not object to the District Engineer's preliminary recommendation for construction of an integrated hydropower/fish hatchery project.

Sincerely,

Gerald D. Seinwill

GERALD D. SEINWILL
ASSISTANT DEPUTY CHIEF FOR
NATURAL RESOURCE PROJECTS

United States Department of Agriculture
Forest Service
Pacific Northwest Region
319 S.W. Pine
P.O. Box 3623
Portland, OR 97208

Reply to: 1950

Date: February 9, 1982

Dr. James O. Waller
Study Manager
U.S. Army Corps of Engineers
Seattle District
Box C 3755
Seattle, WA 97214

Dear Dr. Waller:

Thank you for the opportunity to review the Wynoochee Hydropower/Fish Hatchery DEIS. We have the following comments.

1. Project Access - Forest Service Road No. 2200 is the main access to the project area. Our current Road Management Plan lists the road as inadequate to carry the existing traffic and with high maintenance cost. Existing right-of-way deeds provide for timber traffic use to be first, prior and paramount during week days and recreation traffic use to be first, prior and paramount on Saturdays, Sundays and legal holidays. The road is maintained with timber dollars for timber traffic which includes large, slow moving, over width vehicles.

The construction workers, equipment, and supply traffic will likely be in conflict. They predict an increase in recreation traffic. The establishment of a community of workers living at the fish hatchery and powerhouse will increas the traffic on the road. This will include the use of school buses, private vehicles, moving vans, fish hauling trucks, etc.

We believe that the road right-of-way, construction and maintenance impacts should be discussed and potential costs evaluated in the EIS.

2. Water Quality - The EIS outlines the good and very suitable water quality for a fish hatchery. The draft report of the COE study, Source of Sediment to Grays Harbor Estuary, by Kehoe 1981, lists the Wynoochee River as having far above average suspended sediment loads. As these two studies are in obvious conflict, further study is needed. Because there is a distinct possibility of a higher sediment load, a discussion and daylighting of potential filtration costs should be done in the EIS.

The running of 190/140 c.f.s. of water through this large hatchery could have a large downstream impact on water quality which in turn could impact Forest users. A "pollution abatement pond" might allow the discharge to meet permit standards during the low water months but data is not provided to assess this capability.

A more detailed discussion is needed in the EIS.

3. Threatened and Endangered Species - The biological assessment of eagle use was extremely limited. Forest Service records show two-five bald eagles using the area at various times. The loss of their major food source above the dam will displace them. Food below the hatchery may increase some, but fishermen use may harass the eagles into leaving the area.

A more in-depth assessment of the impacts on this threatened species is needed.

4. Fish Habitat and Fishing Opportunities - The EIS states "fishing opportunities in the Shelton Ranger District would be greatly enhanced by the hatchery and the expected increase in resident recreational fishing in Wynoochee Lake."

There is only an estimated 2 miles of public fishing water on the Wynoochee River below the proposed hatchery site. This is the water where fishing may be enhanced, depending on the species and timing of hatchery runs.

There is a nutrient problem in the reservoir, and stopping anadromous runs will increase this problem. Some improvements in resident fish can be expected through decrease in competition for food in the streams. At present, artificial stocking is needed to maintain a fair fishery in the reservior.

The impacts of present flow releases and possible further release timing and amount on the anadromous runs from salt water to the hatchery has not been evaluated.

There seems to be many impacts in this area that need to be evaluated, coordinated and resolved.

5. Elk Habitat - The quality of the winter elk habitat was not addressed. This flat bottomland has a much higher capacity and value than the steeper sideslopes. When the reservior was constructed, 1100 acres of bottomland range were eliminated. The Washington State Game Department estimated a loss of 250 head of elk or .22 elk per acre. The loss of 150 acres for the fish hatchery would mean a loss of 33 head of elk using the conversion. What is the cumulative effect of small losses and which ones should go unmitigated?

The impact should be discussed in real terms of quality loss and not overall averages which are meaningless.

6. Transmission Line - The transmission line is an integral part of this project. The option should be discussed in the EIS as well as the feasibility report. The impacts of the options are very significant.

The BPA study on the powerline options should be displayed in the EIS, impacts discussed, and mitigation measures developed for each alternative.

7. Dispersed Recreation - The dispersed recreation opportunity at the proposed hatchery site is fairly unique in the Wynoochee drainage. It is a flat area slightly above the fairly well regulated river level. Recreation at this site should not be disregarded because it is a small percentage of total use. The use of averages for dispersed recreation ignores quality. Water-related dispersed recreation is of considerably higher value.

The evaluation in the EIS compares the dispersed recreation opportunities along the Wynoochee River with all dispersed recreation. The comparison should be to other water-related opportunities. When contemplating the picture after project completion, the need for public access increases. Additional evaluation is needed to determine how much public access is needed and what mitigating measures are necessary. Your statement concerning dispersed recreation attributed to the Forest Service in appendix H was made evaluating present plans and did not contemplate the recreation build-up predicted by the Corps of Engineers.

Sincerely,

James F. Torrence

JEFF M. SIRMON
Regional Forester

AD-A120 099 CORPS OF ENGINEERS SEATTLE WA SEATTLE DISTRICT F/G 13/2
WYNOOCHEE HYDROPOWER/FISH HATCHERY: FEASIBILITY REPORT AND ENVI--ETC(U)
SEP 82 J O WALLER

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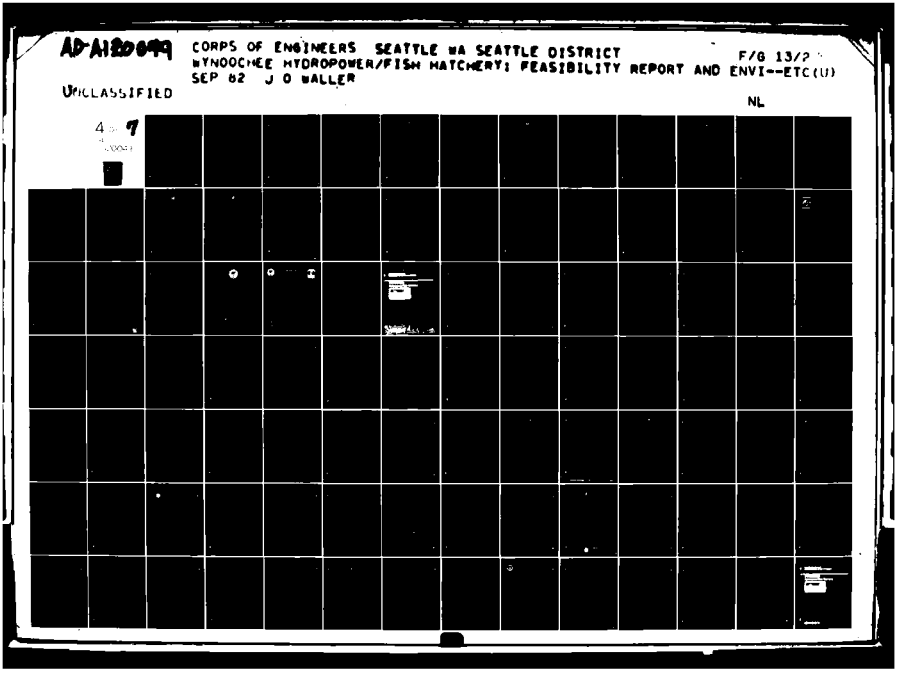


Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

In reply refer to: SJ

February 26, 1982

District Engineer, Seattle District
U.S. Army Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Sir:

We have reviewed the draft environmental impact statement (EIS) on the Wynoochee Hydropower/Fish Hatchery Study and have no comment. However, we have attached a few technical suggestions that you may wish to consider.

We appreciate the opportunity to review the document. If you have any questions regarding our review, please contact Mr. William A. Freeland, telephone (503) 230-4721, of my staff.

Sincerely,

Anthony R. Morrell
Acting Environmental Manager

Enclosure

Technical Suggestions

Draft Environmental Impact Statement, Wynoochee Hydropower/Fish Hatchery Study

1. (3) Fish, p. EIS-30; The concerns and problems associated with the tentatively selected fishery enhancement plan are comprehensively stated. However, it is not clear what operational objectives for the hatchery are expected. You may wish to clarify the following points:

   (a) Are the cited figures for adult fish, the expected annual harvest, or production potential?

   (b) Have strategy plans been proposed for rearing and release times that will minimize any overload impact?

   (c) How will the siting and design of the two satellite fish stations be handled?

   (d) Will rearing only occur at the satellite fish stations?

   (e) What is the impact to resident fish; are there detailed management or strategy plans to reduce the impact?

   (f) Is there an estimated loss of resident fish due to turbines?

   (g) Have minimum flows at the dam been suggested to increase outmigrant survival during historic low flow periods?

   (h) How will the water supply for the hatchery be guaranteed?

2. Transmission Lines;

   (a) p. 26, p. EIS-iii, and p. EIS-3 - The statement about USFS policy to require burial of transmission lines should be clarified with respect to specific areas under management for scenic values.

   (b) p. 18 - The most recent deficit forecasts should be used wherever possible.

Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

In reply refer to:
EOF

July 12, 1982

Colonel Norman C. Hintz
District Engineer, Seattle District
U.S. Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Colonel Hintz:

In July 1981, Bonneville Power Administration (BPA) received a draft copy of the Feasibility Report and Environmental Assessment of Wynoochee Hydropower-Fish Hatchery project. During discussion with Dr. James Waller of your office, we were asked to analyze the transmission alternatives. A preliminary analysis, which encompassed four alternatives, was completed in September 1981. Three of the alternatives, a 69-kV overhead transmission line, a 34.5-kV underground cable and a combination 34.5-kV overhead transmission line, and a 34.5-kV underground cable follow the Donkey Creek corridor and would be integrated into Grays Harbor PUD's 69-kV system at their Promised Land Substation. The fourth alternative was a 69-kV overhead transmission line that would be integrated at the Grays Harbor PUD's Montesano Substation. In the Feasibility Report and Draft Environmental Impact Statement the underground cable was shown as the preferred alternative, based on our preliminary studies. At that time, it was proposed that the U.S. Corps of Engineers (USCE) would construct the generating facilities at Wynoochee Dam, while Grays Harbor PUD would purchase the output and provide the transmission facilities.

In subsequent discussions with Dr. Waller, it was determined that a detailed analysis of the transmission alternatives would be necessary to assist in the selection of the transmission route. This analysis began in November 1981, after a field study of the routes and following a meeting with USCE, the U.S. Forest Service (USFS) and Grays Harbor PUD. It was apparent from the preliminary analysis that the Montesano alternative could not be justified from an economic standpoint, due primarily to its much greater length and impacts. The alternatives that proceeded along Donkey Creek Road to the PUD's Promised Land Substation were to be analyzed. Since that time, Grays Harbor PUD has decided not to participate in the project, so they will no longer be involved in the construction of the transmission portion of the project.

As a result, construction by BPA may be the only means of integrating the output of Wynoochee. If requested by USCE, and the project is authorized by Congress, BPA would ultimately be responsible for the location and design of the integrating transmission. Any decisions we would make would be based on the transmission coverage in the project EIS, including the results of the economic, technical and environmental analysis. The transmission portion of the feasibility report and draft EIS is deficient in the evaluation of transmission alternatives. A separate EIS supplement on transmission will need to be completed before a Record of Decision (ROD) can be made. BPA is willing to complete this supplement, should we be required to construct.

To properly program and budget any BPA involvement, we will need to know, as soon as possible, whether the Corps wishes us to integrate the project and when Congressional authorization is expected to be received.

If we can be of any further assistance regarding this project, please let us know.

Sincerely,

Marvin Klinger
Assistant Administrator for
Engineering and Construction

JOHN SPELLMAN
Governor

DONALD W. MOOS
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Mail Stop PV-11 • Olympia, Washington 98504 • (206) 753-2800

February 25, 1982

Colonel Norman C. Hintz
District Engineer, Seattle District
U.S. Army Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Hintz:

This letter is in response to your request for comments on the draft Environmental Impact Statement and Feasibility Report for the Wynoochee Hydropower/Fish Hatchery project. On behalf of the State of Washington, the following consolidated comments are provided.

First, I wish to express support for the proposed Wynoochee Hydropower/ Fish Hatchery project. Based on the information provided to date, the project appears to be an environmentally sound approach for meeting the future demand of two scarce resources; electric power and anadromous fish. The proposed facilities should further enhance the comprehensive, multipurpose development and utilization of the water resources of the Wynoochee River basin.

The Departments of Game, Fisheries, and Ecology have previously agreed with the proposed approach of addressing the issue of minimum flows in the short reach of the Wynoochee River to be bypassed by the fish hatchery diversion. It is our understanding that the determination of minimum flow releases (if any are required in addition to the inflow known to occur in the bypassed reach) will occur during the advanced engineering and design phase of studies following Congressional authorization of the proposed project. Minimum flow needs will focus on fish and wildlife flow requirements as well as recreational, aesthetic and water quality flow requirements in the bypassed reach. Scoping and coordination of specific studies will occur with the assistance of the Department of Game, Fisheries, and Ecology.

I understand that staff of the Corps and the Department of Ecology have exchanged correspondence regarding whether a state water right is needed for the project. I anticipate that an application for a state water right will be submitted at the appropriate time in this process.

Staff from the Departments of Fisheries and Game have met with your staff to discuss concerns about the size of the hatchery and specific language in the draft EIS. It appears that the Corps has agreed to revise the language in the Final EIS to reflect the concerns of these agencies.

Finally, we appreciate the efforts of your staff to coordinate the Wynoochee Hydropower/Fish Hatchery study with state agencies. We also commend the Corps for its attempt to form an innovative partnership with Grays Harbor PUD. The Department of Ecology has coordinated the review of the draft Environmental Impact Statement with other state agencies. Their comment letters are attached.

Sincerely,

Donald W. Moos
Director

DWM:lc

Attachments

cc: Governor John Spellman
Greg Sorlie, Department of Ecology
Rolland Schmitten, Department of Fisheries
Fred Lockard, Department of Game

JOHN SPELLMAN
Governor

FRANK LOCKARD
Director

STATE OF WASHINGTON
DEPARTMENT OF GAME
600 North Capitol Way, GJ-11 • Olympia, Washington 98504 • (206) 753-5700

February 25, 1982

Norman C. Hintz, Colonel
Corps of Engineers
Post Office Box C-3755
Seattle, Washington 98124

RE: Wynoochee Hydropower/Fish Hatchery

Dear Colonel Hintz:

The Washington Department of Game has reviewed your feasibility report and draft environmental impact statement for Wynoochee hydropower/fish hatchery. As you know, we strongly support this planned facility. This document is well done and includes most of Game's concerns. However, we have three concerns: (1) the state existing mitigation responsibility of 2.6 percent; (2) project impacts to wildlife; and (3) percentage of total steelhead run harvested by sport fishermen and man-days to harvest a steelhead.

The state existing mitigation responsibility is for 1,700 adult steelhead not 3,400 as reported on page 31. The difference between the 3,400 reported and the 1,700 actual figure was a midunderstanding betwen Game and the Corps on spawning escapement. This means the state only is responsible for one-half of the costs discussed. See page by page comments for more specific details.

The tradeoff of fish for wildlife is not completely acceptable to Game. Revegetation of the disturbed area around the hatchery site and along the power-line will mitigate most impacts. We recommend a vegetation barrier (blackberry/multi-floral rose combinations) be planted and maintained around the edge of the hatchery, especially in areas adjacent to old growth forest. On other edges of the hatchery, two small two-acre elk pastures should be developed and maintained with fertilization from settling pond solids. These would help elk by providing critically needed winter food.

The rose/blackberry barrier and the elk pasture could be maintained easily by hatchery personnel. It may be possible to enlarge the proposed settling pond and allow natural wetland vegetation to grow to replace some of the losses caused by filling the two-acre wetland.

If revegetation of disturbed areas and the three techniques mentioned above are accomplished, wildlife losses would be reduced considerably.

Game provided inaccurate information in our July 3 and July 24, 1981 letters to Jack Thompson and Steve Babcock. Total steelhead production remains at 52,900 adults. Since these fish will be planted and return to several rivers, the spawning escapement will increase and the catch per man will change. Spawning escapement will be 7,900. Harvest will be 45,000. Indian harvest will be 22,500, and 22,500 will be available for sport harvest. However, with fish planted in several rivers, only 80 percent of these, or 18,000, will be taken by sport fishermen. With fish planted in several rivers, it will take 6.18 days to catch a steelhead, not the 4.04 as discussed in the letter. This makes each fish worth $219.45 ($35.51 (fisherman day) times 6.18 days).

Following are our specific comments on the feasibility report.

Page 17, under 3.05. Game does not plan to use the satellite fish stations for rearing or releasing steelhead. Some adult steelhead for hatchery broodstock may be taken at these stations. These satellite stations are also discussed in many other places throughout the report.

Page 18, under No Action - Anadromous Fish. Statement says anadromous fish runs are expected to decline. Game is working on management of the steelhead resource and does not expect further run declines.

Page 27, under F. During shutdowns, a combination of multi-level outlets may be required to be open part way to obtain proper temperature. This would be a change, since the existing operation requires each multi-level to be completely open when operating to provide protection for fish passing through the outtake.

Page 31, under 4.13, Mitigation, and Table 2, under Previous State of Washington Mitigation Responsibility. The state's previous mitigation responsibility was for 1,700 adult steelhead not 3,400 as stated. Therefore, the state responsibility is for 1.3 percent not 2.6 percent of the cost as reported.

Page 33, first paragraph. Game substitutes steelhead for cutthroat because we don't have an adequate hatchery stock, not because of fish size as reported.

Page 56, Corps Response #5. Game has a list of plants which provide high wildlife value, which should be planted in disturbed areas where you recommend natural grasses. A draft of this list was provided to the Corps.

Page 60, under a. See page 31 above. The state obligation of $570,000 would be only $285,000 if only 1.3 percent of the hatchery is for previously funded mitigation fish.

Page 60, under b. Only 1.3 percent is for previous mitigation fish, so annual cost should be $13,500 not $27,000.

Following are our specific comments on the draft environmental impact statement.

Page ii. Satellite fish station would not be used for steelhead.

Page v. The project is not in full compliance with the Fish and Wildlife Coordination Act because of wildlife impacts. However, if suggestions listed earlier in this letter are followed, impacts will be insignificant.

Page 6, under (2), Environmental Features. Final species design will be made only for salmon species. Steelhead are planned for one-half the hatchery and 216,000 pounds will be reared.

Page 9, first complete paragraph. The monitoring program will require use of at least one Game Department employee to monitor the steelhead program.

Page 15, 3.02. Rivers named are only examples of where steelhead will be planted. The streams where fish are planted and numbers planted per stream will be determined later.

Page 16, 3.05. Dolly varden are not present.

Page 26, last paragraph. Game provided your staff a list of plants for disturbed areas, especially revegetation along the powerline. These plants provide excellent food and cover for wildlife. Not all these plants are native species.

Page 27, second paragraph. A specific revegetation plan should be developed during advanced engineering and design for hatchery grounds, pipeline, transmission lines, and any other areas disturbed by the project.

Page 37, second paragraph. Fishing may be permitted between the fish collection facility and the dam sometime in the future.

These comments are provided for the draft statement. The Department of Game is continuing to work with the Corps and other resource agencies to provide information for the final impact statement and retains the ability to comment as this process continues. We strongly support this fish hatchery since it provides an excellent opportunity for enhancement of the steelhead resource in the local area.

Sincerely,

THE DEPARTMENT OF GAME

James G. Fenton
Habitat Management Division

JGF:cv
cc: WDF
DOE
FWS
NMFS
Region

JOHN SPELLMAN
Governor

ROLLAND A. SCHMITTEN
Director

STATE OF WASHINGTON
DEPARTMENT OF FISHERIES
115 General Administration Building • Olympia, Washington 98504 • (206) 753-6600 • (SCAN) 234-6600

February 25, 1982

Colonel Norman C. Hintz, District Engineer
Seattle District Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Colonel Hintz:

We have studied the Wynoochee Hydropower/Fish Hatchery Study Draft Feasibility Report and Environmental Impact Statement. The prospect of adding a significant increment to the State's sustainable harvest of Pacific salmon is certainly a very worthwhile objective, particularly for the Grays Harbor region which has endured far more than its share of depressed salmon runs and lost fishing opportunities. However, we have some concerns with the size and features of the project as currently described. We feel that these merit a temporary "holding" action in conjunction with additional biological and economic feasibility work. In our view, a somewhat smaller, phased-in enhancement effort would seem to be more appropriate.

Our primary rationale for the above recommendation stems from the Salmon and Steelhead Conservation and Enhancement Act of 1980 (PL 96-561). This act describes a comprehensive salmon enhancement planning process that will precede submission and consideration of individual projects seeking Federal funds. We doubt that Congress would give serious thought to any large salmon enhancement project at this time, regardless of its merits, until their own legally prescribed planning process is completed, nor do we believe such action to be appropriate. Further, the forwarding of a single major project proposal at this time implies a higher inherent priority designation than other potential salmon projects in the Pacific Northwest. A number of such salmon enhancement proposals are presently on "hold" as various proponents await finalization of the comprehensive planning process. Thus, we are still several steps away from even being able to develop a priority listing of project proposals competing for a limited funding source. The Wynoochee project (at about six times the "normal" hatchery size) is of special concern since, if authorized by Congress, it would allocate an inordinate proportion of the entire Federal enhancement program to a single project in one region of the Pacific Northwest ($18.8 of $52.0 million for salmon and steelhead in the Washington conservation area). Even though this project might not be technically considered as coming under PL 96-561, it is unrealistic to think that funding of this project would not detract from funding of projects that were so submitted.

Furthermore, PL 96-561 specifies that the comprehensive plan include "such standards, restrictions or conditions as are necessary to assure that any project included in the plan contributes to the balanced and integrated development of the salmon and steehead resources of the area". It goes on to define the objectives of those standards. The Wynoochee project has not been specifically analyzed with respect to those objectives nor, of course, have the standards been established.

We have a number of other important concerns which typically transcend your own proposal and track back to a general lack of adequate comprehensive planning for salmon enhancement per se. Some of these were addressed in only a general manner in your proposal. While some deference to "advanced engineering and design" is appropriate, we suggest that key biological issues at least be explored to the depth accorded engineering features of the project. These concerns are as follows:

1. As currently described, the project would produce 396,000 pounds of salmon and steelhead smolts annually. Most of these would be introduced into and impact the ecosystems of the mainstem Wynoochee River, the lower Chehalis River, and the Grays Harbor estuary. We doubt that significant impacts on existing salmonid resources can be avoided, regardless of the operational methodology employed. For example, a much smaller coho enhancement project at Tulalip Bay in Puget Sound appears to have seriously threatened the future viability of a major pink salmon resource in the Stillaguamish River system. While this is admittedly an extreme case, it is only one of many examples of inter- and intraspecies conflicts that have recently been detected by Pacific coastal salmon management agencies.

2. The potential brood stock source for the project presents a major problem that needs to be addressed before proceeding further. The only dependable source of any magnitude for spring chinook brood stock will be WDF Cowlitz Hatchery returns. Even this source presents serious disease problems and genetic implications that will need to be addressed before it can be approved for transfer to the Grays Harbor region. (The greatest "risk" would be a quarantine of Cowlitz Hatchery during or immediate after construction of the Wynoochee project.)

   We do not believe that the small, naturally-spawning spring chinook run in the upper Chehalis River would provide adequate brood stock for the project as presently described. However, the local Chehalis stock might be a viable source for a smaller, phased-in project which

could "afford" the adverse benefit to cost impact of a rather prolonged brood stock build-up period. Again, a number of practical problems related to capture and holding would have to be worked out. Specifically, we recommend that the lower Skookumchuck River be given serious consideration as a permanent adult trapping and juvenile release site for spring chinook.

3. The project, as currently described, offers some difficult or even impossible harvest management implications. Grays Harbor already has a harvest conflict between late-run coho and winter steelhead. The project could greatly exacerbate this problem and add some or all of the following new ones that already occur in varying degrees in other areas of the state:

   spring chinook vs. winter steelhead (including spawn-outs)
   spring chinook vs. summer steelhead
   fall chinook vs. summer steelhead
   early coho vs. fall chinook
   early coho vs. summer steelhead

   In addition to the above, there is an equally complex series of potential conflicts between hatchery and wild fish within the same species and race due to inherent and significantly different allowable harvest rates. (This disparity is amplified in "terminal areas" as stocks leave the mixed-stock ocean fisheries.)

4. The economic justification for the fish hatchery portion of the projects appears to be somewhat misleading and overly optimistic. (In this case, we must comment mainly on our "own data".) The "Ocean Fisheries-Commercial" category, which you were provided in the November 6, 1980, letter from Brian Edie, contains a significant component of Canadian interceptions which should probably be deleted or at least presented separately in the various economic benefits computations (ocean commercial and sport catches by Pacific coastal states other than Washington are also included in the data). In addition, the harvest proportions between Washington Indian and non-Indian fishermen should be adjusted in the same manner as steelhead to reflect an expected 50:50 division of catch. We also recommend a 3.5% survival rate as being more realistic for Grays Harbor spring chinook. Finally, the projected freshwater harvest rate of 38% (7,000 catch; 11,000 escapement) would require optimum access and flow conditions. (Note: The Department of Game will undoubtedly comment separately but a 25,000 steelhead sport catch with only a 2,900 fish escapement would, to our knowledge,

assume a freshwater sport fishing rate that has never been achieved elsewhere).

5. We cannot support an approach which makes mitigation an inseparable component of an enhancement project that may or may not be funded by the Federal government. The three separate and distinct components are:

    a. a current unfulfilled mitigation responsibility from the existing project as generally outlined in your report;

    b. a potential mitigation responsibility from the proposed hydropower component; and

    c. a salmon resource enhancement proposal.

    We believe that good-faith negotiations to resolve the existing mitigation responsibility (No. 1) should proceed in an expeditious manner, since subtantial losses have accumulated since the early 1970's. We would be amenable to some form of interim solution pending possible combination with Nos. 2 and 3 at some later date However, the existing responsibility should be clearly separated from any future mitigation that is contingent upon the possibility of either the hydroelectric or enhancement projects being built.

6. The proposal for two satellite fish stations probably promises more than can ever be realistically achieved. We use "satellites" in our own fish cultural operations but primarily as a means of increasing the rearing capacity beyond that of the "mother" station during certain critical time periods. Your proposal does not increase rearing capacity but rather relies upon trapping native brood stock at other coastal sites, rearing the progeny at the Wynoochee Hatchery, and then returning them to the same off-station sites for acclimatization and subsequent release. We see two basic problems with this concept. One is somewhat unique to the coastal region and this is the extremely heavy freshets that preclude holding any type of effective adult trapping facility in virtually all medium- to large-sized streams. We have experienced continuing difficulty in obtaining brood stock for the fall chinook rearing programs at our coastal hatcheries since most fish spawn downstream from sites where permanent trapping facilities can be maintained. To date, we have been unable to identify <u>any</u> promising coastal sites for the dependable trapping of spring or summer chinook populations.

Our second concern is more of a general nature and concerns the proposed "balancing" of natural and hatchery production implied in your proposal. We have yet to see this concept adequately explained as an attainable hypothesis, much less achieved in actual practice for a larger river system. There are a number of feasible, cost-effective ways of supplementing natural populations such as fry plants in under-utilized stream rearing areas, off-station smolt plants, hauling returning adults off-station, marine rearing pens in inlets with numerous small tributaries, etc. It is important to realize, however, that all these methods have severe limitations due to such factors as costs, disease, access problems, and unavailability of suitable brood stock. Basically, it is not feasible to effectively supplement an entire naturally spawning population in any river system as big as the Queets or Hoh. If the salmon populations in only one or two tributaries are supplemented, then the lower allowable fishing rate for the remaining tributaries still prevails and the end result is simply excess spawners in the same one or two tributaries.

In view of the above concerns, we recommend that the satellite station proposal be examined in somewhat greater detail by your staff, particularly with respect to the Skookumchuck River as recommended earlier.

7. The report is somewhat vague on two important questions. A Federal agency is designated as the "manager" but it is unclear whether this is as an active on-site manager (Quilcene) or as an overall operations manager (WDF-operated Columbia River hatcheries). The second question is status of a future dam at the "Oxbow" site. General feasibility of this second dam should be assessed as well as potential impacts on operational features of the Wynoochee project.

In summary, we feel that the concerns expressed indicate the need for a temporary "holding" action in conjunction with some additional feasibility work on the Wynoochee proposal. In our view, a somewhat smaller initial salmon enhancement effort on the Wynoochee as consistent as possible with full development of the site might ultimately stand a better chance of successfully competing with other worthwhile projects for limited Federal funds. Again, we wish to be positive and conclude that virtually all of the concerns mentioned could be resolved via a comprehensive planning process as described in PL 96-561. We would welcome the opportunity to discuss this and any other areas of interest with you and your staff.

Sincerely,

Rolland A. Schmitten,
Director

JOHN SPELLMAN
Governor

ROLLAND A. SCHMITTEN
Director

STATE OF WASHINGTON
DEPARTMENT OF FISHERIES
115 General Administration Building • Olympia, Washington 98504 • (206) 753-6600 • (SCAN) 234-6600

April 26, 1982

Colonel Norman C. Hintz
Seattle District Engineer
U.S. Army Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Hintz:

My staff has kept me well briefed on your recent efforts to finalize the Wynoochee Hydropower/Fish Hatchery Feasibility Report. In examining the expected modifications to your earlier draft report, I am satisfied that my previous concerns and questions are being accommodated to the fullest extent practicable. It is particularly gratifying that you are now considering a phased-in approach which could take advantage of the local spring chinook broodstock. We will be able to actively support the project as it is currently envisioned.

In my February 25 letter, a temporary holding action was proposed. In retrospect, this will be unnecessary due to the extraordinary efforts of your staff in addressing a number of complex, interrelated technical issues in a short time frame. We genuinely appreciate the positive, receptive attitude exhibited by the Corps of Engineers in this matter.

Sincerely,

Gary C. Alexander for

Rolland A. Schmitten
Director

RAS:ljf

JOHN SPELLMAN
Governor

JAN TVETEN
Direc

STATE OF WASHINGTON
WASHINGTON STATE PARKS AND RECREATION COMMISSION
7150 Cleanwater Lane, KY-11 • Olympia, Washington 98504 • (206) 753-5755

January 18, 1982

35-2650-1820
DEIS & Feasibility
Report - Wynoochee
Hydropower/Fish
Hatchery
(E-2294)

Ms. Barbara Ritchie
Environmental Review Section
Department of Ecology
PV-11

Dear Ms. Ritchie

The staff of the Washington State Parks and Recreation Commission has reviewed the above-noted document and finds that it will have no effect on properties under the management or control of the Washington State Parks and Recreation Commission.

Thank you for the opportunity to review and comment.

Sincerely,

David W. Heiser

David W. Heiser, E.P., Chief
Environmental Coordination

sh

cc: Corps of Engineers, Seattle District

P&R R-90FL(7/81)

PUBLIC
UTILITY
DISTRICT
No. 1 OF GRAYS HARBOR COUNTY

February 22, 1982

Colonel Norman C. Hintz, District Engineer
Seattle District, U. S. Army Corps of Engineers
Post Office Box C-3755
Seattle, Washington 98124

Dear Colonel Hintz:

Wynoochee Dam Hydroelectric Project

By this letter, Public Utility District No. 1 of Grays Harbor County (PUD) submits its formal comments on the Review Draft of the Wynoochee Hydropower/Fish Hatchery Feasibility Report and Draft Environmental Impact Statement (FR/DEIS) and the December 15, 1981 Final Public Meeting. Your cooperation in extending the deadline for submittal of the response is acknowledged and greatly appreciated. As you are aware, the PUD has, in the last few weeks, been heavily occupied by the unrest of our ratepayers which has been brought on principally by the financial difficulities surrounding the WPPSS Nuclear Project Nos. 4 and 5. Thus our consideration of the Wynoochee Dam Project has not been as expedient as we all would have hoped. Unfortunately, those same circumstances now lead us to the conclusion that the PUD cannot at this time consider involvement in the addition of hydroelectric facilities at Wynoochee Dam.

We recognize that the loss of the PUD's support puts the Corps of Engineers in a difficult position with regard to preparation of the final feasibility report and final EIS since the FR/DEIS has been based on a partnership arrangement with the PUD. It would appear that your options at this time would be to restructure your plans based on a Federal-only development or on a future partnership with the PUD. Should you choose the latter course, we request that you explain in the final documents that the PUD has not committed itself to any future partnership and that you address the PUD's comments on the partnership arrangement which are contained in Exhibit A and the PUD's comments on the FR/DEIS which are contained in Exhibit B, which are enclosed.

Yours very truly,

Lois M. Powell

Lois M. Powell
Vice President of the Commission

Enc.

P. O. BOX 480 ABERDEEN, WASHINGTON 98520-0109 PHONE 206/532-4220

EXHIBIT A

COMMENTS BY PUBLIC UTILITY DISTRICT NO. 1
OF GRAYS HARBOR COUNTY ON THE
PROPOSED HYDROPOWER PARTNERSHIP
WITH THE SEATTLE DISTRICT,
U.S. ARMY CORPS OF ENGINEERS
FOR THE
WYNOOCHEE HYDROPOWER/FISH HATCHERY PROJECT

The FR/DEIS defines rather explicitly the terms of a proposed "hydropower partnership" between the COE and the PUD. Because the FR/DEIS has been based totally on that particular partnership arrangement, it implies agreement by the PUD to the terms of the arrangement. However, as stated in the PUD's letter of October 5, 1981, and as the COE knows from discussions on the matter, the PUD has some serious concerns about acting as sponsor of the hydropower facilities as presently proposed. These concerns are not adequately addressed in the FR/DEIS.

The PUD has stated that a solution to these concerns is possible. However, it must be made clear that the proposed partnership arrangement in its present form is unacceptable to the PUD.

To be feasible, a partnership must be beneficial to both the COE and the PUD. With the arrangement proposed in the FR/DEIS, the COE would obviously benefit because of reduced funding requirements from Congress and because the burden of responsibility for the transmission line would be borne by the PUD. However, the PUD does not foresee any benefit that it would receive from the partnership arrangement proposed in the FR/DEIS. Accordingly, it is the PUD's position that the "hydropower partnership" must incorporate the following conditions in order to be acceptable:

1. The PUD will pay 100% of the construction, operation, and maintenance costs of the hydropower facilities.

2. The PUD will market the output of the hydropower facility in a manner determined solely by the PUD.

3. The PUD will own, design, construct, and operate the hydropower facilities. The COE will review the design and construction of those facilities which will be an integral part of or could affect the structural integrity or operation of the existing dam facilities or proposed fish hatchery.

4. Facilities used jointly by the fish hatchery and hydropower facilities will be paid for and owned jointly. Allocation of costs will be made in a manner acceptable to both the PUD and the hatchery owner.

5. Water releases from the dam will be scheduled by the COE in coordination with the City of Aberdeen, the PUD, the hatchery owner, and appropriate State agencies. The PUD will provide the personnel necessary to operate and maintain the hydropower and joint use facilities, and in coordination with the COE and hatchery owner, will be responsible for scheduling maintenance activities.

6. Because the existing Wynoochee Lake Project facilities provide the head and dependable water supply necessary for the operation of the proposed hydropower facilities, the PUD will furnish power free of cost to the COE for operation and maintenance of the existing facilities. The proposed fish hatchery will be a distinct and separate project and will not even be owned by the COE. Therefore, the PUD will not furnish power free of cost for operation of the fish hatchery.

The PUD does not want to circumvent in any way the COE's responsibility of insuring the continued safety and adequacy of the existing structures and fulfillment of the present Project purposes. We believe that the above conditions can be met without compromising the COE's responsibilities. However, it is our position that these conditions are necessary in order for the PUD to fulfill its responsibility of providing adequate and cost-effective power to its customers.

The PUD is greatly concerned that the power from the hydropower facilities as proposed in the FR/DEIS will not be cost-effective. As discussed further in Exhibit B, the PUD believes that cost of power would be about 130 mills/kWh when all appropriate factors are taken into consideration. Power which is that expensive would probably not be marketable to BPA, and if retained by the PUD to meet its own loads would place an unfair expense on the PUD's customers. The PUD believes that with proper design, the cost of power could be lowered substantially, and since the PUD will be paying the costs, it must also have the responsibility for the design of the hydropower facilities.

In addition to the requirements listed above, there are several factors which lead the PUD to believe that some modifications to the nature of the "hydropower partnership" are necessary. These factors are listed below:

1. A determined current national effort is to reduce the level of Federal involvement with water resources projects. Vesting the responsibility of the engineering and construction effort for the hydroelectric portion of this Project to the PUD would both reduce Federal involvement and avoid potential long term delays due to a low priority being placed on the Project by the COE or Congress.

2. The COE has admitted that its procedure for authorization of construction would be more time-consuming than the FERC authorization which the PUD would pursue. Thus a less costly and larger quantity of energy would be available if the PUD developed the hydropower facilities.

3. In the November 2, 1981 Memorandum of Understanding between the FERC and the COE (national level) regarding non-Federal hydropower development, the COE agreed to encourage non-Federal development of hydroelectric facilities at existing COE dams. The PUD is of the opinion that the present course of action taken by the Seattle District COE on the Wynoochee Dam Project has not been in concert with the encouragement of non-Federal (PUD) hydropower development.

4. The COE has stated in public meetings that if they do not develop both the hydropower facilities and the fish hatchery, then by present statutes and regulations the COE may not be successful in securing funding to develop the hatchery alone. It must be kept in mind, though, that by present laws the partnership proposed in the FR/DEIS is not possible either. Either alternative would literally require an Act of Congress for implementation.

Therefore, the PUD requests that a third alternative be fully investigated and addressed in the FR/DEIS. The arrangement that the PUD proposes would consist of the PUD developing the hydropower facilities and another Federal agency, such as the U.S. Fish and Wildlife Service or National Marine Fisheries Service, developing the hatchery. The COE's role would be as an overall project coordinator and as such they would be responsible for review of the design and construction of the various facilities and coordination between the many parties involved in the combined hatchery/hydropower development. Such a partnership appears to be the best for all as it eliminates many of the previously discussed problems of the other partnership alternatives while maintaining the COE in the coordinating role they have so successfully undertaken in recent months. Further, this arrangement would reduce the level of Federal involvement required for development of the Project.

In closing, we wish to reiterate our hope that a mutually agreeable and beneficial solution can be negotiated. However, the FR/DEIS should fully address the PUD's proposed hydropower partnership alternative. The PUD fully recognizes that if an acceptable partnership agreement cannot be reached between the COE and the PUD, the entire hydropower/fish hatchery could in jeopardy. Nevertheless, the PUD must base its decision on this matter first upon its responsibility to all the ratepayers in the PUD's service area to provide adequate and cost-effective electric power and secondarily on the desires of various special interest groups for the fish hatchery.

EXHIBIT B

COMMENTS BY PUBLIC UTILITY DISTRICT NO. 1
OF GRAYS HARBOR COUNTY ON THE
FEASIBILITY REPORT AND
DRAFT ENVIRONMENTAL IMPACT STATEMENT, (REVIEW DRAFT)
BY
THE SEATTLE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
FOR THE
WYNOOCHEE HYDROPOWER/FISH HATCHERY PROJECT

1. The PUD is concerned about the impacts the proposed fish hatchery would have on the power potential of the Oxbow damsite. With the recent termination of work on Washington Nuclear Project Nos. 4 and 5, of which the PUD owns a substantial portion, the PUD feels that options on potential energy sources such as the Oxbow site should be kept open if at all possible. Accordingly, the PUD requests that the viability of a higher location for a fish hatchery be addressed more fully in the final feasibility report and final EIS. It is the PUD's understanding that the location of the hatchery can be altered to accommodate the Oxbow site development up to and during the period of advanced engineering and design. A change in location would depend in large part on the decision to proceed with the Oxbow Project.

2. The cost of power from the hydropower facilities is not presented accurately in the FR/DEIS. Since the FR/DEIS is based on the PUD paying for and marketing the output, the cost of power presented in the FR/DEIS should be the cost incurred by the PUD. The cost to the PUD will be substantially higher than the 53 mills/kWh given in the FR/DEIS due to the PUD financing methods, the additional costs of a transmission line, and reduction in power by transmission losses. When allowances are made for those factors, and assuming that the COE cost estimate and power output estimate are accurate (which we doubt, see Comments 4 and 6), and assuming an online date of July 1986, the cost of power to the PUD would be about 130 mills/kWh at that time.

3. The PUD opposes the selection of an underground transmission line for the Project. Since the FR/DEIS is based on a partnership with the PUD, and since, as indicated in the FR/DEIS (4.09 d.), the PUD would not only construct, operate, and maintain the transmission line but would be responsible for the final decision as to type of line, the selected transmission method of the FR/DEIS should be the aerial line preferred by the PUD.

   We recognize that the direct-buried cable proposed in the FR/DEIS for the transmission line would require less clearing and thus would have fewer environmental impacts. However, that type of buried line has proven to be unreliable and difficult to maintain and therefore would not be acceptable to the PUD. An acceptable buried transmission system would require installing the cable in conduits with periodic manholes, and would result in much higher costs and greater clearing requirements than an aerial transmission system. Thus, it is our position that an aerial line would be the most cost-effective method and would result in environmental impacts comparable to those of a properly constructed underground line.

4. Our consultants have reviewed the detailed cost estimate presented in Appendix E of the FR/DEIS, and are of the opinion that the estimate is optimistic. In particular, the costs for the mechanical and electrical equipment in the intake and powerhouse are too low, as are the costs for the tunnel construction. However, the costs for mobilization-related items appear to be extraordinarily high ($3,700,000). The cost of a transmission line should be included also. If allowances are made for the above items, the construction cost would be about $28,500,000, an increase of about $7,000,000 from the estimate in the FR/DEIS.

5. The PUD is concerned that the preliminary design presented in the FR/DEIS is not as economical as possible. We feel that alternative designs will result in substantially lower costs without adverse environmental or operational impacts. Although we recognize that the design presented in

the FR/DEIS is preliminary in nature and would be expected to change during advanced feasibility studies and final design, we would like to take this opportunity to point out several places where we think a more economical arrangement could be developed:

a. As acknowledged in the FR/DEIS, a surface powerhouse would be substantially more economical than the underground powerhouse proposed in the FR/DEIS. The FR/DEIS indicates that the reason for selecting the underground powerhouse rather than the aboveground powerhouse as proposed by the PUD is concern over the stability of the overburden above the surface powerhouse site, and that the cost of stabilizing the slopes would exceed the 3.1 million dollar cost advantage of the surface arrangement. It is the opinion of our consultants that the overburden slopes stability is not an overwhelming problem and that corrective measures would not be that expensive. Furthermore, as discussed in General Comment 4, we feel the cost estimate presented in the FR/DEIS is optimistic, and the cost advantage of the surface site is actually greater than 3.1 million dollars. In addition, the selection of an underground powerhouse has been made on the basis of limited geotechnical investigations. More extensive, time-consuming, and expensive investigations will be necessary to completely ascertain the feasibility of constructing the powerhouse cavern.

b. The intake system as presented is not as economical as it could be. The main closure slidegate can be installed at foundation level with considerable savings. Also, stoplogs to close off the entire structure would be very expensive; provisions can be made to raise the selective withdrawal panels to a dry location for maintenance, with stoplogs only needed to close the penstock inlet. Four independently operated selective withdrawal gates also would not be necessary; fewer or dependently operated gates can be used without loss of operational flexibility.

c. Substantial economy could be achieved by driving one generator by the two larger turbines, rather than one generator for each turbine. The minor loss in generator efficiency would be more than offset by the initial cost savings.

d. The various tunnels seem too large. We believe that more advanced optimization studies would result in smaller, more economical tunnels being planned.

6. Based on our studies, it appears that the power output of the Project is overstated. It is apparent that no deduction has been applied for transmission line losses or the loss of head caused by the fish hatchery water intake. We estimate that the actual marketable output of the Project would be about 35.9 GWh, rather than 37.4 GWh as presented in the FR/DEIS.

PORT OF
GRAYS HARBOR

GENERAL MANAGER	206	533-9530
TERMINALS MANAGER	206	533-9519
DIRECTOR OF TRADE	206	533-9527
PORT ENGINEER	206	533-9524
DIRECTOR OF MAINTENANCE	206	533-9510
DIRECTOR OF FINANCE	206	533-9504
DIRECTOR OF PLANNING	206	533-9522

P. O. BOX 660, ABERDEEN, WASHINGTON 98520

COMMISSION
JOHN H. STEVENS
ROBERT L. AIKEN
GERALD S. TERRELL

HENRY E. SOIKE
General Manager

February 9, 1982

James O. Waller, Study Manager
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

Re: Wynoochee Hydropower/Fish Hatchery

Dear Dr. Waller:

The Port of Grays Harbor wishes to reaffirm its support for a joint hydropower/fish hatchery project on the Wynoochee River. We have reviewed both the draft EIS and Feasibility Study, and concur with the findings and preliminary recommendation to go ahead with an integrated hatchery and power generating facility at the Wynoochee Dam.

Sincerely,

PORT OF GRAYS HARBOR

John H. Stevens

John H. Stevens, President
Board of Commissioners

JS:dg

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

College of Ocean and Fishery Sciences
School of Fisheries
Office of the Director, WH-10
Finfish Unit

7 January 1982

Dr. James O. Waller, Ph.D.
Hydropower Study Manager
P. O. Box C-3755
Seattle District
U.S. Corps of Engineers
Seattle, WA 98124

Dear Dr. Waller:

I have reviewed the Wynoochee Hydropower/Fish Hatchery Feasibility Study and support the project as a timely and necessary step in the rehabilitation of Washington's salmonid resources. As energy needs increase and smaller hydro projects are developed, the opportunity to effectively combine fish and power production is critical. Hatcheries continue to be the most important rehabilitation tool for coho and chinook salmon in Washington, but they must be viewed as a tool and not the entire solution to revive the resource. Hatcheries should work to supplement natural populations within each river system. The Wynoochee Hatchery project proposes a hatchery development plan that can place primary emphasis on the needs of the Wynoochee River system, using stocks native to the system and providing the only major opportunity to initiate a sustaining management program integrating hatchery production with the production capacity of the natural stream.

Two other components of the plan give it further distinction. Firstly, the use of satellite facilities with stocks native to their sites is a progressive step if never compromised. Secondly, and a very important step, is the opportunity to interface research with hatchery programming which can correct a deficiency in hatchery management that has existed since hatcheries were started. Much can be gained in the Wynoochee hydropower/fish hatchery project toward the enhancement and efficient utilization of our resources. I strongly support the program.

Respectfully,

Ernest L. Brannon
Associate Professor

ELB:fkp

TWX: 910-444-2235 / Telephone: (206) 543-4270

CONFEDERATED TRIBES of the CHEHALIS RESERVATION

February 5, 1982

Colonel Norman C. Hintz
District Engineer, Seattle
P.O. Box C-3755
Seattle, Wash. 98124

Dear Colonel Hintz:

Again the Chehalis Tribe wishes to express our support of the Wynoochee Dam Hydro Power Fish Hatchery Project. However--

Looking at the enviromental impact statement again, we see an important component of the new hatchery operation would be off-station rearing adult capture facilities. Candidate sites identified in your report include the Humptulips, Quinault, Queets and Hoh rivers. We see little reason to make plants into either the Humptulips or Quinault rivers, both of which are heavily planted by existing hatcheries. We understand certain salmonid species from the Hoh river were examined by the U.S. Fish and Wildlife Service and found to be infected with disease organisms which have not been found in the Chehalis system. More importantly, little mention is made of the upper Chehalis water shed as a candidate.

Recent conservation closures of our fisheries indicate a need for enhancement in the upper Chehalis. During the past year, all or part of our Spring Chinook , Fall Chinook, Coho and Steelhead fishing seasons were curtailed for conservation. Small numbers of Chum we caught.

Therefore we support the concept of increased enhancement of Chehalis salmon and Steelhead stocks. We do have some concerns regarding proposed operation and management of any enhancement project in the Grays Harbor and Chehalis River drainage. Large scale salmon and Steel head enhancement in the lower Chehalis coulped with Hatchery Harvest Rates in Grays Harbor Fisheries would soon deplete the remaining up-river native runs our Tribe is dependent on.

Off station plants of salmonid smolts without a period of rearing at the planting site will not guarantee returns past the mouth of the Wynoochee River. Therefore more thought should be applied to spawning and rearing distribution throughout the upper Chehalis water shed.

P.O.BOX 536 OAKVILLE, WA. 98568
AC 206-273-5911

We are concerned about the selection of broodstock for enhancement projects, in the Chehalis system. Low success rates of previous salmon and Steelhead enhancement projects int he Chehalis system may be attributible to selection of foregion stock. We believe native Chehalis River stock are more adapted to the water shed and Grays Harbor Estuary and could survive at a higher rate. Fish runs have been on the decline, but in the last couple years have stabilized. Unknown if ecology has reduced polution or fish have adapted.

Therefore the Chehalis Tribe would like to be a part of the program.

Thank You

Virginia Canales

Virginia Canales
Chairwoman

cc: Ray Maldonado
U.S. Fish and Wildlife Service, Olympia

February 10, 1982

James O. Waller, Study Manager
Wynoochee Hydropower/Fish Hatchery
Dept. of the Army
Seattle District Corps. of Engineers
P. O. Box C-3755
Seattle, WA 98124

Dear Jim:

In regard to the Grays Harbor Public Utility District request for an extension of the review and comment period on the Wynoochee Hydropower/Fish Hatchery Draft Feasibility Report and Draft Environmental Impact Statement, we have nothing further to add.

However, we would once again like to go on record as opposing any attempt by the Grays Harbor P.U.D. to push for the construction of another dam on the Wynoochee River. All support that has been gathered from the community and the various organizations supporting the Corps. proposed joint hydro power/fish hatchery is lost when construction of another dam is ever mentioned.

The Northwest Steelhead and Salmon Council and Trout Unlimited support the project concept proposed by the Corps. of Army Engineers of a hydro-power facility to be built on to the existing dam and a joint salmon/steelhead hatchery approximately one-thousand yards downstream of the existing dam.

Thank you for allowing us this opportunity. Keep in touch. We are willing to do all we can to assist you in bringing this project to a speedy and successful conclusion.

Sincerely,

Jerry Pavletich, President
NORTHWEST STEELHEAD & SALMON COUNCIL OF TROUT UNLIMITED
2100 Bay Ave.
Aberdeen, WA 98520

JP:cw

cc: T.U.

GRAYS HARBOR CHAPTER

Northwest Steelhead & Salmon Council of Trout Unlimited

P.O. Box 1050

Aberdeen Washington 98520

February 17, 1982

Mr. James O. Waller
Hydro Power Study Manager
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

RE: WYNOOCHEE HYDRO POWER/FISH HATCHERY FEASIBILITY STUDY

Dear Mr. Waller:

In as much as the Grays Harbor Chapter of the Northwest Steelhead & Salmon Council of Trout Unlimited has already gone on record supporting the present project plan we believe that several other points of concern should be introduced for inclusion into the final Environmental Impact Statement (E.I.S.).

Primarily, we are diametrically opposed to this project or any other project if a dam located at the Oxbow or any other location on the Wynoochee is constructed. We urge the Corps of Engineers to discourage any further dam construction on the Wynoochee and recommend to the Corp that those streams and/or rivers with known problems with IHN (infectious hematopoietic necrossis) be withdrawn from consideration as a possible enhancement area to be used along with the proposed hatchery.

Furthermore, we would suggest additional terminology be inserted at EIS-30, (3) Fish, end of paragraph 1 to read: "and non-Indian fishing interest" We believe that our input is as important as any other organization, department or governmental body.

Last, we suggest that a few of the non-chemically treated fish carcusses be returned to the Wynoochee and other logical rivers to help promote supplemental food for other anadromous fish and Bald Eagle populations.

Very truly yours,

GRAYS HARBOR CHAPTER
NORTHWEST STEELHEAD & SALMON COUNCIL OF TROUT UNLIMITED

Jim Nelson
Natural Resources Chairman

JN:cw

THE AMERICAN LEAGUE OF ANGLERS

810 18TH STREET NORTHWEST, WASHINGTON, D.C. 20006 (202) 347-7475

The National Lobby for the Preservation and Enhancement of America's Fishing Waters

January 27, 1982

Dr. James O. Waller
Hydropower Study Manager
Seattle District
U.S. Army Corps of Engineers

Dear Dr. Waller:

The American League of Anglers, an affiliation of national and regional sport fishing organizations as well as individual anglers, supports the U.S. Army Corps of Engineers' proposed Hydropower/ Fish Hatchery project at Wynoochee Dam in Washington. The American League of Anglers is a proponent of utilizing already existing dams to produce hydropower as long as fisheries losses are minimized with mitigation and enhancement measures an integral part of the projects. The U.S. Army Corps of Engineers proposal for the Wynoochee River is an admirable example of this policy.

The ALA and affiliate organizations are vitally concerned about the salmon and steelhead resources of Washington State and the Pacific Northwest. The once bountiful populations of salmon and steelhead have been drastically diminished, and the ALA supports a variety of measures for enhancing this valuable resource. The cost-effective Hydropower/Fish Hatchery proposal will significantly contribute to this end by adding salmon and steelhead to several of Washington's coastal rivers, Grays Harbor and the northern Pacific Ocean.

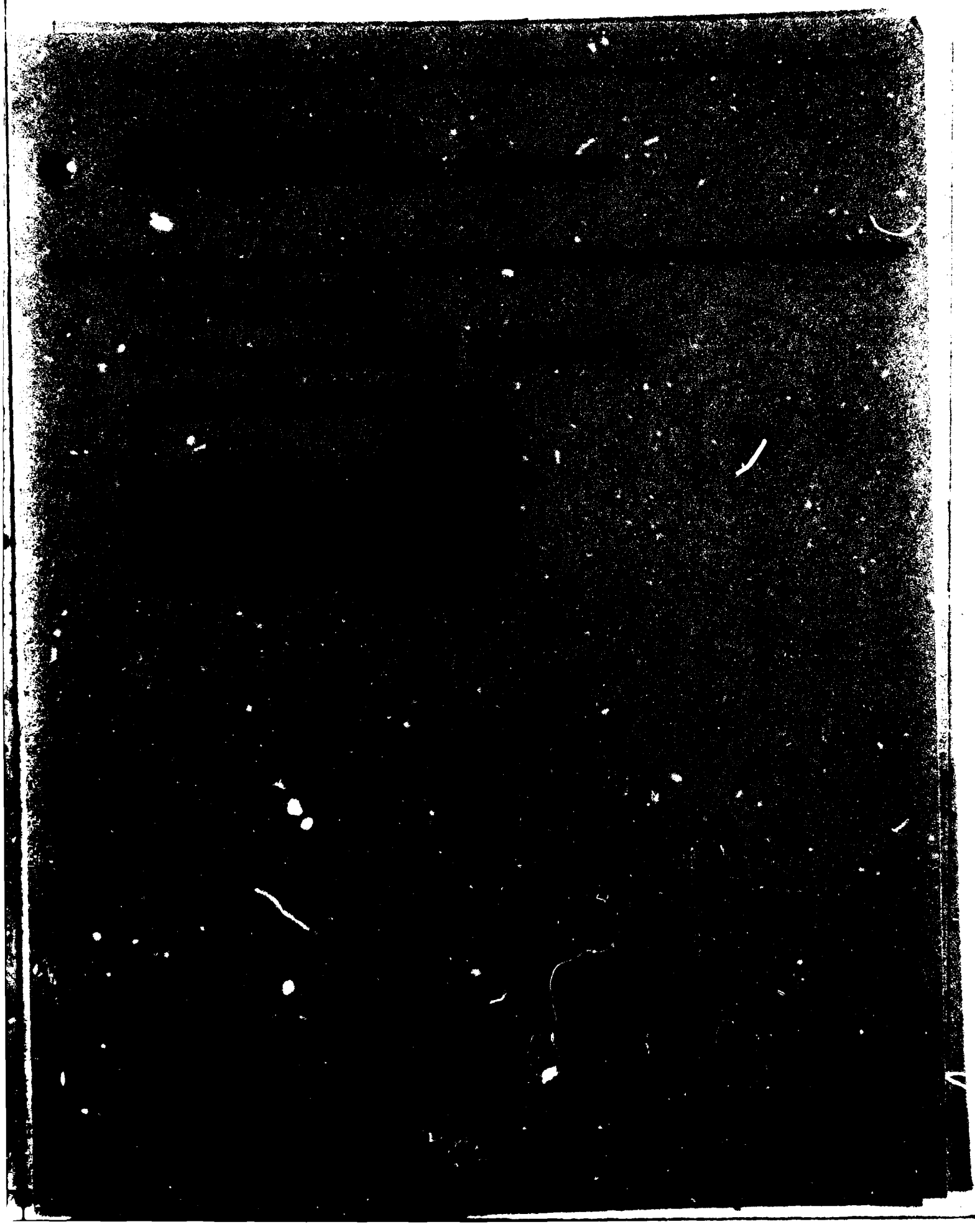
We appreciate having the opportunity to comment and would like to be kept informed of the progress of this study.

Sincerely,

Eileen Barthelmy

Eileen Barthelmy
Executive Director

EB:jmc



APPENDIX C

BENEFITS, COST ALLOCATION, AND COST SHARING COORDINATION

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EXHIBITS

APPENDIX C

BENEFITS, COST ALLOCATION, AND COST SHARING COORDINATION OF RECOMMENDED PLAN

SECTION 1. HYDROPOWER BENEFITS

1.01 Methodology to Determine Small Hydropower Benefits. In the Pacific Northwest, the months of December and January are traditionally the most critical months for electrical loads. Load forecasts for the region indicate energy and capacity deficits through the year 2000. For this study, an average monthly generation for the critical months of December-January was used to determine dependable capacity, most often defined as that generation capable of being produced under the most severe combination of streamflow and load conditions. Because this project is a relatively small project that would operate in the large Pacific Northwest generating system, the traditional method of computing a hydropower plant's dependable capacity based on its ability to carry peakloads under adverse water conditions was not used. For this project it was more appropriate to treat the availability of the plant's capacity in a manner similar to the availability of a thermal plant's capacity. The variability of a hydropower plant's capacity availability due to random streamflow patterns can be considered analogous to the variability of thermal plant availability due to the randomness of forced outages. Since the outflows of the project will not be regulated to meet power demand, the availability of the hydropower capacity is truly random in nature.

1.02 System reliability studies conducted by the Federal Energy Regulatory Commission (FERC) in Washington have confirmed that the hydrologic availability of hydropower capacity is equivalent to thermal plant electrical-mechanical availability in terms of peakload carrying ability in a large power system. Since the purpose of dependable capacity in computing hydropower benefits is to determine the amount of thermal capacity (and hence, cost) that would function the same as the proposed hydropower plant, it is appropriate to use the equivalent reliability approach to define a hydropower project's dependable capacity. Therefore, a hydropower project's dependable capacity can be defined as the amount of thermal generating capability that would carry the same amount of peakload as the proposed hydropower plant. Using this approach, a hydropower plant's equivalent thermal capacity can be derived as follows: equivalent thermal capacity = average hydropower generation during peak-load months x (hydropower plant mechanical availability/thermal plant mechanical availability).

1.03 For the Wynoochee hydropower project, the peakload months were considered December-January. The hydropower plant's mechanical availability was considered to be 98 percent. The thermal plant's availability is based on 100 percent availability less the forced outage rate for the type and size of thermal plant considered to be the most likely alternative; a coal-fired generating plant was considered the alternative and the availability considered to be 84.2 percent. It should be

noted that when this procedure is used to derive equivalent thermal capacity, the hydropower capacity credit included in the FERC power value to account for the greater mechanical availability of hydropower must be deleted from the computation of benefits.

1.04 Equivalent thermal capacity for the 11.3 megawatt (MW) capacity plant at Wynoochee Dam was calculated as follows:

Capacity	11.3 MW
Average Annual Energy	36,900 MWH
Average Power Output in Dec-Jan	.072 x Avg Adjusted Dec-Jan Flow x Avg Dec-Jan Head = .072 x 721 x 117 = 6.1 MW
Hydropower Mechanical Availability	98 percent
Thermal Mechanical Availability	84.2 percent
Hydropower Equivalent Thermal Capacity	6.1 MW x (.98/.842) = 7.1 MW

1.05 Hydropower Benefits. Average annual benefits for the Wynoochee hydropower project were computed using the equivalent thermal capacity of 7.1 MW, the average annual project energy of 36,900 MWH, and 1 October 1981 at-site power values based on data prepared by the San Francisco Regional Office of the FERC. FERC capacity values for the coal-fired plant, the most likely thermal alternative, included a 10 percent capacity value adjustment reflecting hydropower's reliability and flexibility when comparing a hydropower plant to a coal-fired plant. For this study, the reliability and flexibility adjustment was treated explicitly in the derivation of the equivalent thermal capacity, as discussed in the preceding paragraphs, and should not be included in the capacity value. To avoid double counting, the 10 percent adjustment was removed from the FERC capacity value, leaving an unadjusted value. The power values used are as follows: at-site capacity at 1 October 1981 price level, $118.80 per kilowatt year; energy value at 1 October 1981 price level, 20.8 mills per kilowatt hour (KWH).

1.06 Energy values for periods during the life of the project were increased by applying a real fuel cost escalation to the fuel component of the energy value (18 mills/KWH). Real fuel cost escalation occurs when the fuel prices rise faster than the general rate of inflation and must be evaluated when the most likely alternative to a hydropower plant is a thermal powerplant. The real fuel cost escalation was limited to a 29-year period beginning in 1981 and ending in 2010 and was based on the U.S. Department of Energy fuel price forecast. The 29-year cutoff is based on the expectation that the supply of petroleum products and natural gas will be heavily depleted by the end of that period, and that a transition to alternative energy sources and technologies will be well

underway. Given the high degree of uncertainty about the nature and costs of replacement energy sources, and the diminished (through discounting) impact of further increases in prices, no escalation beyond 29 years was considered. The annual rates of a real fuel cost escalation used to escalate the energy values were 5.7 percent for the period 1981 to 1985, 4.4 percent for the period 1985 to 1990, 1.8 percent for the period 1990 to 1995, 2.5 percent for the period 1995 to 2010, and zero percent for the period beyond 2010. For a project online date of 1988, the equivalent annual fuel cost multiplier would be 1.92. The average annual equivalent energy value for the years 1988, the year the power project would be online, to 2088 (100-year economic life) is 37.4 ((18.00 x 1.92) + 2.85) mills per KWH.

1.07 The average annual power benefits for the Wynoochee hydropower project are as follows:

Capacity:

7.1 MW equivalent thermal capacity x $118.80/KW year = $843,000.

Energy:

36,900 MWH average annual energy x 37.4 mills/KWH = 1,380,000.

Total: $2,223,000

SECTION 2. FISH BENEFITS

2.01 Fish Production. The fish hatchery water supply would be divided equally between the salmon and steelhead production, each receiving up to 95 cubic feet per second (c.f.s.). The water would be distributed to the respective holding ponds, incubation facilities, rearing ponds, and raceways in accordance with the production needs of each species as determined by the Washington Departments of Game (WDG) and Fisheries (WDF). The production capability of the fish hatchery for salmon and steelhead is based on the flow available to the salmon and steelhead rearing ponds.

2.02 According to WDF figures (see 13 April 1982 letter), the 95 c.f.s. (Phase I, 40 c.f.s.; Phase II, 55 c.f.s.) salmon water supply would produce 189,000 pounds of smolts (Phase I, 80,000; Phase II, 109,000). Since there are 10 salmon smolts per pound, the hatchery would produce 1,890,000 salmon smolts. Based on a 5 percent survival rate from smolt stage to adult stage, 94,500 salmon would survive to adult stage. Allowing 7,500 adults (Phase I, 4,800; Phase II, 2,700) to escape back to the spawning areas and collection facilities would result in 87,000 adult salmon (Phase I, 35,200; Phase II, 51,800) available for annual harvest under the with project condition. The expected annual distribution of salmon harvest would be as shown in table C-1.

2.03 According to WDG figures (see 3 July 1980 letter), the 95 c.f.s. steelhead water supply would produce 216,000 pounds of smolts (Phase I only). Since there are seven steelhead smolts per pound, the hatchery would produce 1,512,000 steelhead smolts. Based on a 3.5 percent survival rate from smolt stage to adult stage, 52,900 steelhead would survive to adult stage. Allowing 7,900 adults to escape back to the spawning areas and collection facilities would result in 45,000 adult steelhead available for annual harvest under the with project condition. The harvest would be equally divided between commercial/Indian and sport harvests, with only 80 percent of the sport harvest actually caught. The expected distribution of steelhead would be as shown in table C-1.

2.04 Fish Losses. The fish run present prior to construction of Wynoochee Dam was 1,500 adult coho salmon and 570 adult steelhead and cutthroat trout upstream of the reservoir. These fish are using the fish collection, hauling, and passage mitigation facilities associated with the existing project for transport, with a decreasing level of success. Under the proposed hydropower/fish hatchery project, these upstream runs would be terminated at the existing fish collection facility and replaced by hatchery raised fish. Based on a 4:1 catch to escapement ratio for coho salmon, 6,000 coho salmon would be caught with 5,000 (83 percent) in the commercial/Indian fishery and 1,000 (17 percent) in the sport fishery (900 ocean and 100 terminal (river)), and 1,500 would escape back into the Wynoochee River. Based on a 2:1 catch to escapement ratio for steelhead, 1,140 steelhead would be caught, with 570 (50 percent) in

TABLE C-1

ANNUAL ADULT SALMON AND STEELHEAD PRODUCTION

	Ocean	Terminal (River)	Total
Salmon - Phase I			
Commercial/Indian	3,600	28,000	31,600 (90%)
Sport	400	3,200	3,600 (10%)
Total Production	4,000 (11%)	31,200 (89%)	35,200 (100%)
Salmon - Phase II			
Commercial/Indian	5,000	44,500	49,500 (96%)
Sport	500	1,800	2,300 (4%)
Total Production	5,500 (11%)	46,300 (89%)	51,800 (100%)
Total Salmon Distribution			
Commercial/Indian	8,600	72,500	81,100 (93%)
Sport	900	5,000	5,900 (7%)
Total Production	9,500 (11%)	77,500 (89%)	87,000 (100%)

	Subtotal	Noncatch	Total
Total Steelhead Distribution (Phase I Only)			
Commercial/Indian	22,500 (50%)		22,500
Sport	22,500 (50%)	(4,500)	18,000
Total Production	45,000	(4,500)	40,500

the commercial/Indian fishery, and 570 (50 percent) in the sport fishery, and 570 would escape back into the Wynoochee River (see table C-2). The 6,000 coho salmon and 1,140 steelhead production would be part of the Phase I without project condition and would be subtracted from the Phase I total fish hatchery production in determining the with project enhancement production.

2.05 Previous State of Washington's Mitigation Responsibility. In addition, the State of Washington would fulfill its previous mitigation responsibility for steelhead spawning habitat losses associated with Wynoochee Dam under the memorandum of agreement, dated 28 July 1977, between the Corps of Engineers and the WDG. The agreement called for the return of 1,700 adult steelhead to Wynoochee Dam, with 850 (50 percent) in the commercial/Indian fishery and 850 (50 percent) in the sport fishery (see table C-2). The 1,700 steelhead production would also be part of the Phase I without project condition and be subtracted from the Phase I total fish hatchery production in determining the with project enhancement production.

2.06 Sport Fishery Benefits.

a. Methodology. Sport fishery benefits are evaluated in accordance with the Water Resource Council's (WRC) NED Benefit Evaluation Procedures: Recreation (Federal Register 14 December 1979, Subpart K, pages 72950 to 72965). Because both salmon and steelhead represent specialized recreation activities, care was taken in computing sport fishery benefits to use values determined by the travel cost or contingent valuation methods of evaluation. The sport fishery benefit analysis has three component parts: (1) without project condition, (2) with project condition, and (3) sport fishery benefits.

b. Without Project Condition. The sport fishery harvest under the without project condition totals 1,000 coho salmon and 1,420 steelhead, as described above. Sport fishing is estimated to be 900 recreation days[1/] for ocean-caught coho salmon, 560 recreation days for river-caught coho salmon, and 10,508 recreation days for steelhead (see table C-3). Westport, Washington, area ocean salmon fishing requires 1.0 recreation days per fish caught, while river coho salmon fishing requires approximately 5.6 recreation days per fish (see 13 April 1982 WDF letter). Steelhead caught in the Wynoochee River require an average of 7.4 recreation days per fish (see 24 July 1981 WDG letter).

c. With Project Condition. Sport fishing under the with project condition will increase substantially due to improved fishing conditions. The Wynoochee fish hatchery production would make available

1/A standard unit of use consisting of a visit by one individual to a recreation development or area for recreation purposes during any reasonable portion or all of a 24-hour period.

TABLE C-2

ANNUAL ADULT SALMON AND STEELHEAD ENHANCEMENT AND MITIGATION DISTRIBUTIONS FROM WYNOOCHEE FISH HATCHERY

	Phase I			Phase II	Total		
	Salmon	Steelhead	Total	Salmon	Salmon	Steelhead	Total
Total Fish Production							
Commercial/Indian	31,600	22,500	54,100	49,500	81,100	22,500	103,600
Ocean	(3,600)			(5,000)	(8,600)		
Terminal	(28,000)			(44,500)	(72,500)		
Sport	3,600	18,000	21,600	2,300	5,900	18,000	23,900
Ocean	(400)			(500)	(900)		
Terminal	(3,200)			(1,800)	(5,000)		
Total	35,200	40,500	75,700 (100.0%)	51,800 (100.0%)	87,000	40,500	127,500 (100.0%)
Project Caused Fish Losses (Project Mitigation)							
Commercial	5,000	570	5,570		5,000	570	5,570
Sport	1,000	570	1,570		1,000	570	1,570
Total	6,000	1,140	7,140 (9.4%)	0	6,000	1,140	7,140 (5.6%)
Previous State of Washington's Mitigation Responsibility							
Commercial							
Sport		850	850			850	850
		850	850			850	850
Total	0	1,700	1,700 (2.3%)	0	0	1,700	1,700 (1.3%)
Enhancement Portion of Fish Production (Total Production Less Mitigation)							
Commercial	26,600	21,080	47,680	49,500	76,100	21,080	97,180
Sport	2,600	16,580	19,180	2,300	4,900	16,580	21,480
Total	29,200	37,660	66,860 (88.3%)	51,800 (100.0%)	81,000	37,660	118,660 (93.1%)

TABLE C-3

SPORT FISH RECREATION USE
(In Recreation Days)

	Phase I			Phase II			Total		
	Number Fish	Recreation Days/Fish	Recreation Days/Year	Number Fish	Recreation Days/Fish	Recreation Days/Year	Number Fish	Recreation Days/Fish	Recreation Days/Year
I. Without Project Condition									
A. Coho Salmon									
o Ocean Caught	900	1.0	900				900	1.0	900
o River Caught	100	5.6	560				100	5.6	560
o Total Salmon	1,000		1,460	0			1,000		1,460
B. Steelhead	1,420[1]/	7.4	10,508	0			1,420	7.4	10,508
C. Total Days/Year			11,968			0			11,968
II. With Project Condition									
A. Spring Chinook Salmon									
o Ocean Caught	400	1.0	400	500	1.0	500	900	1.0	900
o River Caught	3,200	6.2	19,840	1,800	6.2	11,160	5,000	6.2	31,000
o Total Salmon	3,600		20,240	2,300		11,660	5,900		31,900
B. Steelhead	18,000	6.2	111,600	0		0	18,000		111,600
C. Total Days/Year			131,840			11,660			143,500
III. Attributable to Project (With Minus Without)									
A. Salmon			18,780			11,660			30,440
B. Steelhead			101,092			0			101,092
C. Total Days/Year			119,872			11,660			131,532

1/570 fish loss mitigation p .s 850 previous state of WA mitigation responsibility.

5,900 spring chinook salmon annually (Phase I, 3,600; Phase II, 2,300) for sport fishery harvest (900 ocean catches and 5,000 terminal (river catches)), plus 18,000 steelhead for sport fishery harvest. Sport fishing is expected to increase to 900 recreation days (Phase I, 400; Phase II, 500) for ocean-caught spring chinook salmon, to 31,000 recreation days (Phase I, 19,840; Phase II, 11,160) for river-caught spring chinook salmon, and to 111,660 recreation days for steelhead (see table C-3). This increase would occur with some access and overcrowding problems. Greater availability of steelhead in the Wynoochee River is expected to reduce to 6.2 the estimated recreation days required to catch a steelhead. The recreation days required to catch a freshwater spring chinook salmon is expected to be 6.2 days, the same as steelhead. For ocean-caught salmon, hatchery production is not expected to have a measurable effect. This estimate is based on an extensive creel census conducted on the Cowlitz River, Washington, by WDG and assumes that fishing conditions on the Wynoochee River will be quite similar (see 24 July 1981 WDG letter).

d. Sport Fishing Benefits. Benefits for sport fishing associated with the Wynoochee fish hatchery are based on the value of recreation use of the resource for the with project condition minus the value under without project conditions. Economic values per recreation day of sport fishing were taken from recent sport fishing studies which used methods of evaluation in accordance with WRC's procedures. At October 1981 price levels, salmon sport fishing is valued at $69 per recreation day for ocean fishing and $89 for freshwater (river) fishing; steelhead sport fishing is valued at $89 per recreation day. Values for sport fishing provided by WDF and WDG were not used because they were determined by methods of evaluation not in accordance with WRC's procedures.

The ocean salmon value was derived from the Brown, Sorhus, and Gibbs study[1/] of ocean salmon sport angling in Washington based on the travel cost method of evaluation; the $45 per recreation day value for 1977 in their report was updated to an October 1981 value of $69 per recreation day using the appropriate U.S. Department of Labor Consumer Price Indexes (CPI). The $45 value from Brown, Sorhus, and Gibbs, suitably updated, was judged by Meyer-Zangri Associates in their recent study for NMFS[2/] to be the best value for ocean salmon.

1/Estimated Expenditures by Sport Anglers and Net Economic Values for Salmon and Steelhead for Specified Fisheries in the Pacific Northwest: by W. G. Brown, C. Sorhus, and K. C. Gibbs, Department of Agricultural and Resource Economics, Oregon State University, 1980.

2/Net Economic Values for Salmon and Steelhead from the Columbia River System: prepared for National Marine Fisheries Service by Meyer-Zangri Associates, Inc., February 1982.

The steelhead value was derived from the Richards and Peterson study[1/] of recreational steelheaders in Washington based on the travel cost method of evaluation; the $50.67 per recreation day value for May 1975 in their report was updated to an October 1981 value of $89 per recreation day using the appropriate CPI. The $89 steelhead value was confirmed by Charbonneau and Hay. The Charbonneau and Hay study[2/], which utilized the 1975 National Survey of Hunting, Fishing, and Wildlife Associated Recreation, determined values for both steelhead and freshwater salmon based on the contingent valuation method of evaluation; the $51 per recreation day value for 1975 in their report for both steelhead and freshwater salmon was updated to an October 1981 value of $89 per recreation using the appropriate CPI.

The value of sport fishing without the project is estimated at $1,047,000 (see table C-4). The value of the sport fishery with the project is estimated at $12,753,000 (Phase I, $11,726,000; Phase II, $1,027,000). The sport fishery benefit attributable to the project, the difference between the without and with project conditions, is $11,706,000 (Phase I, $10,679,000; Phase II, $1,027,000), $2,709,000 for salmon (Phase I, $1,682,000; Phase II, $1,027,000), and $8,997,000 for steelhead (Phase I only).

2.07 Commercial/Indian Fishing Benefits.

a. Methodology. Commercial/Indian fishing benefits were evaluated in accordance with the Water Resource Council's NED Benefit Evaluation Procedures: Commercial Fishing (Federal Register 29 September 1980, Subpart L, pages 64461-64464). All values used in this evaluation were provided to the Corps by WDF and WDG for salmon and steelhead, respectively. Indian fishery benefits are treated the same as commercial fishing benefits in this evaluation.

b. Commercial/Indian Fishery Study Areas. The biological study area is the ecosystem within which the proposed hatchery will have impacts on fishery conditions. Stocks from hatchery production will mix with most other anadromous fish stocks and migrate throughout various areas of the North Pacific Ocean. The economic study area, or that area in which the proposed hatchery will yield benefits, would include portions of the states of California, Oregon, Washington, and Alaska and the Province of British Columbia, Canada. The majority of hatchery output, however, will be caught in Washington State waters, with a high percentage caught in Grays Harbor and the Chehalis and Wynoochee Rivers.

c. Without Project Condition. The without project condition is the most likely condition expected to exist in the future in the absence of any alternative plan being considered. Currently there is excess capacity among salmon harvesters in the study area due to declines in natural anadromous fish runs and Federal court decisions dividing the harvest among Indian and non-Indian commercial fishermen in Washington

1/Economic Benefits from Recreational Steelhead Fishing: by J. Richards and S. Peterson, National Marine Fisheries Service, October 1978.

2/Determinants and Economic Values of Hunting and Fishing: by J. J. Charbonneau and M. J. Hay, U.S. Fish and Wildlife Service, March 1978.

TABLE C-4

ANNUAL SPORT FISHERY BENEFITS

	Phase I			Phase II			Total		
	Recreation Days/Year	$/Recreation Day	Economic Value	Recreation Days/Year	$/Recreation Day	Economic Value	Recreation Days/Year	$/Recreation Day	Economic Value
I. Sport Fishing Without Project									
A. Salmon									
• Ocean Caught	900	$69	$62,000				900	$69	$62,000
• River Caught	560	89	50,000				560	89	50,000
• Total Salmon			$112,000	0					$112,000
B. Steelhead	10,508	89	935,000	0			10,508	89	935,000
C. Total Value			$1,047,000			0			$1,047,000
II. Sport Fishing With Project									
A. Salmon									
• Ocean Caught	400	$69	$28,000	500	$69	$34,000	900	$69	$62,000
• River Caught	19,840	89	1,766,000	11,160	89	993,000	31,000	89	2,759,000
• Total Salmon			$1,794,000			$1,027,000			$2,821,000
B. Steelhead	111,600	89	9,932,000	0		0	111,600	89	9,932,000
C. Total Value			$11,726,000			$1,027,000			$12,753,000
III. Benefit Attributable to Project (With Minus Without)									
A. Salmon			$1,682,000			$1,027,000			$2,709,000
B. Steelhead			8,997,000			0			8,997,000
C. Total Sport Benefit			$10,679,000			$1,027,000			$11,706,000

State. Due to this excess capacity, there is currently a state imposed policy of restricted entry to the non-Indian commercial gillnet and troll salmon fishery. In spite of state efforts to reduce the size of the salmon fishing fleet, excess capacity is expected to continue into the foreseeable future. The commercial/Indian harvest under the without project condition totals 5,000 coho salmon and 1,420 steelhead, as described in paragraphs 2.04 and 2.05. Ex-vessel prices are based on the expected total harvest of each species in the biological study area and are determined by international market conditions. Ex-vessel prices for salmon based on 1981 port landings were provided by WDF[1/] as follows:

Spring Chinook Salmon (Ocean Harvest)	$2.66 per pound
Spring Chinook Salmon (River Harvest)	$3.29 per pound
Coho Salmon (Weighted Ocean and River Harvest)	$1.27 per pound

Indians were paid an average of $1.73 per pound in 1981 by commercial buyers for steelhead caught in the Chehalis River basin based on 1981 commercial buyer fish ticket data compiled by WDG. The average weight of harvested fish provided by WDF and WDG are: spring chinook salmon (ocean), 12 lbs./fish; spring chinook salmon (river), 19 lbs./fish; coho salmon, 6 lbs./fish; and steelhead, 9.5 lbs./fish.

d. With Project Condition. The Wynoochee fish hatchery production would make available 81,100 spring chinook salmon annually (Phase I, 31,600; Phase II, 49,500) for commercial/Indian harvest (8,600 ocean catches and 72,500 river catches), plus 22,500 steelhead for commercial/Indian fishery harvest. Subtracting the portion of hatchery salmon and steelhead production which mitigates for without project losses (5,000 salmon and 1,420 steelhead) results in an annual enhancement of 76,100 adult salmon (Phase I, 26,600; Phase II, 49,500) and 21,080 adult steelhead (Phase I only) available for commercial/Indian harvest. Coho salmon would be replaced with spring chinook salmon under with project conditions.

e. Commercial/Indian Fishing Benefits. National Economic Development (NED) benefits resulting from the increase in supply of commercial/Indian fish are measured as the increase in net income to harvesters. The projected increase in the harvest of spring chinook salmon and steelhead is so small in relation to total harvest in the study area that market prices will not be affected. The current without project ex-vessel prices were, therefore, used in the with project economic analysis. Due to the projected continuance of excess capacity among harvesters over project life, the vessels that are already operating will be able to harvest the extra catch without any change in variable costs. NED benefits are, therefore, the existing market price multiplied by the increase in catch as displayed in table C-5. The total commercial/Indian fishing benefits are $5,116,000 (Phase I, $2,174,000; Phase II, $2,942,000), $4,769,000 for salmon (Phase I, $1,827,000; Phase II, $2,942,000) and $347,000 for steelhead (Phase I only).

1/Port Statistics for Commercial Fish Landings in 1981: by Washington Department of Fisheries, 1982.

2.08 Total Annual Fish Benefits. The total fish enhancement benefits (see table C-6) are $16,822,000 (Phase I, $12,853,000; Phase II, $3,969,000), $7,478,000 for salmon (Phase I, $3,509,000; Phase II, $3,969,000) and $9,344,000 for steelhead (Phase I only).

2.09 Average Annual Fish Benefits. Phase I fish benefits would start at project year 4 and last 100 years, and Phase II fish benefits would start at project year 24 and last 80 years. The 4-year delay in benefits is the time required for the first generation of fish to reach harvestable adult stage. Total average annual fish enhancement benefits (at 7-5/8 percent and 100 years economic life) of Phase I and Phase II, commercial and sport fisheries, and salmon and steelhead fisheries (see table C-7) are as follows:

Phase I	$9,580,000
Phase II	679,000
Total	$10,259,000
Commercial Fishery	$2,124,000
Sport Fishery	8,135,000
Total	$10,259,000
Salmon Fishery	$3,294,000
Steelhead Fishery	6,965,000
Total	$10,259,000

TABLE C-5

ANNUAL COMMERCIAL/INDIAN FISHERY BENEFITS

	Spring Chinook Salmon (Ocean)	Spring Chinook Salmon (River)	Steelhead	Coho Salmon	Total Commercial/ Indian Fishery Benefit
Phase I					
With Project Condition (Fish)	3,600	28,000	22,500	0	
Without Project Condition (Fish)	0	0	1,420	5,000	
Change in Output (Fish)	3,600	28,000	21,080	(5,000)	
Ex-vessel Price	$31.92 1/	$62.51 2/	$16.44 3/	$7.62 4/	
Total Value of Change in Output	$115,000	$1,750,000	$347,000	($38,000)	
Change in Harvesting Costs	0	0	0	0	
Annual NED Benefits	$115,000	$1,750,000	$347,000	($38,000)	$2,174,000
Phase II					
With Project Condition (Fish)	5,000	44,500			
Without Project Condition (Fish)	0	0			
Change in Output (Fish)	5,000	44,500			
Ex-vessel Price	$31.92 1/	$62.51 2/			
Total Value of Change in Output	$160,000	$2,782,000			
Change in Harvesting Costs	0	0			
Annual NED Benefits	$160,000	$2,782,000			$2,942,000

1/ 12 lbs/fish x $2.66/lb = $31.92/fish
2/ 19 lbs/fish x $3.29/lb = $62.51/fish
3/ 9.5 lbs/fish x $1.73/lb = $16.44/fish
4/ 6 lbs/fish x $1.27/lb = $7.62/fish

TABLE C-5 (con.)

	Spring Chinook Salmon (Ocean)	Spring Chinook Salmon (River)	Steelhead	Coho Salmon	Total Commercial/ Indian Fishery Benefit
Total					
With Project Condition (Fish)	8,600	72,500	22,500	0	
Without Project Condition (Fish)	0	0	1,420	5,000	
Change in Output (Fish)	8,600	72,500	21,080	(5,000)	
Ex-vessel Price	$31.92[1]/	$62.51[2]/	$16.44[3]/	$7.62[4]/	
Total Value of Change in Output	$275,000	$4,532,000	$347,000	($38,000)	
Change in Harvesting Costs	0	0	0	0	
Annual NED Benefits	$275,000	$4,532,000	$347,000	($38,000)	$5,116,000

1/ 12 lbs/fish x $2.66/lb = $31.92/fish
2/ 19 lbs/fish x $3.29/lb = $62.51/fish
3/ 9.5 lbs/fish x $1.73/lb = $16.44/fish
4/ 6 lbs/fish x $1.27/lb = $7.62/fish

TABLE C-6

TOTAL ANNUAL FISH BENEFITS

	Commercial/ Indian	Sport	Total
Phase I			
Salmon	$1,827,000	$1,682,000	$3,509,000
Steelhead	347,000	8,997,000	9,344,000
Total	$2,174,000	$10,679,000	$12,853,000
Phase II			
Salmon	$2,942,000	$1,027,000	$3,969,000
Steelhead	0	0	0
Total	$2,942,000	$1,027,000	$3,969,000
Total			
Salmon	$4,769,000	$2,709,000	$7,478,000
Steelhead	347,000	8,997,000	$9,344,000
Total	$5,116,000	$11,706,000	$16,822,000

TABLE C-7

TOTAL AVERAGE ANNUAL FISH BENEFITS

	Commercial/ Indian	Sport	Total
Phase I			
Salmon	$1,362,000	$1,253,000	$2,615,000
Steelhead	259,000	6,706,000	6,965,000
Total	$1,621,000	$7,959,000	$9,580,000
Phase II			
Salmon	$503,000	$176,000	$679,000
Steelhead	0	0	0
Total	$503,000	$176,000	$679,000
Total			
Salmon	$1,865,000	$1,429,000	$3,294,000
Steelhead	259,000	6,706,000	6,965,000
Total	$2,124,000	$8,135,000	$10,259,000

SECTION 3. COST ALLOCATION

3.01 Cost Allocation. Project costs were allocated between the two project purposes, power and fish enhancement, using the separable costs-remaining benefits cost allocation procedure. Costs associated with the previous State of Washington mitigation responsibility were excluded from the cost allocation. Table C-8 summarizes the total construction costs. Table C-9 summarizes the average annual costs and benefits. Table C-10 summarizes the allocated fish enhancement costs. Table C-11 presents the determination of separable and residual joint costs. Table C-12 presents the cost allocation.

3.02 The allocated power and fish enhancement costs (in $1,000) are as follows:

	Power	Fish	Previous Washington Mitigation Responsibility	Total
Investment Cost	$23,420	$19,505	$485	$43,410
Annual Cost				
Interest and Amortization	1,787	1,488		
OM&R	321	715	$17	$1,053
Total Annual Cost	$2,108	$2,203		

TABLE C-8

SUMMARY OF TOTAL CONSTRUCTION COSTS
(October 1981 Prices in $1,000)

	Permanent Features[6]	Previous State of Washington Mitigation Responsibility[1]	Multiple-Purpose Project: Specific Power	Multiple-Purpose Project: Specific Fish Enh.	Multiple-Purpose Project: Joint Use	Multiple-Purpose Project: Total	Alternative Single-Purpose Projects: Power[2]	Alternative Single-Purpose Projects: Fish[3]	Alternative Multiple-Purpose Project With Purpose Omitted: Without Fish[4]	Alternative Multiple-Purpose Project With Purpose Omitted: Without Power[5]
01	LANDS & DAMAGES[7]		10			10	10		10	
04	DAM									
.4	Intake Works		5,940			5,940	5,940		5,940	
06	FISH & WILDLIFE									
	Fish Hatchery - Phase I			17,050		17,050		16,260		17,050
	Enhancement				1,790	1,790	4,960	1,700	1,790	1,790
	Mitigation	450								
07	POWERPLANT									
.1	Powerplant		6,100			6,100	6,100		6,100	
.2	Turbines & Generators		4,990			4,990	4,990		4,990	
.3	Accessory Electrical Equipment		1,100			1,100	1,100		1,100	
.4	Misc. Powerplant Equipment		255			255	255		255	
.5	Tailrace		1,375			1,375	1,375		1,375	
.6	Switchyard		275			275	275		275	
19	BUILDINGS, GROUNDS, & UTILITIES[7]		325			325	325		325	
20	PERMANENT OPERATING EQUIPMENT[7]		220			220	220		220	
	INITIAL CONSTRUCTION SUBTOTAL	450	20,590	17,050	1,790	39,430	25,550	17,960	22,380	18,840
	FUTURE CONSTRUCTION - FISH HATCHERY - PHASE II[8]			395		395		395		395
	TOTAL CONSTRUCTION COST	450	20,590	17,445	1,790	39,825	25,550	18,355	22,380	19,235

1/Nonallocable costs.
2/Single-purpose power project is same as power portion of recommended plan except that downstream fish bypass facility would be required to maintain fish runs instead of mitigation production in the fish hatchery for loss of fish runs.
3/Single-purpose fish project is same as fish portion of recommended plan except that hatchery water supply would flow directly from the dam instead of through the intake structure, powerhouse, tailrace tunnel, and fish hatchery intake structure.
4/Alternate multiple-purpose project without fish is multiple-purpose project without specific fish features.
5/Alternate multiple-purpose project without power is multiple-purpose project without specific power features.
6/Feature costs include E&D and S&A.
7/Costs in these features are associated with hydropower only.
8/Represents $1,720,000 discounted 20 years at 7-5/8 percent.

TABLE C-9

SUMMARY OF AVERAGE ANNUAL
COSTS AND BENEFITS
(October 1981 Prices in $1,000)

	Previous State of Washington Mitigation Responsibility	Multiple-Purpose Project				Alternative Single-Purpose Projects		Alternative Multiple-Purpose Project With Purpose Omitted	
		Specific Power	Specific Fish Enh.	Joint Use	Total	Power	Fish	Without Fish	Without Power
TOTAL CONSTRUCTION COST	450	20,590	17,445	1,790	39,825	25,550	18,355	22,380	19,235
INTEREST DURING CONSTRUCTION1/	35	1,600	1,360	140	3,100	1,990	1,430	1,740	1,500
Joint Use				(140)					
Specific Power		(1,600)							
Specific Fish	—	—	(1,360)	—	—	—	—	—	—
PROJECT INVESTMENT	485	22,190	18,805	1,930	42,925	27,540	19,785	24,120	20,735
AVERAGE ANNUAL COST									
Interest & Amortization	37	1,693	1,435	147	3,275	2,101	1,510	1,840	1,582
Operation & Maintenance	16	212	637	63	912	268	700	275	700
Replacements	1	64	54	6	124	71	56	70	60
TOTAL ANNUAL COST	54	1,969	2,126	216	4,311	2,440	2,266	2,185	2,342
AVERAGE ANNUAL BENEFITS									
Power					2,223	2,223		2,223	
Fish Enhancement					10,259	—	10,259	—	10,259
TOTAL ANNUAL BENEFITS					12,482	2,223	10,259	2,223	10,259
NET BENEFITS					8,171	(217)	7,993	38	7,917
BENEFIT-TO-COST RATIO					2.9	0.9	4.5	1.0	4.4

1/Computed for each item based on equal distribution of construction cost in each year of 2-year construction period.

TABLE C-10

SUMMARY OF ALLOCATED FISH ENHANCEMENT COSTS - PHASES I AND II
(October 1981 Prices in $1,000)

Permanent Feature	Construction Cost	Interest During Construction	Investment Cost	Annual Costs: Interest and Amortization	Annual Costs: Operation and Maintenance	Annual Costs: Replacements	Annual Costs: Total
Phase I - Initial Construction							
06 FISH AND WILDLIFE							
Specific[1]	17,050	1,330	18,380	1,402	595	53	2,050
Joint	649	51	700	53	22	2	77
TOTAL	17,699	1,381	19,080	1,455	617	55	2,127
Phase II - Nondiscounted							
06 FISH AND WILDLIFE							
Specific[1]	1,720	135	1,855	142	183	2	327
Phase II - Discounted[2] - Future Construction							
06 FISH AND WILDLIFE							
Specific[1]	395	30	425	33	42	1	76
Total Fish Enhancement Cost (Phase I Plus Phase II Discounted)	18,094	1,411	19,505	1,488	659	56	2,203

1/Also represents separable costs.
2/Costs shown have been discounted 20 years at 7-5/8 percent.

TABLE C-11

DETERMINATION OF SEPARABLE AND RESIDUAL JOINT POWER
AND FISH ENHANCEMENT COSTS
(October 1981 Prices in $1,000)

	Project Cost	Investment Cost	Annual Costs			
			Interest and Amortization	Operation and Maintenance	Replacements	Total
MULTIPLE-PURPOSE PROJECT	39,825	42,925	3,275	912	124	4,311
MULTIPLE-PURPOSE WITH FUNCTION OMITTED						
Without Fish	22,380	24,120	1,840	275	70	2,185
Without Power	19,235	20,735	1,582	700	60	2,342
SEPARABLE COSTS						
Fish Enhancement	17,445	18,805	1,435	637	54	2,126
Power	20,590	22,190	1,693	212	64	1,969
TOTAL SEPARABLE	38,035	40,995	3,128	849	118	4,095
RESIDUAL COSTS	1,790	1,930	147	63	6	216

TABLE C-12

COST ALLOCATION BY SEPARABLE
COST-REMAINING BENEFITS METHOD
(October 1981 Prices in $1,000)

		Power	Fish Enhancement	Total
1.	ALLOCATION OF ANNUAL COSTS			
	a. Benefits	2,223	10,259	12,482
	b. Alternative Costs	2,440	2,266	
	c. Limited Benefits	2,223	2,266	
	d. Separable Costs	1,969	2,126	4,095
	e. Remaining Benefits	254	140	394
	f. Percent Remaining Benefits	(64.47)	(35.53)	(100.00)
	g. Allocated Residual Costs	139	77	216
	h. Total Allocation	2,108	2,203	4,311
	i. Benefit-to-Cost Ratio	1.1	4.7	2.9
	j. Net Benefits	115	8,056	8,171
2.	ALLOCATION OF ANNUAL O&M COSTS			
	a. Separable Costs	212	637	849
	b. Allocated Residual Costs	41	22	63
	c. Total O&M Allocation	253	659	912
	d. Specific Costs	212	637	849
	e. Allocated Joint-Use Costs	41	22	63
	f. Percent Joint-Use Costs	(64.47)	(35.53)	(100.00)
3.	ALLOCATION OF ANNUAL MAJOR REPLACEMENT COSTS			
	a. Separable Costs	64	54	118
	b. Allocated Residual Costs	4	2	6
	c. Total Replacement Allocation	68	56	124
4.	ALLOCATION OF CAPITAL INVESTMENT			
	a. Annual Investment Costs	1,787	1,488	3,275
	b. Percent Annual Investment	(54.56)	(45.44)	(100.00)
	c. Allocated Investment	23,420	19,505	42,925
5.	ALLOCATION OF PROJECT COSTS			
	a. Specific Investment	22,190	18,805	40,995
	b. Investment - Joint-Use	1,230	700	1,930
	c. Interest During Construction	89	51	140
	d. Project Costs - Joint Use	1,141	649	1,790
	e. Percent Project Cost - Joint-Use	(63.74)	(36.26)	(100.00)
	f. Project Cost - Specific Facilities	20,590	17,445	38,035
	g. Total Project Cost	21,731	18,094	39,825

SECTION 4. COST SHARING COORDINATION

4.01 Cost Sharing Coordination. Extensive coordination with the State of Washington, Grays Harbor Public Utility District No. 1, National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Bonneville Power Administration was required. Copies of pertinent correspondence follow.

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF GAME
600 North Capitol Way GJ 11 Olympia, WA 98501 206 753 5700

July 3, 1980

Mr. Jack Thompson
Corps of Engineers
Post Office Box C-3755
Seattle, WA 98124

Dear Jack:

This letter is a compilation of Roger Bogden's and my data on the proposed Wynoochee Hatchery. The proposed hatchery would rear summer and winter steelhead. Listed below are various hatchery features and estimates of value of fish produced.

I. Production capacity would be 216,000 pounds.

II. Construction cost would be 5.6 to 6.3 million dollars at 1980 costs.

III. Hatchery would include:

A. Trough Room - 42' wide x 136' long, 128 troughs required, total flow 1.5 c.f.s.

B. Raceways - total of 20 required 10' wide x 100' long (overall) each - total of 30 c.f.s. maximum, 20 c.f.s. minimum.

C. Rearing Ponds (earth) - Four (4) required at 2 acres each - water surface - 80' wide x 1,089' long, 15 c.f.s. to each pond.

D. Holding Ponds (adults) - Two (2) required 10' wide x 100' long x 6' deep, total of 14.5 c.f.s. for both ponds.

IV. Steelhead would be planted at seven fish to the pound.

A. 216,000 pounds times seven to a pound is 1,512,000 smolts produced for release.

V. Annual operation and maintenance cost was estimated by our Hatchery Division to be 250,000 to 275,000 at 1980 costs. This would include four man-years.

VI. Department of Game uses 50 years as life of a hatchery. Replacement costs would be two percent a year.

VII. Value of steelhead to sport and commercial fisheries.

A. This hatchery is designed to produce best quality smolt possible, using an excellent quality and volume of water. A four percent return of smolts t adults is possible. Today a pollution problem exists in Grays Harbor and a three percent return of smolts to adults is possible. During project life a return of 3.5 percent of smolts planted is possible. Plant would be 1,512,000 smolts,at a 3.5 percent return 52,900 adults would return. About 50,000 of these could be harvested.

1. Indian harvest would be 25,000 adults.

a. Average weight of fish caught by Indians in Chehalis River from 1976 to 1980 was 9.5 pounds.

b. Indians were paid an average of $2.75 a pound for fish caught in Chehalis River in 1980.

c. Value is:

1) 25,000 fish at 9.5 pounds = 237,500 pounds of fish
2) 237,500 pounds times $2.75/lb. - $653,000

2. Twenty-five thousand (25,000) to sport harvest.

a. Steelhead fishery value for a day of fishing is 32.61 (Oliver et. al., 1975).

b. Takes 4.54 days to catch a steelhead (Oliver).

c. Value for sport caught steelhead is:

1) 4.54 x 25,000 equals 113,500 man-days
2) 113,500 x $32.61 equals $ 3,701,235

B. Total annual value is:

1. Indian Harvest	-	653,000
2. Sport Harvest	-	3,701,000
		4,354,000

C. The $32.61 figure for a day of steelhead fishing is not accepted by the Federal Government, they use $10.00 a day. The ten dollar figure is very unrealistic. If we used $10.00 a day for steelhead spent fishing, the run value would be:

1. 25,000 fish x 4.54 man-days equals 113,500 man-days

2. 113,500 x $10.00 a day equals $1,135,000

3. Total value is:

a)	Indian Harvest	- $ 653,000
b)	Sport Harvest	- $ 1,135,000
		$ 1,788,000

Very truly yours,

THE DEPARTMENT OF GAME

James G. Fenton, Wildlife Biologist
Habitat Maagement Division

JGF:fmb

JOHN SPELLMAN
Governor

STATE OF WASHINGTON
DEPARTMENT OF GAME
600 North Capitol Way, GJ-11 • Olympia, Washington 98504 • (206) 753-5700

July 24, 1981

Steve Babcock
Seattle District Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Mr. Babcock:

This letter will provide you with the information you requested on value of steelhead fisherman-day and length of time to catch a steelhead.

The department uses the report by Oliver et. al, August 1975, "A Short Form For Bioeconomic Evaluations of Wildlife in Washington State", to determine value of each fishing or hunting man-day. Appendix C gives the value per man-day for steelhead fishing as $32.61 in 1980. The value expanded 8.9 percent for inflation (as it was during other years) means each steelhead fisherman-day is worth $35.51 in 1981.

Game Department creel census work during the 1979-80 and 1980-81 winter steelhead season in Boldt case area streams (Puget Sound, Pacific coast through Grays Harbor) determined it took 6.18 fisherman-days to catch a steelhead (25.6 hours a fish, and 4.14 hours a man). This would make each sport harvested steelhead worth $219.45 (6.18 x $35.51) in 1981.

However, the Wynoochee fishery is not considered as good as Boldt case area streams. The Game Department conducted a creel census of winter steelhead fishermen on the Wynoochee River during winter season in 1974-75, 1975-76, and 1976-77. During this period, 2,864 fisherman-days were counted with a harvest of 387 fish (7.40 days to catch a steelhead). This makes each Wynoochee sport caught steelhead worth $262.77 (7.40 x $35.51).

When fish start returning from Wynoochee Hatchery, we think it will take less fisherman-days to catch each fish. The Cowlitz River, which receives a large fish plant, is probably about what the Wynoochee would be like after the hatchery is operating. An intensive creel census was conducted on the

Cowlitz River during winter steelhead season for four years (1976-77 through 1979-80). Using creel census information, an estimated harvest of 46,479 fish during 187,735 man-days was made. If took 4.04 man-days to catch each fish. This would make each Wynoochee fish worth $143.46 (4.04 x $35.51).

If you need any other information, please advise me.

Sincerely,

THE DEPARTMENT OF GAME

James D. Fenton

James G. Fenton, Wildlife Biologist
Applied Wildlife Ecology

JGF:mjf

JOHN SPELLMAN
Governor

ROLLAND A. SCHMITTEN
Director

STATE OF WASHINGTON
DEPARTMENT OF FISHERIES
115 General Administration Building • Olympia, Washington 98504 • (206) 753-6600 • (SCAN) 234-6600

April 13, 1982

Colonel Norman C. Hintz, District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Hintz:

During recent discussions with members of your staff involving the Wynoochee hydropower/fish hatchery project, a number of specific technical factors have been reaffirmed or, in some cases, modified to reflect more recent data and conclusions as discussed in our February 25, 1982 letter. In order to guard against completely losing track of how certain factors actually came into existence, we provide the following documentation of their status at this particular point in time.

Recreational Fishing Per-Day Values

Earlier estimates provided by the Washington Department of Fisheries (WDF's) Dale Ward are still judged to be appropriate for on-going benefit: cost analysis purposes.[1] These were derived by application of cost of living adjustments to earlier values developed by WDF. As you are well aware, almost any type of estimate has its respective strong and weak points depending on which economist is involved. A more simple and logical approach might be to simply acknowledge the one known factor; i.e., that the recreational angler is clearly foregoing his opportunity to purchase the same fish at a retail outlet. Thus, the minimum recreational value should at least be pegged at retail price or a level comparable to that provided by Dale Ward.

Commercial Ex-Vessel Values

These values are relatively straightforward and most economists support their use for benefit:cost evaluations. Such prices are provided on fish receiving tickets and are compiled regularly by WDF.

Smolt Sizes

We recommend the continued use of 10 smolts per pound for evaluation purposes, although in actual practice a range of values would be more appropriate. The actual number is not critical, however, since there is a positive correlation between size and expected survival rates. Thus, a given poundage of either smaller or large smolts would generally yield a comparable number of adults.

[1] $28 per day in Matthews and Brown (1970) updated to 1981 = $56 per day.

Smolt Poundage

In our earlier discussions, we examined only full development and recommended an allocation of 50 out of 95 cfs to produce 180,000 pounds of smolts at a rearing density of 8/lbs. per gallon. Since then, however, recent U.S. and Canadian experimental results indicate that a lower rearing density of 6/lbs. per gallon will probably produce better results. In addition, our initial recommendation allocated 45 cfs to adult holding but this is now believed to be overly conservative. Recent work with WDF's hatchery computer model (HATCH) indicates that most hatcheries will only become totally "full" during the spring months immediately prior to smolt releases. Thus, for a two phase developmental plan, we recommend the following.

Phase 1: 40 cfs, allocated between about 30 cfs for rearing 80,000/lbs. of smolts at 6/lbs. per gallon plus an additional 10 cfs for adult holding requirements.

Phase 2: An additional 55 cfs, capable of supporting a smolt rearing increment of 109,000/lbs. plus associated adult holding needs. (Note: the combined totals would be 95 cfs yielding about 189,000/lbs. of smolt production).

Ocean Survival

We initially recommended a 5 percent smolt to adult survival rate and still feel this to be appropriate for a phased-in project that will rely on gradual development of a local-origin broodstock. A range will occur in actual practice due to changes in predator populations, food availability and other factors in the estuarine and marine environments that interact with salmon populations. The 5 percent average has been measured in several other spring chinook stocks but would have been an unrealistic expectation under an immediate full development plan necessitating heavy reliance on one or more non-local broodstocks.

Distribution of Adult Production

The following Table indicates the expected escapement and catch distribution for Wynoochee spring chinook salmon in both hatchery development phases.

				Catches			
				Commercial		Sport	
Phase	Smolts	Adults	Escape-ments	Ocean	River	Ocean	River
I	800,000	40,000	4,800	3,600	28,000	400	3,200
II	1,090,000	54,500	2,700	5,000	44,500	500	1,800
Total	1,890,000	94,500	7,500	8,600	72,500	900	5,000

With the intended development of a local-origin broodstock having a major component of 5-year-old fish, we now project an ocean fishing rate of only about 10 percent. Recent experimental results with several upper Columbia River spring chinook stocks indicate that low rates of this magnitude can

be expected for spring-run stocks migrating to an feeding off central or northern British Columbia and southeastern Alaska. Such stocks are available only to commercial troll fisheries, being largely protected by prevailing size limits and by their departure from these areas prior to the opening of fishing seasons (in their final year of life). With this type of projection, Canadian interceptions will be minimal and most adult harvest will occur in the Grays Harbor region.

In our earlier comments on immediate full development, we projected a mandatory use of Cowlitz River broodstock which is characterized by high ocean fishing rates. Evidence now in hand points to the definite possibility that the Cowlitz stock is atypical of spring chinook in general. You will also note that we have projected a higher escapement for Phase 1 than Phase 2. This was done for two reasons. First is the unavoidable relationship between recreational harvest and escapement. Since anglers will only be able to harvest about 40 percent or less of the fish available to them, we have projected some "surplus" escapement in order to provide a moderate-sized, viable recreational fishery during the first phase of development. The second reason is simply to have a fully-developed broodstock in-hand to take immediate advantage of the second phase of development.

River Angler Days Per Salmon

We have adequate data to demonstrate that the relationship between spring chinook run size and angler days expended per fish landed is definitely not linear. Small native runs have much higher angler day yields per fish caught when contrasted to the existing Cowlitz River situation. Unfortunately, we do not have any "data points" for run sizes comparable to the phased-in development stages currently projected for the Wynoochee system. We believe that days per fish will be somewhat higher than measured on the Cowlitz, or possibly about 6 days per spring chinook. To avoid splitting hairs, we recommend the use of 6.18 days per fish or the same statistic as developed by the Game Department from a better data base on steelhead. This use is logical since the fisheries for spring chinook and steelhead will overlap to a significant degree and some anglers will be fishing simultaneously for both species.

Monitoring Programs

Biological monitoring programs to evaluate such factors as rearing techniques and fishery contribution rates should be an integral part of the project plan. With phased-in development, a reasonable length of time to complete these studies would be 25 years, or 5 years beyond the full development stage.

The above narrative should provide adequate documentation for key factors involved in your project analysis. In addition, we have regularly briefed WDF Administration on the positive (and successful) staff-to-staff efforts to help you produce a project plan that is acceptable to and can be actively supported by WDF.

Sincerely,

Sam Wright

Sam Wright, Chief
Habitat Management Division

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

OFFICE OF THE GOVERNOR
Legislative Building, Olympia, Washington 98504

April 23, 1980

Colonel Leon K. Moraski
Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

The purpose of this letter is to request the Corps of Engineers to initiate studies of a fish hatchery below Wynoochee Dam with the ultimate objective of enhancing anadromous fish runs in the Chehalis River Basin and Grays Harbor area. We understand that adequate authority exists for such a study in the Chehalis River Basin.

The salmon and steelhead fisheries have been declining for several years in some areas of the state of Washington. Opportunities to reverse this trend and enhance the development of the fisheries should be fully considered at all levels of government with full involvement by the public. One of the favorable fish enhancement options in the Chehalis River Basin and Grays Harbor area is a combined salmon and steelhead hatchery just downstream from Wynoochee Dam. Because we believe that substantial benefits will accrue to fishery interests, a hatchery has been under consideration by the Washington Department of Fisheries for several years and is currently being discussed by the Grays Harbor Fishery Enhancement Task Force. A preliminary design for a hatchery has been prepared by the state and provided to your staff for planning purposes.

Recognizing that a Wynoochee hydropower study is already underway, development of both hydropower and a fish hatchery could yield benefits to both purposes. A fish hatchery could use water after it first generates hydroelectric power, would benefit from an abundant gravity-flow supply of good quality water in the Wynoochee reservoir, and would not require large amounts of power for pumping water. The unique opportunity this combined hydropower and fish hatchery development offers should be vigorously pursued.

I strongly recommend that the Corps of Engineers consider further fishery enhancement in addition to hydropower at Wynoochee Dam. It is the intent of the state to act as local sponsor of the hatchery. Personnel from the departments of Fisheries and Game will work closely with your staff.

Sincerely,

Dixy Lee Ray
Governor

NPSEN-PL-HP

6 JAN 1981

Mr. Sterling Munro
Administrator
Bonneville Power Administration
Post Office Box 3621
Portland, Oregon 97208

Dear Mr. Munro:

We are currently conducting a study which is assessing the feasibility of adding an underground powerhouse at the existing Wynoochee Dam and developing an enhancement fish hatchery for spring chinook salmon and steelhead 3,000 feet downstream of the dam. Wynoochee Dam is located at river mile 51.8 on the Wynoochee River, 35 miles north of the town of Montesano in Grays Harbor County, Washington (inclosure 1). The project provides 70,000 acre-feet of total storage and is operated principally for the city of Aberdeen's industrial water supply, with winter flood control, fisheries, and irrigation as subordinate purposes. The purpose of this letter is to request your views on the marketability in the Bonneville Power System of the hydropower generation possible at Wynoochee Dam.

Preliminary studies at Wynoochee Dam indicate that the installation of three generating units, with a total capacity of 10 megawatts, would effectively capture the potential energy currently passing the project with no change in the operation of the existing project. The units would produce approximately 40,000 megawatt hours annually at an estimated production cost of 51 mills per kilowatt hour based on total annual hydropower costs of $2,037,000 (October 1980 price level, 7-3/8 percent Federal interest rate). These costs include a fixed share payment for capacity ($1 per kilowatt year) and energy (2 mills per kilowatt hour) to the local sponsor of the existing project for their share (78 percent) of the head and flows that the existing project provides for hydropower development.

For projects of this type, the Water Resource Council's new benefit evaluation procedures allow an analysis of marketability to determine the need for future generation. A statement from you regarding the marketability of power produced by the new units under study would satisfy our needs. The estimated production costs and energy produced are preliminary estimates and subject to some revision as the project proceeds into the detailed design stage. Your marketability statement will be included in our report to higher authority seeking approval to construct the project. We will keep you advised as more detailed information becomes available.

NPSEN-PL-HP
Mr. Sterling Munro

Please contact me or Dr. James O. Waller, Hydropower Study Manager, if you have any questions concerning our study or this request.

Sincerely,

1 Incl
As stated

LEON K. MORASKI
Colonel, Corps of Engineers
District Engineer

Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

OFFICE OF THE ADMINISTRATOR

FEB 12 1981

In reply refer to: PRI

Colonel Leon K. Moraski
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

We have reviewed the information provided in your January 6, 1981, letter outlining your current studies on the feasibility of adding an underground powerhouse at the existing Wynoochee Dam located on the Wynoochee River in Grays Harbor County, Washington.

Our latest load-resource analyses show that, under critical water conditions, the region is faced with both energy and peak deficits every year in the coming decade. Resource additions which can serve to offset a segment of these forecasted deficits will, therefore, be marketable.

The power output of the project is needed; its cost can be repaid from revenues of the Federal system within 50 years of completion; and it is generated by a renewable resource. Therefore, the project merits approval conditional upon favorable cost-effective analysis being upheld in subsequent feasibility reports.

One of the provisions of the recently enacted Pacific Northwest Electric Power Planning and Conservation Act mandates the establishment of a program to protect, mitigate, and enhance the fish and wildlife resources of the Columbia River and its tributaries and requires BPA's participation in that program. While this project is outside BPA's fish and wildlife involvement as identified in the

Act, it is appropriate that BPA encourage implementation of the Wynoochee Dam Project's fisheries enhancement plan, which is directed toward reestablishing depleted spring chinook and steelhead runs.

We would appreciate being provided with the more detailed studies as they become available.

Sincerely,

Earl Gjelde

ACTING Administrator

NPSEN-PL-ER

20 MAR 1981

Joseph Blum, Area Manager
U.S. Fish and Wildlife Service
2625 Parkmont Lane, Building A
Olympia, Washington 98502

Dear Mr. Blum:

On 18 November 1980, members of my staff met with you and your staff to discuss your agency's role in cost sharing the hatchery portion of the combined Wynoochee Hydropower/Fish Hatchery project. The purpose of this letter is to summarize the events that have occurred since that meeting and to request your initiation of the U.S. Fish and Wildlife Service (FWS) letter of intent process.

At the 18 November meeting, my staff understood that you would be willing to initiate the letter of intent process pending a meeting with the directors of the Washington State Departments of Fisheries (WDF) and Game (WDG) confirming their support. The directors would have to assure you that: (1) the state supports the Wynoochee hatchery, (2) the state accepts the potential impacts of the hatchery on the wild anadromous fish stocks of the Wynoochee River and Chehalis River Basin and believes that the system could be managed to minimize those impacts, and (3) the state intends to act as local sponsor of the fish hatchery and would cost share hatchery first costs and annual hatchery operation, maintenance, and replacement (OM&R) costs.

On 24 December 1980, I requested the Governor to provide a letter advising me of the State of Washington's intent to act as local sponsor of the fish hatchery portion of the combined Wynoochee Hydropower/Fish Hatchery project and to meet the six items of responsibility. A copy of that letter was provided to your office at that time. As you are aware, WDG has had concerns regarding cost sharing and funding, especially in view of their own budgetary constraints. Nevertheless, in a letter dated 18 February 1981 (inclosure 1), the WDG formally expressed support for the hatchery and for a letter of intent from the Governor committing the state to act as the local sponsor. The WDF has continued their support for the hatchery and for a letter of intent from the state. I have now received the state's letter of intent, dated 6 March 1981, and have attached it as inclosure 2.

NPSEN-PL-ER
Joseph Blum, Area Manager

Both WDG and WDF are prepared to meet with you to discuss and confirm their support of the hatchery. Through coordination with Mr. Charles Dunn of your Olympia field office we had arranged a meeting with WDF and WDG for you on 11 March 1981, but it was cancelled due to last minute schedule changes. Per our conversations with Mr. Dunn on 10 and 12 March 1981, we now understand that such a meeting is no longer necessary in view of the continued coordination your office has had with WDG and WDF and your knowledge of the letter of intent from the Governor's office. We further understand that you are prepared to initiate the FWS letter of intent process.

I would appreciate you initiating your agency's letter of intent process as soon as possible. The letter of intent should state that the FWS intends to meet the following items of responsibility:

a. Become owner and operator of the proposed Wynoochee fish hatchery.

b. Provide for the life of the fish hatchery, 92.5 percent of the total annual project operation, maintenance, and replacement costs attributable to the fish hatchery, an annual amount presently estimated at $1,013,000.

c. Enter into a memorandum of understanding with the State of Washington regarding fish hatchery operation, maintenance, and replacement.

We are at a point in the Wynoochee Hydropower/Fish Hatchery feasibility study where initiation of your process is critical to our study progress. We will submit our draft feasibility report to our Division Office in Portland at the end of March for review and comment prior to public distribution in late May. We hope to include in our report to Division notification from you that the FWS letter of intent process has been initiated. This would require that we receive your notification by 27 March 1981.

In order to assist you in your letter of intent process we have attached a copy of our most recent recommended plan description (inclosure 3). As the project is now planned, the U.S. Army Corps of Engineers would construct the combined hydropower and fish hatchery project and would operate and maintain the hydropower facility; the FWS would own and manage the fish hatchery and would contract with WDF and WDG for its operation and maintenance; and the State of Washington would be the local sponsor of the fish hatchery. The project plan is contingent upon the Corps of Engineers, as the owner and operator of the Wynoochee Lake project and planned owner and operator of the proposed appurtenant hydropower facility, providing a water supply of adequate volume (up to 190 cubic feet per second) and temperature to the fish hatchery intake structure within the existing operational constraints of the Wynoochee Lake project.

We were informed at the 18 November 1980 meeting with you and again in recent conversations with your staff that formal transmittal of the draft Fish and Wildlife Coordination Act (FWCA) report for the Wynoochee Hydropower/Fish

NPSEN-PL-ER
Joseph Blum, Area Manager

Hatchery study will occur upon initiation of the FWS letter of intent process. We would appreciate receiving a copy of the draft FWCA report along with your notification that the FWS letter of intent process has been initiated. Although we have not had the benefit of any written input from your agency, we are aware of the FWS concerns relative to the hydropower/fish hatchery plan through informal coordination with your staff and are treating those concerns in the draft feasibility report. Our report will be reviewed by agencies and the public and must be approved by higher level Corps of Engineers' offices before submittal to Congress for authorization. Once the project has been authorized by Congress and funds are provided for advanced engineering and design, we will proceed to develop a final plan. Final species selection and hatchery design will be determined during advanced engineering and design studies through detailed consultation with your agency and the state. Following approval of the final plan, we will request funds from Congress for construction.

We feel we have a unique opportunity at the existing Wynoochee Dam to meet a portion of two major needs in the Pacific Northwest - energy and anadromous fish. We appreciate your continued interest and participation in the study and look forward to hearing from you in the near future. I will personally continue to keep you advised of any future developments regarding the Wynoochee hydropower/Fish hatchery study. If you have any questions or require additional information, please do not hesitate to contact me at FTS 399-3690. Dr. James O. Walker, Wynoochee Study Manager, and Ms. Karen Northup, Environmental Coordinator, at FTS 399-3473 and FTS 399-3624, respectively, are also available to assist both you and your staff.

Sincerely,

LEON K. MORASKI
Colonel Corps of Engineers
District Engineer

3 incl
as stated

Copy furnished:
Frank A. Lockard, Director
Washington Department of Game
600 North Capitol Way
Olympia, Washington 98504

Roland A. Schmitten, Director
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

16 JUN 1987

NPSEN-PL-HP

Bert Larkin, Regional Director
Pacific Northwest Region
National Marine Fisheries Service
1700 Westlake North
Seattle, Washington 98109

Dear Mr. Larkin:

Our Wynoochee hydropower/fish hatchery studies and our coordination with your office have progressed to the point where your formal response is needed regarding National Marine Fisheries Service's (NMFS) intent to act as Federal sponsor of the fish hatchery portion of the combined Wynoochee hydropower/fish hatchery project. I would appreciate receiving your statement as soon as possible.

The letter of intent should state that NMFS intends to meet the following items of responsibility:

a. Become owner and operator of the proposed Wynoochee fish hatchery.

b. Provide, for the life of the fish hatchery, 100 percent of the total annual project operation, maintenance, and replacement costs attributable to the commercial enhancement portion of the fish hatchery, an annual amount presently estimated at $603,000.

c. Enter into a memorandum of understanding with the State of Washington regarding fish hatchery operation, maintenance, and replacement.

If you have any questions or require additional information, please do not hesitate to contact me at 764-3690. Dr. James O. Waller, Wynoochee Study Manager, and Ms. Karen Northup, Environmental Coordinator, at 764-3473 and 764-3624, respectively, are also available to assist both you and your staff.

Sincerely,

LEON K. MORASKI
Colonel, Corps of Engineers
District Engineer

Copy furnished:
(See next page)

NPSEN-PL-HP
Bert Larkin, Regional Director

Copy furnished:
Mr. Robert Ayers
Pacific Northwest Region
National Marine Fisheries Service
1700 Westlake North
Seattle, Washington 98109

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
1700 Westlake Avenue North
Seattle, Washington 98109

June 18, 1981

F/NWR/1505-07

Colonel Leon K. Moraski
District Engineer, Seattle District
U. S. Army Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Lee:

First, I should make clear that the following comments are those of the Northwest Regional Office of NMFS, not NMFS as a whole, although by copy of this letter and yours of June 16 to our Headquarters I am recommending agency concurrence with my views.

I believe the Wynoochee Hatchery project proposed by your office has extraordinary potential as a regional salmon and steelhead wild stock recovery and enhancement facility. As I am sure you are aware, runs of native chinook and coho salmon and of steelhead to many Washington coastal streams are severely depressed. These poor stock conditions have serious implications regarding Indian treaty fishing rights vis-a-vis Pacific Council and State of Washington salmon management.

The State and Federal fishery agencies, and as I understand it the coastal Indian tribes, prefer to maintain native fish runs where possible rather than replacing those wild stocks with hatchery strains. The proposed Wynoochee facility, given proper design of its ponds and raceways and because of its location and its water quantity and quality, seems ideally suited for rearing the progeny of wild fish from this critical and sensitive area for out-planting back to their native rivers.

In the context of the above, I heartily endorse the Corps' proposed Wynoochee Hatchery project. That endorsement, however, is predicated on the condition that any NMFS financial and administrative responsibility for project O and M be subject to specific authority and appropriation from the Congress.

Sincerely,

Bart

H. A. Larkins
Regional Director

cc: Leitzell
(w/project proposal and COE letter)
Martinson, FWS
Blum, FWS

10TH ANNIVERSARY 1970-1980
National Oceanic and Atmospheric Administration
A young agency with a historic tradition of service to the Nation

NPSEN-PL-HP

17 AUG 1981

Ferris Gilkey, Manager
Grays Harbor Public Utility District
Post Office Box 480
Aberdeen, Washington 98520

Dear Mr. Gilkey:

For the last 2 months we have been informally discussing with you a possible partnership between us to develop the hydropower potential at Wynoochee Dam. Our discussions have progressed to the point where formal response by the Grays Harbor Public Utility District (PUD) is required regarding its intent to act as local sponsor of the hydropower portion of the combined hydropower/fish hatchery project.

The partnership, as we now perceive it, would primarily involve the following:

a. The U.S. Army Corps of Engineers would design, construct, operate, and maintain the hydropower facility.

b. The Grays Harbor PUD would distribute and market any energy and capacity produced by the hydropower facility. As a part of project authorization, Congress would have to specifically exempt this project from the provisions of Section 5 of the 1944 Flood Control Act which requires the marketing of Federal power by the Bonneville Power Administration.

c. Grays Harbor PUD would pay 100 percent of the construction cost allocated to hydropower at the time of construction and 100 percent of the annual hydropower operation, maintenance, and replacement cost for the life of the hydropower facility.

d. Grays Harbor PUD would fund and construct any necessary power transmission line.

The proposed hydropower facility would be a 10.2-megawatt (MW) (nameplate) underground facility which would produce approximately 40,000 MW hours of energy per year. Hydropower development would be combined with enhancement fish hatchery development into an integrated hydropower/fi hatchery project with no change in the existing Wynoochee Lake project operations.

NPSEN-PL-HP
Ferris Gilkey, Manager

Hydropower operation would be subordinant to all other purposes and the facility would operate as a run-of-river plant.

The specific responsibilities of the Grays Harbor PUD as local sponsor of the hydropower portion of the combined hydropower/fish hatchery project are as follows:

a. Provide a cash contribution equal to 100 percent of the total project first cost attributable to hydropower, presently estimated at $19,400,000 (does not include transmission costs).

b. Provide a cash or in-kind annual contribution for the life of the hydropower facility equal to 100 percent of the total annual project operation, maintenance, and replacement costs attributable to hydropower, an annual contribution presently estimated at $306,000.

c. Distribute any energy and capacity which is produced from the hydropower facility.

d. Furnish power free of cost to the United States for operation and maintenance of the Wynoochee Lake project and recommended fish hatchery at voltage and frequency required and at a point adjacent thereto.

e. Hold and save the United States free from damages due to the construction and subsequent operation and maintenance of the hydropower facility, except for such damages that are due to the fault or negligence of the United States or its contractors.

f. Hold and save the United States free from any and all claims and damages for lost power revenues and additional operation costs resulting from operation and maintenance of the Wynoochee Lake project and from the construction, operation, and maintenance of the recommended fish hatchery.

After we have had an opportunity to discuss this matter, I would appreciate receiving a resolution from the commission stating Grays Harbor PUD's intent to act as local sponsor of the hydropower portion of the combined hydropower fish hatchery project. The resolution should restate the items of responsibility (a through f) listed above and include a statement of the PUD's authority and financial capability. The resolution will be included in our draft feasibility report now in preparation. Our report will be reviewed by agencies and the public and must be approved by higher level Corps of Engineers offices before submittal to Congress for authorization. Once authorized by Congress, and funds provided for advanced engineering and design, we will proceed in cooperation with all interested parties to develop a final integrated hydropower/fish hatchery plan. Following approval of the final plan, we would request the Grays Harbor PUD to pay all subsequent costs allocated to hydropower design, construction, operation, and maintenance.

NPSEN-PL-HP
Ferris Gilkey, Manager

Your decision to act as local sponsor of the hydropower facility will be needed prior to final congressional action, and the commitment of PUD funds will be needed prior to final design and advertisement of the construction contracts.

If you or the PUD commissioners have any questions concerning this letter, please contact me at telephone (206) 764-3690, or Dr. James O. Waller, Hydropower Study Manager, at telephone (206) 764-3473.

Sincerely,

LEON K. MORASKI
Colonel, Corps of Engineers
Commanding

PUBLIC
UTILITY
DISTRICT
No. 1

GRAYS HARBOR COUNTY

October 5, 1981

Colonel Leon K. Moraski
Corps of Engineers, Seattle District
Department of the Army
P. O. Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

During the past several months representatives of your office and the District have been discussing an arrangement under which the District might become a sponsor of the power facilities which the Corps proposes to build as a part of its joint development of power and fisheries facilities at the Wynoochee dam. During those discussions both parties have expressed a number of concerns which need to be addressed.

Because of the complex nature of those concerns, agreement has not yet been reached but it appears that a solution is possible. We understand that, in order to meet the timing requirements of your office, an indication of the District's position is needed at this time. Therefore, subject to a satisfactory agreement being reached upon the concerns which the District has expressed, the District would be willing to act as a sponsor for all of the costs allocated to the hydropower facilities which the Corps proposes to be added to the Wynoochee dam.

Yours very truly,

Arnold L Holm

Arnold L. Holm
President of the Commission

P. O BOX 480 ABERDEEN WASHINGTON 98520 PHONE 20[illegible]

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE, WASHINGTON 98124

NPSEN-PL-HP

26 OCT 1981

Honorable John D. Spellman
Governor of Washington
Olympia, Washington 98504

Dear Governor Spellman:

In our previous correspondence on the Wynoochee Hydropower/Fish Hatchery Study, we requested (inclosure 1) a letter from you advising of the State of Washington's intent to act as local sponsor of the fish hatchery portion of the combined Wynoochee hydropower/fish hatchery project. You responded on 6 March 1981 (inclosure 2) stating it is your intention to do what you can to have the State of Washington act as local sponsor for the fish hatchery portion of the combined project and meet the six items of responsibility, subject to funding by the legislature.

In the past few months, the results of our studies have been reviewed by our higher authorities in Portland, Oregon, and Washington, D.C. Several changes in the project design, economics, and cost sharing resulted from their comments. In addition, the scope of the proposed fish hatchery has been expanded in consultation with the Washington State Departments of Fisheries and Game into an enhancement facility for anadromous fish in several Washington coastal rivers, not just the Wynoochee River.

These changes require a revised letter of intent from the State of Washington. On 22 September, my staff briefed Messrs. Lockard, Schmitten, and Spencer of the Departments of Game, Fisheries, and Ecology and their staffs on this project. We discussed the concept and scope of the fish hatchery and the revised cost sharing figures. The agencies expressed their strong support for the project.

As the project is now planned, the U.S. Army Corps of Engineers would construct the combined hydropower/fish hatchery project, the Grays Harbor Public Utility District would be the local sponsor for the hydropower facility and market the power output (instead of power marketing by Bonneville Power Administration), the National Marine Fisheries Service or Fish and Wildlife Service would own and manage the fish hatchery and contract with the Washington State Departments of Fisheries and Game for its operation and maintenance, and the State of Washington would be the local sponsor of the fish

hatchery. The combined project would produce 37,400-megawatt hours of average annual energy from the 10.2-megawatt hydropower facility and add 129,000 adult salmon and steelhead to the anadromous fish harvest annually. The proposed project would cost $42,400,000 (October 1981 price level) and would produce $1.20 in hydropower benefits for every $1 in hydropower costs and $2.90 in fish enhancement benefits for every $1 in fish costs.

The project plan includes and is contingent upon the following:

a. The Corps of Engineers, as owner and operator of the Wynoochee Lake project and planned owner and operator of the proposed appurtenant hydropower facility, providing a water supply of adequate volume (up to 190 cubic feet per second) to the fish hatchery intake structure within the existing operational constraints of the Wynoochee Lake project.

b. A Federal fish agency accepting ownership of the fish hatchery from the Corps of Engineers and assuming the responsibility for the management of the fish hatchery and the Federal Government's share of the annual operation, maintenance, and replacement costs attributable to the fish hatchery.

c. The State of Washington fulfilling its obligation under the signed memorandum of agreement (MOA) with the Corps of Engineers dated 28 July 1977 (Construction of Fish Hatchery Facilities for Prevention of Natural Spawning Areas for Anadromous Trout Occasioned by Construction of Wynoochee Lake Project) by providing funds for accomplishing said construction as part of the proposed fish hatchery. The MOA dated 28 July 1977 may need to be amended or supplemented, as legally required, to reflect this change of fulfilling the state obligation.

The total allocated first cost of the fish hatchery is presently estimated at $20,820,000, and the total annual allocated operation, maintenance, and replacement cost of the fish hatchery is presently estimated at $984,000. The total allocated first cost of the hydropower facility is presently estimated at $21,580,000, and the total annual allocated operation, maintenance, and replacement cost of the hydropower facility is presently estimated at $341,000. All costs are at the October 1981 price level. The percentage of the allocated fish hatchery first and annual costs attributable to the existing state mitigation responsibility as set forth in the 28 July 1977 MOA is 2.6 percent based on the percentage of total fish production attributable to said mitigation. The remaining fish production is enhancement and would be distributed 29.3 percent to the sport fishery and 70.7 percent to the commercial and Indian fishery based on state catch figures. The State of Washington's share of allocated first costs and allocated annual operation, maintenance, and replacement costs of the enhancement fish hatchery (97.4 percent of the fish hatchery) are 25 percent of the separable first costs and 100 percent of the separable annual costs attributable to the sport fishery. This cost sharing is in accordance with the Federal Water

Project Recreation Act (Public Law 89-72, as amended) and the Water Resources Council's Principles and Standards for Water and Related Land Resources. The Federal Government's share of the cost is 75 percent of the separable sport fishery first cost, 100 percent of the joint sport fishery first and annual costs, and 100 percent of the commercial and Indian fishery first and annual costs. The Grays Harbor PUD's share is 100 percent of the hydropower costs.

In addition, former President Carter's proposed cost sharing policy must be addressed. This policy, if implemented by Congress, would require states to participate more actively in project implementation decisions. This proposed cost sharing is in addition to any non-Federal cost sharing required under existing law. Specifically, the state would be required to provide a cost contribution for 10 percent of the construction (first) cost associated with vendable outputs in exchange for 10 percent of net revenues and 5 percent of the construction cost associated with nonvendable outputs. My recommendation to Congress for project authorization will be in accordance with former President Carter's proposed cost sharing policy.

The responsibilities for the State of Washington as local sponsor of the fish hatchery are as follows:

a. Provide a cash contribution equal to the allocated first costs attributable to the fish hatchery for constructing a part of the fish hatchery to fulfill the state's obligation under the signed MOA dated 28 July 1977 (as amended or supplemented as legally required), a contribution presently estimated at $570,000.

b. Provide a cash or in-kind annual contribution for the life of the fish hatchery equal to the annual allocated operation, maintenance, and replacement costs attributable to the fish hatchery for operating, maintaining, and replacing a part of the fish hatchery to fulfill the state obligation under the signed MOA dated 28 July 1977 (as amended or supplemented as legally required), an annual contribution presently estimated at $27,000.

c. Provide a cash contribution equal to 25 percent of the separable first cost attributed to the recreation (sport) enhancement portion of the fish hatchery, a contribution presently estimated at $1,470,000.

d. Provide cash or in-kind annual contribution for the life of the fish hatchery equal to 100 percent of the separable annual operation, maintenance, and replacement costs attributable to the recreation (sport) enhancement portion of the fish hatchery, an annual contribution presently estimated at $278,000.

e. In accordance with former President Carter's proposed cost sharing policy, provide a cash contribution equal to 10 percent of the allocated

construction cost attributable to hydropower plus 5 percent of the allocated construction cost attributable to the fish hatchery, a contribution presently estimated at $3,199,000.

f. Enter into a memorandum of understanding with the sponsoring Federal fish agency regarding fish hatchery operation, maintenance, and replacement.

g. Obtain any necessary permits.

h. Hold and save the United States free from damages due to the construction and subsequent operation and maintenance of the fish hatchery, except for such damages that are due to the fault and negligence of the United States or its contractors.

We will appreciate receiving a new letter from you advising of the State of Washington's intent to act as local sponsor of the fish hatchery portion of the combined Wynoochee hydropower/fish hatchery project. Your letter should restate the items of contingency (a-c) and items of responsibility (a-h) listed in this letter and include your intention in regards to the items of responsibility. This preauthorization stage letter of intent is not binding and does not obligate future legislatures. However, a firm binding commitment on the estimated cost contributions will be required subsequent to congressional authorization as a basis for the Corps of Engineers to initiate construction. Your letter of intent will be included in our draft feasibility report now in preparation.

Our report will be reviewed by Federal agencies, the state, and the public and must be approved by higher level Corps of Engineers offices before submittal to Congress for authorization. Once the project is authorized by Congress and funds provided for advanced engineering and design, we will proceed in cooperation with the state to develop a final plan. Following approval of the final project, we will request funds for construction from Congress. The decision to act as local sponsor of the fish hatchery will be needed prior to final congressional action and a commitment of state funds will be necessary prior to advertisement of the construction contracts.

If you or your staff have any questions concerning this letter, please contact me at telephone (206) 764-3690 or Dr. James O. Waller, Hydropower Study Manager, at (206) 764-3473.

Sincerely,

LEON K. MORASKI
Colonel, Corps of Engineers
District Engineer

2 Incl
As stated

Copy furnished w/incl:
(see next page)

NPSEN-PL-HP
Honorable John D. Spellman

Copy furnished w/incl:
Rolland A. Schmitten, Director
Department of Fisheries
State of Washington
115 General Administration Building
Olympia, Washington 98504

Frank R. Lockard, Director
Department of Game
State of Washington
600 North Capitol Way
Olympia, Washington 98504

Donald W. Moos, Director
Department of Ecology
State of Washington
Olympia, Washington 98504

Edward Sheets, Director
Washington State Energy Office
400 East Union Avenue
Olympia, Washington 98504

H. A. Larkins, Regional Director
National Marine Fisheries Service
1700 Westlake Avenue North
Seattle, Washington 98109

Joseph R. Blum, Area Manager
U.S. Fish and Wildlife Service
2625 Parkmont Lake
Olympia, Washington 98502

State of Washington

JOHN SPELLMAN, Governor

November 20, 1981

OFFICE OF THE GOVERNOR

Colonel Norman C. Hintz, District Engineer
Seattle District Corps of Engineers
Post Office Box C-3755
Seattle, Washington 98124

Dear Colonel Hintz:

I have reviewed your letter of October 26, 1981, regarding the proposed hydropower and anadromous fish enhancement facility at Wynoochee. I find a combined facility that would produce both power and anadromous fish very appealing.

As you are aware, this office by itself cannot commit the legislature to the funding required for local sponsorship of this or any other project. However, I believe the legislature in their wisdom, and as they have in the past, will recognize the value to the state of this proposal. It is my intention to strongly support this project and have the state of Washington act as local sponsor for their share of this project.

The state acknowledges the following contingencies contained in your October 26, 1981, letter:

a. The Corps of Engineers, as owner and operator of the Wynoochee Lake project and planned owner and operator of the proposed appurtenant hydropower facility, providing a water supply of adequate volume (up to 190 cubic feet per second) to the fish hatchery intake structure within the existing operational constraints of the Wynoochee Lake project.

Legislative Building • Olympia, Washington 98504 • (206) 753-6780 • (Scan) 234-6780

b. A Federal fish agency accepting ownership of the fish hatchery from the Corps of Engineers and assuming the responsibility for the management of the fish hatchery and the Federal Government's share of the annual operation, maintenance, and replacement costs attributable to the fish hatchery.

c. The state of Washington fulfilling its obligation under the signed memorandum of agreement (MOA) with the Corps of Engineers dated 28 July 1977 (Construction of Fish Hatchery Facilities for Prevention of Natural Spawning Areas for Anadromous Trout Occasioned by Construction of Wynoochee Lake Project) by providing funds for accomplishing said construction as part of the proposed fish hatchery. The MOA dated 28 July 1977 may need to be amended or supplemented, as legally required, to reflect this change of fulfilling the state obligation.

The state also accepts as local sponsor the following responsibilities for the fish hatchery:

a. Provide a cash contribution equal to the allocated first costs attributable to the fish hatchery for constructing a part of the fish hatchery to fulfill the state's obligation under the signed MOA dated 28 July 1977 (as amended or supplemented as legally required), a contribution presently estimated at $570,000.

b. Provide a cash or in-kind annual contribution for the life of the fish hatchery equal to the annual allocated operation, maintenance, and replacement costs attributable to the fish hatchery for operating, maintaining, and replacing a part of the fish hatchery to fulfill the state obligation under the signed MOA dated 28 July 1977 (as amended or supplemented as legally required), an annual contribution presently estimated at $27,000.

c. Provide a cash contribution equal to 25 percent of the separable first cost attributed to the recreation (sport) enhancement portion of the fish hatchery, a contribution presently estimated at $1,470,000.

d. Provide cash or in-kind annual contribution for the life of the fish hatchery equal to 100 percent of the separable annual operation, maintenance, and replacement costs attributable to the recreation (sport) enhancement portion of the fish hatchery, an annual contribution presently estimated at $278,000.

f. Enter into a memorandum of understanding with the sponsoring Federal fish agency regarding fish hatchery operation, maintenance, and replacement.

g. Obtain any necessary permits.

h. Hold and save the United States free from damages due to the construction and subsequent operation and maintenance of the fish hatchery, except for such damages that are due to the fault and negligence of the United States or its contractors.

However, item e of your letter about former President Carter's proposed cost-sharing policy, which adds an estimated $3,199,000 to the state share, causes some concern. This, as we understand it, is policy only and not a law. It would require congressional enactment before the state would have to meet this item of responsibility. If this proposed policy is implemented by Congress, the state's sponsorship of this project could become highly uncertain. Therefore, we cannot agree to this item e now.

In conclusion, this combined project is important to the state of Washington and I will do whatever I can to make the state the local sponsor of the fish hatchery.

Sincerely,

John Spellman
Governor

cc: Director of Game
Director of Fisheries

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE, WASHINGTON 98124

NPSEN-PL-HP

12 FEB 1982

Peter Johnson, Administrator
Bonneville Power Administration
Post Office Box 3621
Portland, Oregon 97208

Dear Mr. Johnson:

The purpose of this letter is to obtain your current comments on the marketability of Federal power produced by a proposed hydropower project at Wynoochee Dam and your views on a proposed partnership arrangement between the U.S. Army Corps of Engineers and a non-Federal entity for marketing the power. This letter follows discussions between Mr. Neil Freeman and others of your staff and members of the Corps of Engineers on 5 February 1982. Your response of 12 February 1981 to our 6 January 1981 request for comments on marketability is inclosed for your reference (inclosure 1).

Seattle District is concluding work on a feasibility report recommending the addition of hydropower and enhancement fish hatchery facilities to Wynoochee Dam on the Wynoochee River, Washington. The proposed project, shown on the inclosed drawing (inclosure 2), is a 10.2-megawatt hydropower addition which would produce an average 37,400 megawatt-hour (MWH) of energy per year and a 396,000-pound enhancement fish hatchery for anadromous fish 3,000 feet downstream of Wynoochee Dam providing 129,000 adult fish annually to the harvest. The draft feasibility report/environmental impact statement was mailed on 3 December 1981 to interested parties and agencies, including Bonneville Power Administration (BPA), for review and comment. The comment period is now scheduled to close on 28 February 1982.

In response to the local public's desire for non-Federal marketing of power, the proposed project contains provisions for a Federal/non-Federal partnership to develop the hydropower potential. Under the partnership, the Corps of Engineers would construct the hydropower facility. A non-Federal entity, as local sponsor of the hydropower facility, would market the power output and pay 100 percent of the hydropower construction cost and annual hydropower operation, maintenance, and replacement costs. This partnership requires an exemption from the power marketing provisions of Section 5 of the 1944 Flood Control Act (Public Law 534, 78th Congress) which requires BPA to market power produced at Corps of Engineers' projects in the Pacific Northwest. The proposed partnership reflects the current administration's goal for 100 percent non-Federal financing of hydropower projects.

NPSEN-PL-HP
Peter Johnson, Administrator

Since this plan contains unusual aspects affecting the marketing of electrical power generated from a Corps of Engineers facility, we request your comments on the following two aspects of power marketability for the proposed Wynoochee hydropower facility:

a. Does BPA support (1) an agreement between the Corps of Engineers and a non-Federal entity requiring the non-Federal entity to pay all allocated hydropower costs at Wynoochee Dam in return for the right to market all electric power generated by the facility and (2) the required congressional exemption to Section 5 of the 1944 Flood Control Act?

b. Should the proposed annual generation of 37,400 MWH be marketed directly through BPA, would the power produced at a cost of 53 mills per kilowatt-hour at the project's bus bar be marketable? The cost of power is based on repayment of $21,580,000 investment cost allocated to hydropower over 100 years at 7-5/8 percent interest plus annual operation, maintenance, and replacement costs of $341,000.

I would appreciate receiving your comments by the close of the comment period on 28 February. Please contact Dr. Waller at FTS 399-3473 if you have any questions concerning this request.

Sincerely,

NORMAN C. HINTZ
Colonel, Corps of Engineers
District Engineer

2 Incl
As stated

Copy furnished w/incl:
Neil Freeman, Chief
Power Resources Investigation
Bonneville Power Administration
Post Office Box 3621
Portland, Oregon 97208

PUBLIC
UTILITY
DISTRICT
No. 1 OF GRAYS HARBOR COUNTY

February 22, 1982

Colonel Norman C. Hintz
Corps of Engineers, Seattle District
Department of the Army
P. O. Box C-3755
Seattle, Washington 98124

Dear Colonel Hintz:

Colonel Moraski's August 17, 1981 letter concerned the possible partnership between the Department of the Army, Corps of Engineers, and Public Utility District No. 1 of Grays Harbor County, Washington, to develop the hydropower potential at Wynoochee Dam. October 5, 1981 this District by letter indicated a willingness "to act as a sponsor for all of the costs allocated to the hydropower facilities which the Corps proposes to be added to the Wynoochee Dam," which was conditioned and "subject to a satisfactory agreement."

At our recent meeting February 10, 1982 we reviewed with members of your staff the present circumstances which did not exist at the time of the initiation of the partnership. Presently there is no guarantee that the District at a future date would be able to or have the authority to finance this project by the sale of bonds.

Therefore, the District has determined that it must withdraw from this above-mentioned partnership at this time.

Although the District believes the project is needful in the future, present circumstances mandate withdrawal by the District as sponsor to develop the hydropower potential at Wynoochee in partnership with the Department of the Army, Corps of Engineers. We intend to make every effort to convey the obtained Permit and by so doing recover the expended funds and coincidentally provide another sponsor.

In the event it should appear to this Public Utility District some time in the future that sponsorship is available to the Public Utility District, you will be immediately notified.

Yours very truly,

Lois M. Powell

Lois M. Powell
Vice President of the Commission

P. O. BOX 480 ABERDEEN, WASHINGTON 98520-0109 PHONE 206/532-4220

Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

OFFICE OF THE ADMINISTRATOR

JUL 6 1982

In reply refer to: PRI

Colonel Norman C. Hintz
District Engineer, Seattle District
U.S. Army Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Colonel Hintz:

We have reviewed your letter of February 12, 1982, concerning the marketability of 10.2 megawatts proposed for installation by the Corps of Engineers at Wynoochee Dam on the Wynoochee River near Aberdeen, Washington. We apologize for the delay in our response. We are struggling with much the same policy questions that you are, including a changing load-resource balance in the region.

You asked in your letter if BPA supports:

"(1) An agreement between the Corps of Engineers and a non-Federal entity requiring the non-Federal entity to pay all allocated hydropower costs at Wynoochee Dam in return for the right to market all electric power generated at the facility.

"(2) The required congressional exemption to Section 5 of the 1944 Flood Control Act."

In general, we are supportive of the concept, provided the Corps constructs and operates the total project. This should allow proper coordination of both the Government's and the sponsor's interests. This arrangement can uniquely be applied in the Pacific Northwest because of the capability of Bonneville to, in effect, be the sponsor in conjunction with the non-Federal entity as a result of PL 96-501. We recognize, however, that these are policy issues of nationwide importance now under consideration in Washington, D.C. The Assistant Secretaries Working Group of the Cabinet Council on Natural Resources and Environment, chaired by William R. Gianelli, Assistant Secretary of the Army (Civil Works), has these policy issues in an advanced stage of examination and should have some decisions on them shortly. If the type of development you suggest is pursued, we would be very pleased to work with the Corps of Engineers and all other participants. If a sale of power to BPA is proposed as part of this arrangement, we would need to further examine the economics of a purchase much as we would any resource offered to us.

We understand from your proposal that the hydroelectric plant would produce an annual average energy of 37,400 megawatthours, for a plant factor of about 41 percent. The hydroelectric proposal is in addition to a fish hatchery for a 396,000-pound enhancement of anadromous fish. Our comments on the fish hatchery were sent in a letter, February 26, 1982. Your summary has an energy cost of 53 mills/kilowatthour, based on repayment of a $21,580,000 investment cost, allocated to hydroelectric power over 100 years, at 7-5/8 percent interest plus annual operation, maintenance, and replacement costs of $341,000.

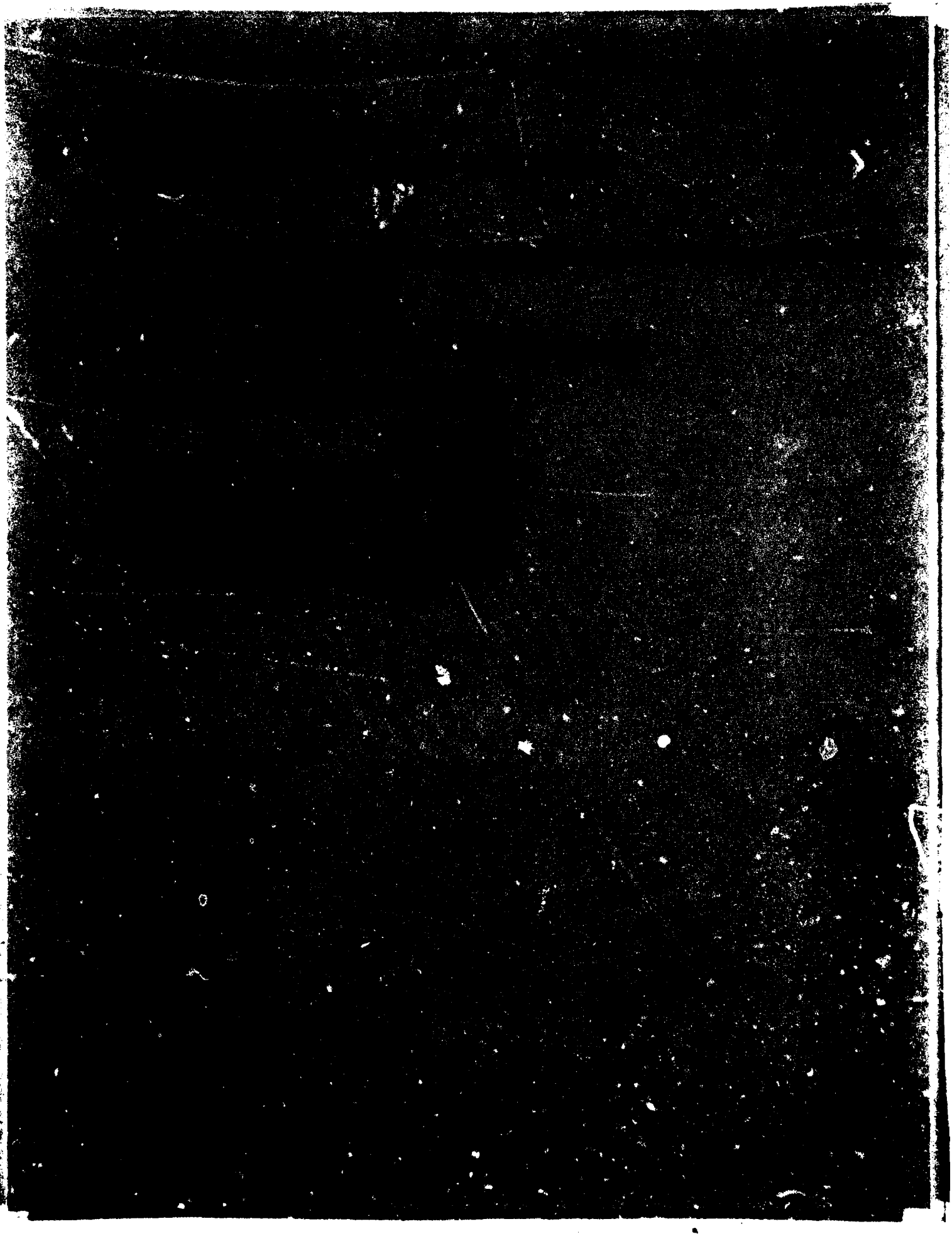
It is not possible for us to give a truly definitive answer to whether we would currently purchase or support the marketability of this project. Our most current load forecasts are outlined in the draft, "Bonneville Power Administration Forecasts of Electricity Consumption in the Pacific Northwest," dated April 1982. The high load growth projection is 2.5 percent annually from 1980-2000, a base case of 1.7 percent, and a low load growth projection is 0.8 percent per year, for the same period. Translating this load forecast into a load/resource balance for the region shows, for the base case, a potential surplus until the late 1980's followed by growing deficits in the 1990's. Under these circumstances, preliminary analyses we have performed indicate that long-term resources brought online in the near future would need to have a levelized 1982 dollar cost of 30-40 mills/kilowatthour or less in order to be economically desirable. A later online date would yield a larger number increasing to full avoided cost when the project would be coming online at a time of expected deficit rather than surplus. Special arrangements for either structuring the debt service or special early year sales outside the Region, or a combination, might also be explored.

As I have often discussed with General van Loben Sels, we would be pleased to work with the Corps in any way we can for the benefit of both agencies. Please keep us informed of any new developments you may have concerning the hydroelectric feasibility of this project.

Sincerely,

Peter T. Johnson

Administrator



AD-A120 049 CORPS OF ENGINEERS SEATTLE WA SEATTLE DISTRICT F/G 13/2
WYNOOCHEE HYDROPOWER/FISH HATCHERY: FEASIBILITY REPORT AND ENVI--ETC(U)
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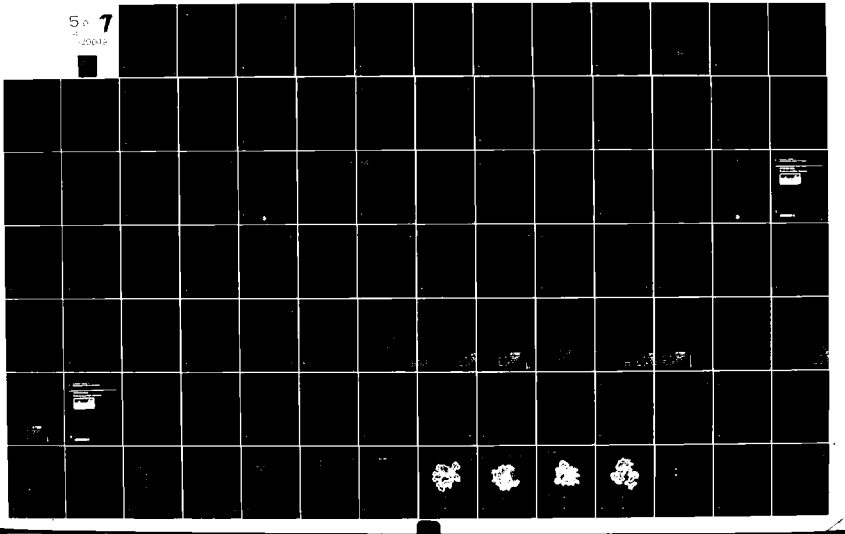

APPENDIX D

U.S. FISH AND WILDLIFE SERVICE COORDINATION ACT REPORT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Area Office
2625 Parkmont Lane
Olympia, Washington 98502

July 2, 1981

Colonel Leon K. Moraski
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

Enclosed are two copies of our final Fish and Wildlife Coordination Act report on the proposed hydropower and hatchery projects at Wynoochee Dam, Washington. The draft report was circulated to other Federal and State agencies for review. Letters of concurrence from these agencies are included. Recommendations made in letter of concurrence were considered in preparing this final report. We believe this final report reflects the views of the appropriate resource agencies.

Sincerely,

Joseph R. Blum
Area Manager

Enclosures

cc: RO (AE)
AO
FAO
WDG (Fenton)
WDF (Wright)
NMFS (Evans)
(Groves)

WYNOOCHEE HYDROPOWER AND HATCHERY PROJECTS

Fish and Wildlife Coordination Act Report

Ecological Services, Olympia Field Office
Olympia, Washington

July, 1981

Fish and Wildlife Service
U.S. Department of the Interior

WYNOOCHEE HYDROPOWER PROJECT
WYNOOCHEE HATCHERY PROJECT

Final
Coordination Act Report
submitted to
Seattle District, U.S. Army Corps of Engineers
Seattle, Washington

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U.S. Fish and Wildlife Service
Ecological Services, Olympia Field Office
Olympia, Washington

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DESCRIPTION OF THE PLAN AREA

The Wynoochee River basin occupies a 126-square-mile area in the southern portion of Washington's Olympic Peninsula (Figure 1). From its headwaters in the southern slopes of the Olympic Mountains, the Wynoochee River flows generally south for 67 miles to its confluence with the Chehalis River near Montesano. The uppermost portion of the river is steeply mountainous, followed by the more moderate gradient of the Weatherwax Basin, a narrow steep-walled canyon, and alternating gorges and open brushy bottoms until it becomes a broad valley near its confluence with the Chehalis. The lower mile of the Wynoochee River is under tidal influence.

Lands in the upper valley are primarily used for timber production, where Douglas fir, western red cedar, and western hemlock forests predominate. Recently logged or otherwise disturbed areas exhibit typical regenerative plant associations of red alder, bigleaf maple, and other subclimax species. Lower valley lands (below river mile 27) are used primarily for agriculture, mostly pasture and cropland, and exhibit various stages of natural regenerative growth peripheral to farmed areas.

A wide range of wildlife occurs in the Wynoochee drainage. Some of the many species are Roosevelt elk, black-tailed deer, black bear, cougar, brush rabbit, muskrat, river otter, grouse, osprey, and harlequin and wood ducks.

Anadromous fish resources of the Wynoochee River system presently include coho, chum, and fall chinook salmon; steelhead and cutthroat trout. Washington Department of Fisheries feels the former run of spring chinook salmon has disappeared in recent years. Resident fish include cutthroat and rainbow trout and mountain whitefish. Suckers, squawfish, and other nongame fish species are also present.

A primary feature of the drainage is the existing Corps of Engineers' Wynoochee Lake Project at river mile 51.8 in the Weatherwax Basin (Figure 1). The project, completed in 1972, consists of a concrete and earthfill dam creating a 1,170-acre reservoir at full pool. Construction of the project was authorized in 1962 for the purposes of industrial water supply, irrigation, flood control, with fish and wildlife mitigation measures included. Project mitigation features included provisions for anadromous fish and resident wildlife species. Anadromous fish features consisted of upstream and downstream fish passage facilities, downstream flow and passage enhancement, and a one-time monetary payment to Washington Department of Game for hatchery production sufficient to offset project losses to anadromous trout. Wildlife mitigation consisted of acquiring easements on Wynoochee bottomlands for elk habitat improvement purposes (see Figure 1).

DESCRIPTION OF THE SELECTED PLAN

Combined Hatchery and Hydropower Project

The plan recommended by the Corps of Engineers is a 10.2-megawatt (nameplate) hydropower addition to Wynoochee Dam which would produce an average of 40,000 megawatt-hours of energy per year, and a hatchery designed for

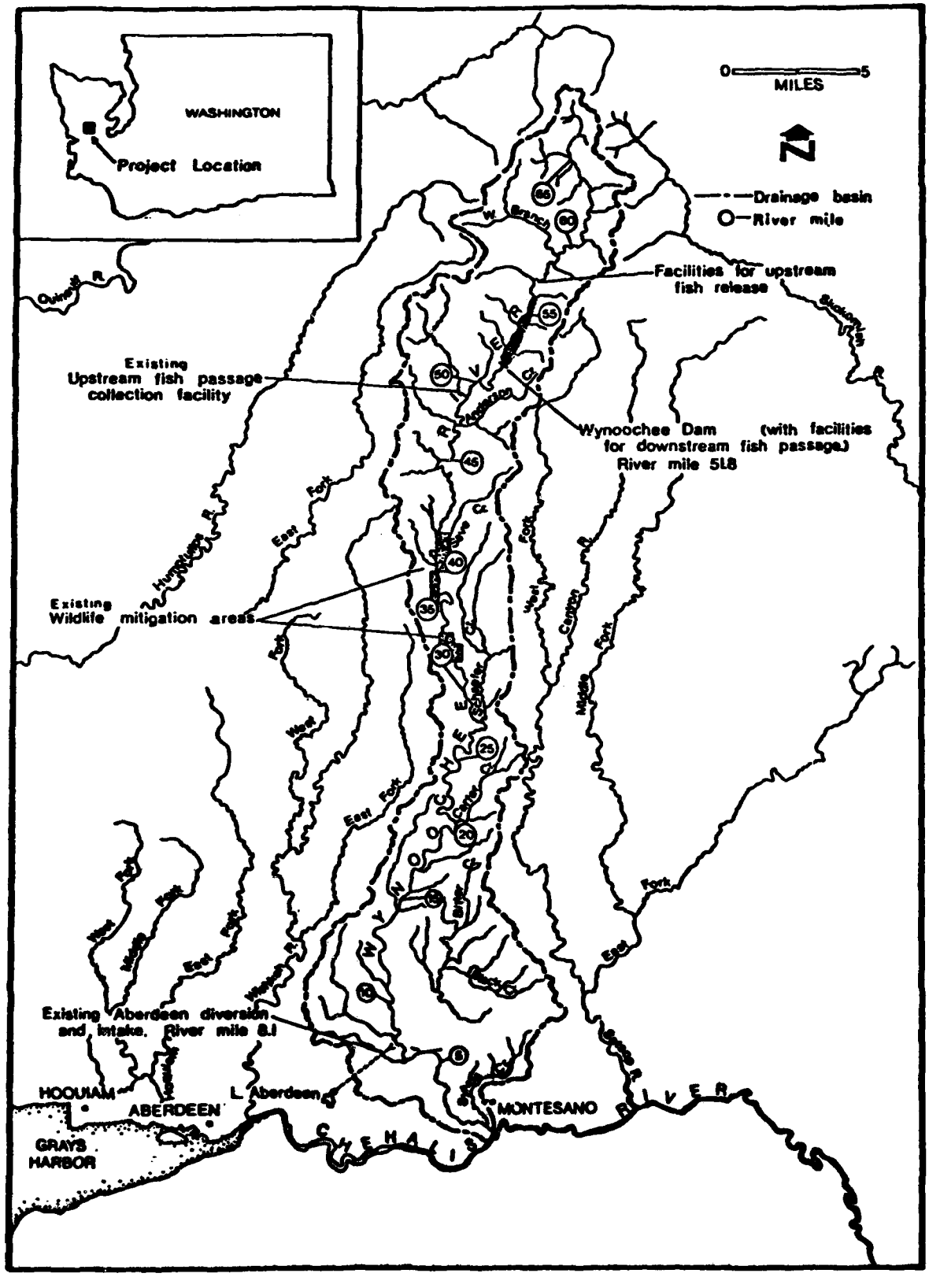


Figure 1. The Wynoochee River Basin and vicinity with existing Wynoochee Lake project features.

anadromous fish production of up to 396,000 pounds/year, 3,000 feet downstream of the dam. The hydropower outfall would be directed to the hatchery as water supply by means of the fish hatchery intake structure. An additional backup water supply line directly from the dam to the fish hatchery intake structure would ensure a fail-safe water supply to the proposed hatchery.

With a combined project, the existing downstream migrant fish passage facility would become obsolete; water would only pass through the facility on rare occasions, as water would normally be diverted through the turbines. No new bypass facility would be built, resulting in termination of natural production above the dam.

Hydropower Portion Alone

This proposal consists of a small-scale hydropower addition to the existing Corps of Engineers' Wynoochee Dam at river mile 51.8. It would employ an underground powerhouse on the right bank with a penstock tunneled beneath the right abutment and through the right bank (Figure 2). A multi-level intake structure would be built in the reservoir on a 720-foot elevation bench adjacent to the upstream side of the dam. Water would be withdrawn from multiple levels for downstream water temperature control. The penstock would be tunneled beneath the grout curtain to the underground powerhouse located under the existing visitor center parking lot, 200 feet downstream of the dam and 200 feet back from the canyon wall. The powerhouse would be 128 feet long, 40 feet wide, and 57 feet high. It would utilize flows from the existing project, and the total hydraulic capacity of the powerhouse would be 1,200 c.f.s. Flows from the reservoir in excess of 1,200 c.f.s. would exit from the existing dam's multi-level outlets, sluices, or spillway. The powerhouse tailrace would exit from the right canyon wall about 400 feet downstream of the dam, approximately 100 feet downstream of the U.S. Forest Service bridge.

Development of the hydropower portion alone, without the fish hatchery, would require the construction of a fish attraction and bypass facility to pass juvenile salmon and steelhead outmigrants safely downstream, or augmentation of existing hatchery production elsewhere in numbers equal to the loss of natural production above the dam. In neither case would there be any enhancement opportunity.

Hatchery Portion Alone

The proposed hatchery portion of the recommended plan consists of a 396,000-pound chinook salmon and steelhead trout hatchery located approximately 3,000 feet downstream of the existing Wynoochee Dam on a relatively flat terrace area on the right bank of the river (Figure 2). Chinook and steelhead could be reared to 10 and 6 fish per pound, respectively, prior to release. In addition, the hatchery could produce coho salmon in numbers equivalent to the upstream watershed's pre-dam potential for release in the Wynoochee River.

The hatchery proposal would utilize a 1900/140 c.f.s. fail-safe gravity water supply from the powerhouse. A buried pipeline would run generally along the

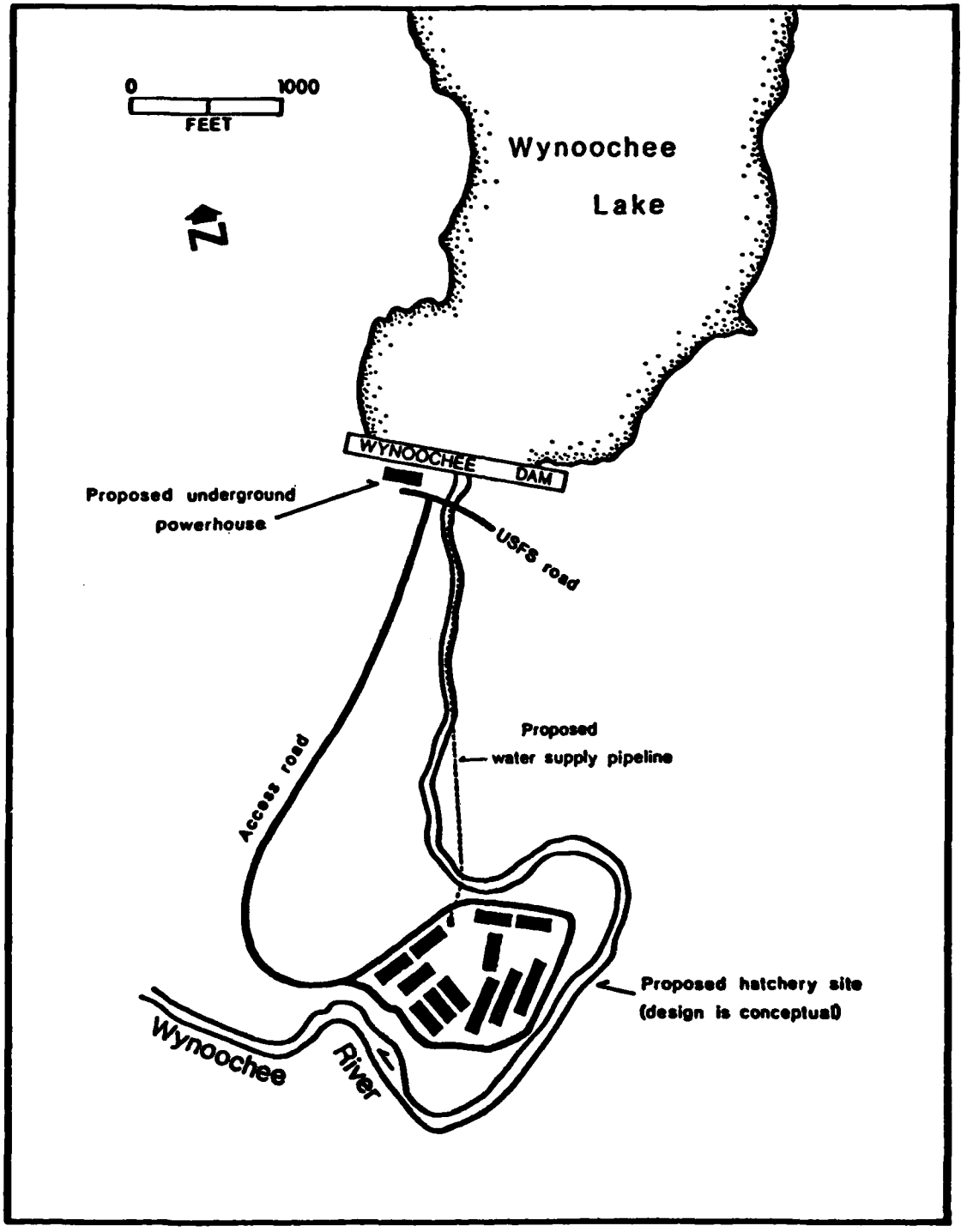


Figure 2. Proposed Wynoochee Hydropower and Hatchery Project features in vicinity of existing Wynoochee Dam.

canyon bottom and left riverbank directly from the powerhouse to the hatchery site. Water would be of adequate quality and quantity to meet all hatchery needs for the proposed size. Flows downstream of the hatchery outlet would not be affected by hatchery operation.

Currently proposed physical features of the hatchery would include the water intake and supply line serving a hatchery building, two series of raceways, four 2-acre rearing ponds for steelhead, five ½-acre holding and rearing ponds for salmon, and a water treatment pond. The development would include residences for most of the operators, a service building, and access road. In total, the physical layout of the hatchery facility would occupy approximately 50 acres. The existing fish barrier dam and collection facilities located 2.2 miles downstream of Wynoochee Dam could be used to obtain native hatchery brood stock. To prevent erosion of the right bank of the river immediately above the hatchery site, 700 feet of shoreline would be stabilized with a 2-foot-thick riprap blanket designed to withstand extreme flooding velocities.

To the extent possible, hatchery plans and construction activities would be formulated to preserve as much of the natural vegetation as possible, reducing the impact of the facility on wildlife. During Advanced Engineering and Design, as the details of the hatchery and associated facilities are finalized, design considerations will be given to wildlife protection through such measures as maintenance of riparian vegetation and a vegetative buffer zone around the hatchery complex and maintenance of natural vegetation interspersed throughout the hatchery grounds (subject to construction constraints and safety requirements). Areas unavoidably disturbed by construction activity, but suitable for revegetation, would be seeded and planted with native plant species and restored as much as possible to pre-development conditions.

The fish hatchery would result in the termination of anadromous fish runs above Wynoochee Dam; as with the combined plan, the present bypass facility would become obsolete and no provision has been made for continued maintenance of the fish runs. With the hatchery, the existing program of transporting fish above Wynoochee Dam would be discontinued. Mitigation for the lost upstream runs, as well as mitigation for the previous loss of steelhead spawning habitat associated with the existing Wynoochee Lake project, would be met and performed as part of yearly hatchery production.

FISHERY RESOURCES

Without the Project

The Wynoochee River and tributaries contribute significantly to fisheries of the region. Salmon contribute primarily to the commercial and sport fisheries of the United States and Canada in the Pacific Ocean, the gillnet fishery in Grays Harbor and the Chehalis River, and to the sport fisheries in the Chehalis and Wynoochee Rivers. Steelhead contribute to the Indian and sport fisheries in the Chehalis and Wynoochee Rivers. Searun cutthroat trout, and resident rainbow and cutthroat trout, whitefish, and Dolly Varden contribute to the sport fishery in the Wynoochee River.

Table 1 summarizes the estimated proportion of total catch, plus escapement, of Grays Harbor salmon stocks based on most recent Washington Department of Fisheries tagging and harvest data. Of the total harvestable number of salmon and steelhead from the Chehalis drainage taken by Washington fishermen, Treaty Indians are entitled to one-half the catch, subject to the moderate living standard. Accordingly, anadromous fish harvest over the planning period will likely reflect this apportionment.

Prior to construction of the existing Wynoochee Dam and Reservoir project, an average of about 5,000 coho, 2,500 chum, 50 spring chinook, and 2,000 fall chinook salmon; and 4,300 steelhead and 3,300 searun cutthroat trout were reported to enter the Wynoochee River annually to spawn (USFWS, 1967)[1]. Additional steelhead were taken in the sport fishery and Washington Department of Game estimates a total average of over 6,000 steelhead adults utilized the river annually. Chum salmon spawned primarily in the lower 40 miles of the river above the limits of tidal influence. Two-thirds of the coho salmon population spawned below the Wynoochee Dam site, and the remainder spawned in the area upstream from the dam, including a valuable late-run fish. Spring chinook salmon spawned in the mainstem river both above and below the Wynoochee Dam, although their numbers have significantly decreased in recent years to the point Washington Department of Fisheries no longer considers this species to be present in the Wynoochee watershed. About 75 percent of the fall chinook salmon spawned in the lower 40 miles of the river. Steelhead and searun cutthroat trout spawned in the mainstem and tributaries from tidewater to the upstream limit of migration at river mile 62.

A significant influence on Wynoochee River anadromous stocks is the existing Wynoochee Dam Project at river mile 51.2 and its associated fish mitigation features. Originally, a spawning area for an estimated 1,000 steelhead and 330 cutthroat trout was inundated by the Wynoochee Reservoir, and an estimated additional 1,500 coho salmon and 558 steelhead and 130 searun cutthroat trout were potentially blocked from upper watershed spawning grounds. Inundation losses were mitigated by providing a one-time monetary payment of $680,000 to Washington Department of Game for construction, operation, and maintenance of a hatchery capable of production to maintain a run of 6,000 steelhead, plus additional steelhead to replace lost sea-run cutthroat trout for the life of the project. Mitigation for the blockage losses consisted of a trap-and-haul facility for upstream migrants, and a prototype multi-level flow outlet system in the dam for passing downstream migrants. The project also augments downstream flows during low-flow months, improving migration and rearing conditions for salmon and steelhead. Additionally, should upstream water diversions authorized by the project eventually be used, a series of small check dams would be installed in the lower Wynoochee River to overcome potential fish passage problems.

Presently, anadromous fish production above the Wynoochee Project is significantly below preproject levels, as the original mitigation proposals

1 These estimates were made by various agencies during early project discussions. They were considered to be the best estimates available at the time.

Table 1. Proportion of total catch plus escapement taken in various fisheries - by Grays Harbor stock*

Species	Washington Ocean Troll	Washington Ocean Sport	Puget Sport	British Columbia Troll	British Columbia Sport	British Columbia Net	Oregon	Alaska	Puget Net	Terminal Harvest	Escapement	Total	Total Survival (catch per fish released)
Coho 1+	.088	.056	.002	.343	---	.004	.046	.002	---	.213	.246	1.000	.025
Chinook	.017	.013	.009	.378	.002	.017	.004	.156	.001	.141	.262	1.000	
Fall 0+													.010
Spr/Sum 0+													.010
Spr/Sum 1+													.035
Chum										.500	.500	1.000	.005

*Estimated contribution rate to various fisheries would be computed by multiplying fishery proportions times total survival rate.

were never fully realized. Post project studies (Dunn, 1978 and LaVoy, 1978) indicate that downstream fish passage is not satisfactory and, accordingly, above-reservoir salmon and steelhead stocks are declining. While escapement data alone does not provide a complete analysis of above-dam native fish production, Table 2 does indicate a general decline of all species above the dam, including those which would seem to be little or unaffected by ocean harvest rates and artificial production releases (i.e., cutthroat and steelhead). Data assembled by Washington Department of Fisheries on upper Wynoochee River coho returns for 1971 to 1978 (Table 3), which includes interception and artificial production information, similarly indicates a downward trend for coho salmon. Moreover, Washington Department of Game has been unable to construct the agreed-upon steelhead facilities due to rising construction costs and lack of an affordable water supply for such a facility, although some rearing of Wynoochee steelhead has been accomplished at the existing Aberdeen hatchery. Consequently, losses of steelhead and searun cutthroat due to Wynoochee Reservoir itself have not been, nor likely will be, compensated for under the present mitigation arrangement. In sum, over the next 50 years without the proposed project, Wynoochee River anadromous fish stocks will likely remain depressed, absent full compensation for the existing Wynoochee Project losses.

With the Project

With-project impacts were evaluated for three conditions: Implementation of hydropower alone; hatchery alone; and the selected combined hydropower/hatchery plan.

Hydropower Portion Alone

Addition of hydropower alone to the existing Wynoochee Project will likely have an adverse impact on the abundance and distribution of anadromous salmonids due to passage loss of downstream migrants. Attraction/collection devices necessary to prevent fish entrainment in the proposed hydrogeneration system are, with few exceptions (e.g., Baker Lake Project), unsuccessful in safely and efficiently passing downstream migrants. Over the life of the hydropower project, therefore, there is a strong likelihood that the anadromous fish resource will be further reduced, if not virtually eliminated, above Wynoochee Dam with the hydropower project only. Fishery resources lost above the dam could be mitigated, however, through augmentation of existing hatchery production elsewhere, minimizing impact to sport and commercial fisheries.

Impacts to anadromous fish below Wynoochee Dam will be insignificant as water releases and quality would remain at preproject levels, and initial construction impacts to aquatic habitat would be localized and minor.

Resident fish utilizing the approximately 500-foot reach between the existing Wynoochee tailrace and the proposed hydropower outfall will be adversely affected from significantly reduced streamflow, particularly during summer low-flow months. This loss will be relatively minor, however, and no loss of fishing opportunity will occur in this canyon reach.

Table 2. Anadromous fish returns to the Wynoochee Project barrier dam collection facility

Year	Spring Chinook	Steelhead	Cutthroat	Adult Coho**	Jack Coho**
1971-72	8	1,765	303	5,698	1,595
1972-73	0	562	11	1,019	178
1973-74	0	719	83	873	261
1974-75	0	524	31	2,764	382
1975-76	0	417	11	1,054	291
1976-77	0	153	19	3,049	128
1977-78	0	143	19	444	65
1978-79	*	42	0	708	76
1979-80		46	0		

** Coho returns may be influenced by hatchery plants in the Wynoochee River in recent years.

* Spring chinook returns from hatchery plants were recorded.

Table 3. Upper Wynoochee River coho returns - 1971-1978.

Return Year	Wynoochee Trap Count	Number of Smolts Planted	Expected Survival Rate	Estimated Hatchery Adult Production	Estimated Hatchery Adults To Trap	Estimated Native Adults To Trap	Catch-to Escapement Ratio*	Estimated Total Native Rur
1971	5,714	307,000	1.2%	3,684	1,228	4,486	2:1	13,458
1972	1,019	202,000	1.2%	2,424	606	413	3:1	1,652
1973	873	96,000	1.2%	1,152	288	585	3:1	2,340
Pre-Dam Average	2,535	---	1.2%	2,420	707	1,828	---	5,817
1974	2,762	162,000	2.7-3.6% avg. 3.18%	5,157	1,289	1,473	3:1	5,892
1975	1,054	146,000	1.2-1.8% avg. 1.49%	2,182	436	618	4:1	3,090
1976	3,049	273,000	1.2-2.4% avg. 1.42%	3,883	1,213	1,836	2.2:1	5,875
1977	444	63,000	1.2%	756	151	293	4:1	1,465
1978	708	99,000	1.2%	1,188	238	470	4:1	2,350
Post-Dam Average	1,603	---	---	2,633	665	938	---	3,734

* Does not include Canadian catch

Hatchery Portion Alone

Development of the proposed Wynoochee hatchery would enhance riverine, estuarine, and offshore fisheries by providing additional chinook salmon and steelhead to the total annual anadromous fish harvest by commercial, Indian, and sport fishermen over the life of the project. Treaty Indians would realize 50 percent of the Washington harvest; non-Indian sport and commercial fishermen would realize the remainder of this harvest over the project life. Non-Washington harvest of chinook would likely be predominately Canadian, as relative distribution of this catch over the project life presumably will not change significantly from existing conditions (Table 1).

As a portion of the proposed hatchery salmon production could also produce coho smolts annually for release to the Wynoochee system, all losses of natural anadromous fish production due to the existing Wynoochee Project could be more than offset by this proposal.

Depending on fish management and culture practices associated with the project, potential genetic and harvest impacts to existing natural fish stocks in the Chehalis watershed could be realized. Hatchery production of non-native salmon and steelhead at the proposed levels would likely result in reductions or losses of corresponding native stocks in the Chehalis watershed unless stocks with substantial enough differences in run timing from the native stocks were obtained. Introduction of non-native spring chinook salmon of similar run timing, for example, at the proposed rate would rapidly lead to the elimination of the native stock, which constitutes one of the last three remaining stocks on the north coast. Likewise, propagation of non-native steelhead at the proposed level could result in reduction of the existing native stocks of the Chehalis drainage, including the Wynoochee strain, which is noted for its larger-sized adults. Additionally, if non-native steelhead brood are selected, harvest at a rate consistent with the proposed hatchery production could lead to conflict with late-running native coho salmon, as the mid-winter return of this stock would substantially overlap with many non-native steelhead stocks. However, these impacts can be substantially minimized through appropriate management and culture practices to be detailed during the Advanced Engineering and Design phase.

Lessened water quality conditions below the hatchery outfall may adversely affect fish inhabiting that vicinity. Lowered dissolved oxygen, increased temperatures, and occasional presence of hatchery chemotherapeutics and disease pathogens in the hatchery outfall will reduce wild fish survival in the discharge zone. However, these effects will likely be localized and minor, as wastewater treatment will be accomplished onsite prior to discharge into the Wynoochee River.

Although streamflow below the hatchery outfall will not change from preproject levels, the 6,800-foot reach of river between the existing overflow weir and hatchery oulet may experience reduced streamflow, particularly during summer low-flow months, should the full complement of water be supplied to the hatchery during a time of minimum discharge from the reservoir. This reduced streamflow will limit resident fish populations and potential angling opportunity. However, these losses will not likely be significant as existing

resident populations are small. Additionally, this reach of river is presently closed to sport fishing year-around, and will likely remain so. A maintenance flow will be provided in this river reach as a project feature by provision of checkdams. Minimum flow requirements will be determined with the State resource agencies during the Advanced Engineering and Design phase of the planning period.

Natural production above the dam would cease in that no provision has been made in project design to allow continuation of juvenile bypass activities or adult transport above the dam.

Combined Hydropower and Hatchery Project

Effects on fish and fishing from a combined hydropower and hatchery project will essentially be the same as those described above for the hatchery portion alone. The combined plan eliminates the necessity for costly and historically inefficient fish bypass facilities associated with hydropower alone, and as with the hatchery portion alone, incorporates mitigation for the loss of upstream anadromous fish runs, as well as mitigates for loss of steelhead spawning habitat associated with the existing Wynoochee Lake project. Additionally, the hatchery water supply is expected to remain fail-safe with the combined projects, thus ensuring a dependable water system for the proposed fish culture facility.

WILDLIFE RESOURCES

Without the Project

The mixed bottomland of the upper Wynoochee Valley provides important habitat for a range of wildlife species. Of particular significance in the project vicinity are big game, furbearer, and upland game bird populations.

Lands bordering the river provide important year-long habitat for Roosevelt elk and blacktail deer. Elk and deer populations are primarily resident, with slight seasonal migrations to lower elevations, such as the proposed hatchery site, during the winter period. Winter carrying capacity of these bottomlands range from approximatley 10 to 35 elk per square mile, which is perhaps four times greater than that which occurs during the summer period (Smith, personal communication). Deer abundance information is less precise, but relative seasonal use is approximately the same.

Elk numbers are likely to be reduced in that winter insulation areas, like the proposed hatchery site, are slated for cutting by the U.S. Forest Service.

Furbearers, particularly beaver, are also important in the streamside environment of the project area where food and denning requirements are readily available. Upland game birds, such as blue and ruffed grouse, are also present in the mixed bottomland habitat where food and cover are abundant.

With the Project

With-project impacts were evaluated for three conditions: Implementation of hydropower alone; hatchery alone; and the selected combined hydropower/hatchery plan.

Hydropower Portion Alone

For the most part, addition of hydropower to the existing Wynoochee Project will have little impact to wildlife, as the proposed powerhouse would be located underground and the power transmission line would be immediately adjacent to an existing road. Reduction in stream flow from the Wynoochee tailrace to the hydropower outfall will likewise have little, if any, impact to wildlife in the affected reach.

Depending on location of borrow sources for the powerhouse construction, loss and disruption of wildlife habitat could occur, particularly if bottomlands are used for an aggregate source.

Hatchery Portion Alone

The proposed hatchery will adversely affect wildlife populations through the direct loss of habitat at the hatchery site, reduction in stream flow between the existing overflow weir and the hatchery outlet, riprapping of streambank, and the general increase in human disturbance in the hatchery vicinity.

The 50 acres of Wynoochee bottomlands used for the hatchery site will essentially be lost to larger wildlife species production and use for the life of the project. Human activity at the facility will further reduce the value of surrounding lands for wildlife use in general. Of particular concern will be the overall reduction in elk and deer carrying capacity, with a commensurate reduction in elk and deer numbers, particularly during more severe winters when the project site provides essential food and cover requirements not found at higher elevations in the watershed. In the context of overall carrying capacity of the upper Wynoochee watershed, this loss will not likely be significant, however.

Reduced streamflows between the existing overflow weir and the proposed hatchery outlet, together with streambank armoring above the proposed hatchery site, will adversely affect riparian habitat. Furbearer populations, particularly beaver, which utilize soft bank substrate and hardwoods of the riparian zone for food and cover, will be reduced in this stream reach.

Because the upriver anadromous fish run would be discontinued with hatchery construction, a seasonal food source will be lost to wildlife in the upper basin, as some of the spawned-out salmon carcasses provide food for carrion feeders, such as the bald eagle, bear, and raccoon.

Combined Hydropower and Hatchery Projects

Wildlife impacts associated with the combined project will be virtually the same as those associated with the hatchery portion alone. However, impact

could be somewhat lessened as the proposed hatchery site could serve as a borrow source for construction of the hydropower facility, additional impact from creation of a borrow pit elsewhere in the watershed could be avoided.

THREATENED AND ENDANGERED SPECIES

Pursuant to the Endangered Species Act of 1973, as amended, this agency notified the U.S. Army Corps of Engineers on January 23, 1981, as requested, that the bald eagle occurs within the proposed project area. This species is Federally listed as threatened in Washington State. We understand that the Corps is preparing a biological assessment, as required by the Act, to determine if the proposed hydropower and hatchery project will affect this species. Should that assessment conclude that the project may affect the bald eagle, the Corps is required to enter into formal consultation with this Service.

DISCUSSION

Regional policy of the Fish and Wildlife Service encourages maintenance and, where possible, restoration of natural-occurring runs of anadromous fish, with emphasis on wild fish strains over hatchery strains. The rationale for this policy is that hatchery production may, over the long term, alter the wild gene pool of native fish stocks through artificial selective pressure for such traits as early time of return and rapid hatchery growth. These traits may not be advantageous to survival in the wild. Further, hatchery runs can sustain a greater harvest rate than wild stocks, resulting in the possible reduction or loss of wild fish in a system fished at a hatchery harvest rate. These factors suggest caution in development of hatchery programs in some situations. Additionally, restoration of native spring chinook stocks in coastal Washington is a Service priority.

With regard to the Wynoochee River system and the Chehalis River basin as a whole, however, hatchery development offers a potential solution to unmet mitigation needs associated with the existing Wynoochee Project, as well as a much needed fishery enhancement tool for the overall drainage. Restoration of the diminishing anadromous fish runs above Wynoochee Dam appears unlikely without substantial further study and redesign of the existing downstream passage facility, during which time upriver stocks will likely continue to decline without hatchery inputs. Hatchery production, however, should be consistent with long-range management goals for anadromous salmonids in the Grays Harbor drainage, as hatchery outputs may detrimentally affect fish stocks basin-wide.

Accordingly, hatchery propagation of a stock non-indigenous to the Chehalis system, such as summer chinook, would reduce potential adverse impacts to any existing native stocks, including spring chinook, while providing a high quality sport and commercial fish for marine and freshwater fisheries. At the same time, low-level upriver plants of native spring chinook could assist restoration efforts for this fish. While past efforts by WDF to secure native spring chinook broodstock have met with little success, Oakville tribal catch records (Table 4) indicate at least sufficient numbers enter the river to support such an endeavor. It is possible an interagency cooperative effort

Table 4. Oakville Tribe spring chinook catch records - 1970-1980.[1]

Year	Catch	Year	Catch
1970	947	1976	388
1971	607	1977	775
1972	852	1978	559
1973	773	1979	675
1974	239	1980	286
1975	149		

1 Obtained through John Easterbrooks, Washington Department of Fisheries.

with the Tribe to secure native broodstock could succeed, with maintenance of historical distributions as a planning criteria.

With regard to steelhead, propagation of only native stocks at the proposed levels would reduce potentially adverse impacts to the Chehalis basin gene pool, although the steelhead/coho harvest conflict could adversely affect the late-run coho. A program of fry or fingerling outplants aimed at maintaining historical distributions of coho may reduce this impact, however. Needs and opportunities for anadromous fish restoration in the entire watershed should be addressed via a long-term study in order to maximize fishery benefits over the life of the proposed project.

From a siting standpoint, the proposed hatchery location appears to have an excellent water source, which is all-important in fish culture, particularly for those species under consideration. However, development of this bottomland site will destroy 50 acres of important elk range, as well as riparian habitat of value to beaver and other wildlife. Additional habitat treatment at existing wildlife mitigation areas in the Wynoochee basin may offset wildlife losses incurred at the Wynoochee hatchery site and should be considered in further project planning.

Development of hydropower in conjunction with the hatchery proposal is preferable over development of hydropower alone, as the proposed hatchery facility provides an opportunity to mitigate anadromous fish production above Wynoochee Reservoir that would be jeopardized by a hydropower water withdrawal system in Wynoochee Dam. A lesser consideration is that borrow materials for the hydropower project construction could be obtained from the proposed hatchery site, rather than impacting another location. Development of hydropower alone would require measures to offset all anticipated passage losses to downstream fish migrants, either through inclusion of an attraction/collection device in the existing Wynoochee Dam, or hatchery production plantings of anadromous fish sufficient to offset all upstream losses.

Without development of the proposed hatchery or significant improvement in the existing downstream passage facility in Wynoochee Dam, other, perhaps less viable, means will be necessary to achieve mitigation for original Wynoochee Project anadromous fish losses.

In an attempt to achieve optimum production, we would find it desireable to maintain natural production above the dam, as well as fish culture production below the dam. In the case of a combined hatchery and hydropower construction, several reasons give the Service cause to reluctantly accept termination of above-dam natural production. The existing production above Wynoochee Dam is, in a sense, already artificially maintained since adults are physically transported by truck around the dam. Because the existing juvenile bypass facility would become obsolete, construction of an expensive new system to shunt fish around the hydropower facility would be necessary. There is no reason to believe a new system would be any more effective than the present one. The primary cause for the ineffectiveness of the present system is the less-than-desireable attraction of juveniles to the outlet points, due to low average flows, resulting in migrational delays and residualism in the lake

itself. Because flow regime would not change from pre-project values, this problem would continue to plague the bypass system. The steelhead run has been almost totally eliminated. The State of Washington has therefore approached the Corps of Engineers and asked for full steelhead mitigation. If something is not done for the coho run, they may, in turn, suffer the same demise. Hatchery production would more than offset the loss to fisheries resulting from termination of natural production above the dam. For these reasons, we, like the Washington Departments of Fisheries and Game, accept termination of natural production as a project feature for the selected combined hatchery and hydropower plan.

In the opinion of the Service, there is not sufficient justification to terminate natural production above the dam if the hatchery portion alone is constructed without a hydropower facility. The existing bypass structure could still be operated and adults collected and transported above the dam. If present multi-level outlets were used as a water source for the hatchery, salmonid mortality presently suffered at the tailrace would probably be reduced, increasing the effectiveness of the bypass facility.

RECOMMENDATIONS

Hydropower Portion Alone

We recommend that:

1. Measures be incorporated in further project design to offset all anticipated passage losses to downstream fish migrants resulting from addition of hydropower generation to the existing Wynoochee Project. Such measures may include an attraction/collection device in the existing Wynoochee Dam Project and/or artificial production of anadromous fish in numbers equivalent to the total upstream watershed potential.

2. As presently proposed, water flow and quality be maintained at preproject levels to avoid adverse impact to downstream fishery values.

3. Selection of borrow sites for construction materials be coordinated with Federal and State resource agencies to minimize wildlife impacts in the upper Wynoochee basin.

Hatchery Portion Alone

We recommend that:

1. Fish production at the proposed facility should emphasize protection of native Chehalis system stocks, and should be compatible with long-range management goals of Washington Departments of Fisheries and Game.

2. Funds for a comprehensive, long-term examination of anadromous fish restoration needs and potentials in the Chehalis drainage be included in your authorization request in order to maximize fish production benefits from the proposed hatchery over the project life.

3. Maintenance flows between Wynoochee Dam and the hatchery outfall be included as a project feature.

4. As presently proposed, water flow and quality be maintained at preproject levels to avoid adverse impact to downstream fishery values.

5. Natural production above the dam be maintained to at least pre-project levels.

6. As presently proposed, natural vegetation destruction be minimized at the project site and revegetation accomplished when feasible.

Combined Hydropower and Hatchery Projects

We recommend that:

1. Fish production at the proposed facility should emphasize protection of native Grays Harbor stocks, and should be compatible with long-range management goals of Washington Departments of Fisheries and Game.

2. Funds for a comprehensive, long-term examination of anadromous fish restoration needs and potentials in the Chehalis drainage be included in your authorization request in order to maximize fish production benefits from the proposed hatchery over the project life.

3. Maintenance flows between Wynoochee Dam and the hatchery outfall be included as a project feature.

4. As presently proposed, water flow and quality be maintained at preproject levels to avoid adverse impact to downstream fishery values.

5. As presently proposed, natural vegetation destruction be minimized at the project site and revegetation accomplished when feasible.

REFERENCES

Dunn, C. 1978. Evaluation of downstream fish passage at the multi-level outlet pipes at Wynoochee Dam. Washington Department of Fisheries. 96 pp.

LaVoy, L. and Fenton, J. 1978. Evaluation of adult steelhead returns to Wynoochee River from smolt releases 1973, 1974, and 1975 and comparisons with juvenile studies. Contract #DACW 67-73-C-0057. Washington Department of Game. 34 pp.

Smith, Jack. October 1980. Washington Department of Game. Personal communication.

U.S. Fish and Wildlife Service. 1967. Detailed Fish and Wildlife Coordination Act Report for Wynoochee Dam and Reservoir Project. 15 pp.

APPENDIX

Agency comments on the draft Coordination Act report

JOHN SPELLMAN
Governor

ROLLAND A. SCHMITTEN
Director

STATE OF WASHINGTON
DEPARTMENT OF FISHERIES
115 General Administration Building • Olympia, Washington 98504 • (206) 753-6600 • (SCAN) 234-6600

April 21, 1981

Mr. Charles Dunn, Field Supervisor
U.S. Department of the Interior
Fish and Wildlife Service
Ecological Services
2625 Parkmont Lane, S.W.
Building E-3
Olympia, Washington 98502

Dear Chuck:

We have reviewed the draft Coordination Act report entitled Wynoochee Hydro-power Project, Wynoochee Hatchery Project and find that it generally presents an accurate appraisal of project impacts to salmon stocks of the Wynoochee River. Some specific comments are offered which should be considered in your preparation of the final report.

Page 1, paragraph 4. Our data indicates that the former remnant run of spring chinook has probably been completely lost in recent years.

Page 5, paragraph 3. Due to the lack of references, we are unable to comment specifically on the percentages cited in the second sentence. We suggest, however, that the current data bases available from Morris Barker and Rich Lincoln of WDF's Harvest Management Division should be used for any such analysis. The third sentence should be revised to state that treaty Indians are entitled to up to one-half the allowable catch subject to the moderate living standard.

Page 5, paragraph 4. The referenced salmonid escapement numbers were offered by various agency representatives during early project discussions as the best estimates available. A footnote to this effect should be included in the final report to prevent acceptance of the numbers as anything except early estimates. In addition, although recent fall chinook surveys indicate that some limited spawning occurs above Wynoochee Canyon, nearly all occurs below the canyon. Approximately 65 to 75 percent spawn in the mainstem below the canyon and the balance in Carter and Schaefer Creeks. With respect to coho salmon, the area above the dam once supported a valuable early-run stock that has probably been lost or at least greatly diminished (due primarily to lower river fish passage problems below the diversion).

Page 6, Table 1. These data need to be updated since WDF Progress Report No. 49 is somewhat out-of-date. The current stock model data needed for this table can be obtained from Rich Lincoln.

Page 7, paragraph 2 and Page 8, Table 2. Any analysis of stock status must also include such factors as harvest and artificial production releases in addition to escapement data. We provided such an analysis in a November 1979 letter to Mr. Steven F. Dice (Seattle District, Corps of Engineers) but did not receive a response. We will be updating this analysis due to the newer data base now available, including complete 1979-80 and 1980-81 escapement counts. Although useful as reference material, your Table 2, Anadromous Fish Returns to the Wynoochee Project Barrier Dam Collection Facility does not provide enough information to draw the conclusions reached in the statement regarding salmon production trends.

Page 9, paragraph 3. With respect to the introduction of non-native spring or summer chinook stocks, adverse impacts could be forecasted for the upper Chehalis River native stocks only if the runs overlapped to such a degree that their respective harvests could not be separated and controlled by practical fisheries management measures. Even if this occurred while the two stocks were mixed in Grays Harbor and the lower Chehalis River, there would still be additional harvest options for hatchery fish within the Wynoochee River system.

Page 12, paragraph 1. The current WDF long-range management intent is that all Grays Harbor fall salmon runs originating below the Chehalis Indian reservation should be managed for their full natural production potential. To date, this intent, as expressed in the actual management practices of recent years, has not been formally challenged by the Quinault Indian Nation (the only Indian group with current treaty fishing rights inside Grays Harbor).

Page 12, paragraph 2. Reference to use of a "native" spring chinook stock from the Wynoochee itself should be deleted. The closest thing to a native stock would be fish from the upper Chehalis, particularly the Skookumchuck system. Even here, a past WDF effort relative to broodstock collection failed, indicating that anything approaching an adequate egg source for a major hatchery operation would have to come from outside the Grays Harbor drainage. In addition, the upper Chehalis native stock would yield a Wynoochee hatchery return of comparable run timing, even if broodstock collection proved to be cost effective.

With respect to your recommendations, we believe that the only way in which this project can make a reasonable case for feasibility is via use of non-local spring and/or summer chinook broodstock as an up-front "given". In the past, failures to secure preferred broodstocks for other facilities have typically led to pressures for "filling the ponds" with whatever stock or species is available at a given point in time. This problem should be recognized at the onset, even if it results in rejection of a proposed project for biological or other reasons.

We hope our comments will be useful to you in the preparation of the final draft. If you have any questions, please contact Sam Wright (753-3621).

Sincerely,

by Sam Wright

for Rolland A. Schmitten,
Director.

JOHN SPELLMAN
Governor

STATE OF WASHINGTON
DEPARTMENT OF GAME
600 North Capitol Way, GJ-11 • Olympia, Washington 98504 • (206) 753-5700

May 6, 1981

Charles Dunn
Field Supervisor
United States Department of Interior
Fish and Wildlife Service
Ecological Services
2625 Parkmont Lane, S.W. Bldg. B-3
Olympia, Washington 98502

Dear Chuck:

We have reviewed your draft Fish and Wildlife Coordination Act Report for the Wynoochee Hydropower and Wynoochee Hatchery projects. We concur with your recommendations with limited exceptions. The following are our comments, by page.

Page 1, third paragraph. Suggest starting the second sentence of this paragraph with, "Some of the many species are..." Remove "included are".

Page 1, fourth paragraph, and page 5, second paragraph. We don't believe any Dolly Varden are produced in the Chehalis Basin. Some may stray into the Wynoochee, but only rarely.

Page 5, third paragraph under Fishery Resources states there were 4,300 steelhead and 3,300 sea-run cutthroat spawning in the system annually. Additional fish were taken in the sport harvest. We estimate the steelhead run was actually over 6,000 fish.

Page 5, last paragraph. Mitigation was for a hatchery to rear enough steelhead smolts to maintain the run size at 6,000 fish, plus sufficient additional steelhead to replace lost sea-run cutthroat. Steelhead replaced sea-run cutthroat because we did not have a sufficient broodstock of sea-run cutthroat.

It is important to note the contract signed by the Corps and Game does not discuss numbers of smolts to be released. The actual agreement is to return 1,700 additional anadromous game fish adults to the Wynoochee River.

We estimate an additional 558 steelhead (9.3% of 6,000) and 130 sea-run cutthroat were produced from the upper water shed, not 400 total you report.

Page 7, under "With the Project - Hydropower Project". We need assurance that if only the hydro project is built a multi-level intake structure will be included to control water temperature.

Page 9, 1st complete paragraph. If coho are produced to replace native anadromous fish losses, spring chinook production will be reduced.

Page 9, 2nd complete paragraph. The facts you state about propagation of non-native fish are true, but the Department plans to use only native Chehalis Basin fish.

Page 9, 4th complete paragraph. We agree with your statement, but we need to say a minimum flow will be required.

Some place under Fisheries Resources with the project, we recommend a screen system be designed to keep resident fish in the lake. This would allow increased resident fish production in the reservoir.

Page 12, 3rd complete paragraph. We believe potential exists to develop wildlife habitat on the 50 acres impacted. We suggest about 30 acres be provided adjacent to the 50 acres hatchery plot. These 30 acres could be developed to increase wildlife carrying capacity and mitigate impacts.

Page 13, under Recommendations - Hatchery Project.

> Number 2. If funds are provided for a long-term examination in the Chehalis Basin, they should go to the Department of Game for anadromous game fish.
>
> Number 4. It is possible wildlife mitigation could be done at the hatchery site with some additional land set aside and developed. However, the mitigation could occur at existing mitigation lands.

Except for the few changes recommended, we believe the report was well done with good information provided.

Sincerely,

THE DEPARTMENT OF GAME

James G. Fenton, Wildlife Biologist
Habitat Management Division

JGF:mjf

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Environmental & Technical Services Division
P.O. Box 4332, Portland, Oregon 97208

June 8, 1981 F/NWR5:MET:cd

Charles A. Dunn, Field Supervisor
U.S. Fish and Wildlife Service
Olympia, Washington 98502

Dear Mr. Dunn:

On May 14, you and members of my staff discussed several comments pertaining to your March 30, draft report for Wynoochee hydropower and hatchery projects. As agreed we are providing these following comments.

1. We agreed that both fish passage and the fish hatchery would be requested, rather than having the hatchery substitute for passage. This was necessary to achieve one essential goal - to maximize fish produced from Wynoochee system. Maintaining and improving passage through improvements in outlet facilities needed for hydroelectric power production would encourage restoration of those runs using the system prior to the existing project. Then by adding substantial production through construction of the fish hatchery we could achieve both restoration and enhancement. Therefore, the recommendations should be modified to prevent the misunderstanding that the hatchery is an acceptable substitute for fish passage.

2. The existing project operation mode should not be considered as a given constraint. If changes in water releases are desired to achieve better fish passage or spawning or rearing conditions, now is the time to make such a request, prior to reauthorization. We should work with the Corps of Engineers to assure that anticipated hydropower development improves the aforementioned conditions needed for anadromous fish.

3. Apparently the adult collection facility does not adequately function at high flows. The project should include modification of that facility.

4. Fish passage studies associated with the improvements for the new hydropower project should be required. (Only hatchery studies had been contemplated).

5. The report should specify the amount of flow needed between the dam and the hatchery outfall.

Charles A. Dunn

We appreciate the opportunity to meet with you and to comment on this project. If we can be of further assistance please let me know.

Sincerely yours,

Dale R. Evans
Division Chief

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE, WASHINGTON 98124

NPSEN-PL-ER

8 MAY 1981

Charles A. Dunn, Field Supervisor
U.S. Fish and Wildlife Service
2625 Parkmont Lane Southwest, Building B-3
Olympia, Washington 98502

Dear Mr. Dunn:

We have completed our review of the draft Wynoochee Hydropower/Fish Hatchery Fish and Wildlife Coordination Act (FWCA) Report which was transmitted to our office by your letter dated 30 March 1981. Our major comments on the report, including responses to the report recommendations, are attached as inclosure 1. Additional comments are provided in the attached copy of the report (inclosure 2).

The responses to the report recommendations were discussed between Ms. Karen Northup of my staff and Mr. Jeff Opdycke of your staff on 28 April 1981. They recognized that additional coordination may be necessary to resolve recommendation (4) regarding wildlife mitigation for the combined hydropower/hatchery project. Please note that we have responded in detail only to those recommendations made for the combined project as this is the plan we have tentatively selected for recommendation to Congress. In our initial stages of planning, we were pursuing study of separate hydropower and hatchery projects at Wynoochee Dam; however, the decision was made to combine the two separate projects into one integrated plan. Accordingly, in order to be consistent with our draft feasibility report, we are requesting throughout your report that references to the "hydropower and hatchery projects" be revised to read the "hydropower and hatchery portions" of the combined plan.

Our draft Wynoochee Hydropower/Fish Hatchery feasibility report and environmental assessment are scheduled for public review starting in mid-June 1981. We prefer to include the final signed FWCA report in our report for public review. In order for that to occur, we would have to receive the final FWCA report by 1 June 1981. If that is not possible, we request that you provide us with the final report by 1 July 1981 so it may be available prior to the final public meeting, tentatively planned for mid-July.

We are pleased with the overall quality of the draft FWCA report and particularly wish to thank Messrs. Bob Wunderlich, Jim Bottorff, and Jeff Opdycke

NPSEN-PL-ER
Charles A. Dunn

for their efforts in preparing a clear, concise document. Should you or your staff have any questions regarding our comments, please call Ms. Northup, Environmental Coordinator, at FTS 399-3624. She will be contacting Mr. Opdycke in the near future to arrange any additional coordination necessary before finalization of your report and its recommendations.

Sincerely,

R.P. Sellevold

R.P. SELLEVOLD, P.E.
Chief, Engineering Division

2 Incl
As stated

Copy furnished w/incl:
Mr. Jeff Opdycke
U.S. Fish and Wildlife Service
2625 Parkmont Lane Southwest, Building B-3
Olympia, Washington 98502

NPSEN-PL-ER 30 April 1981

SUBJECT: Seattle District Comments on the Draft Fish and Wildlife Report for the Wynoochee Hydropower/Fish Hatchery Study

1. Description of Project Area, Page 1. In the Wynoochee draft feasibility report, the project area is termed the plan area. For consistency, we recommend the same be done in the FWCA report. In planning terminology, until a plan is authorized and enters advanced engineering and design, it is usually referred to as a plan not a project.

2. Description of Projects, Page 1. The selected plan is the combined hydropower/fish hatchery project and it should be presented as such in the draft FWCA report. To that end, the title of the section should be revised to read "Description of the Selected Plan" and the hydropower and fish hatchery project should be referred to as "portions" of the combined plan. Refer to inclosure 2 for recommendations regarding the organization of this section.

3. Hydropower Project, Page 4, First Complete Paragraph. Because hydropower is a portion of the integrated plan, a fish attraction facility to bypass downstream migrants will not be necessary. This paragraph should be rewritten to reflect that development of hydropower only would have required a fish passage facility, but such is not necessary with the combined plan. Suggested wording is "Development of the hydropower portion alone, without the fish hatchery, would provide no enhancement of the anadromous fisheries and would require a costly fish attraction and bypass facility at Wynoochee Dam to pass downstream migrants."

4. Hatchery Project, Page 4, Second Paragraph. Revisions, as provided in inclosure 2, are necessary in this paragraph to clarify "with project" flow conditions. The hatchery is designed for a water supply of 190 c.f.s. Except for the months of May and June, 190 c.f.s. is the operational minimum flow from the existing Wynoochee Dam. In May and June, the operational minimum flow may drop to 140 c.f.s. The powerhouse is designed to utilize the 190/140 c.f.s. minimum flow from the existing project up to a hydraulic capacity of 1,200 c.f.s. Discharge from the reservoir that is not passed though the powerhouse would be discharged from the existing dam's multilevel outlets, sluices, and/or spillway. The water supply system to the hatchery is designed with an intake structure at the hydropower outlet which can be supplied with water from either the powerhouse or the dam discharges. Accordingly, should the powerhouse be shut down for any reason, water supply to the hatchery would not be interrupted.

5. Hydropower Project, Page 5, Top Paragraph. If the hydropower were developed alone, the existing program of transporting anadromous fish for release above Wynoochee Dam would continue. With the hatchery alone, as well as with the combined plan, the program would be discontinued. Suggest

Incl. 1

deletion of the paragraph at the top of page 5 and insertion of the following as a final paragraph to the Hatchery Project discussion on page 5: "The fish hatchery would result in the termination of the anadromous fish runs above Wynoochee Dam but would enhance the overall anadromous fishery resources in the Chehalis River Basin, Grays Harbor area, and northern Pacific Ocean. With the hatchery, the existing program of transporting fish above Wynoochee Dam would be discontinued. Mitigation for the lost upstream runs, as well as the mitigation for the previous loss of steelhead spawning habitat associated with the existing Wynoochee Lake project, would be incorporated as part of the hatchery production."

6. With the Project, Page 7. For clarification, after With the Project, add "With project impacts were evaluated for three conditions: implementation of hydropower alone; hatchery alone; and the selected combined hydropower/fish hatchery plan." The same sentence should be added after With the Project on page 10.

7. With the Project, Hatchery Project, Page 9, Second Complete Paragraph. This paragraph discusses the potential adverse impacts of the hatchery on native stocks but does not indicate that these impacts could be minimized with appropriate management and culture practices. The hatchery plan, as now proposed, is to propagate Wynoochee River native stock steelhead and Skookumchuck stock spring chinook salmon. Accordingly, the negative impacts discussed may not be realized. This point should be noted in the referenced paragraph.

8. Recommendations, Page 13. We have provided detailed responses only to these recommendations provided for in the combined hydropower/hatchery project as this is the plan we have tentatively selected for recommendation to Congress. We basically concur with your recommendations for the hydropower project; there is no need to respond separately to the recommendations for the hatchery project as they are the same as for the combined plan.

a. Recommendation 1. Concur. It is the intent of the hatchery portion of the proposal to emphasize protection of native Grays Harbor stocks and to be compatible with long-range management goals of the Washington Departments of Fisheries (WDF) and Game (WDG). In a letter dated 6 March 1981, the Governor of the State of Washington provided the Corps a letter of intent to become the local sponsor of the hatchery. The Corps views this letter as indication that enhancement of the anadromous fish runs in the Chehalis River Basin is a high state priority and that the Wynoochee hatchery offers the state an opportunity to achieve a portion of a recognized need.

b. Recommendation 2. Concur. Examination of anadromous fish restoration needs and potentials in the Chehalis River drainage in order to maximize fish production benefits from the hatchery is included in the authorization request as part of the monitoring program over the life of the hatchery. The current estimated cost of the monitoring program is an annual amount of $159,000. Other aspects of this program would include postconstruction water quality monitoring of the hatchery effluent, assessment of the effects of the effluent on the biota of the Wynoochee River and of any

consequent increases in salmonid and resident fish natural production downstream of the hatchery outlet, and evaluation of fishery contribution rates and hatchery management strategies of Wynoochee hatchery released fish for the purpose of maximizing harvest with minimal impact on wild stocks. Information from the monitoring program would provide continual input to fisheries management of the Chehalis River Basin and Grays Harbor area as well as provide important data on salmonid production for application in other watersheds. The details of the monitoring program for the Wynoochee hatchery would be formulated in coordination with state and Federal fisheries agencies, Indian tribes, and interested public during advanced engineering and design studies.

c. Recommendation 3. Flow in the Wynoochee River in the 6,800-foot reach between the existing overflow weir and the hatchery outlet could become extremely low should the full compliment of water be supplied to the hatchery during a time of minimum flows (190/140 c.f.s.) from the reservoir. The impacts of a low flow in that reach would primarily be reduced visual esthetics and a lower aquatic production. We believe an exception to a minimum flow requirement is warranted in this case because the impacts of low flow would not be significant and provision of a minimum flow during a low flow period may result in decreased water supply to the hatchery and a subsequent decrease in fish production. We will continue our coordination with the State of Washington during advanced engineering and design studies to determine the requirement for, and amount of, minimum flows for the subject reach. A concrete weir in the river just upstream of the powerhouse tailrace would assure water in the 400-foot reach of the river between the main dam and powerhouse tailrace. Downstream of the hatchery outlet, the river discharge would be the same as that without a hatchery and powerhouse project.

d. Recommendation 4. As stated in the draft FWCA report, page 10, last sentence, "In the context of overall carrying capacity of the upper Wynoochee watershed, this loss (referring to the loss of 50 acres of wildlife habitat due to hatchery construction) will not likely be significant." We concur with your evaluation, and because the impacts to wildlife in the upper Wynoochee watershed would not likely be significant, we believe mitigation is not warranted. Further, as a result of our impact evaluation, we believe the unavoidable adverse wildlife impacts to be a tradeoff that would be more than offset by the enhancement of the anadromous fishery of the Chehalis River Basin and consider the with project condition an overall net plus to the environment. In order to give your recommendation further consideration, we would require additional information from you regarding its scope, justification, and cost of implementation. Since we determined that impacts to wildlife would not be significant, we did not explore mitigation alternatives ourselves.

e. Recommendation 5. No adverse impacts to downstream fishery values are expected to result from the recommended plan. As discussed in c above, downstream of the hatchery outlet the river discharge would be the same as

that without a hatchery and powerhouse project. Water supply to the hatchery and the operation of the powerhouse would not result in a change to the existing operational mode of Wynoochee Dam, and river discharge frequency in the Wynoochee River would not change from existing conditions. The powerhouse would operate as baseload and would not be operated for peaking. Accordingly, no flow-related adverse impacts to downstream fishery values would occur.

Short-term increases in suspended sediment and turbidity would occur in the Wynoochee River and reservoir during instream construction activities associated with the recommended plan. Although increases in turbidity may result in exceeding the Washington State water quality standard, the effect on water quality is not considered significant due to the short-term, localized nature of the impact. The construction contractor(s) would be required to utilize methods which would minimize turbidity. Cofferdams would be used for instream construction of the hatchery supply pipeline crossings, the hatchery outlet channel, and the powerhouse outlet structure to minimize impacts to water quality.

The powerhouse intake would be a selective withdrawal structure to maintain preproject water quality from reservoir releases. The hatchery effluent could affect water quality by the addition of nutrients to the Wynoochee River with resulting increases in aquatic productivity and an alteration in the aquatic benthic community in the area near the effluent outlet. The impact may be beneficial to downsteam fishery values because aquatic productivity in the Wynoochee River is rather low naturally.

As a project feature of the hatchery, a pollucion abatement pond would be constructed for treatment of the water from the raceways and rearing ponds during cleaning. Additionally, when chemotherapeutics are used in large doses, the waters would be routed to the pollution abatement pond. The hatchery would be operated to meet the effluent limitations established by the Environmental Protection Agency for suspended and settleable solids, and the limitations for other parameters (biological oxygen demand, nitrates, ammonia, fecal coliforms, etc.) as determined by the Washington State Department of Ecology in cooperation with the WDG and WDF. Water quality monitoring would be accomplished at the outlet, and if allowable limits were approached, provision would be made for treatment of the effluent water prior to release to the river. The carcasses of returning adult salmon and steelhead used for spawning or surplus to spawning needs would be sold commercially under WDG and WDF policies or disposed of in an approved landfill. These procedures, as required by Federal law, would eliminate water quality impacts generated from large quantities of carcasses decomposing in the Wynoochee River. All domestic wastes from the hatchery and residences would be treated by a septic tank system.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E.
BIN C15700
Seattle, WA 98115

F/NWR5:MET

NOV 13 1981

Colonel Norman C. Hintz
District Engineer, Seattle District
Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Hintz:

We have concluded that Wynoochee Hydropower/Fish Hatchery Project should proceed as you have proposed, after review of the July 1981 Fish and Wildlife Service (FWS) report transmitted to you on July 2, and discussions with your staff on October 29.

For mitigation we are satisfied that your staff has carefully analyzed the costs involved in fish passage as compared to additional capacity within the hatchery. In this instance, where the hatchery is intended to be an integral part of the total project, hatchery expansion for mitigation is the most reasonable alternative.

We appreciate the efforts of your staff in resolving our concerns.

Sincerely,

Thomas E. Kruse

for H. A. Larkins
Regional Director

cc: Fish and Wildlife Service, Olympia

APPENDIX E

DESIGN AND COST ESTIMATES

TABLE OF CONTENTS

TABLE E-1

COST ESTIMATE SUMMARY

DESIGN OPTION 1

UNDERGROUND HYDROPOWER ONLY

Account No.	Feature or Item	April 1980 Feature Cost (Item Cost) ($1,000)	October 1981 Feature Cost (Item Cost) ($1,000)
01	LANDS AND DAMAGES	$10	$10
04	DAM	4,620	5,180
.4	Power Intake Works	(4,620)	(5,180)
06	FISH AND WILDLIFE FACILITIES Downstream Fish Bypass Facility	3,880	4,350
07	POWERPLANT	10,970	12,290
.1	Powerhouse	(4,750)	(5,320)
.2	Turbines and Generators	(3,880)	(4,350)
.3	Accessory Electrical Equipment	(860)	(960)
.4	Miscellaneous Powerplant Equipment	(200)	(220)
.5	Tailrace	(1,070)	(1,200)
.6	Switchyard	(210)	(240)
19	BUILDINGS, GROUNDS, AND UTILITIES	250	280
20	PERMANENT OPERATING EQUIPMENT	170	190
	Subtotal	$19,900	$22,300
30	ENGINEERING AND DESIGN (E&D)	$1,600	$1,800
	E&D (7-1/2 percent)	(1,480)	(1,670)
	Model Studies	(120)	(130)
31	SUPERVISION AND ADMINISTRATION (S&A) (6-1/2 percent)	1,300	1,450
	TOTAL (April 1980 Price Level)	$22,800[1/]	
	TOTAL (October 1981 Price Level)		$25,550

1/Price increased $2,750,000 from April 1980 to October 1981 (+12 percent).

TABLE E-2

COST ESTIMATE SUMMARY

DESIGN OPTION 2

SURFACE HYDROPOWER ONLY

Account No.	Feature or Item	April 1980 Feature Cost (Item Cost) ($1,000)	October 1981 Feature Cost (Item Cost) ($1,000)
01	LANDS AND DAMAGES	$20	$20
04	DAM	5,740	6,440
.4	Power Intake Works	(5,740)	(6,440)
06	FISH AND WILDLIFE FACILITIES Downstream Fish Bypass Facility	3,880	4,350
07	POWERPLANT	8,000	8,960
.1	Powerhouse	(2,520)	(2,820)
.2	Turbines and Generators	(3,740)	(4,190)
.3	Accessory Electrical Equipment	(590)	(660)
.4	Miscellaneous Powerplant Equipment	(250)	(280)
.5	Tailrace	(690)	(770)
.6	Switchyard	(210)	(240)
08	ROADS, RAILROADS, AND BRIDGES	140	160
19	BUILDINGS, GROUNDS, AND UTILITIES	250	280
20	PERMANENT OPERATING EQUIPMENT	170	190
	Subtotal	$18,200	$20,400
30	ENGINEERING AND DESIGN (E&D)	$1,500	$1,670
	E&D (7-1/2 percent)	(1,380)	(1,540)
	Model Studies	(120)	(130)
31	SUPERVISION AND ADMINISTRATION (S&A) (6-1/2 percent)	1,200	1,330
	TOTAL (April 1980 Price Level)	$20,900[1/]	
	TOTAL (October 1981 Price Level)		$23,400

1/Price increased $2,500,000 from April 1980 to October 1981 (+12 percent).

TABLE E-3

COST ESTIMATE SUMMARY

DESIGN OPTION 3

FISH HATCHERY ONLY

Account No.	Feature or Item	April 1980 Feature Cost (Item Cost) ($1,000)	October 1981 Feature Cost (Item Cost) ($1,000)
06	FISH AND WILDLIFE FACILITIES	$15,550	$17,400
	Fish Hatchery - Phase I	(14,150)	(15,890)
	Fish Hatchery - Phase II	(1,350)	(1,510)
	Subtotal	$15,500	$17,400
30	ENGINEERING AND DESIGN (E&D)	$1,300	$1,470
	Phase I E&D (7-1/2 percent)	(1,150)	(1,300)
	Model Studies (Phase I)	(50)	(60)
	Phase II E&D	(100)	(110)
31	SUPERVISION AND ADMINISTRATION (S&A)	1,100	1,230
	Phase I S&A (6-1/2 percent)	(1,010)	(1,130)
	Phase II S&A	(90)	(100)
	TOTAL (April 1980 Price Level)	$17,900[1/]	
	TOTAL (October 1981 Price Level)		$20,100

1/Price increased $2,200,000 from April 1980 to October 1981 (+12 percent).

TABLE E-4

COST ESTIMATE SUMMARY

DESIGN OPTION 4

UNDERGROUND HYDROPOWER PLUS FISH HATCHERY

Account No.	Feature or Item	April 1980 Feature Cost (Item Cost) ($1,000)	October 1981 Feature Cost (Item Cost) ($1,000)
01	LANDS AND DAMAGES	$10	$10
04	DAM	4,620	5,180
.4	Power Intake Works	(4,620)	(5,180)
06	FISH AND WILDLIFE FACILITIES	16,280	18,250
	Fish Hatchery - Phase I	(14,930)	(16,740)
	Fish Hatchery - Phase II	(1,350)	(1,510)
07	POWERPLANT	10,970	12,290
.1	Powerhouse	(4,750)	(5,320)
.2	Turbines and Generators	(3,880)	(4,350)
.3	Accessory Electrical Equipment	(860)	(960)
.4	Miscellaneous Powerplant Equipment	(200)	(220)
.5	Tailrace	(1,070)	(1,200)
.6	Switchyard	(210)	(240)
19	BUILDINGS, GROUNDS, AND UTILITIES	250	280
20	PERMANENT OPERATING EQUIPMENT	170	190
	Subtotal	$32,300	$36,200
30	ENGINEERING AND DESIGN (E&D)	$2,630	$2,950
	Phase I E&D (7-1/2 percent)	(2,410)	(2,710)
	Model Studies (Phase I)	(120)	(130)
	Phase II E&D	(100)	(110)
31	SUPERVISION AND ADMINISTRATION (S&A)	2,170	2,450
	Phase I S&A (6-1/2 percent)	(2,080)	(2,350)
	Phase II S&A	(90)	(100)
	TOTAL (April 1980 Price Level)	$37,100 1/	
	TOTAL (October 1981 Price Level)		$41,600

1/ Price increased $4,500,000 from April 1980 to October 1981 (+12 percent).

TABLE E-5

COST ESTIMATE SUMMARY

DESIGN OPTION 5

SURFACE HYDROPOWER PLUS FISH HATCHERY

Account No.	Feature or Item	April 1980 Feature Cost (Item Cost) ($1,000)	October 1981 Feature Cost (Item Cost) ($1,000)
01	LANDS AND DAMAGES	$20	$20
04	DAM	5,740	6,430
.4	Power Intake Works	(5,740)	(6,430)
06	FISH AND WILDLIFE FACILITIES	15,580	17,460
	Fish Hatchery - Phase I	(14,230)	(15,950)
	Fish Hatchery - Phase II	(1,350)	(1,510)
07	POWERPLANT	8,000	8,960
.1	Powerhouse	(2,520)	(2,820)
.2	Turbines and Generators	(3,740)	(4,190)
.3	Accessory Electrical Equipment	(590)	(660)
.4	Miscellaneous Powerplant Equipment	(250)	(280)
.5	Tailrace	(690)	(770)
.6	Switchyard	(210)	(240)
08	ROADS, RAILROADS, AND BRIDGES	140	160
19	BUILDINGS, GROUNDS, AND UTILITIES	250	280
20	PERMANENT OPERATING EQUIPMENT	170	190
	Subtotal	$29,900	$33,500
30	ENGINEERING AND DESIGN (E&D)	$2,470	$2,740
	Phase I E&D (7-1/2 percent)	(2,250)	(2,500)
	Model Studies - Phase I	(120)	(130)
	Phase II E&D	(100)	(110)
31	SUPERVISION AND ADMINISTRATION (S&A)	2,030	2,260
	Phase I S&A (6-1/2 percent)	(1,940)	(2,160)
	Phase II S&A	(90)	(100)
	TOTAL (April 1980 Price Level)	$34,400 1/	
	TOTAL (October 1981 Price Level)		$38,500

1/Price increased $4,100,000 from April 1980 to October 1981 (+12 percent).

TABLE E-6

DETAILED COST ESTIMATE

RECOMMENDED PLAN

(UNDERGROUND HYDROPOWER PLUS FISH HATCHERY)

Summary

Account No.	Feature or Item	April 1980 Feature Cost (Item Cost) ($1,000)	October 1981 Feature Cost (Item Cost) ($1,000)
01	LANDS AND DAMAGES	$10	$10
04	DAM	4,620	5,180
.4	Power Intake Works	(4,620)	(5,180)
06	FISH AND WILDLIFE FACILITIES	16,280	18,250
	Fish Hatchery - Phase I	(14,930)	(16,740)
	Enhancement (88.3 percent)	((13,190))	((14,780))
	Project Mitigation (9.4 percent)	((1,400))	((1,570))
	WA Mitigation Responsibility (2.3 pct.)	((340))	((390))
	Fish Hatchery - Phase II (future)	(1,350)	(1,510)
	Enhancement (100 percent)	((1,350))	((1,510))
07	POWERPLANT	10,970	12,290
.1	Powerhouse	(4,750)	(5,320)
.2	Turbines and Generators	(3,880)	(4,350)
.3	Accessory Electrical Equipment	(860)	(960)
.4	Miscellaneous Powerplant Equipment	(200)	(220)
.5	Tailrace	(1,070)	(1,200)
.6	Switchyard	(210)	(240)
19	BUILDINGS, GROUNDS, AND UTILITIES	250	280
20	PERMANENT OPERATING EQUIPMENT	170	190
	Subtotal	$32,300	$36,200
30	ENGINEERING AND DESIGN (E&D)	$2,630	$2,950
	Phase I E&D (7-1/2 percent)	((2,410))	((2,710))
	Model Studies (Phase I)	((120))	((130))
	Subtotal - Phase I	(2,530)	(2,840)
	Hydropower and Enhancement	((2,390))	((2,690))
	Project Mitigation	((110))	((120))
	WA Mitigation Responsibility	((30))	((30))
	Phase II E&D	(100)	(110)
	Enhancement	((100))	((110))

TABLE E-6 (con.)

Summary (con.)

Account No.	Feature or Item	April 1980 Feature Cost (Item Cost) ($1,000)	October 1981 Feature Cost (Item Cost) ($1,000)
31	SUPERVISION AND ADMINISTRATION (S&A)	$2,170	$2,450
	Phase I S&A	(2,080)	(2,350)
	Hydropower and Enhancement	((1,970))	((2,220))
	Project Mitigation	((90))	((100))
	WA Mitigation Responsibility	((20))	((30))
	Phase II S&A	(90)	(100)
	Enhancement	((90))	((100))
	TOTAL (April 1980 Price Level)	$37,100 1/	
	TOTAL (October 1981 Price Level)		$41,600

1/Price increased $4,500,000 from April 1980 to October 1981 (+12 percent).

TABLE E-6 (con.)

DETAILED COST ESTIMATE (April 1980)

Account No.	Feature or Item	Unit	Quantity	Unit Price	Sub Amount	Amount
01	LANDS AND DAMAGES					
	Hydropower					
	Powerhouse and Penstock	AC.	5	$2,000.00		$10,000
	Fish Hatchery (included in Account 06)					
	Subtotal					$10,000
	Contingencies 25 Percent ±					0
	TOTAL					$10,000
04	DAM					
.4	Power Intake Works					
	Mobilization and Preparation	JOB	1	L.S.		1,000,000
*	Resident Engineer Facility (1/2 cost)	JOB	1	L.S.		175,000
	Foundation Excavation Rock Dry	C.Y.	500	25.00		12,500
	Foundation Concrete	C.Y.	40	275.00		11,000
	Cement	CWT	240	3.50		840
	Anchors 50K	EA.	10	700.00		7,000
	Assembly Area	JOB	1	L.S.		10,000
	Concrete	C.Y.	630	275.00		173,250
	Cement	CWT	2,836	3.50		9,926
	Resteel All	LBS.	100,000	0.45		45,000
	Filler Concrete	C.Y.	120	275.00		33,000

*Replaceable item.

TABLE E-6 (con.)

Account No.		Feature or Item	Unit	Quantity	Unit Price	Sub Amount	Amount
.4		Power Intake Works (con.)					
		Treme Concrete	C.Y.	8	185.00		1,480
		Cement	CWT	768	3.50		2,688
	*	Gate Guides	LBS.	55,400	2.50		138,500
		Shaft					$138,376
		Excavation Rock	C.Y.	790	$100.00	$79,000	
		Rock Bolts 1" dia. x 15'	EA.	165	140.00	23,100	
		Shotcrete Liner	C.Y.	60	115.00	6,900	
		Concrete Liner	C.Y.	96	285.00	27,360	
		Cement	CWT	576	3.50	2,016	
		Machinery House					76,814
		Concrete Walls (tilt-up)	C.Y.	66	125.00	8,250	
		Concrete Roof and Floor	C.Y.	58	200.00	11,600	
		Cement	CWT	261	3.50	914	
		Resteel	LBS.	9,000	0.45	4,050	
	*	Machinery	JOB	1	L.S.	52,000	
	*	Roll-up Door 24' x 20'	EA.	1	2,000.00	2,000	
	*	Selective Gates (4)	LBS.	59,550	2.00		119,100
	*	Emergency Gate	EA.	1	84,000.00		84,000
	*	Trash Racks (4)	LBS.	55,110	2.00		110,220
	*	Stoplogs (16)	LBS.	167,110	2.00		334,220
		Penstocks					750,468
		Excavation Rock	C.Y.	2,300	100.00	230,000	
		Shotcrete Lining	C.Y.	133	115.00	15,295	
		Concrete Filler	C.Y.	553	285.00	157,605	
		Cement	CWT	3,224	3.50	11,284	
		Steel Lining - Plate	TON.	56	3,636.00	203,616	
		Steel Lining - Stiffners	TON.	13	3,636.00	47,268	
		Rock Bolts	EA.	610	140.00	85,400	

*Replaceable item.

TABLE E-6 (con.)

Account No.	Feature or Item	Unit	Quantity	Unit Price	Sub Amount	Amount
.4	Power Intake Works (con.)					
	Trifurcation					
	Steel Liner	LBS.	76,000	3.50	266,000	459,840
	Concrete	C.Y.	540	200.00	108,000	
	Cement	CWT	3,240	3.50	11,340	
*	8.0' dia. Butterfly Valve	EA.	2	28,000.00	56,000	
*	5.0' dia. Butterfly Valve	EA.	1	$18,500.00	$18,500	
	Powerhouse Bypass (included in Account 06)					
	Subtotal					
	Contingencies 25 Percent ±					$3,693,222
	TOTAL					926,778
06	FISH AND WILDLIFE FACILITIES					$4,620,000
	Fish Hatchery - Phase I					
	Land and Damages (Fish Hatchery Site, Pipeline, Access Road)	A.C.	60	$2,000.00		$120,000
	Land Development	JOB	1	L.S.		191,300
	Roads	JOB	1	L.S.		323,100
*	Hatchery Building	JOB	1	L.S.		715,000
*	Service Building	JOB	1	L.S.		314,000
*	Freezer	JOB	1	L.S.		275,000
*	Spawn Building	JOB	1	L.S.		300,000
*	Small Service Building	JOB	1	L.S.		55,000
*	Head Tank	JOB	1	L.S.		603,000
	Salmon Raceways (6)	JOB	1	L.S.		242,500
	Steelhead Raceways (20)	JOB	1	L.S.		808,500

*Replaceable item.

TABLE E-6 (con.)

Account No.	Feature or Item	Unit	Quantity	Unit Price	Sub Amount	Amount
06	FISH AND WILDLIFE FACILITIES (con.)					
	* Salmon Holding Pond (1)	JOB	1	L S.		97,000
	Fish Outlet	JOB	1	L.S.		165,000
	Collection Structure	JOB	1	L.S.		110,000
	Sedimentation Pond	JOB	1	L.S.		100,000
	Salmon Rearing Ponds (1)	JOB	1	L.S.		77,300
	Steelhead Rearing Ponds (4)	JOB	1	L.S.		1,200,000
	Housing (4)	JOB	1	L.S.		307,300
	* Domestic Water	JOB	1	L.S.		56,000
	* Fire Protection	JOB	1	L.S.		$95,000
	* Domestic Sewage	JOB	1	L.S.		55,000
	* Auxiliary Power 50 kW	JOB	1	L.S.		26,000
	* Miscellaneous Mechanical	JOB	1	L.S.		660,000
	* Miscellaneous Electrical	JOB	1	L.S.		330,000
	* Visitor Facility	JOB	1	L.S.		100,000
	* Hatchery Water Distribution	JOB	1	L.S.		430,200
	Mobilisation and Preparation	JOB	1	L.S.		100,000
	Permanent Operating Equipment					525,000
	* Hatchery Equipment	JOB	1	L.S.	$500,000	
	* Fish Haul Truck	JOB	1	L.S.	25,000	
	Powerhouse Bypass					67,715
	Excavation Rock	C.Y.	100	$100.00	(10,000)	
	Mass Concrete	C.Y.	64	285.00	(18,240)	
	Steel Pipe	TON	5.7	3,636.00	(20,725)	
	* 3.5' dia. Butterfly Valve	EA.	1	18,750.00	(18,750)	

*Replaceable item.

TABLE E-6 (con.)

Account No.		Feature or Item	Unit	Quantity	Unit Price	Sub Amount	Amount
06		FISH AND WILDLIFE FACILITIES (con.)					
		Fish Hatchery Intake Structure and Portion of Tailrace					813,321
		Rock Excavation	C.Y.	942	100.00	94,200	
		Rock Bolts 1" dia. x 15'	EA.	110	140.00	15,400	
		Concrete	C.Y.	386	253.42	97,820	
		Cement	CWT	2,316	3.50	8,106	
		Resteel	LBS.	17,000	0.45	7,650	
		Steel Pipe	LBS.	31,000	3.50	108,500	
	*	Gates 12' x 20'	EA.	2	L.S. (partial)	30,000	
		Fish Hatchery Intake Structure				345,005	
		Excavation Rock	C.Y.	2,465	100.00	(246,500)	
		Concrete	C.Y.	220	275.00	(60,500)	
		Cement	CWT	990	3.50	(3,465)	
		Rebar	LBS.	17,200	0.45	(7,740)	
	*	Gate 9' x 16'	EA.	1	22,800.00	(22,800)	
		Flap Gate	EA.	1	4,000.00	(4,000)	
		Pipe from Existing Weir				$46,640	
		Excavation Common	C.Y.	60	$4.00	(240)	
		Excavation Rock	C.Y.	25	100.00	(2,500)	
		Pipe	LBS.	12,000	3.50	(42,000)	
		Cut Out Existing Weir	C.Y.	9	100.00	(900)	
		Grout in Pipe	JOB	1	L.S.	(1,000)	
	*	6.5' dia. Butterfly Valve	EA.	1	20,000.00	20,000	
	*	10.0' dia. Butterfly Valve	EA.	1	40,000.00	40,000	

*Replaceable item.

TABLE E-6 (con.)

Account No.	Feature or Item	Unit	Quantity	Unit Price	Sub Amount	Amount
06	FISH AND WILDLIFE FACILITIES (con.)					
	Water Supply Line					$1,597,155
	Excavation Common	C.Y.	22,400	3.50	78,400	
	Pipe 6' diameter	LBS.	17,280	3.50	60,480	
	Pipe 5' diameter	LBS.	368,000	3.50	1,288,000	
	Pipe 12" diameter	L.F.	3,600	27.00	97,200	
	Embankment Gravel	C.Y.	320	10.00	3,200	
	Embankment Common	C.Y.	6,250	3.50	21,875	
	Concrete Supports	EA.	30	1,500.00	45,000	
	Anchors #8 Rebar 10'	EA.	150	20.00	3,000	
	River Crossing at Hatchery					246,500
	Cofferdam Diversion	C.Y.	11,500	5.00	57,500	
	Well Points	EA.	160	150.00	24,000	
	Sump Pump	JOB	1	L.S.	6,000	
	Bank Protection	JOB	1	L.S.	159,000	
	River Crossing at Powerhouse					83,280
	Cofferdam Division	C.Y.	5,700	5.00	28,500	
	Well Points	EA.	80	150.00	12,000	
	Sump Pump	JOB	1	L.S.	3,000	
	Concrete Incasement	C.Y.	240	150.00	36,000	
	Cement	CWT	1,080	3.50	3,780	
	Satellite Fish Station					724,300
	Lands and Damages	AC.	5	2,000.00	10,000	
*	Collection Facilities	EA.	1	L.S.	245,500	
*	Holding/Rearing Ponds	EA.	1	L.S.	$468,800	
	Wildlife Mitigation	JOB	1	L.S.		$4,570
	Phase I Subtotal					$11,918,041
	Phase I Contingencies 25 Percent ±					3,011,959
	Phase I Total					$14,930,000

*Replaceable item.

TABLE E-6 (con.)

Account No.	Feature or Item	Unit	Quantity	Unit Price	Sub Amount	Amount
06	FISH AND WILDLIFE FACILITIES (con.)					
	Fish Hatchery - Phase II (future)					
	Roads	JOB	1	L.S.		$32,300
	Salmon Raceways (14)	JOB	1	L.S.		566,000
	* Salmon Holding Pond (1)	JOB	1	L.S.		97,000
	Salmon Rearing Ponds (2)	JOB	1	L.S.		154,700
	Housing (2)	JOB	1	L.S.		153,700
	* Hatchery Water Distribution	JOB	1	L.S.		47,800
	Mobilization and Preparation and Land Development	JOB	1	L.S.		25,000
	Phase II Subtotal					$1,076,500
	Phase II Contingencies 25 Percent ±					273,500
	Phase II Total (Future)					$1,350,000
	TOTAL (Phase I and Phase II)					$16,280,000

*Replaceable item.

TABLE E-6 (con.)

Account No.		Feature or Item	Unit	Quantity	Unit Price	Sub Amount	Amount
07		POWERPLANT					
.1		Powerhouse (Underground)					
		Excavation					$1,461,800
		Excavation Rock	C.Y.	13,250	100.00	1,325,000	
		Rock Bolts 1" dia. x 15'	EA.	540	$140.00	$75,600	
		Rock Bolts 1" dia. x 20'	EA.	360	170.00	61,200	
		Access Shaft					$610,382
		Excavation Rock	C.Y.	3,175	100.00	317,500	
		Rock Bolts 1" dia. x 15'	EA.	400	140.00	56,000	
		Shotcrete	C.Y.	150	115.00	17,250	
		Concrete	C.Y.	412	250.00	103,000	
		Cement	CWT	2,472	3.50	8,652	
		Resteel	LBS.	62,000	0.45	27,900	
		Stairway	JOB	1	L.S.	2,200	
	*	Elevator	JOB	1	L.S.	55,000	
	*	House at Surface	S.F.	572	40.00	22,880	
		Tilt-Up Concrete					554,636
		Powerhouse Concrete	JOB	1	L.S.	470,000	
		Shotcrete	C.Y.	406	115.00	46,690	
		Crane Rail Concrete	C.Y.	114	250.00	28,500	
		Cement	CWT	513	3.50	1,796	
		Rebar	LBS.	17,000	0.45	7,650	
		Mobilization and Preparation	JOB	1	L.S.		1,000,000
	*	Resident Engineer Facility (1/2 cost)	JOB	1	L.S.		175,000
		Subtotal					$3,801,818
		Contingencies 25 Percent ±					948,182
		TOTAL					$4,750,000

*Replaceable item.

TABLE E-6 (con.)

Account No.	Feature or Item	Unit	Quantity	Unit Price	Sub Amount	Amount
.2	* Turbines and Generators					
	Turbines (3)	JOB	1	L.S.		$1,720,000
	Generators (3)	JOB	1	L.S.		$1,391,000
	Governor	JOB	1	L.S.		45,000
	Valves	JOB	1	L.S.		80,000
	Subtotal					$3,236,000
	Contingencies 20 Percent ±					644,000
	TOTAL					$3,880,000
.3	* Accessory Electrical Equipment					
	Switchgear, Breakers, and Busses	JOB	1	L.S.		$360,000
	Station Service Unit	JOB	1	L.S.		50,000
	Control System	JOB	1	L.S.		150,000
	Miscellaneous Electrical Systems	JOB	1	L.S.		154,000
	Subtotal					$714,000
	Contingencies 20 Percent ±					146,000
	TOTAL					$860,000
.4	* Miscellaneous Powerplant Equipment					
	Heating and Ventilating	JOB	1	L.S.		$15,000
	Station, Breaker and Governor Air	JOB	1	L.S.		5,000
	Unwatering and Drainage System	JOB	1	L.S.		36,000

*Replaceable item.

TABLE E-6 (con.)

Account No.	Feature or Item	Unit	Quantity	Unit Price	Sub Amount	Amount
.4	* Miscellaneous Powerplant Equipment (con.)					
	Miscellaneous Mechanical Systems	JOB	1	L.S.		$29,000
	Bridge Crane	JOB	1	L.S.		80,000
	Subtotal					$165,000
	Contingencies 20 Percent ±					35,000
	TOTAL					$200,000
.5	Tailrace - Hydropower Portion					
	Rock Excavation	C.Y.	2,600	$100.00		$260,000
	Rock Bolts 1" dia. x 15'	EA.	770	140.00		107,800
	Shotcrete	C.Y.	306	115.00		35,190
	Concrete	C.Y.	339	285.00		96,615
	Cement	CWT	2,034	3.50		7,119
	* Gates 12' x 20'	EA.	2	L.S. (partial)		42,000
	Hydropower Outlet					132,029
	Excavation Rock	C.Y.	1,000	100.00	$100,000	
	Concrete	C.Y.	38	275.00	10,450	
	Cement	CWT	171	3.50	599	
	Rebar	LBS.	4,800	0.45	2,160	
	* Trashracks	LBS.	2,660	2.00	5,320	
	* Stoplogs	JOB	1	L.S.	10,000	
	* Guides	LBS.	1,000	3.50	3,500	
	Work Area					73,509
	Excavation Rock	C.Y.	112	100.00	11,200	
	Concrete	C.Y.	38	275.00	10,450	
	Cement	CWT	171	3.50	599	
	Resteel	LBS.	2,800	0.45	1,260	
	* Jib Crane, 2 Ton	EA.	1	L.S.	50,000	

*Replaceable item.

TABLE E-6 (con.)

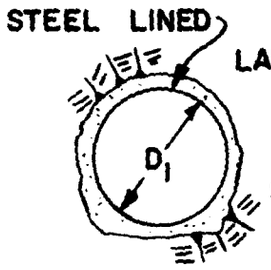
Account No.	Feature or Item	Unit	Quantity	Unit Price	Sub Amount	Amount
.5	Tailrace - Hydropower Portion (con.)					
	Access					$5,117
	Excavation Common	C.Y.	29	$100.00	$2,900	
	Crushed Rock	C.Y.	12	15.00	180	
	Concrete Stairs	C.Y.	7	275.00	1,925	
	Cement	CWT	32	3.50	112	
	Dewater Area	JOB	1	L.S.		100,000
	Tailrace - Fish Portion (included in Account 06)					
	Subtotal					$859,379
	Contingencies 25 Percent ±					210,621
	TOTAL					$1,070,000
.6	* Switchyard and Transmission Lines					
	Power Transformer	JOB	1	L.S.		$150,000
	Disconnects and Electrical Equipment	JOB	1	L.S.		24,000
	Subtotal					$174,000
	Contingencies 20 Percent ±					36,000
	TOTAL					$210,000

*Replaceable item.

TABLE E-6 (con.)

Account No.	Feature or Item	Unit	Quantity	Unit Price	Sub Amount	Amount
19	* BUILDINGS, GROUNDS, AND UTILITIES					
	Hydropower					
	Administration Building	S.F.	500	55.00		27,500
	Maintenance Building	S.F.	3,000	40.00		120,000
	Standby Power			L.S.		20,000
	Fencing	L.F.	1,500	15.00		22,500
	Gates	EA.	3	3,000.00		9,000
	Lights	EA.	10	$200.00		$2,000
	Fish Hatchery (included in Account 06)					
	Subtotal					$201,000
	Contingencies 25 Percent ±					49,000
	TOTAL					$250,000
20	* PERMANENT OPERATING EQUIPMENT					
	Hydropower					
	Pickup, 1/2 ton	JOB	1	L.S.		6,000
	Flatbed, 2 tons	JOB	1	L.S.		12,000
	Mobile Crane, 15 tons	JOB	1	L.S.		90,000
	Portable Air Compressor	JOB	1	L.S.		25,000
	Fish Hatchery (included in Account 06)					
	Subtotal					$133,000
	Contingencies 25 Percent ±					37,000
	TOTAL					$160,000

*Replaceable item.



PENSTOCKS
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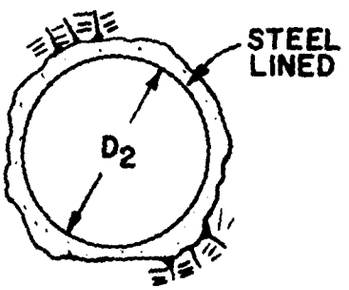

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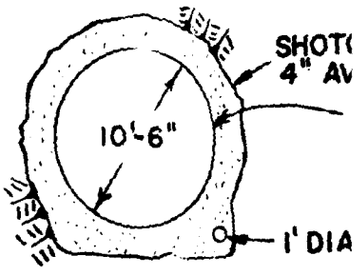

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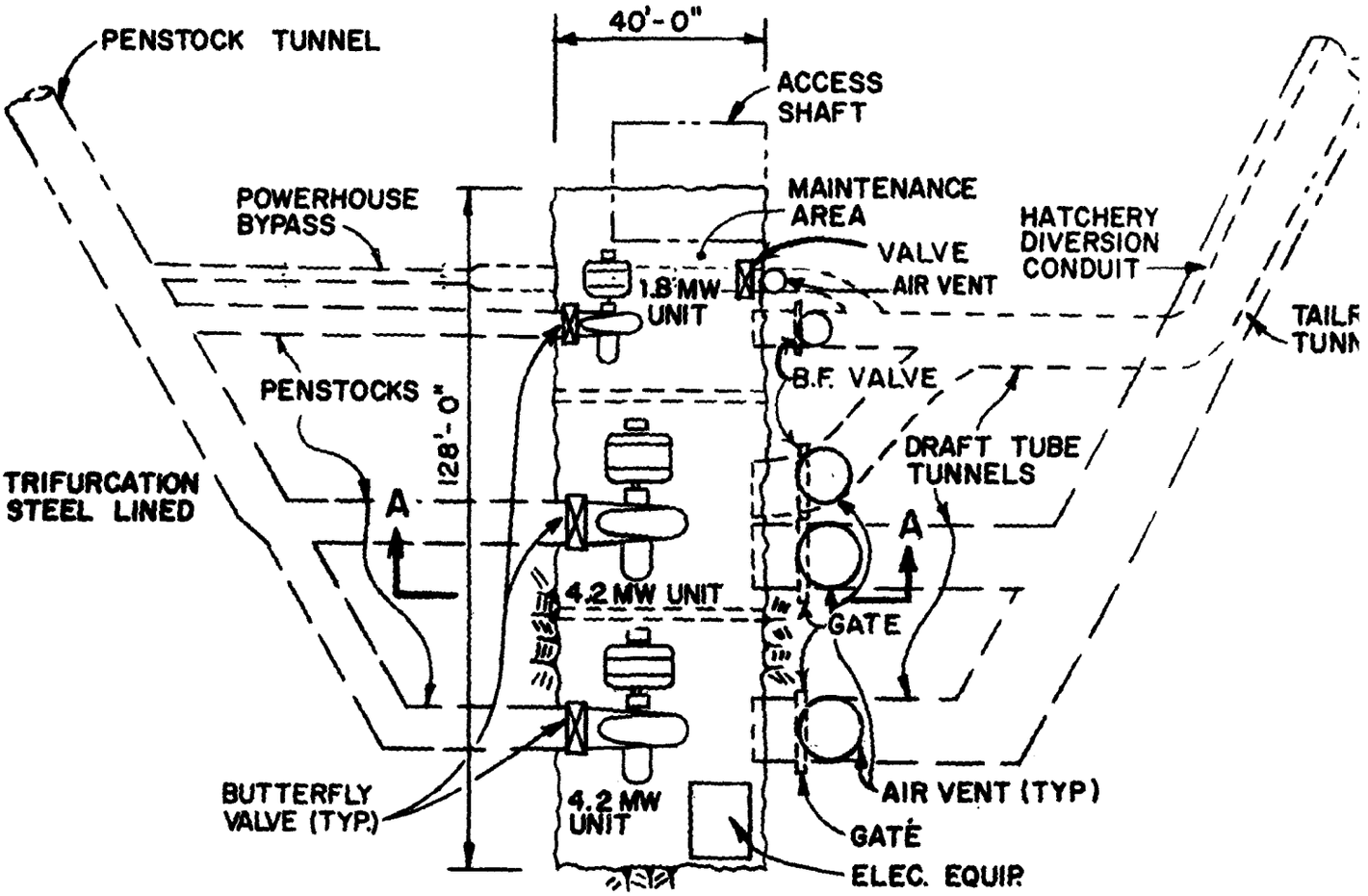
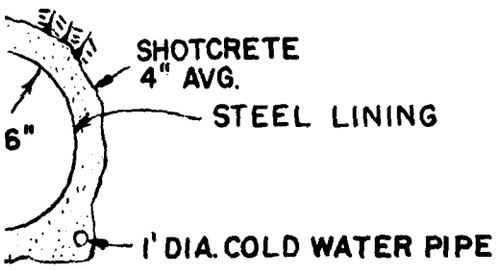


POWERHOUSE
PLAN VIEW
SCALE: 1"=30'-0"

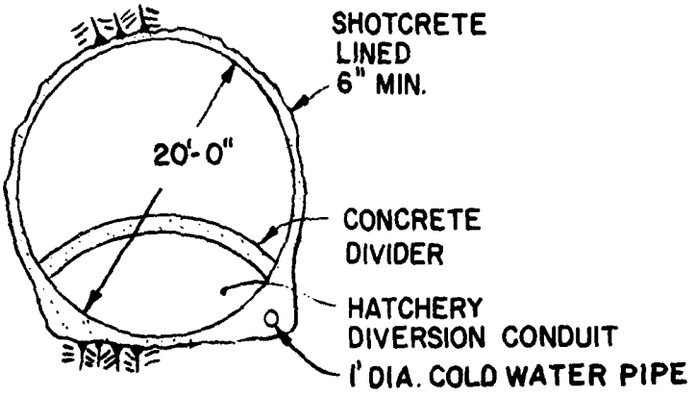
1"= 10'-0" 10' 0'

1"=20'-0" 20' 0'

1"=30'-0" 30' 0'



CK TUNNEL
: 1"=10'-0"



TAILRACE TUNNEL
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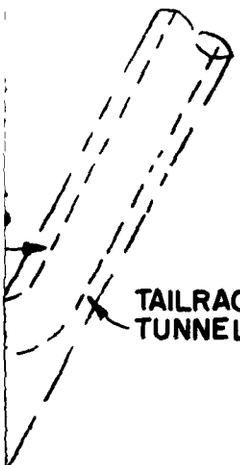

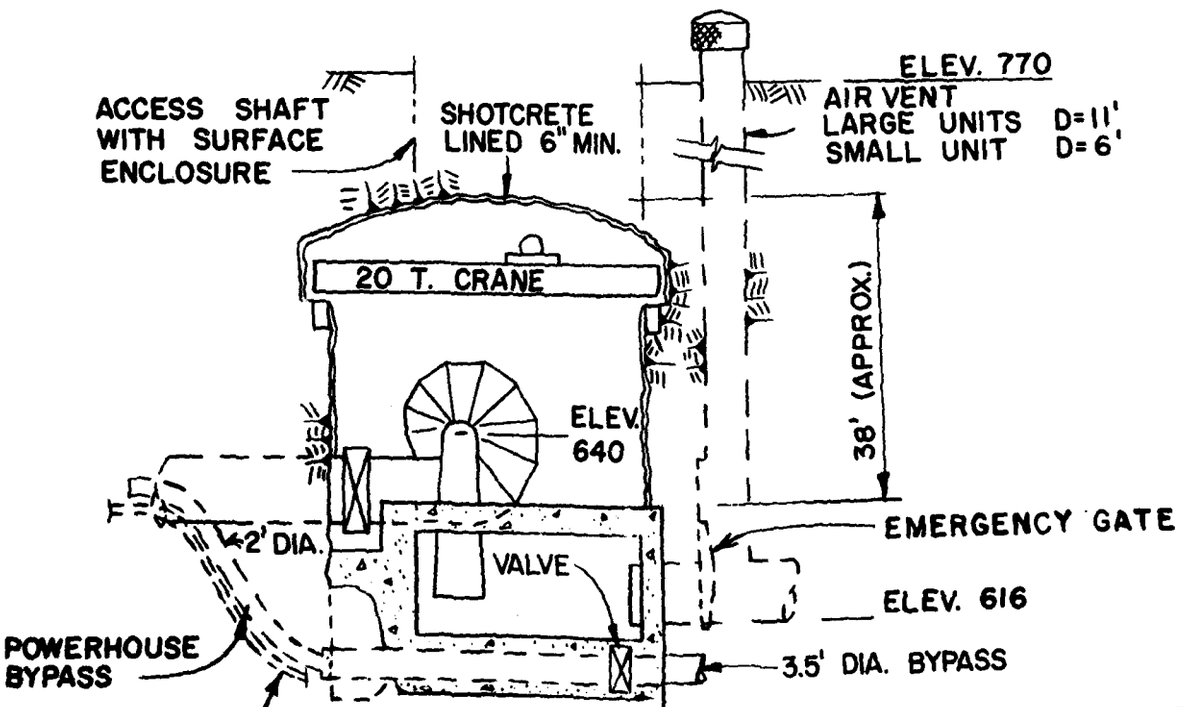

SECTION A-A
POWERHOUSE

CROSS SECTION
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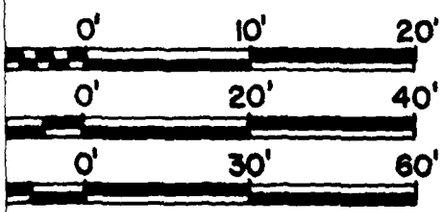
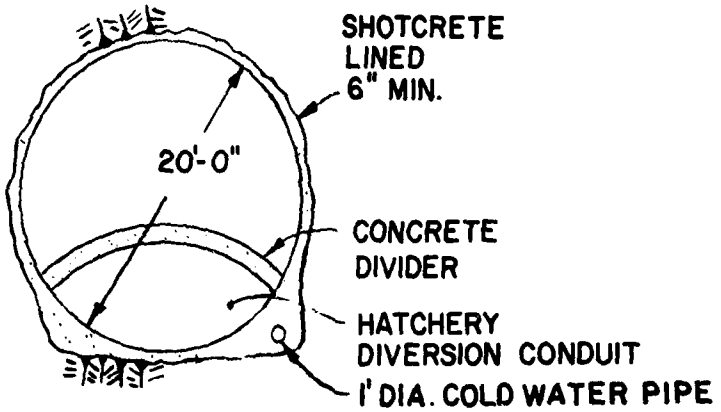


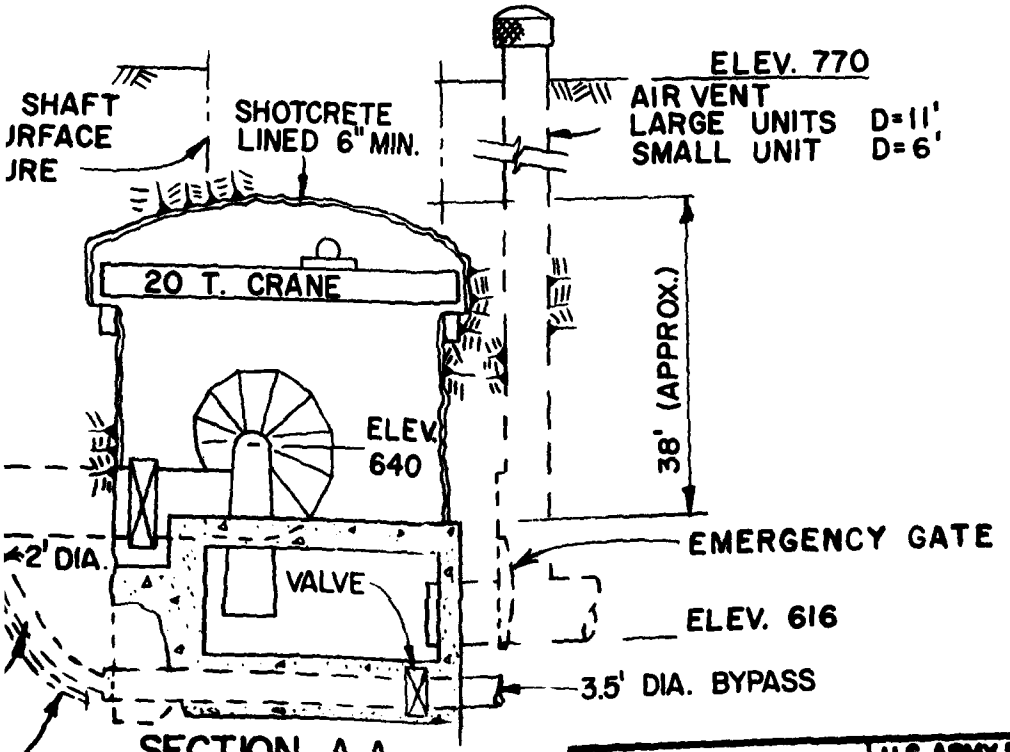
U.S. ARMY ENG
CORPS OF
SEATTLE, W

Designed by: NOYES	WYNOOCHEE FISH H RECOMME
Checked by: NELSON	PLAN DE
Reviewed by: WALLER	Scale: VARIES
Approved by: SHANNON	Date: 20 NOV 81
	Sheet reference number: E-1

2



TAILRACE TUNNEL
SCALE: 1" = 10'-0"



SECTION A-A
POWERHOUSE

CROSS SECTION
SCALE: 1" = 20'-0"

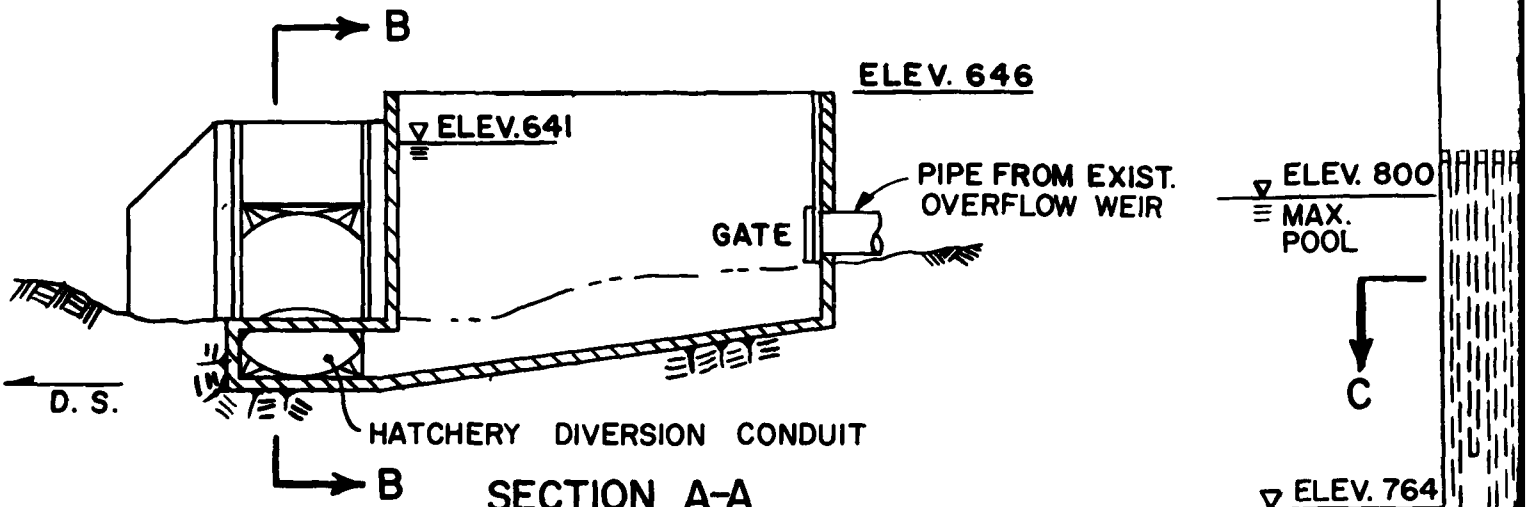
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

WYNOOCHEE HYDROPOWER/
FISH HATCHERY
RECOMMENDED PLAN

PLAN DETAILS I

Designed by NOYES	
Drawn by	
Checked by NELSON	
Reviewed by WALLER	Scale VARIES
Approved by SHANNON	Date 20 NOV 81
	Drawing No. E-1
	Sheet _ of _

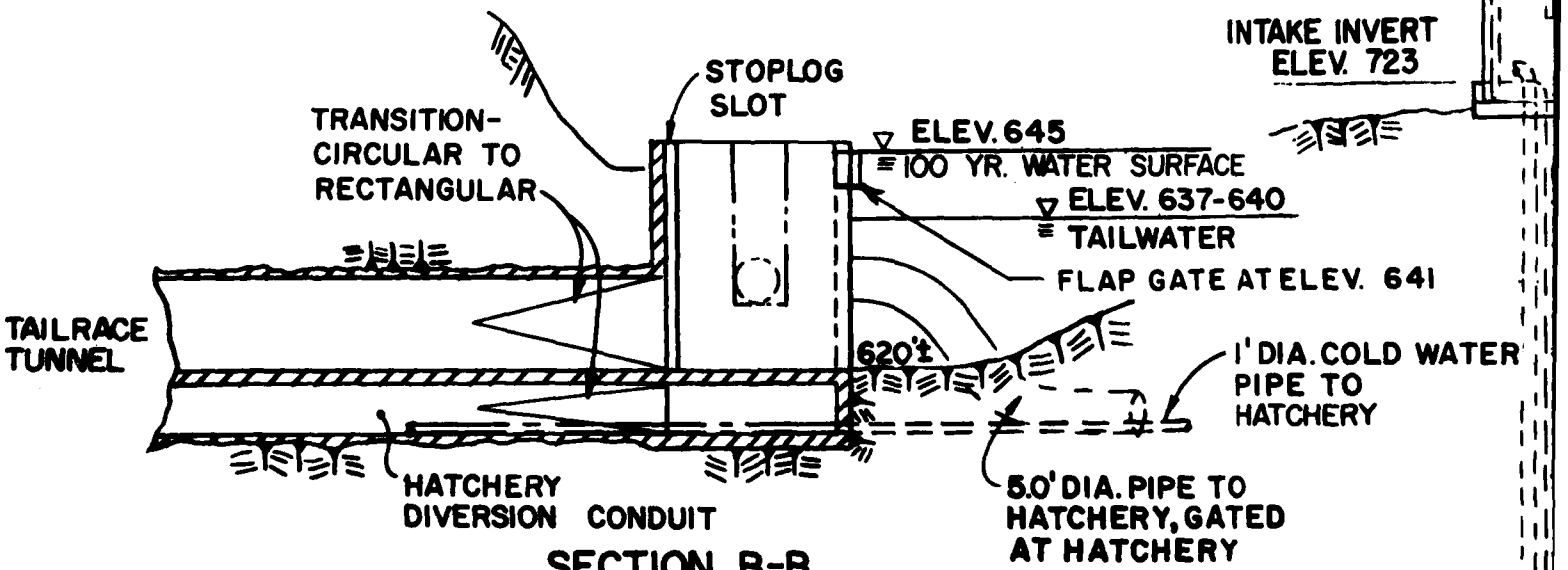
3



SECTION A-A

HYDROPOWER OUTLET/FISH HATCHERY INTAKE STRUCTURE

LONGITUDINAL SECTION (SEE PLATE 3)
SCALE: 1" = 20'-0"



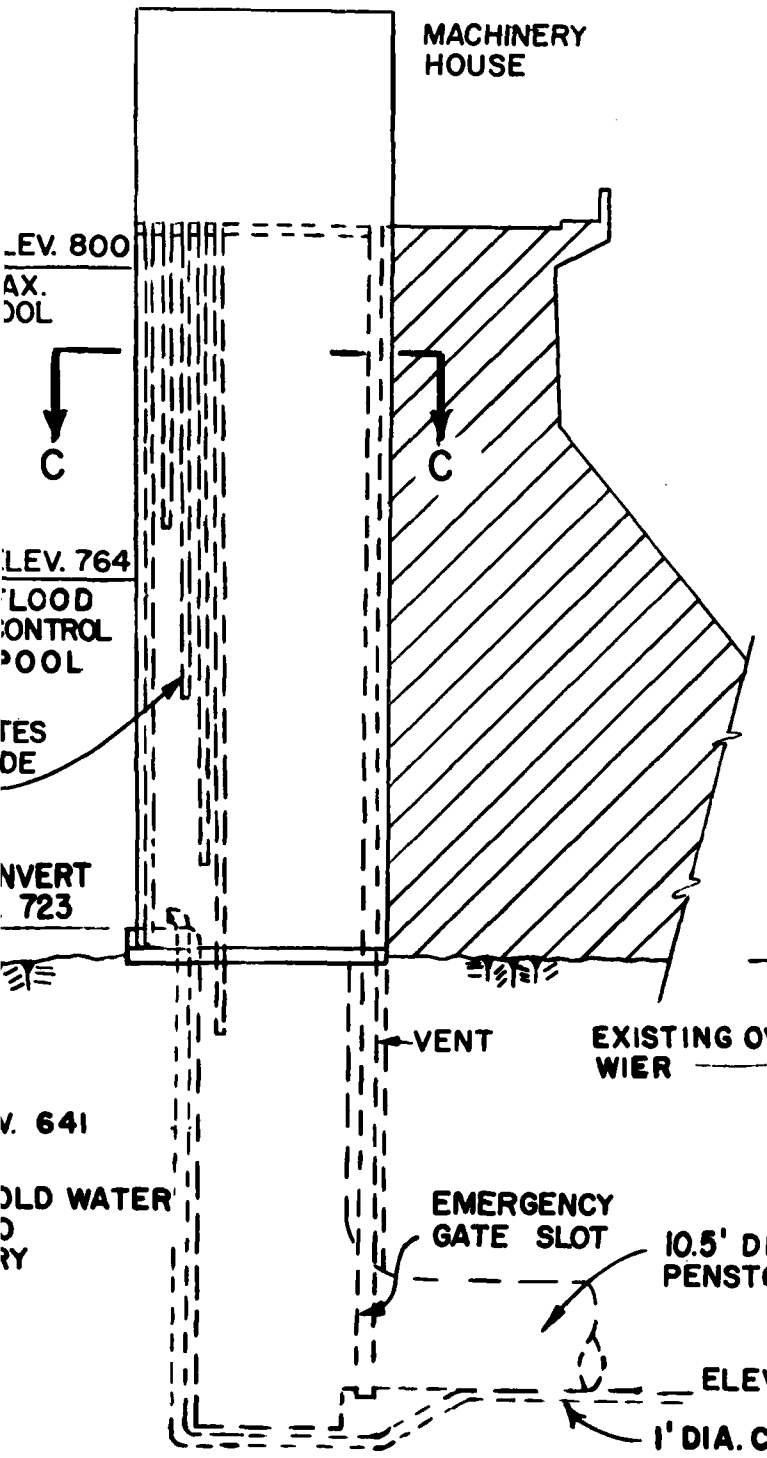
SECTION B-B

HYDROPOWER OUTLET/FISH HATCHERY INTAKE STRUCTURE

CROSS SECTION
SCALE: 1" = 20'-0"

MULTILEVEL

EL
SCA



LTILEVEL POWER INTAKE

ELEVATION
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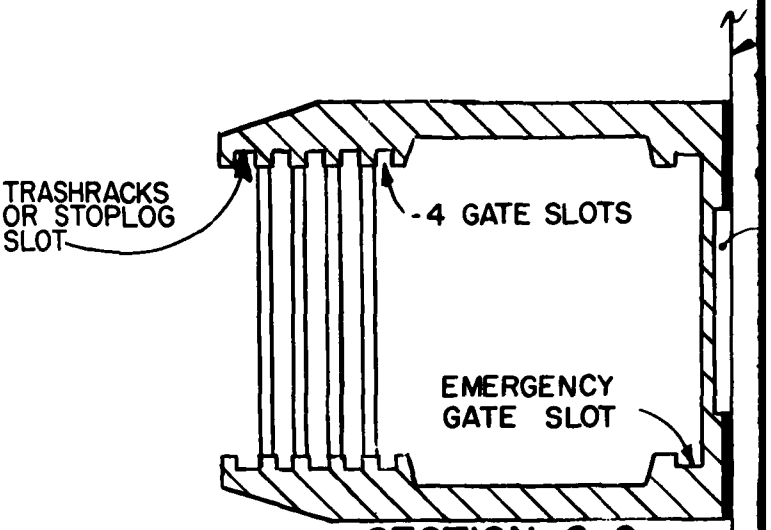
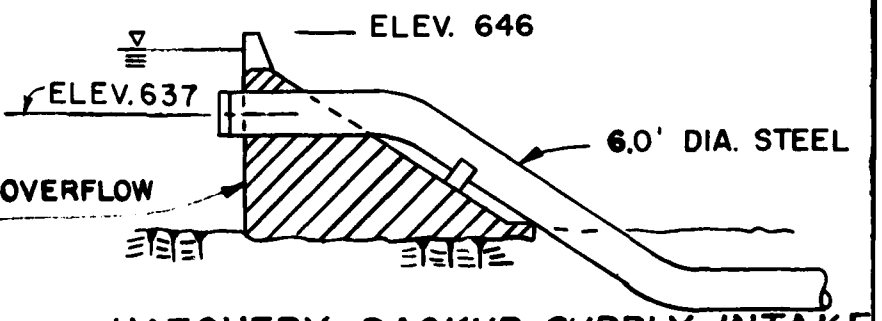


SECTION C-C

MULTILEVEL POWER INTAK

CROSS SECTION
SCALE: 1" = 10'-0"



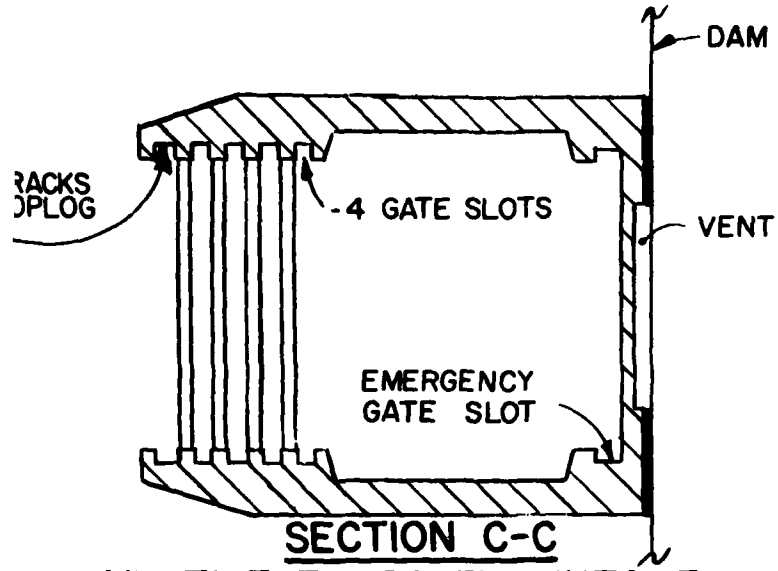
HATCHERY BACKUP SUPPLY INTAKE

SCALE: 1" = 20'-0"

1"=10'-0" 10' 0' 10'

1"=20'-0" 20' 0' 20'

	U.S. ARMY E… CORPS O… SEATTLE
Designed by: NOYES	WYNOOCHEE FISH RECOMM…
Drawn by:	
Checked by: NELSON	PLAN D…
Reviewed by: WALLER	Scale: VARIES
Approved by: SHANNON	Date: 20 NOV 81
	E-2…



SECTION C-C

MULTILEVEL POWER INTAKE

CROSS SECTION
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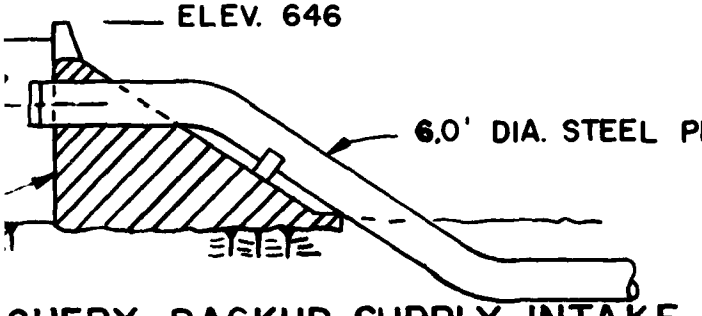


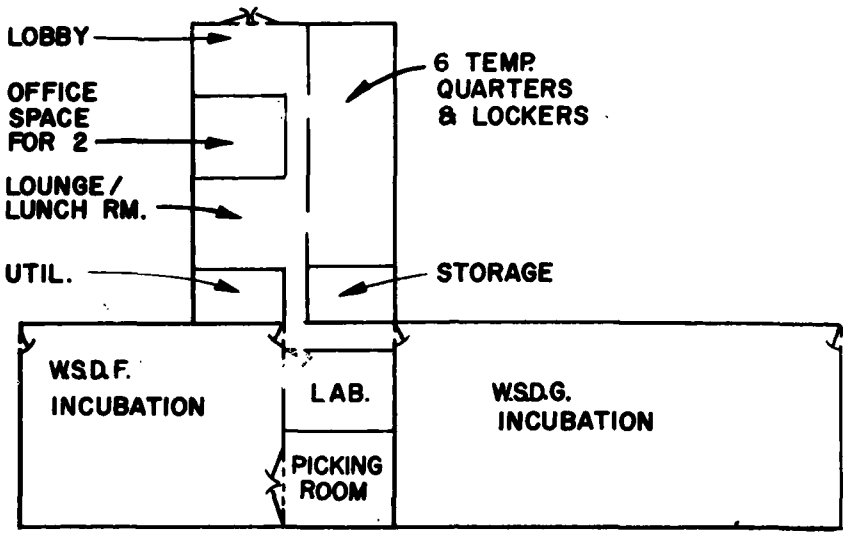
CHERY BACKUP SUPPLY INTAKE

SCALE: 1" = 20'-0"

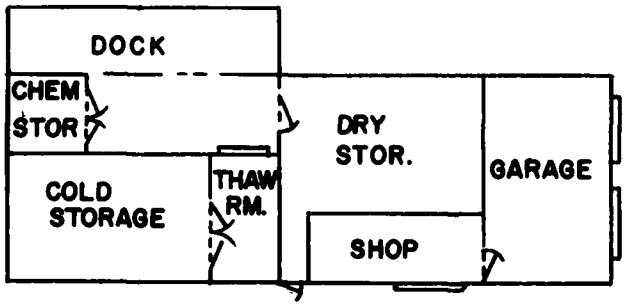
	U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS SEATTLE, WASHINGTON
Designed by: NOYES	WYNOOCHEE HYDROPOWER/ FISH HATCHERY RECOMMENDED PLAN
Drawn by:	
Checked by: NELSON	PLAN DETAILS 2
Reviewed by: WALLER	Scale: VARIES
Approved by: SHANNON	Date: 20 NOV 81
	Drawing number: E-2
	Sheet _ of _

10'
20'

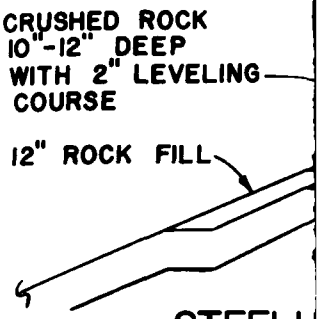
3



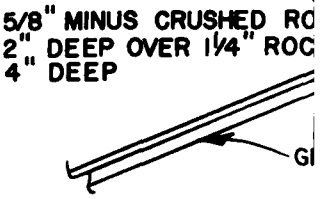
HATCHERY BUILDING
SCALE: 1" = 40'-0"



SERVICE BUILDING
SCALE: 1" = 40'-0"

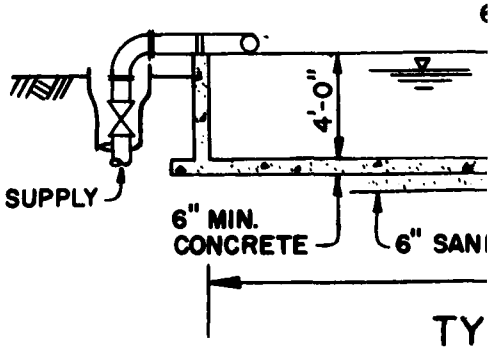


STEELH

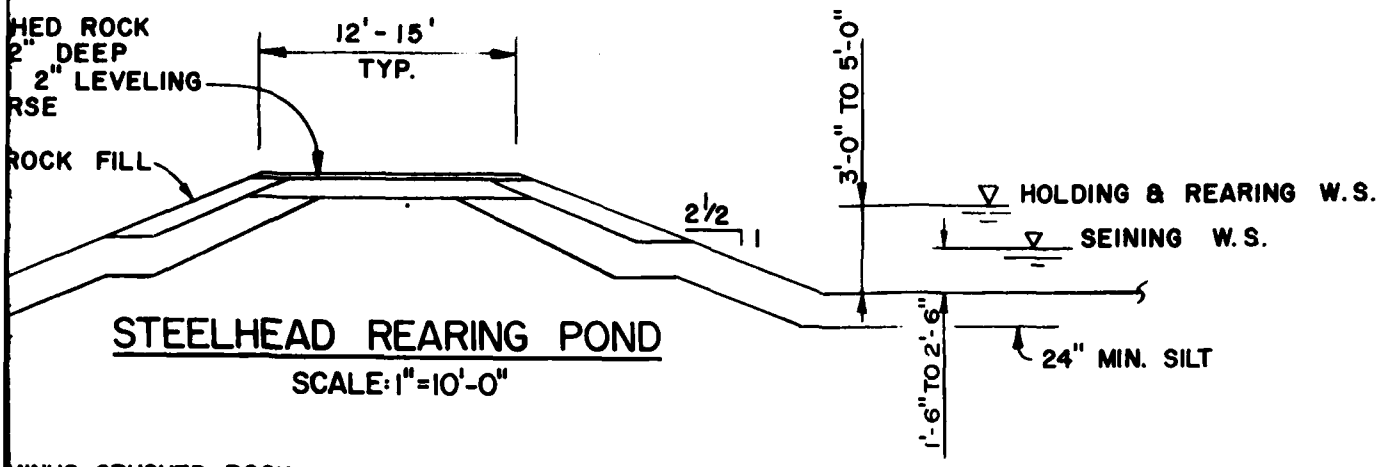


SALM

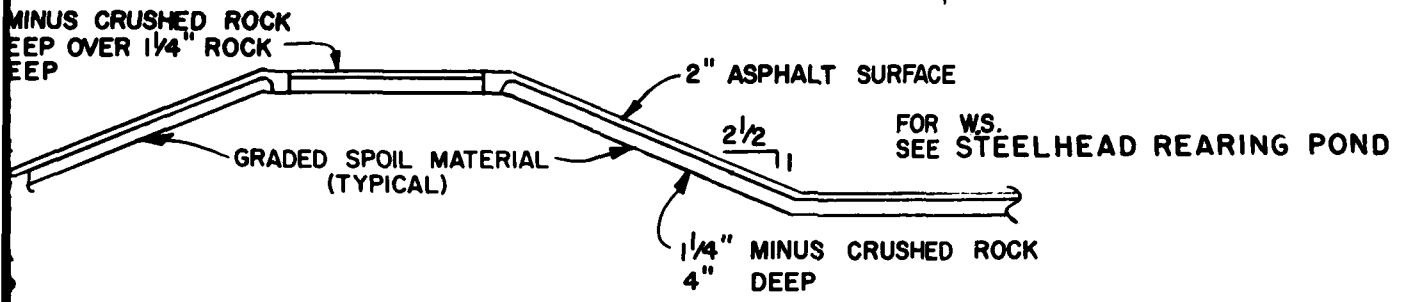
SALM



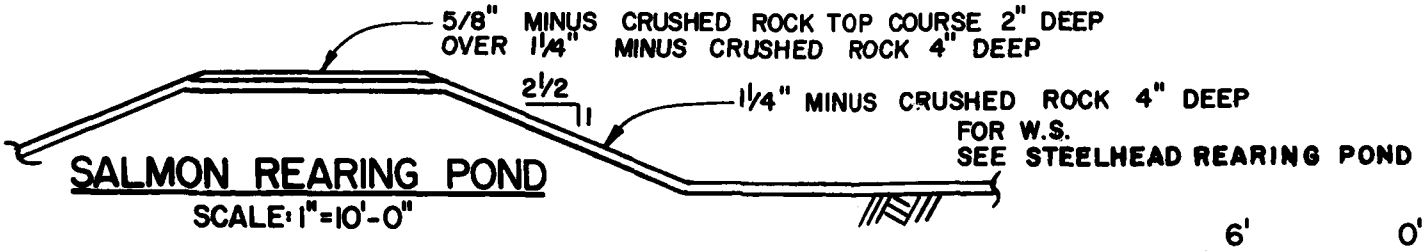
TY
LO



STEELHEAD REARING POND
SCALE: 1"=10'-0"



SALMON HOLDING POND
SCALE: 1"=10'-0"



SALMON REARING POND
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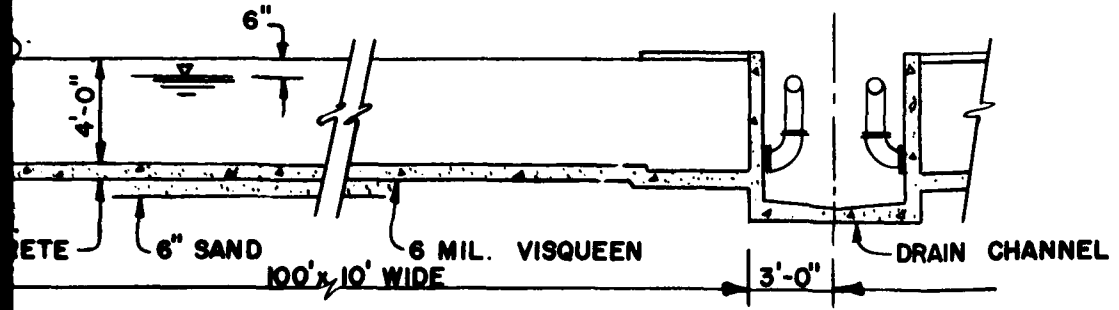

TYPICAL RACEWAY
LONGITUDINAL SECTION
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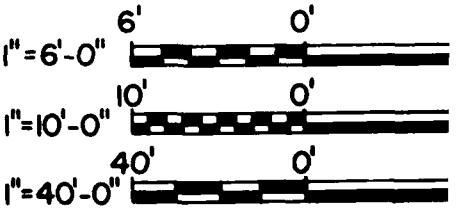
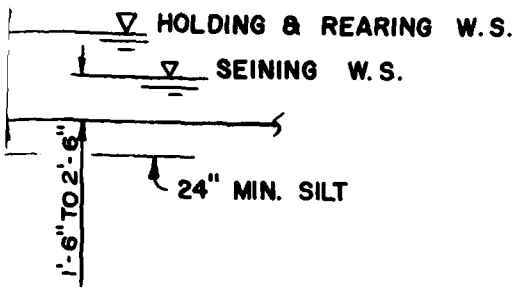
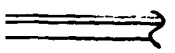


	U.S. ARMY CORPS SEATTLE
Designed by: NOYES	WYNOOCHEE FISH RECOVERY
Drawn by:	PLAN
Checked by: NELSON	
Reviewed by: WALLER	Scale: VARIES
Approved by: SHANNON	Date: 20 NOV 91



SURFACE

FOR W.S.
SEE STEELHEAD REARING POND

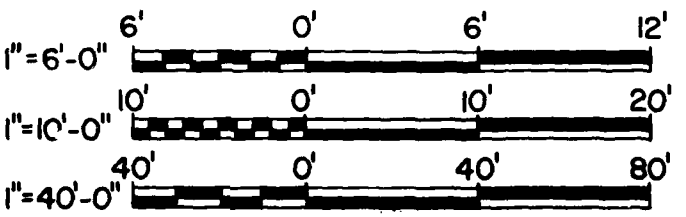


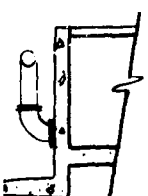
CRUSHED ROCK

CK TOP COURSE 2" DEEP
HED ROCK 4" DEEP

" MINUS CRUSHED ROCK 4" DEEP

FOR W.S.
SEE STEELHEAD REARING POND





DRAIN CHANNEL

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

Designed by: NOYES	WYNOOCHEE HYDROPOWER/ FISH HATCHERY RECOMMENDED PLAN
Checked by: NELSON	PLAN DETAILS 3
Reviewed by: WALLER	Scale: VARIES
Approved by: SHANNON	Date: 20 NOV 81
	Sheet reference number: E-3
	Sheet _ of _

3

APPENDIX F

GEOLOGY, SOILS, AND CONSTRUCTION MATERIALS

TABLE OF CONTENTS

TABLES

FIGURES

TABLE OF CONTENTS (con.)

FIGURES (con.)

PLATES

1. Geology.

a. Geologic Setting.

(1) The Wynoochee Lake project lies on the southern flank of the Olympic Mountains, part of the coast ranges within the Pacific Border Physiographic Province. Two geologic terrains which comprise the Olympic Mountains are core rocks and peripheral rocks. The peripheral rocks form a large horseshoe pattern open on the west and consist of folded and faulted volcanic rocks, sandstones, argillites, and conglomerates of the Eocene Crescent Formation. The contrasting metasedimentary core rocks (phyllites, slates, and metasandstones) range in age from Eocene to middle Miocene and are highly deformed. The peripheral rocks are separated from the younger core rocks by a series of thrust faults. Imbricate thrust blocks underwent complex folding and doming during the middle to late Miocene. The project lies within the belt of peripheral rocks.

(2) Most of the central part of the Olympics has been modified by alpine glaciation with cirques at the heads of deep, U-shaped main valleys. Alpine glaciers still occupy areas around several peaks in the central Olympics. The Wynoochee River flows southwesterly in what appears to be a structurally controlled, U-shaped valley partly filled with glacial drift including morainal, glaciofluvial, and glaciolacustrine stratified deposits consisting of sand, gravel, silt, and clay, usually mantled by recent alluvium or colluvium. In Pleistocene time the upper and middle reaches of the Wynoochee Valley were repeatedly glaciated. The repetitive glacial deposition combined with interglacial stream erosion has left a complex valley characterized by midvalley basalt rock knobs largely covered by glacial drift. Wynoochee Dam spans a narrow canyon cut through the high point of one of these rock knobs.

(3) In the vicinity of the dam, Wynoochee Valley is 2 miles wide and is bounded by rock ridges which rise to 2,000 feet above the valley floor. From 8 miles upstream to 10 miles downstream of the dam the rocks are dominantly basaltic lava flows. The flows strike west to northwest and dip steeply to the south and are well exposed in the narrow canyon. The black to dark greenish gray basalt flows are characterized by closely spaced random joints and locally are columnar jointed or more rarely have pillow structures characteristic of the submarine lava flows. Pockets of brown or gray clay are found in flow contact zones. Locally the lavas are intruded by small, dark gray, moderately jointed crystalline diorite bodies.

b. Tectonic and Seismic Setting.

(1) The project lies within the Coast Range tectonic province and is adjacent to the tectonic provinces of the Puget-Willamette Trough and the Continental Shelf-Slope. The Coast Range tectonic province is subdivided into Olympic Mountains, Willapa Hills, and Oregon Coast Range. Dominant tectonic elements developed during the Pleistocene and consist of major basement uplifts and minor faults.

(2) The Olympic Mountains are a tectonic province of extremely complex geology and deformation. The deformation climaxed during the middle to late Miocene. The structures observed in the Olympics are considered to be the result of continental rise sedimentation being carried against and welded onto the subduction zone beneath the continental edge. One documented, potentially capable fault, the Saddle Mountain fault near Lake Cushman, is recognized in this province, though more recent remote sensing data suggest others may be present. The minor seismicity present within the Olympic Mountains is, however, associated with major fault systems present on its northern flank.

(3) The Puget Sound subprovince of the Puget-Willamette Trough is the most seismically active portion of the region. Tertiary bedrock of the Puget Trough is concealed under thick sequence of the Pleistocene and recent deposits. Faults are not generally expressed in the cover due to deep hypocenters for the large seismic events. Gravity, magnetic, and hypocentral location studies infer numerous faults within the bed- rock. These faults are conceptionalized as composing rectilinear blocks which are similar in dimension to portions of Puget Sound currently undergoing differential subsidence. Major events in 1949 and 1965 (Mag- nitudes 7.1 and 6.5, respectively) are spatially restricted to blocks in the southern end of Puget Sound. These blocks are adjacent to the Southern Olympic area and are 35 miles east of the dam. Strong linear trends with the southern blocks, apparent on gravity and magnetic maps and SLAR (sidelooking airborne radar) imagery, provide a basis to local- ize future strong events.

(4) The Willapa Hills extend from the Chehalis Valley south of the Olympic Mountains to the Columbia Valley and are an area of low seismicity. The Continental Slope and Shelf province contains moderate events which are localized on fracture zones and transform faults far offshore.

c. Siting Considerations. Consideration was given to two powerhouse locations on the right bank: an underground location and a surface location. A conservative approach was used in siting the underground powerhouse about 200 feet downstream of the dam and 200 feet behind the canyon wall. Considerations included the length of existing rock bolts which stabilize stress relief joints in the canyon wall, possible margin of safety for tunnel blasting. A surface powerhouse site was also considered, located about 900 feet downstream of the dam on the right bank at the lower end of the bedrock canyon and at the toe of a slide in the overburden material (see plate F-1 for slide configuration). Foundation preparation for the surface powerhouse site would require excavation of both bedrock and overburden, leading to a potentially unstable slide condition and the possibility of requiring potentially expensive remedial measures not included in the cost estimates. Further downstream, the bedrock surface drops rapidly and a bedrock foundation is not available.

d. Investigation.

(1) Approximately 45 exploratory borings were drilled using cable tool, rotary, and diamond drills during exploration for Wynoochee Dam at river mile 51.8 between 1964 and 1968. Four of these borings are appropriately located to give useful information on rock character pertaining to the underground powerhouse and associated structures. Boring logs are presented in figures F-1 through F-4. Of the four borings, only core from boring 65-DD-32 has been retained. Investigation included backhoe pits and trenches, dozer cuts, and natural exposure mapping.

(2) The Corps' feasibility investigations for the proposed powerhouse were limited to more detailed geologic mapping of natural exposures, one diamond drill borehole (figure F-5) in the underground powerhouse site, borehole camera photography, and refraction seismic work. Locations of borings and rock exposures are shown on plate F-2. Concrete aggregate investigation consists of eight backhoe holes in the lower right bank meander bench approximately 3,000 feet downstream of the dam. Logs of the backhoe excavations are shown on plate F-3, and locations are shown on plate F-1.

(3) Converse, Ward, Davis, and Dixon, Geotechnical Engineers, supervised the exploration program for R. W. Beck and Associates, design engineers for Grays Harbor PUD. Five boreholes were drilled and completed during October - November 1980. Locations of the borings DH-101 through DH-105 are shown on plate F-1. The Corps conducted borehole photography for borings DH-101 and DH-105.

2. Site Geotechnical Considerations.

a. Bedrock Configuration and Character.

(1) Downstream from the dam for about 800 feet, the Wynoochee River flows through a narrow, steep-walled rock canyon. The rock canyon is approximately 20 feet wide at river level, elevation 635 feet, and 100 to 150 feet wide at elevation 750 feet. On the left bank of the river, the bedrock surface reaches an elevation of 770 feet before dropping abruptly into an adjacent buried valley. On the right bank the rock rises to an elevation of about 790 feet and maintains that general elevation for a minimum distance of several hundred feet from the canyon wall. Contours on the bedrock surface are shown on plate F-2.

(2) Submarine, pillow basalt flows represent most of the bedrock at the site. The rock is closely jointed and finely crystalline with carbonate veinlets and zones of palagonite. Palagonite hydrous glass forms 1-inch rinds on pillows and 1-foot zones at flow contacts and along zones of internal shear in a flow. Most joint surfaces are coated with unweathered dark chlorite which acts as a friction reducer. Thin clay and fine sandy interbeds occasionally are present at flow contacts. An altered, coarse grained basaltic rock body about 20 feet

thick is mapped as a basalt intrusion in the foundation of dam monoliths 1 and 2. This rock body follows the general attitude of basaltic flows in the site area, probably represents a spilitic rock type and is no more than a coarse grained flow.

b. Bedrock Structure.

(1) The rock is characterized by many discontinuous, randomly oriented joints (see plate F-2). Contraction (cooling) joints, tectonic joints, stress relief joints, and joints along flow contacts cause a highly variable degree of rock competency throughout the area. Joint sets were mapped on the right bank canyon wall over its length from the dam to 800 feet downstream. Significant joint-pole clusters are shown on the summary polar contour diagram, figure F-6. Highs on the contour diagram represent preferred orientations of systems of structural discontinuities. The diagram shows two significant joint set trends. The canyon wall joint density varies from one to an excess of 10 joints per foot. Flow contacts are irregular, strike roughly northwest, and dip between 30 and 80 degrees to the southwest. Stress relief joints with uneven and rough surfaces dip toward the river in both canyon walls. A few tectonic joints strike northeast and are near vertical. Discontinuous, incipient, chlorite-coated joints at 1/2-inch intervals present in borings 65-DD-32, figure F-1, and 80-RD-101, figure F-5, suggest that samples of the bedrock might be expected to have a low unconfined compressive strength. However, discontinuity of the joints gives the rock mass a moderately high shear strength which is reflected in the 100-foot-high, near-vertical canyon walls.

(2) Rock Quality Designation (RQD) was completed on the core for borings DD-32 and RD-101. In boring DD-32, the rock is dominantly poor to very poor from elevations 639 feet to 737 feet and fair quality between elevations 600 and 639 feet. In boring RD-101, the rock varies from excellent to very poor throughout the hole. Between elevations 615 and 675 feet, the area selected for the powerhouse cavern, the RQD is generally fair. RQD is a tool for obtaining information about qualities of a rock mass and should be used in conjunction with seismic surveys, core logging techniques, and borehole camera to best achieve an index to rock mass quality. Joint plane attitudes were photographed and measured in boring RD-101 using a borehole camera. Figure F-7 presents the summary polar contour diagram for RD-101. Figures F-8 and F-9 represent joint sets found in DH-101 and DH-105, respectively, drilled during exploration supervised by Converse, Ward, Davis, and Dixon, Geotechnical Engineers. Significant joint concentrations are shown on the figures. Only one joint cluster ranging N20-35E, 35-45 NW appears to be common to figures F-6, F-7, and F-8. No correlation is seen in the downstream boring DH-105, figure F-9.

c. Ground Water. The submarine pillow basalt flows are characteristically impervious. Pressure tests in boring RD-101 showed no inflow below elevation 730 feet, and no weathered joints were noted below the first 14 feet of rock drilled. The rock is generally competent and

impermeable even though closely jointed and fractured. In boring RD-101 the static water level appears to be stable at elevation 754 feet as measured on 25 June 1980. On this same date, Wynoochee Lake elevation was at elevation 790 feet. Ground-water seepage in boring RD-101 probably has occurred through overburden sand and fractures in the basalt in the upper 22 feet of the boring. Springs emerging along fracture planes are present on the canyon wall between elevations 640 and 700 feet for a distance of 800 feet downstream from the dam axis. These springs are probably related to the more open stress relief joints near the canyon wall and are not characteristic of rock character away from the canyon.

d. Excavation Considerations - Underground Powerhouse and Tunnels. The underground powerhouse and related structures will be excavated in closely jointed basalt. The intake structure will be founded on competent rock adjacent to monolith 5. Overbreak could be substantial unless closely controlled. Controlled blasting patterns using cushion and zone procedures and limited explosive charges will be required during excavation in the closely jointed basalt to minimize damage to excavated chambers and slopes and to insure integrity of the existing dam and canyon walls. In rock of this nature, rock reinforcement is necessary to prevent progressive loosening of the jointed material. A combination bolting pattern is recommended and should consist of long bolts firmly anchored in sound rock supplemented by short bolts. Overhead areas will require installation of wire mesh. Bolt diameter should be on the order of 1 inch and closely spaced, say a 5- by 5-foot parallel pattern in the tunnels, a 4- by 4-foot staggered pattern for the powerhouse roof, and a 5- by 6-foot staggered pattern for the powerhouse and access shaft walls. The roof of the powerhouse will be lined with approximately 6 inches of shotcrete. The tunnels will be lined with steel or shotcrete. In mining the tunnels, a circular section will provide optimum natural support. No major problems are anticipated with either seepage or stability on the project. Tunnel muck may be wasted in the old clay pit or in the fish hatchery area utilizing the concrete aggregate borrow excavation if compatible with construction schedules. See plate F-1 for location of proposed fish hatchery area.

e. Foundation Condition - Surface Powerhouse. Basalt flows at the site strike N35°W and dip about 55° south, with the bedrock surface dropping rapidly downstream. Details of the concealed rock surface require confirmation. Several small faults exist, having no preferred orientation, and many joints contain calcite. Flow contacts are locally characterized by clay or sandy interbeds up to 4 inches thick.

f. Preliminary Earthquake Design. A static seismic factor of 0.1g was used in stability analysis of slope and embankments for the existing dam prior to construction. This was determined by state-of-the-art knowledge in existence at the time. Earthquake risk and design is modified by constant changes in the development of the art. New facilities at Wynoochee Dam should be designed to standards reflected in current state-of-the-art in earthquake engineering. Existing structures are

being reanalyzed in accordance with ER 1110-2-1806. New structures will be analyzed accordingly during the preconstruction planning and engineering (PP&E). A preliminary examination of the seismic environment indicates that structures should be designed to withstand stress caused by dynamic earthquake forces of 0.35g base rock acceleration. This force is estimated to result from a magnitude 7.5 event originating in Puget Sound near the southern end of Hood Canal. A site intensity of Modified Mercalli VIII should be expected.

g. Fish Hatchery Pipeline Alinement. The proposed hatchery pipeline will consist of a 5-foot-diameter pipe extending from the hydropower outlet/fish hatchery intake structure to the fish hatchery site, a distance of 2,400 feet (see plate F-1). Between the intake structure and where the pipeline exits the rock canyon onto the left bank, the proposed pipeline would be encased in concrete and founded on the bottom of the rock gorge. On the left bank, the pipeline will be founded on a thin bed of gravel placed in a trench excavated to a depth of 7 feet in common material. Overburden here consists of about 5 feet of sandy gravel overlying glaciolacustrine clay, silt, and sand beds. Significant quantities of ground water, several hundred gallons per minute, are expected in excavation in two segments along the pipe alinement: from 1,700 to 1,900 feet and 2,400 to 2,700 feet downstream of the dam. At the downstream river crossing the top of the pipe is to be buried an appropriate depth beneath the streambed to allow for scour under controlled river conditions. The last 75 feet of pipeline will be excavated through a 35-foot-high bank composed of about 10 feet of sandy gravel overlying glaciolacustrine clay, silt, and sand beds. The pipeline empties into a distribution headbox at the northern edge of the fish hatchery site.

h. Fish Hatchery Site. The hatchery site is located on a river terrace lying 5 to 10 feet above the present river channel. An oxbow pond occupies part of the inner terrace margin. The terrace surface is underlain by 3 feet of overbank silt and sand underlain by up to 8 feet of sand and gravel. Portions of the material will be removed for concrete aggregate, and waste from rock excavation would be placed and graded prior to construction of hatchery facilities.

3. Construction Material.

a. Concrete Aggregate.

(1) Preliminary investigations of a potential source of concrete aggregate was conducted in July 1980. This source is a lower right bank river terrace deposit (fish hatchery site) located approximately 3,000 feet downstream of Wynoochee Dam on the right bank. The source is upstream of the area identified as the Simpson Pit, which was investigated as a source of concrete aggregate for Wynoochee Dam and reported in Design Memorandum 2, Construction Material, dated April 1966. The source of aggregate for Wynoochee Dam has been inundated by the reservoir.

(2) Eight backhoe trenches varying from 8 to 10-1/2 feet in depth were excavated to ascertain the general nature and extent of the deposit and to obtain samples for petrographic examination. These trenches are identified as 80-BH-102 through 80-BH-109, and locations are shown on plate F-1. Materials in the trenches were visually classified and logs of the explorations are shown on plate F-3. Materials encountered appeared similar to those in the vicinity investigated for concrete aggregate for the dam. Particle sizes varied throughout the area from zones of moderately clean sandy gravel to silty, gravelly sand, with lenses of silty sand and areas with cobbles and boulders. Samples of a sandy gravel zone were taken from several trenches and sent to the North Pacific Division Laboratory for petrographic examination. Results of this examination are given in the General Test Report (table F-1). Adequate quantities of materials for the production of concrete aggregate for the proposed hydropower facilities can be obtained from the meander bench. The maximum size aggregate required will be 1-1/2 inches. It is expected that this source may contain a high percentage of soft constituents in the sand sizes, as was evidenced in sources investigated for the existing dam. Benefication processing or use of manufactured sand may be necessary. Further investigations and testing will be conducted during PP&E.

(3) The Wynoochee gravels are derived from an upstream area of hard graywacke, siltstone, and argillite and from a middle-reach belt of moderately altered basaltic rocks. Gravels downstream from the damsite in the lower right bank meander bench (fish hatchery site) are dominantly altered basalt with appreciable amounts of graywacke and argillite. By contrast, these recent river gravels are fresher and cleaner than the Pleistocene valley fill gravels which tend to show a weathered rind and are commonly silt covered.

b. Rock Borrow. Rock borrow may be obtained from an existing quarry in prophyritic basalt 1.5 miles northwest of the damsite. The rock mass is about 100 feet thick and dips near vertical. Joint spacing limits the maximum rock size to about 24 inches. This source will be used for riprap on the north side of the fish hatchery site. This source was used for riprap at the dam on the upstream embankment slopes and at the toe of the downstream left abutment slope treatment area.

4. Recommended Additional Studies for Preconstruction Planning and Engineering. Data on ground water and seepage conditions are minimal for the powerhouse site. Specific attention should be directed to the hydrogeologic conditions in the selected intake area, powerhouse site, and intake and outlet tunnels by drilling additional borings and installing piezometers. The additional borings should be located such that they give structural geologic data as well as rock surface configuration in the intake and surface powerhouse area. A more detailed aggregate investigation is needed in the fish hatchery area. The overburden slide on the right bank, located between 600 and 1,000 feet downstream of the dam, requires additional exploration and may require installation of instrumentation for safety monitoring.

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GENERAL TEST REPORT	DATE 25 MAR 80 DISTRICT NPDL	SPD LABORATORY CORPS OF ENGINEERS, US ARMY SAUSALITO CALIFORNIA 94966
PROJECT WYNOOCHEE POWERHOUSE WASHINGTON	CONTRACT No.	WORK ORDER No. & DATE 22 OCTOBER 1979 E85809505
UNIT COST $ 900	DATE SAMPLE RECEIVED 13 AUGEST 1980	LABORATORY No. NPDL No. 1424
DESCRIPTION PIT-RUN SAND AND GRAVEL +1 1/2in to PAN, FROM 6'TO 8'		SOURCE COMPOSITE HOLES 80-BH-102, 103, 105, 106 & 107

Summary:

1. The coarse aggregate was composed of generally hard sound, slightly weathered subround to subangular particles. The approximate composition was 58 percent basalt, 16 percent metasediment, 13 percent basic igneous, 8 percent metabasalt and 5 percent andesite.

2. The sand was composed of subround rock particles and angular mineral grains which were generally hard and sound. Approximate composition was 42 percent basalt, 18 percent basic igneous, 15 percent quartzite, 7 percent metabasalt, 4 percent andesite, 6 percent quartz, 4 percent feldspar, 2 percent amphibole, 2 percent olivine.

3. No previous data was available, but this material was similar to aggregate that was potentially reactive. Chemical and mortar bar tests should be run to determine reactivity.

Rock Type

4. Basalt. This type was comprised of generally fine, dense, hard basalts which were slightly weathered with 2 percent soft weathered grains.

5. Quartzite. This rock type was mostly medium to fine grained metamorphosed quartz sandstone with some metagraywackes present. All particles were fresh, hard and sound.

6. Basic Igneous. This category included all medium grained igneous rock composed principally of pyroxenes with minor calcic feldspar. All particles were hard, fresh and sound.

7. Metabasalt. These were metamorphosed fine to medium grained basalts. Most particles were slightly to moderately weathered.

8. Andesite. All the rocks included in this category were andesitic in composition, but varied in texture from fine to medium grained.

TABLE F-I

SPD Form 40

GENERAL TEST REPORT	DATE 25 MAR 80 DISTRICT NPDL	SPD LABORATORY CORPS OF ENGINEERS, US ARMY SAUSALITO CALIFORNIA 94966
PROJECT WYNOOCHEE POWERHOUSE WASHINGTON	CONTRACT No.	WORK ORDER No. & DATE 22 OCTOBER 1979 E85809505
UNIT COST $ 900	DATE SAMPLE RECEIVED 13 AUGEST 1980	LABORATORY No. NPDL No. 1424
DESCRIPTION PIT-RUN SAND AND GRAVEL +1 1/2in to PAN, FROM 6'TO 8'	SOURCE COMPOSITE HOLES 80-BH-102, 103, 105, 106 & 107	

COARSE AGGREGATE

Rock Type, Percent	Sieve Size +1½"	1"	3/4"	1/2"	3/8"	No. 4
Basalt	49	59	57	59	58	57
Quartzite	20	18	17	16	15	14
Basic Igneous	19	14	13	12	12	14
Metabasalt	12	7	9	8	9	8
Andesite		2	4	5	6	7

FINE AGGREGATE

Rock and Mineral Types, Percent	Sieve Size No. 8	No. 16	No. 30	No. 50	No. 100	Pan
Basalt	54	51	49	39	28	20
Basic Igneous	17	19	21	16	10	8
Quartzite	15	16	16	15	13	12
Metabasalt	8	8	7	6	5	5
Andesite	6	5	4	3	3	1
Quartz		1	2	9	17	21
Feldspar			1	6	11	13
Amphibole				3	8	12
Olivine				3	5	7
Mica						1

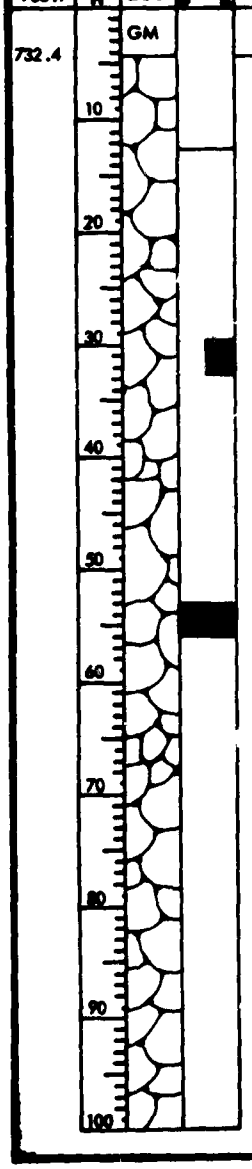
TABLE F-1 cont.

SPD Form 40

WYNOOCHEE DAM PROJECT MILE 51.8, WYNOOCHEE RIVER

DEPTH OF HOLE 136.5 DIAMETER OF HOLE NX
DEPTH OF O.B. 4.3 DATE STARTED 2 Sept 1965
ROCK DRILLED 132.2 DATE COMPLETED 10 Sept 1965
% CORE RECOVERED 96.3 CONTRACTOR KOR-IT CO., INC.

SURFACE EL 736.7 HOLE NO 65-DD-32 N 763,543 E 1,231,075



DESCRIPTION OF MATERIALS	REMARKS
Sandy Silty GRAVEL, brown Top Rock 4.3'	Tricone 3-7/8" w/ water & no mud to depth 12.5
BASALT, pillow structure, amygdaloidal, gray to near - black, mod. hard to hard Jointed at 1/2" to 8" intervals from 12.5 to 25.7; brown stains on some joints to depth 16.6'	NX casing to 12.3 partial brown water return NX core bbl. 100% water return
Jointed at 1/2" to 9" intervals from 25.7' to 63.5'	Core loss of 1.7' w/ high R.P.M. in closely jointed zone.
Jointed at 1" to 12" intervals from 63.5' to 85.0'	Core lifter slipped & no recovery.
Jointed at 1" to 6" intervals from 85.0' to 103.0"	

FIGURE F-1

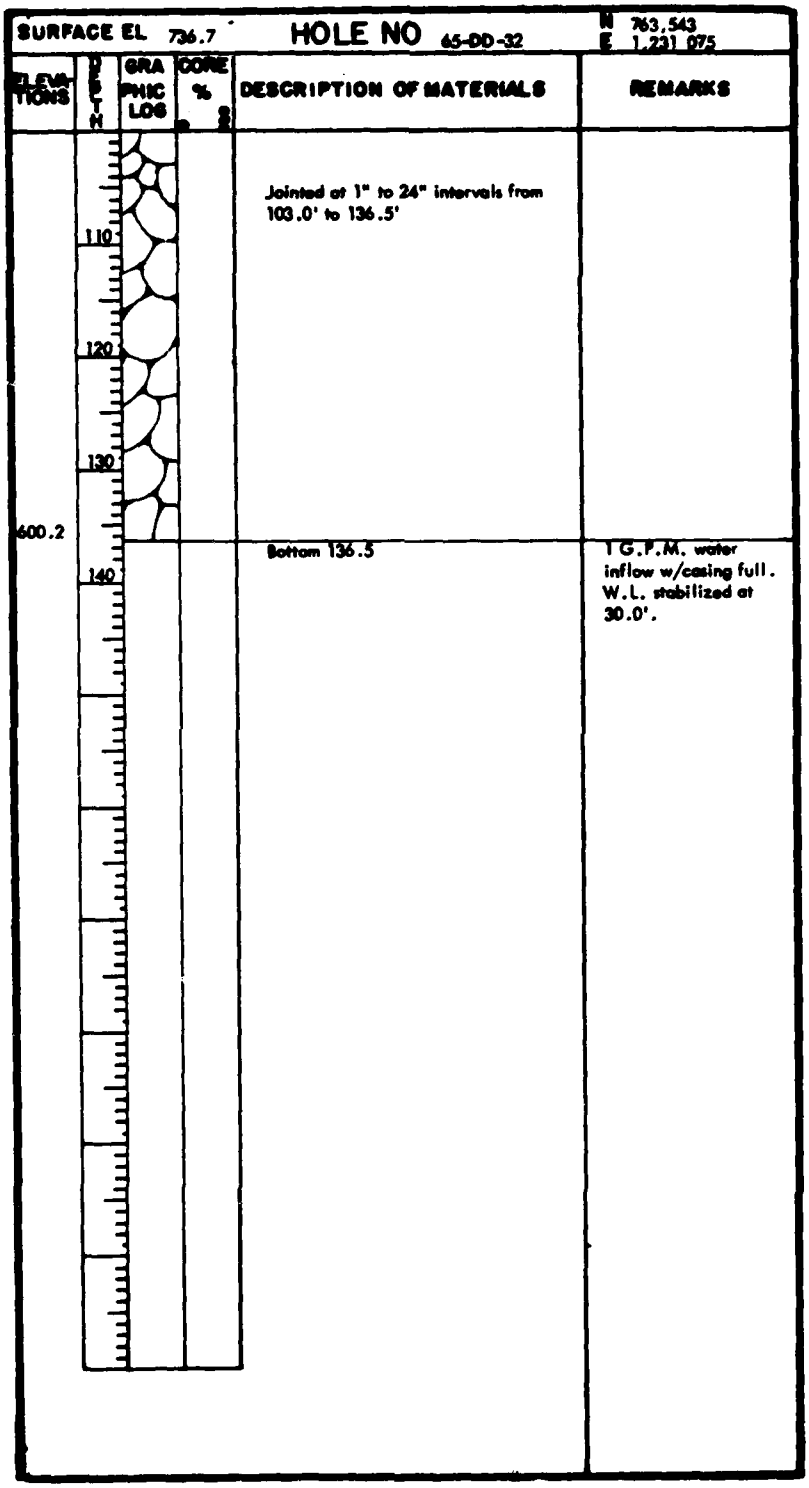
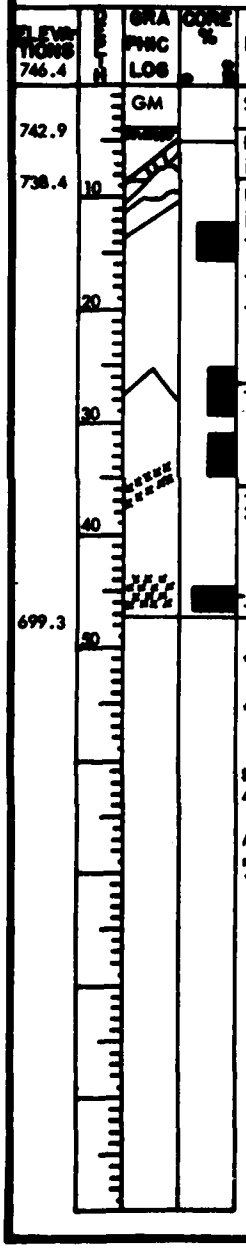


FIGURE F-I cont.

WYNOOCHEE DAM PROJECT MILE 51.8 WYNOOCHEE RIVER

DEPTH OF HOLE 47.1 DIAMETER OF HOLE NX
DEPTH OF O.B. 3.5 DATE STARTED 8 November 1966
ROCK DRILLED 43.6 DATE COMPLETED 16 November 1966
% CORE RECOVERED 89% CONTRACTOR USAED Seattle

SURFACE EL 746.4 HOLE NO 66-DD-118 N 763,289 E 1,230,928



DESCRIPTION OF MATERIALS	REMARKS
Silty Sandy GRAVEL, brown	Tricone to 4.9'
BASALT, hard, fine grained, weathered joints every 0.05 - 0.4'	Top of rock 3.5
	Bottom casing @ 4.9
Pillow BASALT, mod hard, dark gray, joints 0.05 - 1.0	NX core below 4.9
Jt dip 40 degrees, open 1" @ 7' *	
Jts open 1/8" - 1/16" @ 7.9 & 10.7	
Jt trace clay @ 12.9	
Jt dip 45 degrees, open 1/8" @ 26.2 **	Core losses all due to grinding
Jts slightly stained @ 19.9 34.6, 35.1, 35.3, 35.6, 35.9	
Joints 0.05 - 0.1, stained brown	
	Bottom @ 47.1
	Water level @ 28.0 w/water entering hole @ 4.9 17 Nov 66
	Hole bailed to 46.1 & water level rose 2'/hr 19 Nov 66
*Joint dips riverward (southeast)	
** Joint dips toward and away from river (southeast and northwest)	
Hole examined with light and mirror to 44.0'	
All pillow basalt core pieces flawed by minor incipient cooling cracks at 1/2" to 1" intervals	

FIGURE F-2

WYNOOCHEE DAM PROJECT MILE 51.8 WYNOOCHEE RIVER

DEPTH OF HOLE 62.1 DIAMETER OF HOLE NX
DEPTH OF O.B. 8.0 DATE STARTED 17 November 1966
ROCK DRILLED 54.0 DATE COMPLETED 18 November 1966
% CORE RECOVERED 100% CONTRACTOR USAED Seattle

SURFACE EL 749.5 HOLE NO 66-DD-119 N 763,271 E 1,230,894

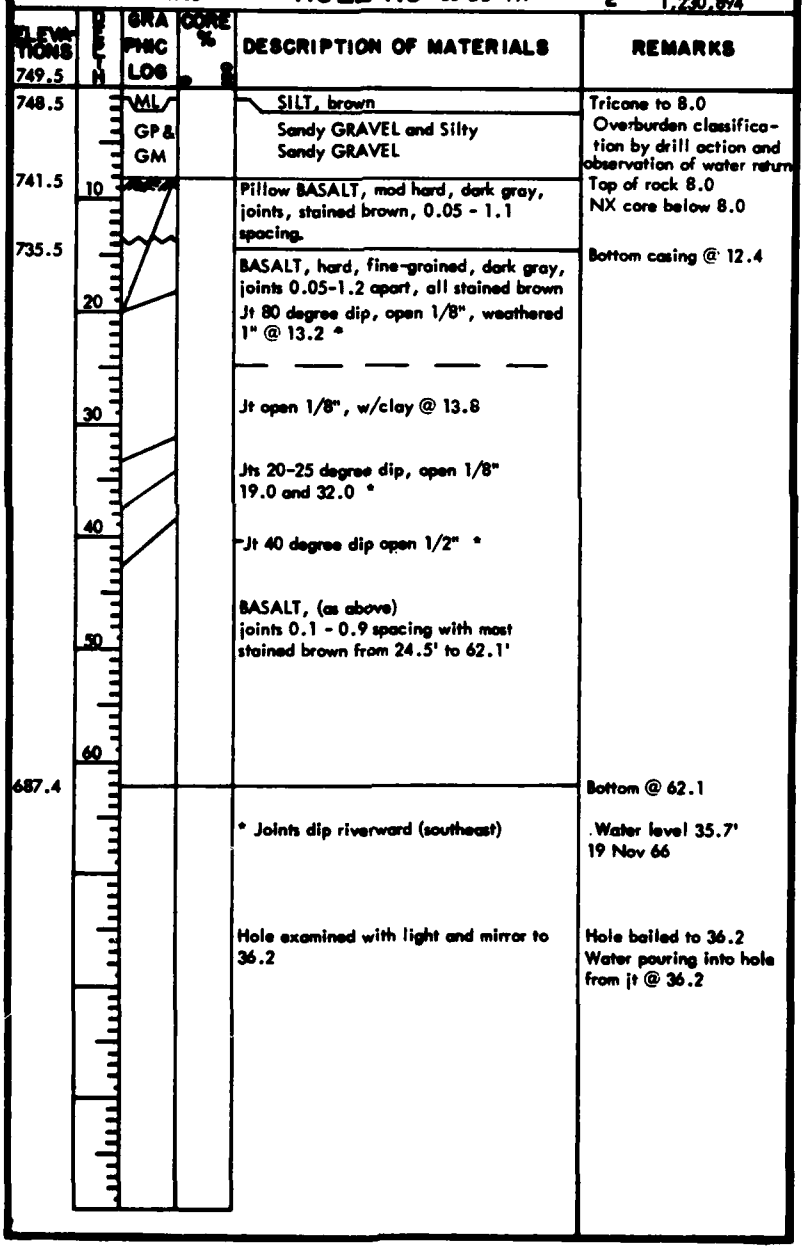


FIGURE F-3

WYNOOCHEE DAM PROJECT MILE 51.8 WYNOOCHEE RIVER

DEPTH OF HOLE 92.2 DIAMETER OF HOLE NX
DEPTH OF O.B. 1.5 DATE STARTED 14 November 1966
ROCK DRILLED 90.7 DATE COMPLETED 28 November 1966
% CORE RECOVERED 100% CONTRACTOR U.S.A.E.D. Seattle

SURFACE EL 724.0 HOLE NO 66-DD-120 N 763,598 E 1,231,126

ELEVATIONS	DEPTH IN FEET	GRAPHIC LOG	CORE %	DESCRIPTION OF MATERIALS	REMARKS
724.0					
722.5		ML		SILT, soft, brown	Tricored to 5.4' cased to 2.0' NX core below 5.4
				Top of Rock @ 1.5'	
	10			BASALT, gray, hard w/feldspar and mafic phenocrysts, CO_3 veinlets Stained joints at 0.1' to 0.6' intervals to depth 19.0'	
				Gradational contact 19'	
705.0	20			BASALT, dark-gray, hard w/mafic phenocrysts, curved CO_3 veinlets suggestive of pillow structure. Mafic phenocrysts decrease in size and abundance to depth 40'. Stained joints at 0.1' to 0.8' intervals to depth 44.0'	Traces of clay on some joints to depth 36'
	30				With surface water running into the hole below casing, the lowest measured water level was 20.0'
684.0	40			Gradational contact @ 40'	
				BASALT, dark-gray, moderate hard w/curved CO_3 veinlets and altered glass rinds indicative of pillow basalt flow	
	50				
				Unstained joints at 0.05' to 1.2' intervals joints coated with chloritoid film showing a mirror polish. Incipient cooling cracks at 0.05' to 0.1' intervals.	
	60				
	70				
	80				
	90				
631.8				Bottom @ 92.2'	
	100				

FIGURE F-4

PROJECT	WYNOOCHEE HYDROPOWER STUDY	HOLE NO.	80-RD-101
LOCATION	DOWNSTREAM - RIGHT BANK	INSPECTOR	SATTER
DEPTH OF HOLE	182.1 ft	CONTRACTOR	GOVERNMENT
DEPTH OF O.B.	8.0 ft	DATE STARTED	12 June 1980
ROCK DRILLED	174.1 ft	DATE COMPLETED	18 June 1980
% CORE RECOVERED	99.2	SURFACE EL.	776 ft (topo)
DIAM. HOLE	4" - NMIR Wireline	N	763,475 E 1,230,795
EQUIPMENT	Diamond Skid - Mount Hydraulic Rotary		

ELEVATIONS	DEPTH	GRAPHIC LOG	CORE % 0 100 / BLOWS /FT	DESCRIPTION OF MATERIALS Soils Classification Plasticity Condition Moisture Color	REMARKS Casing Depth, Depth of Hole at Start & End of Shift, Water Level at Start & End of Each Shift & Run, Drilling Time, Size & Type of Bit, Action of Drill, Rate of Penetration, % Water Loss or Return, Water Color, Drilling Fluid Data, etc.
		SP		SAND, fine to medium brown	Tricone to 8.0 ft
				Top of Rock @ 8'	RQD INTERVAL — QUALITY 8'-65.2' — Very Poor 65.2'-123.8' — Poor to Fair 123.8'-132.8' — Excellent 132.8'-141.8' — Fair 141.8'-146.2' — Good 146.2'-168.6' — V. Poor to Poor 168.6'-173.1' — Fair 173.1'-182.1' — V. Poor to Poor
768	10			BASALT, highly fractured yielding ¼" to 2" core, chlorite and calcite mineralization, joints with occasional slicken sides. Dips of major joints were recorded and are shown below	
752	20			Base of weathered rock	
				Joints dip 30°, w/slickensides Jt dip 35°, w/slickenslides	
	30			Jt dip 15°, w/slickensides	Water Level 28.3 ft. measured 18 June 1980
					Pressure Tests taken in overlapping intervals as shown below
	40				
	50				Test 1 Gage = 50 psi Packer = 140 psi No Water Take
713	60			From 60.8 to 182.1 ft BASALT same as above except core to 14" in length.	
				Jt dip 35°	Test 2 Gage = 50 psi Packer = 170 psi No Water Take
	70			Jt dip 60°, w/slickensides Jt dip 50°	
	80			Jt dip 70°, w/slickensides	
				Jt dip 20°, rehealed w/calcite	Test 3 Gage = 50 psi Packer - 170 psi No Water Take
	90			Jt dip 20°, rehealed w/calcite	
				Jt dip 20°, rehealed w/calcite	
664	100			Jt dip 60°, rehealed w/calcite	

USBR Form 101 (Rev Apr 65)

FIGURE F-5

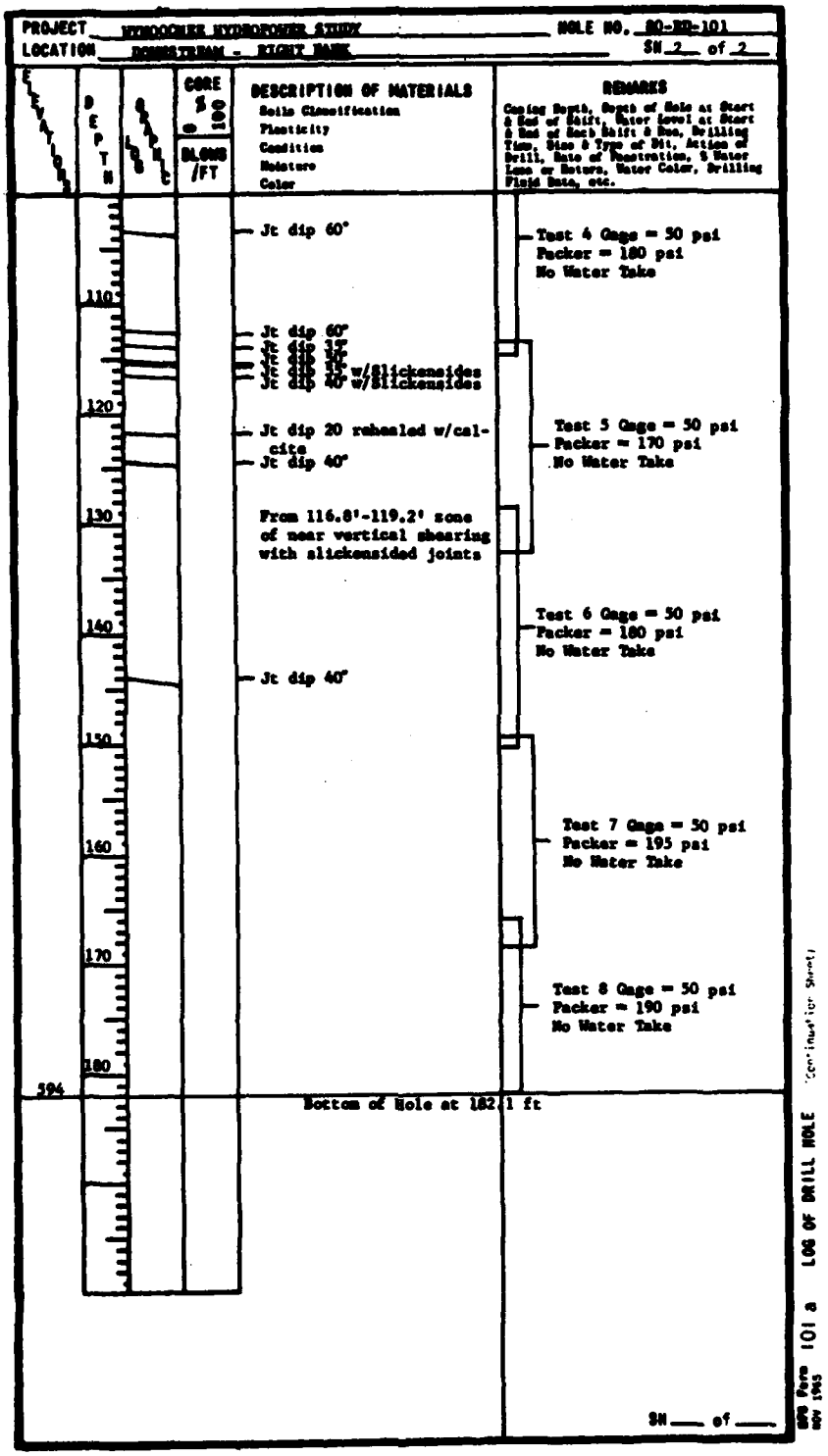


FIGURE F-5 cont.

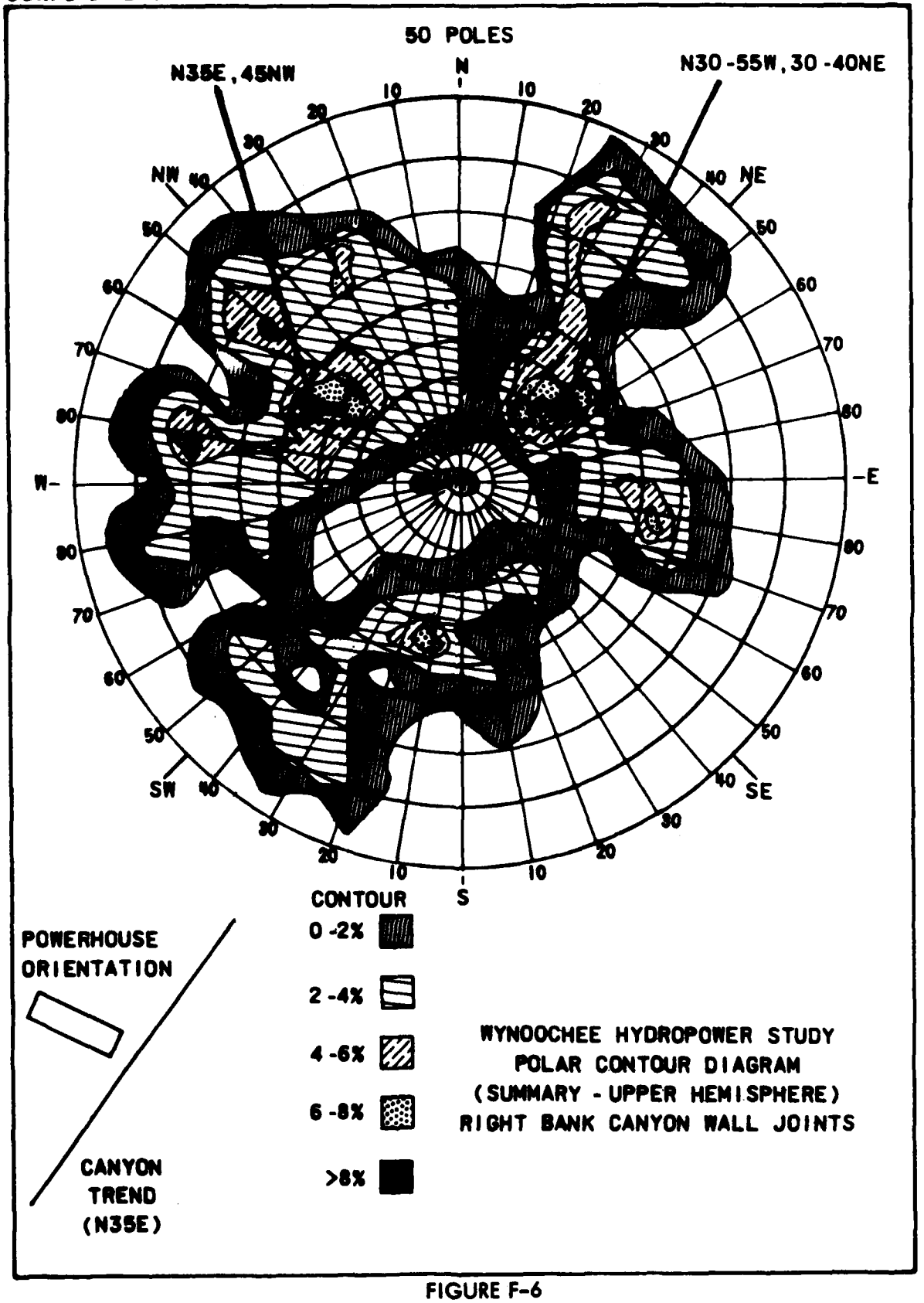

50 POLES
N35E, 45NW
N30-55W, 30-40NE
N
NE
E
SE
S
SW
W
NW
10
20
30
40
50
60
70
80
CONTOUR
0-2%
2-4%
4-6%
6-8%
>8%
POWERHOUSE ORIENTATION
CANYON TREND (N35E)
WYNOOCHEE HYDROPOWER STUDY
POLAR CONTOUR DIAGRAM
(SUMMARY - UPPER HEMISPHERE)
RIGHT BANK CANYON WALL JOINTS

FIGURE F-6

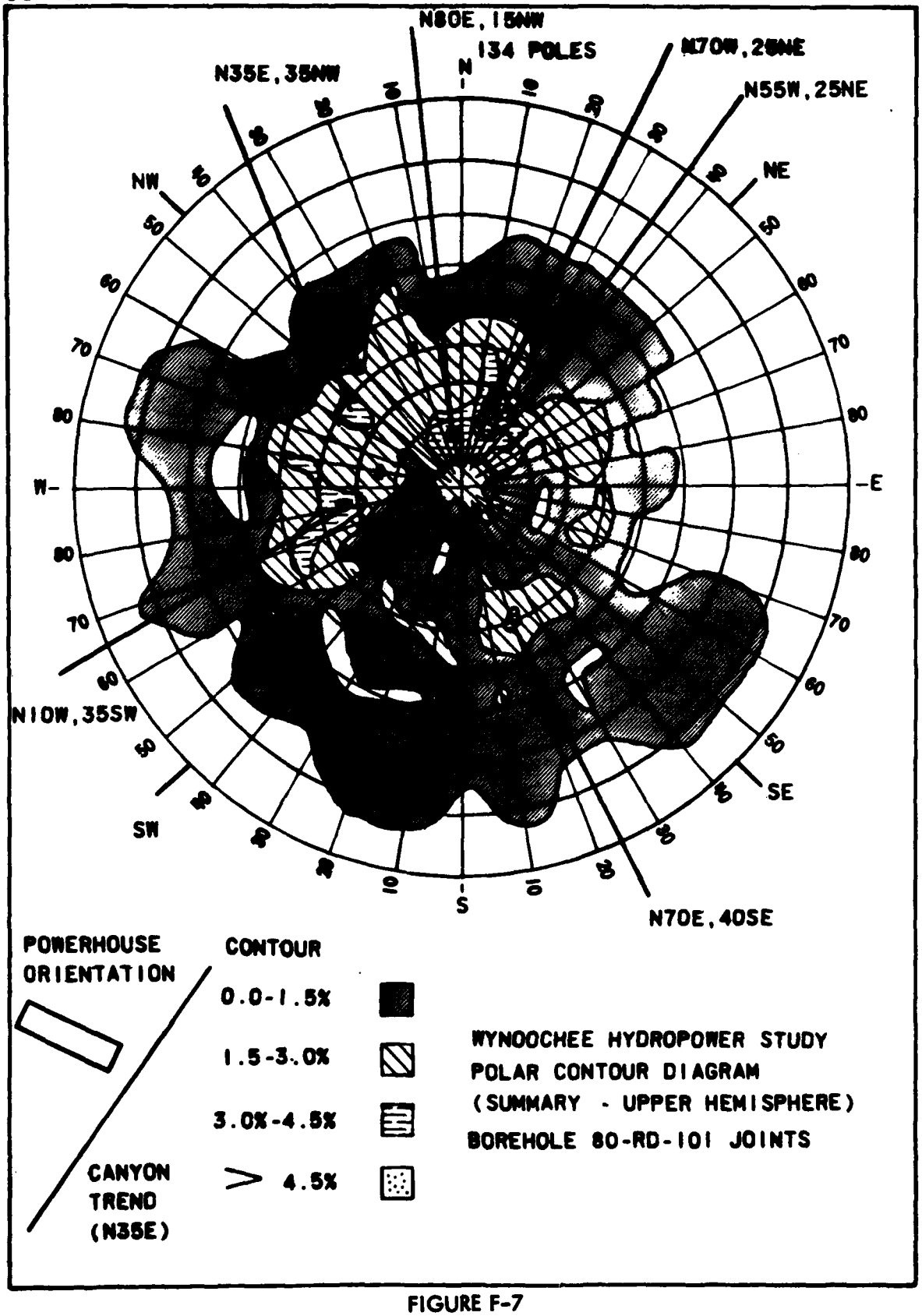

N80E, 15NW
134 POLES
N70W, 25NE
N35E, 35NW
N55W, 25NE
N
NE
NW
W
E
SW
SE
S
N10W, 35SW
N70E, 40SE
POWERHOUSE ORIENTATION
CONTOUR
0.0-1.5%
1.5-3.0%
3.0%-4.5%
> 4.5%
CANYON TREND (N35E)
WYNOOCHEE HYDROPOWER STUDY
POLAR CONTOUR DIAGRAM
(SUMMARY - UPPER HEMISPHERE)
BOREHOLE 80-RD-101 JOINTS

FIGURE F-7

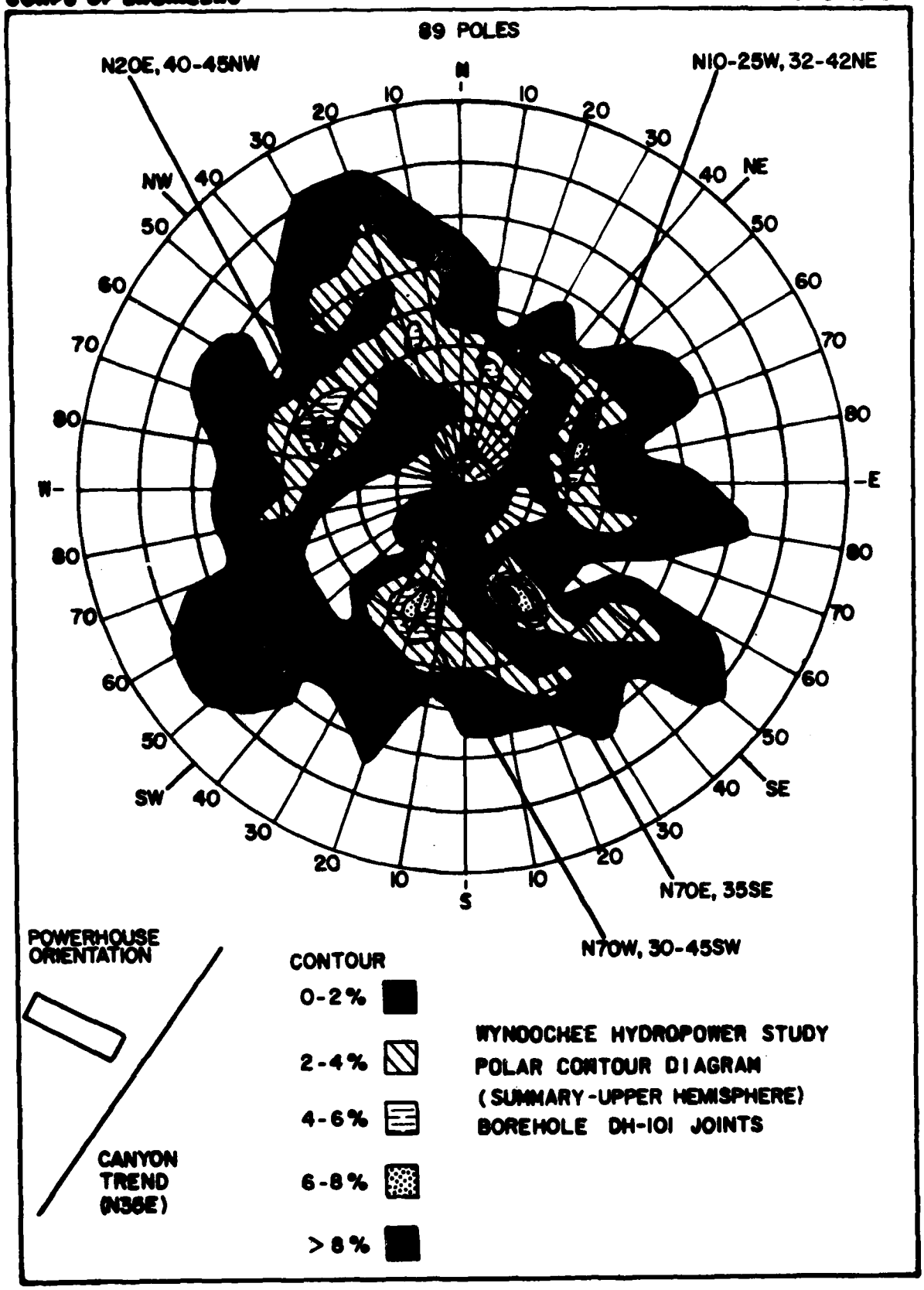

89 POLES
N20E, 40-45NW
N10-25W, 32-42NE
N70E, 35SE
N70W, 30-45SW
N
NE
E
SE
S
SW
W
NW
10
20
30
40
50
60
70
80
POWERHOUSE ORIENTATION
CANYON TREND (N36E)
CONTOUR
0-2%
2-4%
4-6%
6-8%
>8%
WYNOOCHEE HYDROPOWER STUDY
POLAR CONTOUR DIAGRAM
(SUMMARY-UPPER HEMISPHERE)
BOREHOLE DH-101 JOINTS

FIGURE F-8

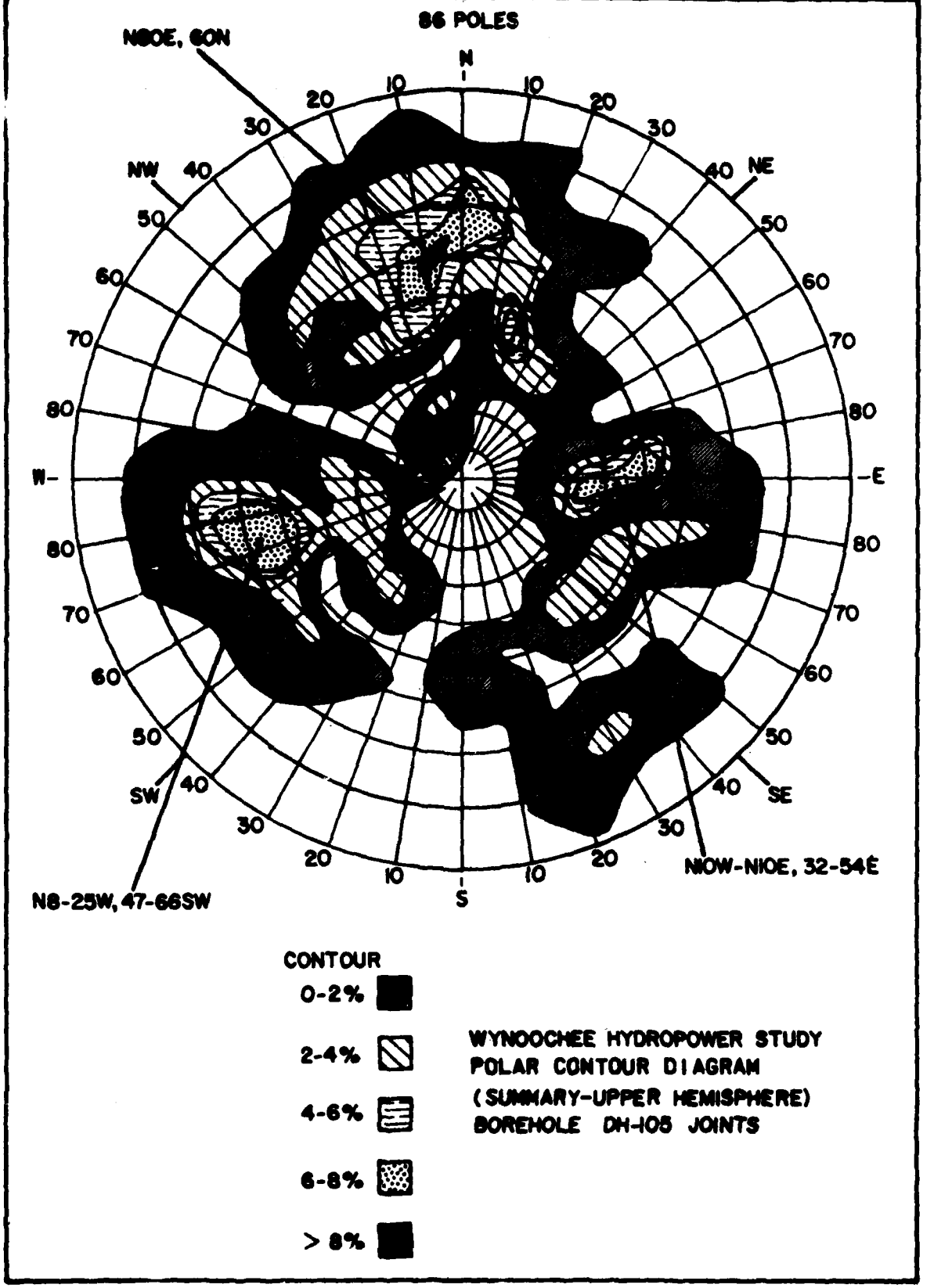

86 POLES
N80E, 60N
N8-25W, 47-66SW
N10W-N10E, 32-54E
N
NE
E
SE
S
SW
W
NW
10
20
30
40
50
60
70
80
CONTOUR
0-2%
2-4%
4-6%
6-8%
> 8%
WYNOOCHEE HYDROPOWER STUDY
POLAR CONTOUR DIAGRAM
(SUMMARY-UPPER HEMISPHERE)
BOREHOLE DH-105 JOINTS

FIGURE F-9

PROJECT	WYNOOCHEE HYDROPOWER STUDY	HOLE NO.	DH-101
LOCATION	DOWNSTREAM - RIGHT BANK	INSPECTOR	D. YONEMITSU &
DEPTH OF HOLE	170.1 ft.	CONTRACTOR	Anderson Drilling Service
DEPTH OF O.B.	3.5 ft.	DATE STARTED	9 October 1980
ROCK DRILLED	166.6 ft.	DATE COMPLETED	23 October 1980
% CORE RECOVERED	93.4	SURFACE EL.	759.5
DIAM. HOLE	5" to 4.7', NX(3") to 170.1'	N	763,500.9 E 1,230,942.9
EQUIPMENT	Rotary Drill		

ELEVATIONS	DEPTH	GRAPHIC LOG	CORE % 0 100 / BLOWS /FT	DESCRIPTION OF MATERIALS Soils Classification Plasticity Condition Moisture Color	REMARKS Casing Depth, Depth of Hole at Start & End of Shift, Water Level at Start & End of Each Shift & Pen. Drilling Time, Size & Type of Bit, Action of Drill, Rate of Penetration, % Water Loss or Return, Water Color, Drilling Fluid Data, etc.
756.0		Fill		Top of Rock @ 3.5'	
	10		Loss	BASALT fine grained, amygdaloidal, moderately hard, rock ribboned with calcite and quartz veins, joint surfaces are both planar and curved indicative of pillow structure. Occ. slickensides on joint surfaces. Dips of major joints are shown below.	
	20			Base of weathered rock	
			Loss	Calcite and chlorite most common mineralization on joint surfaces.	Static water level 28.3' 2 December 1980
731.2	30				RQD Interval / Quality 0-48.5 V. Poor 48.5-82.1 Poor 82.1-119.3 V. Poor 119.3-125.0 Good 125.0-137.3 V. Poor 137.3-170.1 Poor to Fair
	40				
	50			JT dip 30 JT dip 85 , w/slickensides Breccia zone rehealed w/ calcite Breccia zone rehealed w/ calcite	NX casing to depth 18.5' Casing stick-up level w/ asphalt pavement
	60			JTs dip 80 w/ slickensides	
	70			JTs dip 80 JTs dip 20 and 80 w/ slickensides	
	80			JTs dip 20 and 80 w/ slickensides JTs dip 20 and 60 w/ slickensides	
	90				
659.5	100			JTs dip 20 , 60 and 80 w/slickensides	

BPA form 101 (Rev. Apr 65)

FIGURE F-10

PROJECT WYNOOCHEE HYDROPOWER STUDY HOLE NO. DH-101

LOCATION Downstream Right Bank SH 2 of 2

ELEVATIONS	DEPTH	GRAPHIC LOG	CORE % 0 100 BLOWS /FT	DESCRIPTION OF MATERIALS Soils Classification Plasticity Condition Moisture Color	REMARKS Casing Depth, Depth of Hole at Start & End of Shift, Water Level at Start & End of Each Shift & Hrs, Drilling Time, Size & Type of Bit, Action of Drill, Rate of Penetration, & Water Loss or Return, Water Color, Drilling Fluid Data, etc.
	110			JT dip 45	
				JT dip 80	
	120			JT dip 35	
	130				
	140			JTs dip 60 and 80	
	150				
	160			JT dip 90	
589.4	170			JT dip 70	
				Bottom of Hole @ 170.1 Ft.	

* Employee of Converse, Ward, Davis, Dixon, Geotechnical Engineers, who supervised exploration program for R.W. Beck and Associates, design engineers for Grays Harbor, P.U.D.

Original log modified by R. Eckerlin June, 1981 from independent logging.

SH 2 of 2

BPA Form 101 a LOG OF DRILL HOLE

FIGURE F-10 cont.

PROJECT	WYNOOCHEE HYDROPOWER STUDY	HOLE NO.	DH-102
LOCATION	Downstream Right Bank	INSPECTOR	D. Yonemitsu *
DEPTH OF HOLE	60.1 ft.	CONTRACTOR	Anderson Drilling Service
DEPTH OF O.B.	60.1 ft.	DATE STARTED	10 Oct 80
ROCK DRILLED	None	DATE COMPLETED	17 Oct 80
% CORE RECOVERED	-	SURFACE EL.	746.0 ft.
DIAM. HOLE	5 inch	N 762,877.1	E 1,230,471.4
EQUIPMENT	Rotary Drill		

ELEVATIONS	DEPTH	GRAPHIC LOG	CORE % 0-100 / SAMPLE NO.	DESCRIPTION OF MATERIALS (Soils Classification, Plasticity, Condition, Moisture, Color)	REMARKS (Casing Depth, Depth of Hole at Start & End of Shift, Water Level at Start & End of Each Shift & Run, Drilling Time, Size & Type of Bit, Action of Drill, Rate of Penetration, % Water Loss or Return, Water Color, Drilling Fluid Data, etc.)
744.5		OL		Organic Soil	
741.5		ML		Sandy SILT, w/gravel, med. dense, moist	
	10	SP	1, 2, 3	Gravelly SAND, fine to med. w/occ. cobbles, moist, gray to brown	Sampled w/300 pound downhole hammer and ring sampler.
725.2	20	ML, CL	4, 5	Clayey SILT w/laminations of silty CLAY & occ. sand & gravel, stiff, moist, brown to gray to blue gray at 25'	Sample No. / Blows/6 in.: 1 — 17, 33, 34; 2 — 32, 39, 46; 3 — 21, 31, 44; 4 — 20, 25; 5 — 12, 18, 25; 6 — 16, 19, 42; 7 — 100/2" refusal; 8 — 39, 50/2" ref.; 9 — 32, 72; 10 — 65, 100/3" ref.; 11 — 59, 100/3" ref.; 12 — 100/2" ref.
715.5	30		6		
	40	SM	7, 8, 9	Silty SAND, fine w/occ. gravel, cobbles and boulders, rust brown to gray.	
696.5	50	SP	10, 11	SAND, fine to med., w/thin interbeds of gravelly sand, very dense, moist, brown.	
685.9	60		12	Bottom of Hole @ 60.1 ft.	
	70				Piezometer installed w/tip @ 53.0' Back filled w/gravel to 30' bentonite seal 27-30; surface to 27' backfilled with cuttings. Hole dry 11 Nov 80

* Employee of Converse, Ward, Davis, Dixon, Geotechnical Engineers, who supervised exploration program for R.W. Beck and Associates, design engineers for Grays Harbor, P.U.D.

Original log modified by R. Eckerlin, June 1981, from independent logging.

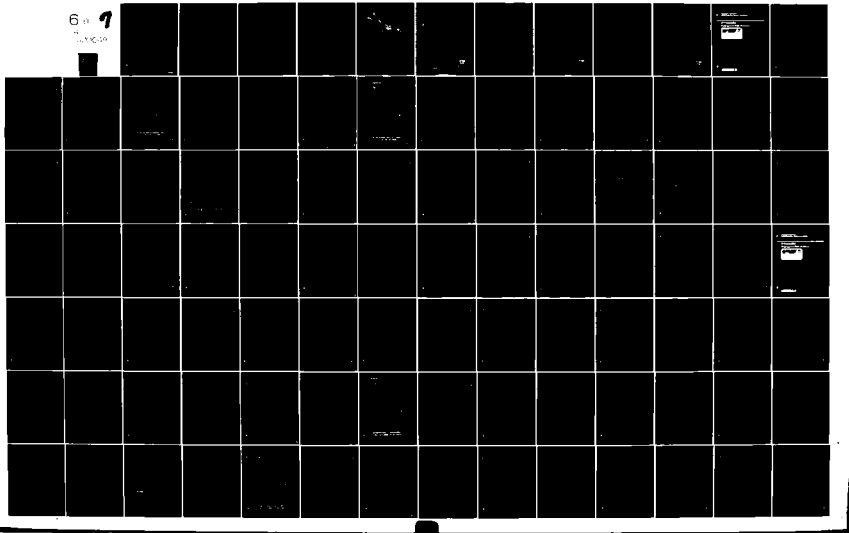
ENG Form 101 (Rev Apr 65)

FIGURE F-11

AD-A180 089 CORPS OF ENGINEERS SEATTLE WA SEATTLE DISTRICT F/G 13/2
WYNOOCHEE HYDROPOWER/FISH HATCHERY: FEASIBILITY REPORT AND ENVI--ETC(U)
SEP 82 J O WALLER

UNCLASSIFIED NL

6 of 7



PROJECT	WYNOOCHEE HYDROPOWER STUDY	HOLE NO.	DH-103
LOCATION	Downstream Right Bank	INSPECTOR	D. Yonemitsu *
DEPTH OF HOLE	41.5 ft	CONTRACTOR	Anderson Drilling Service
DEPTH OF O.B.	41.5 ft	DATE STARTED	22 Oct 1980
ROCK DRILLED	None	DATE COMPLETED	23 Oct 1980
% CORE RECOVERED	-	SURFACE EL.	710.7
DIAM. HOLE	5 Inch	N 762,387.4	E 1,230,538.7
EQUIPMENT	Rotary Drill		

ELEVATION	DEPTH	GRAPHIC LOG	CORE % 0 100 / SAMPLE NO.	DESCRIPTION OF MATERIALS Soils Classification Plasticity Condition Moisture Color	REMARKS Casing Depth, Depth of Hole at Start & End of Shift, Water Level at Start & End of Each Shift & Run, Drilling Time, Size & Type of Bit, Action of Drill, Rate of Penetration, & Water Loss or Return, Water Color, Drilling Fluid Data, etc.
			1	Silty SAND, fine w/gravel and laminations of silt dense, moist, brown to gray	Sampled w/300 pound downhole hammer and ring sampler.
	10	SM	2		Sample No. / Blows/6in 1 — 30,30 2 — 29, 39, 46 3 — 39, 52 4 — 39, 54 5 — 46, 100/5" ref. 6 — 22, 50, 50/3" refusal 7 — 42, 49, 63/3" refusal 8 — 80, 100
			3		
	20		4	At about 20' lenses of coarse sand, very dense	
684.2			5		
	30	ML	6	SILT, w/fine sand and interbeds of gravelly silt, very dense, gray, wet.	100% water loss at 9.5 ft.
671.7	40	▽	7		water level 39' 11 Nov 80
669.2			8		
				Bottom of Hole @ 41.5'	
	50				Piezometer installed w/3/4" pvc slotted pipe from 35'-40' backfilled w/gravel to 29.0'; bentonite seal 27.2-29.0'; from surface to 27.2' backfill w/cuttings.

* Employee of Converse, Ward, Davis, Dixon, Geotechnical Engineers, who supervised exploration program for R.W. Beck and Associates, design engineers for Grays Harbor, P.U.D.

Original log modified by R. Echerlin, June 1981, from independent logging.

BPR Form 101 (Rev) Apr 65

FIGURE F-12

PROJECT WYNOOCHEE HYDROPOWER STUDY — HOLE NO. DH-104

LOCATION Downstream Right Bank — INSPECTOR D. Yonemitsu *

DEPTH OF HOLE 59.3 ft — CONTRACTOR Anderson Drilling Service

DEPTH OF O.B. 7.0 — DATE STARTED 28 Oct 80

ROCK DRILLED 52.3 ft — DATE COMPLETED 3 Nov 80

% CORE RECOVERED 100% — SURFACE EL. 648.1 ft

DIAM. HOLE 5" to 9', NX(3") to 59.3' — N 762,795.9 E 1,230,646.0

EQUIPMENT Skid Mount Rotary Drill (Wireline)

ELEVATIONS	DEPTH	GRAPHIC LOG	CORE % 0 100 / BLOWS /FT	DESCRIPTION OF MATERIALS (Soils Classification, Plasticity, Condition, Moisture, Color)	REMARKS (Casing Depth, Depth of Hole at Start & End of Shift, Water Level at Start & End of Each Shift & Run, Drilling Time, Size & Type of Bit, Action of Drill, Rate of Penetration, & Water Loss or Return, Water Color, Drilling Fluid Data, etc.)
641.1	10	SM		Silty SAND, trace gravel organics and wood, med. dense, brown, wet Top of Rock @ 7.0' BASALT, gray-green, fine grained amygdaloidal, mod. hard to hard, slightly weathered to fresh. Dips of major jts shown below.	From 11.5 to 17.0' had up to 80% water loss during drilling
	20			JT dip 60 , clay seam JT dip 65 , clay traces	RQD Interval — Quality 9.0-32.9 — Poor to fair 32.9-46.5 — Fair 46.5-51.1 — V. Poor 51.1-59.3 — Fair to Good
	30			JT dip 40 , clay traces Most joints coated or in-filled w/calcite & chlorite & clay near surface.	
	40				
	50				No ground water encountered during drilling
588.8	60			JT dip 35 , chlorite in-filling	
	70			Bottom of hole @ 59.3 ft.	NX casing (3.5") to 9' NX wireline casing (3.0") 9' to 53.9'

* Employee of Converse, Ward, Davis, Dixon, Geotechnical Engineers, who supervised exploration program for R.W. Beck and Associates, design engineers for Grays Harbor, P.U.D.

Original log modified by R. Echerlin, June 1981, from independent logging.

BPA Form 101 (Rev. Apr 65)

FIGURE F-13

PROJECT: WYNOOCHEE HYDROPOWER STUDY — HOLE NO. DH-105
LOCATION: Downstream Right Bank — INSPECTOR: D. Yonemitsu *
DEPTH OF HOLE: 135.0 ft — CONTRACTOR: [illegible] Drilling Service
DEPTH OF O.B.: 43.5 ft — DATE STARTED: 9 Oct 1980
ROCK DRILLED: 91.5 ft — DATE COMPLETED: 23 Oct 1980
% CORE RECOVERED: 99% — SURFACE EL.: 752.0
DIAM. HOLE: 5.5" to 43.5', NX (3.5") in Rock — N 763,135.3 — E 1,230,697.8
EQUIPMENT: Rotary Drill

ELEVATION	DEPTH	GRAPHIC LOG	CORE % (0–100) / SAMPLE NO.	DESCRIPTION OF MATERIALS (Soils Classification, Plasticity, Condition, Moisture, Color)	REMARKS (Casing Depth, Depth of Hole at Start & End of Shift, Water Level at Start & End of Each Shift & Run, Drilling Time, Size & Type of Bit, Action of Drill, Rate of Penetration, % Water Loss or Return, Water Color, Drilling Fluid Data, etc.)
	0	Fill	1	Sand, Gravel, Cobbles & Boulders	
743.0	10	ML	2, 3, 4, 5	Clayey SILT w/trace sand, v. loose, wet, brown	
731.0	20	CL, ML	6	Silty CLAY, thinly bedded, blue gray w/clayey SILT, stiff, moist, brown	
729.5			7		NX casing to 52.5' Casing stick-up 0.3'
	30	ML, SP	8, 9, 10	Clayey SILT, thinly bedded v. dense, moist, brown to gray, traces of gravel. SAND (fine to med.) thinnly bedded, v. dense, moist, brown	Sampled with 300 pound down hole hammer, 30" drop, ring sampler.
708.5	43.5			Top of Rock @ 43.5'	
	50			BASALT, fine grained, amygdaloidal, moderately hard, rock ribboned w/calcite & quartz veins, joint surfaces are both planer curved indicative of pillow structure. Dips of major joints are shown below.	
696.5	55.5	▽			Static water level 55.5' 3 Dec 1980
	60			JT dip 35, 1/16" tan Clay filling	
				Calcite and chlorite most common mineralization on joint surfaces.	
	87			JT dip 60, 3/8" calcite filling	
	95			JT dip 70, ½" gouge	
652.0	100				

SAMPLE	BLOWS/6"
1	7, 6, 3
2	7, 2, 4
3	2, 4, 6
4	11, 7, 8
5	7, 12, 12
6	4, 7, 21
7	49, 100, refusal
8	100, refusal
9	100, refusal
10	100/3" refusal

RQD

Interval	Quality
45.0-54.1	V. Poor
54.1-128.3	Fair to Good
128.3-135.0	Excellent

NPS Form 101 (Rev) Apr 65

FIGURE F-14

PROJECT WINOOCHEE HYDROPOWER STUDY HOLE NO. DH-105

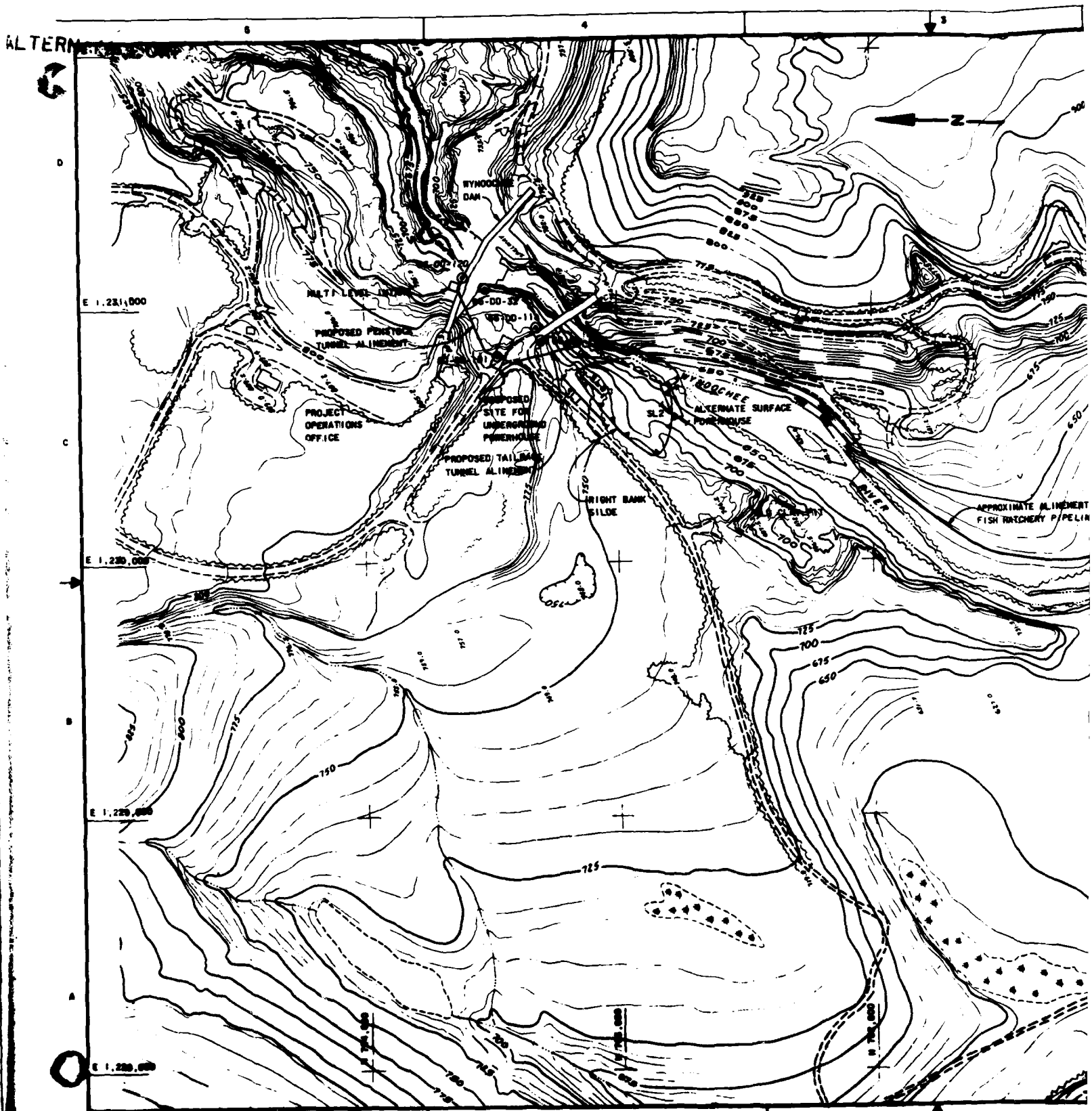
LOCATION Downstream Right Bank SH 2 of 2

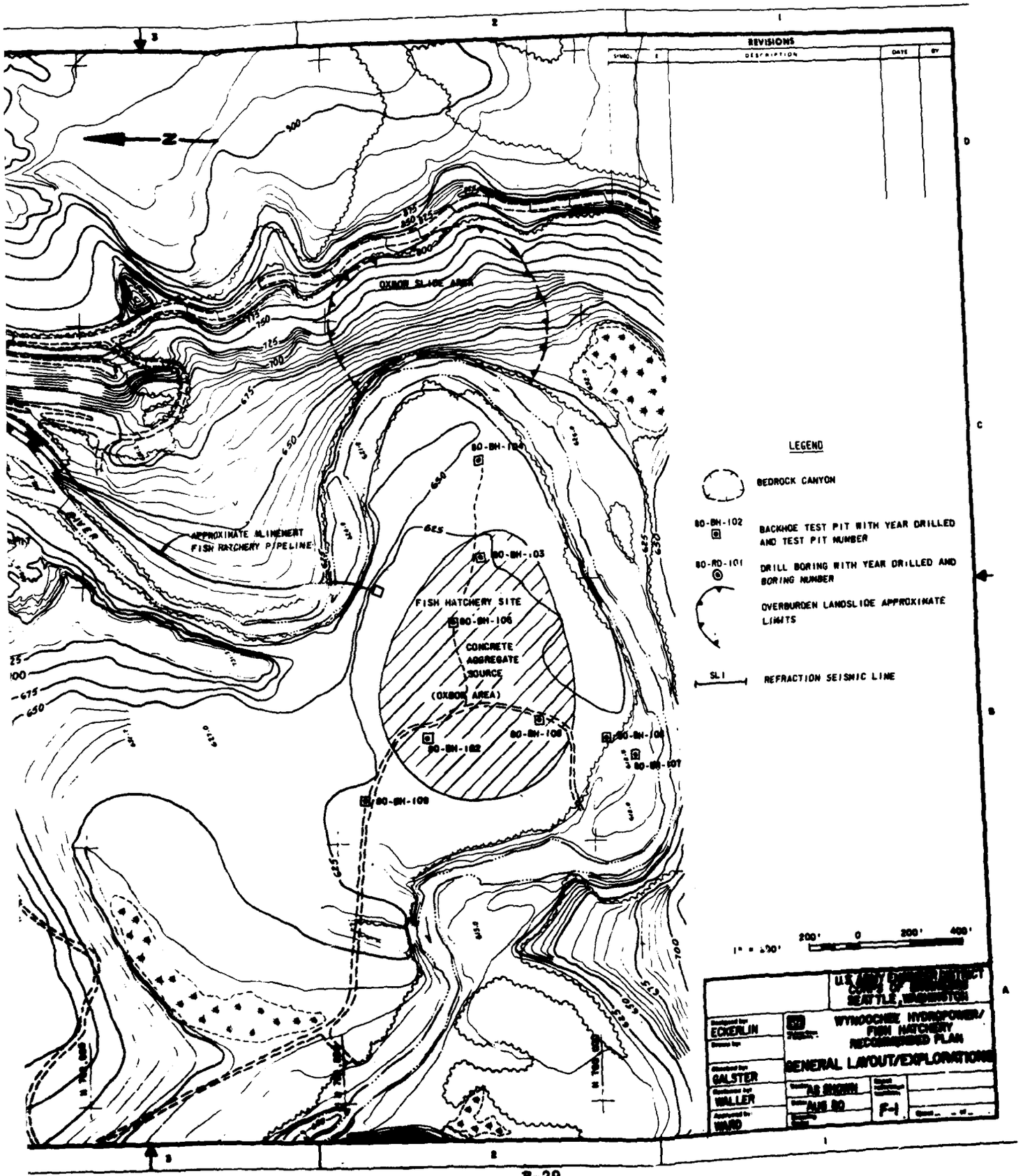
ELEVATION	DEPTH	SAMPLE	CORE % REC. / BLOWS /FT	DESCRIPTION OF MATERIALS Soils Classification Plasticity Condition Moisture Color	REMARKS Casing Depth, Depth of Hole at Start & End of Shift, Water Level at Start & End of Each Shift & Hrs, Drilling Time, Size & Type of Bit, Action of Drill, Rate of Penetration, & Water Loss or Return, Water Color, Drilling Fluid Data, etc.
				Bedrock, BASALT (Cont.)	
	110				
				JT dip 30 , w/slickensides	
	120				
	130			JT dip 45 , w/slickensides JT dip 75 , w/slickensides	
617.0				Bottom of hole @ 135.0 ft	
	140				
				* Employee of Converse, Ward, Davis, Dixon, Geotechnical Engineers, who supervised exploration program for R.W. Beck and Associates, design engineers for Grays Harbor, P.U.D.	
				Original log modified by independent logging.	R. Eckerlin, June 1981, from independent logging.

SH 2 of 2

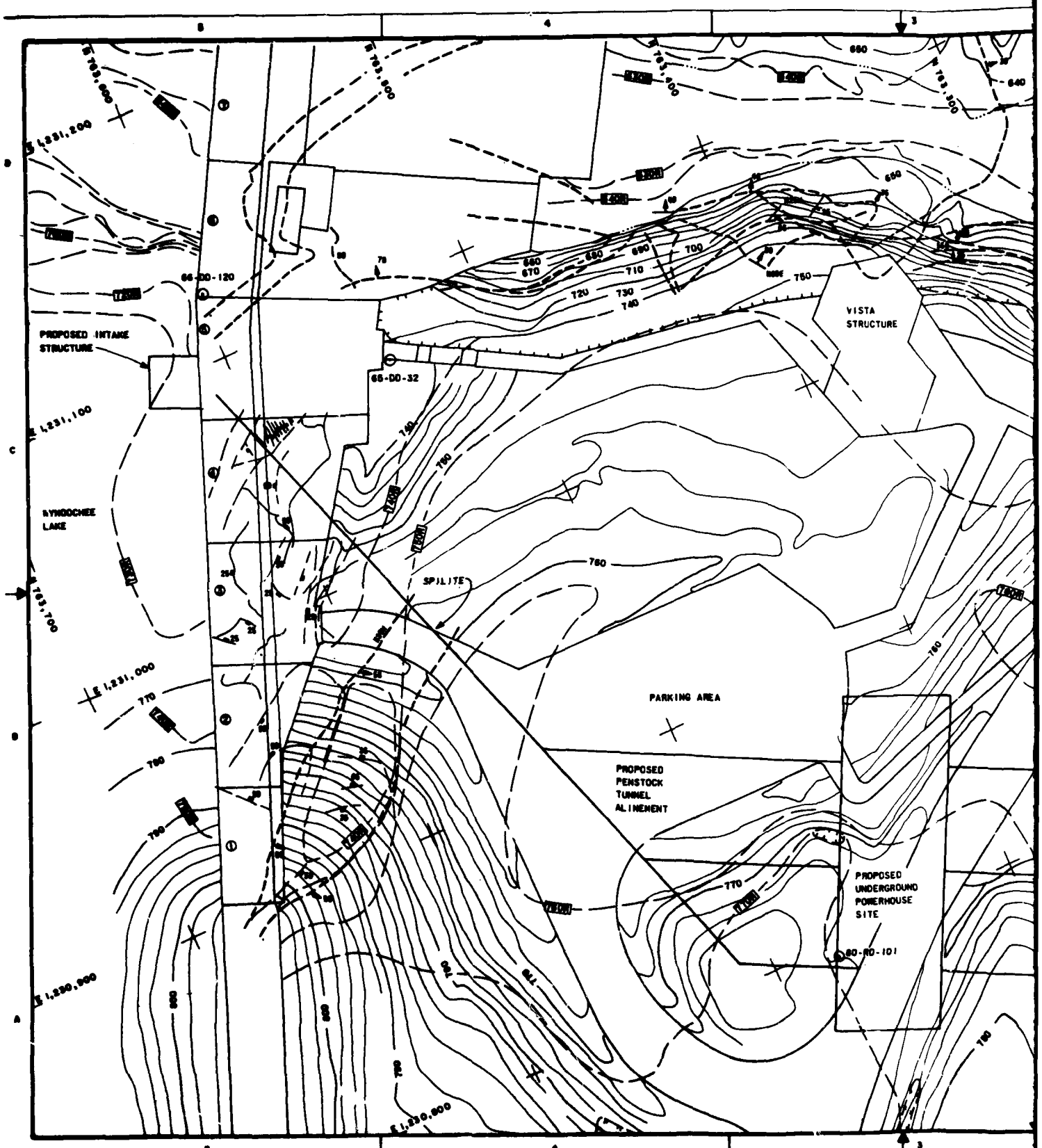
ENG Form 101 a LOG OF DRILL HOLE

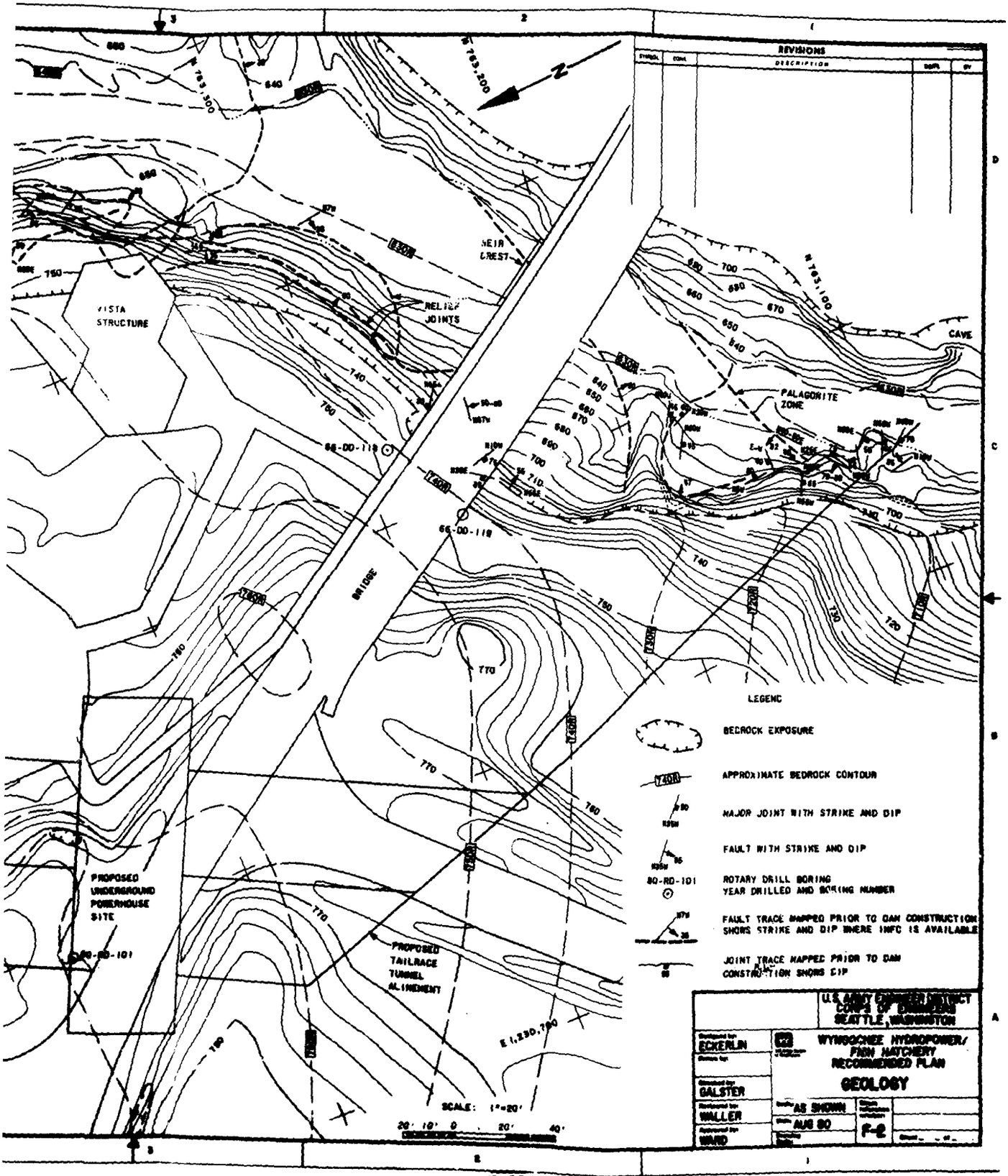
FIGURE F-14 cont.


ALTERN
WYNOOCHEE DAM
MULTI LEVEL INTAKE
PROPOSED PENSTOCK TUNNEL ALINEMENT
PROJECT OPERATIONS OFFICE
PROPOSED SITE FOR UNDERGROUND POWERHOUSE
PROPOSED TAILRACE TUNNEL ALINEMENT
RIGHT BANK SLIDE
WYNOOCHEE ALTERNATE SURFACE POWERHOUSE
APPROXIMATE ALINEMENT
FISH HATCHERY P/PELIN
E 1,231,000
E 1,230,000
E 1,229,000
E 1,228,000


REVISIONS
SYMBOL
DESCRIPTION
DATE
BY
N
OXBOW SLIDE AREA
APPROXIMATE ALINEMENT FISH HATCHERY PIPELINE
FISH HATCHERY SITE
CONCRETE AGGREGATE SOURCE (OXBOW AREA)
80-BH-102
80-BH-103
80-BH-106
80-BH-107
80-BH-108
80-BH-109
LEGEND
BEDROCK CANYON
80-BH-102 BACKHOE TEST PIT WITH YEAR DRILLED AND TEST PIT NUMBER
80-RD-101 DRILL BORING WITH YEAR DRILLED AND BORING NUMBER
OVERBURDEN LANDSLIDE APPROXIMATE LIMITS
SL1 REFRACTION SEISMIC LINE
1" = 200'
200' 0 200' 400'
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SEATTLE, WASHINGTON
Designed by ECKERLIN
Drawn by GALSTER
Checked by WALLER
Approved by WARD
WYNOOCHEE HYDROPOWER/ FISH HATCHERY RECOMMENDED PLAN
GENERAL LAYOUT/EXPLORATIONS
Scale AS SHOWN
Date AUG 80
F-1

2


PROPOSED INTAKE STRUCTURE
66-DD-120
66-DD-32
VISTA STRUCTURE
SPILLITE
PARKING AREA
PROPOSED PENSTOCK TUNNEL ALIGNMENT
PROPOSED UNDERGROUND POWERHOUSE SITE
66-RD-101
E 1,231,200
E 1,231,100
E 1,231,000
E 1,230,900
E 1,230,800
N 783,600
N 783,500
N 783,400
N 783,300
N 783,700


REVISIONS
DESCRIPTION
N 783,200
N 783,100
E 1,230,700
VISTA STRUCTURE
RELIEF JOINTS
WEIR CREST
CAVE
PALAGORITE ZONE
66-DD-118
BRIDGE
PROPOSED UNDERGROUND POWERHOUSE SITE
80-RD-101
PROPOSED TAILRACE TUNNEL ALIGNMENT
SCALE: 1"=20'
20' 10' 0 20' 40'
LEGEND
BEDROCK EXPOSURE
APPROXIMATE BEDROCK CONTOUR
MAJOR JOINT WITH STRIKE AND DIP
FAULT WITH STRIKE AND DIP
ROTARY DRILL BORING
YEAR DRILLED AND BORING NUMBER
FAULT TRACE MAPPED PRIOR TO DAM CONSTRUCTION SHOWS STRIKE AND DIP WHERE INFO IS AVAILABLE
JOINT TRACE MAPPED PRIOR TO DAM CONSTRUCTION SHOWS DIP
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SEATTLE, WASHINGTON
WYNOOCHEE HYDROPOWER/
FISH HATCHERY
RECOMMENDED PLAN
GEOLOGY
ECKERLIN
GALSTER
WALLER
WARD
AS SHOWN
AUG 80
F-2

2

HOLE NUMBER 80-BH-102
PROJECT WYNOOCHEE "HYDROPOWER / FISH HATCHERY"
LOCATION: FISH HATCHERY SITE
N 760,645 E 1,229,400
DATE STARTED 21 July 1980 | DATE COMPLETED 21 July 1980

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS
620.0	0	
619	1	OL, Organic SILT, loose, moist, brown
	2	ML, Sandy SILT, non-plastic, moist, gray
618	3	SW, SAND (fine to coarse) dense, moist, brown
617	4	GP, Sandy, GRAVEL, loose, brown
616	5	SP, SAND (medium to coarse) w/minor gravel (1") loose, brown
614	6	
	7	GP, Sandy GRAVEL, w/cobbles (7") and occ. lenses of SP, SAND
	8	
	9	
	10	Cobbles increasing in quantity at 10'
609.5		Water at 10'
	11	Bottom at 10.5'

HOLE NUMBER 80-BH-103
PROJECT WYNOOCHEE "HYDROPOWER / FISH HATCHERY"
LOCATION: FISH HATCHERY SITE
N 760,430 E 1,230,090
DATE STARTED 21 July 1980 | DATE COMPLETED 21 July 1980

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS
624.0	0	
	1	OL, Organic SILT w/alternating lenses of SM, Silty SAND, loose, moist, brown
622	2	
	3	GP, Sandy GRAVEL alternating with lenses of SP, SAND, loose, moist, brown
	4	
620	5	GP, Sandy GRAVEL (3") w/cob. (4"), loose, moist
	6	
	7	Water at 8.0'
616	8	Bottom at 8.0'

HOLE NUMBER 80-BH-104
PROJECT WYNOOCHEE "HYDROPOWER / FISH HATCHERY"
LOCATION: FISH HATCHERY SITE
N 760,430 E 1,230,455
DATE STARTED 21 July 1980 | DATE COMPLETED 21 July 1980

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS
629	0	
	1	OL, Organic SILT, loose, moist, brown
	2	
	3	
626	4	SM, Silty SAND, loose, moist, brown
625	5	GP, Sandy GRAVEL, w/num. cob. (8"), Sand content approx. 25% by volume, loose, moist, brown to gray.
	6	
	7	
	8	occ. boulders (8")
	9	
619.5		Bottom at 9.5'
	10	

HOLE NUMBER 80-BH-105
PROJECT WYNOOCHEE "HYDROPOWER / FISH HATCHERY"
LOCATION: FISH HATCHERY SITE
N 760,530 E 1,229,835
DATE STARTED 21 July 1980 | DATE COMPLETED 21 July 1980

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS
623	0	
	1	OL, Orgainc SILT, loose, moist, brown
622	2	SP, SAND (fine to medium), loose, moist, brown
	3	
620	4	GP, Sandy GRAVEL w/occ. cob. (8"), Sand content approx. 25% by volume, loose, moist, brown
	5	
	6	
	7	
	8	numerous cobbles (10") sand quantity less than 15%
614	9	Bottom at 9.0'
	10	

HOLE NUMBER 80-BH-106
PROJECT WYNOOCHEE "HYDROPOWER / FISH HATCHERY"
LOCATION FISH HATCHERY SITE
N 760,420 E 1,229,460
DATE STARTED 22 July 1980 | DATE COMPLETED 22 July 1980

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS
622	0	
621.5	1	OL,Organic SILT, w/roots, loose, moist, brown
	2	SP, SAND (fine to medium) w/ occ. lenses of SM, Silty SAND, roots, loose, moist brown
619.5	3	
	4	GP, Sandy GRAVEL (3") w/cob. (4"), loose, moist, gray to brown
	5	
	6	
	7	
	8	
613	9	Bottom at 9.0'
	10	

LEGEND

80-BH-103 YEAR DRILLED
BACKHOE TRENC

DEPTH RANGE
COMPOSITE SA
TAKEN

UNIFIED SOIL CLASSIFICATI

HOLE NUMBER 80-BH-106
PROJECT WYNOOCHEE "HYDROPOWER / FISH HATCHERY"
LOCATION: FISH HATCHERY SITE
N 760,220 E 1,229,460
DATE STARTED 22 July 1980 | DATE COMPLETED 22 July 1980

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS
622	0	OL, Organic SILT, w/roots, loose, moist, brown
621.5	0.5	SP, SAND (fine to medium) w/ occ. lenses of SM, Silty SAND, roots, loose, moist brown
619.5	2.5	GP, Sandy GRAVEL (3") w/cob. (4"), loose, moist, gray to brown
613	9	Bottom at 9.0'

HOLE NUMBER 80-BH-107
PROJECT WYNOOCHEE "HYDROPOWER / FISH HATCHERY"
LOCATION: FISH HATCHERY SITE
N 759,835 E 1,229,325
DATE STARTED 22 July 1980 | DATE COMPLETED 22 July 1980

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS
616	0	GP, Sandy (coarse) GRAVEL w/ num. cobbles (6") and occ. boulders (15"), loose, moist, brown
	7	water at 7.0'
608	8	Bottom at 8.0'

HOLE NUMBER 80-BH-108
PROJECT WYNOOCHEE "HYDROPOWER / FISH HATCHERY"
LOCATION: FISH HATCHERY SITE
N 759,950 E 1,229,395
DATE STARTED 22 July 1980 | DATE COMPLETED 22 July 1980

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS
622	0	OL, Organic SILT, loose, moist, brown
621.5	0.5	SP, SAND, w/lenses of SM, silty sand, loose, moist, brown
619.5	2.5	SP, Gravelly SAND, w/occ. lenses of GP, Sandy GRAVEL (3") 2" thick, loose, moist, brown
613.5	8.5	Bottom at 8.5'

HOLE NUMBER 80-BH-109
PROJECT WYNOOCHEE "HYDROPOWER / FISH HATCHERY"
LOCATION: FISH HATCHERY SITE
N 760,890 E 1,229,165
DATE STARTED 22 July 1980 | DATE COMPLETED 22 July 1980

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS
627	0	GP, Sandy (med. to coarse) GRAVEL, w/num. boulders (2")
622	5	water at 5.0'
		SP, SAND, (fine to coarse) w/ silt lenses 1/8" thick, dense, moist, brown
619.5	7.5	ML, SILT and occ. lenses of SM, silty SAND, dense, moist, brown
618.5	8.5	Bottom at 8.5'

LEGEND

80-BH-103 YEAR DRILLED AND BACKHOE TRENCH NUMBER

DEPTH RANGE WHERE A COMPOSITE SAMPLE WAS TAKEN

UNIFIED SOIL CLASSIFICATION SYSTEM

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

Designed by JOHNSON
Drawn by
Checked by GALSTER
Reviewed by WALLER
Approved by HARD

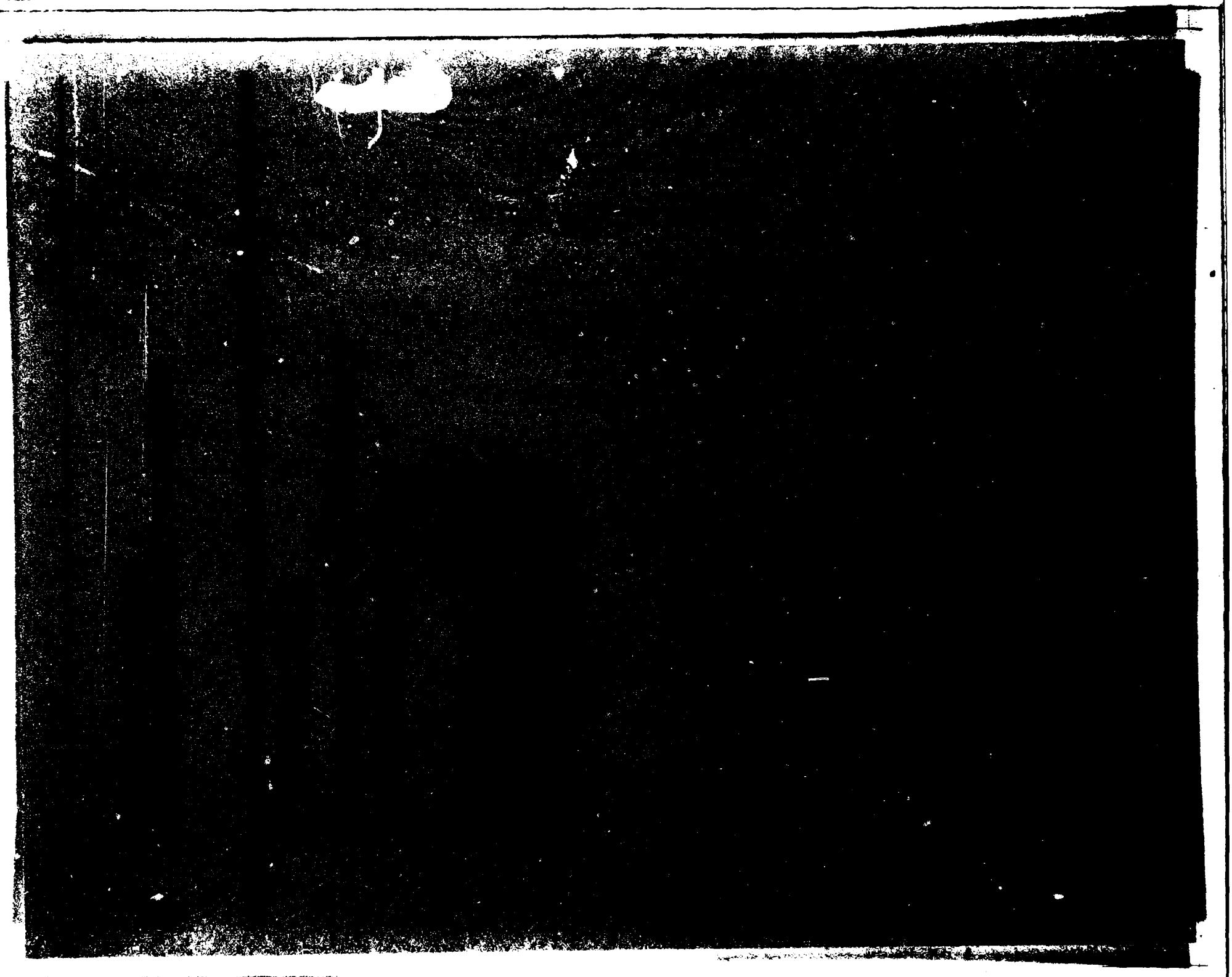
WYNOOCHEE HYDROPOWER/ FISH HATCHERY RECOMMENDED PLAN

AGGREGATE INVESTIGATION

Scale AS SHOWN
Date JULY 80

F-3

2



APPENDIX G

PLAN FORMULATION

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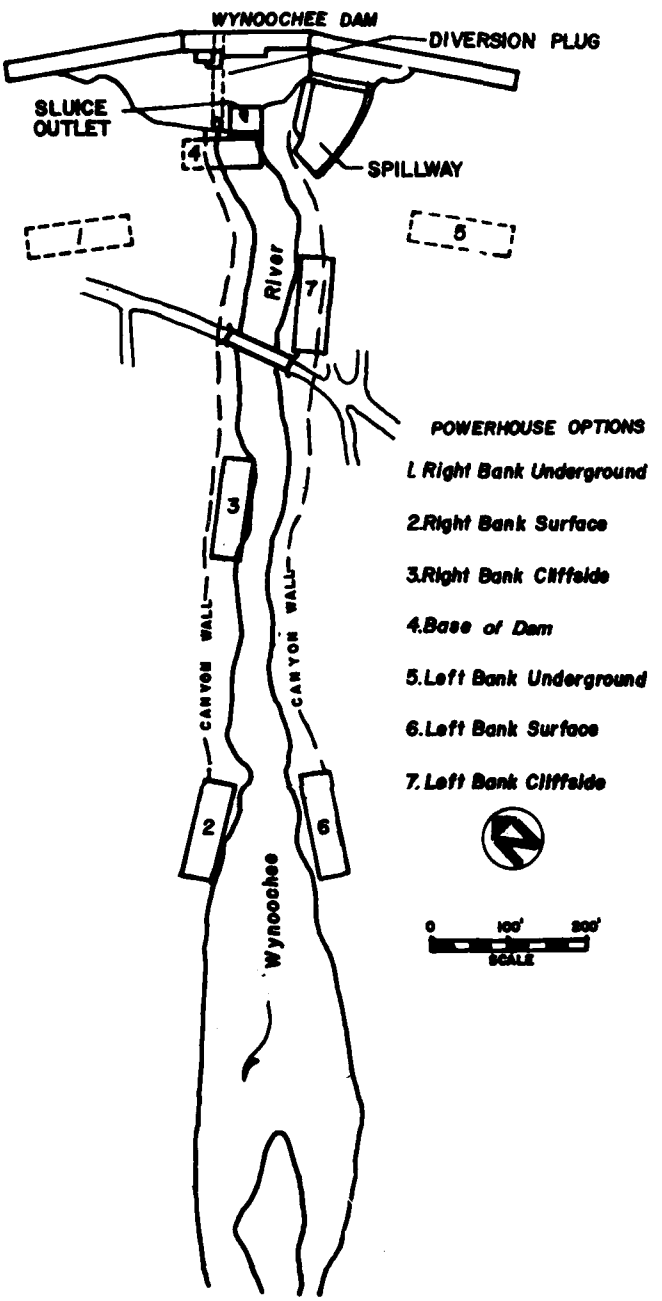
TABLES

FIGURES

1. Preliminary Analysis and Screening. Alternatives for meeting the two planning objectives were formulated, evaluated, and screened during preliminary engineering, economic, and environmental studies. The alternatives included hydropower at Wynoochee Dam, various fish enhancement measures in the vicinity of Wynoochee Dam, and no action.

a. Hydropower at Wynoochee Dam. Hydropower formulation studies were conducted to determine the powerhouse configuration most appropriate to produce energy from a reasonably high percentage of expected outflows from Wynoochee Dam without modifying existing project operations. A preliminary hydraulic capacity of the powerhouse was selected to be 1,200 cubic feet per second (c.f.s.), the flow equalled or exceeded 20 percent of the time in December, the month with the highest runoff at Wynoochee Dam. The selection of the 1,200 c.f.s. powerhouse was confirmed during the hydropower optimization studies (see paragraph 3c). A combination of three horizontal shaft Francis turbines was considered to be reasonable and sufficient to produce power under the varying head and existing project flow conditions up to 1,200 c.f.s. One small turbine would be used during low flow operation as well as other flow periods, and two larger turbines would be used during intermediate and high flow periods. The small turbine was sized for a 190 c.f.s. discharge from the 780-foot pool (133 feet net head). The larger turbines were each sized for a full gate discharge of 500 c.f.s. from the 764-foot pool elevation (117 feet net head). The small generator would have a 1.8-megawatt (MW) nameplate capacity rating (2.1-MW continuous overload rating) which would be matched to the turbine full gate output from the 800-foot pool elevation (153 feet net head). The larger generators would each have a 4.2-MW nameplate capacity rating (4.8-MW continuous overload rating each) which would be matched to the turbine full gate outputs from the 764-foot pool. In total, there would be three commercially available generators, a 1.8-MW unit, and two 4.2-MW units, with a total installed generating nameplate capacity of 10.2 MW. The total continuous overload capacity of the powerhouse would be 11.3 MW; 1.7 MW, 4.8 MW, and 4.8 MW for the respective units. For descriptive purposes, the powerhouse is considered to have a capacity of 11.3 MW. The final size of the units will be determined during preconstruction planning and engineering (PP&E). These studies will include the possibility of making full use of the presently unutilized industrial water supply and irrigation storage in the existing project for power production until such time as the storage is requested for its authorized purposes. The powerhouse would be approximately 130 feet long, 40 feet wide, and 60 feet high. The average annual energy of the project based on average monthly pool elevations (net heads) and reservoir releases would be 36,900 megawatthours (MWH) (4.3 MW average energy), approximately 90 percent of the total annual potential energy available at Wynoochee Dam.

Seven powerhouse locations (figure G-1), with various penstock configurations as appropriate, were considered during the preliminary studies. The hydropower design options to the hydropower alternative were as follows:



WYNOOCHEE POWERHOUSE LOCATION OPTIONS

FIGURE G-1

(1) Right bank underground powerhouse (200 feet downstream of the dam).

(a) Tunnel through diversion plug, into right canyon wall, and through right bank.

(b) Tunnel under right abutment and through right bank.

(c) Tunnel through dam at 700-foot level, into right canyon wall, and through right bank.

(2) Right bank surface powerhouse (900 feet downstream of dam).

(a) Tunnel through diversion plug, into right canyon wall, and through right bank.

(b) Tunnel under right abutment and through right bank.

(c) Tunnel through dam at 700-foot level, into right canyon wall, and through right bank.

(d) Tunnel through diversion plug and surface penstock down canyon.

(3) Right bank cliffside powerhouse (500 feet downstream of dam).

(a) Tunnel through diversion plug, into right canyon wall, and through right bank.

(b) Tunnel under right abutment and through right bank.

(c) Tunnel through diversion plug and surface penstock down canyon.

(4) Powerhouse at base of dam.

(a) Tunnel through diversion plug with powerhouse cut into right canyon wall.

(b) Tunnel through diversion plug with powerhouse under sluices.

(c) Manifold existing low flow conduits through dam with powerhouse under sluices (no intake structure).

(5) Left bank underground powerhouse (200 feet downstream of dam).

(a) Tunnel under left abutment and through left bank.

(b) Tunnel through dam at 700-foot level, into canyon wall, and through left bank.

(6) Left bank surface powerhouse (900 feet downstream of dam).

(a) Tunnel under left abutment and through left bank.

(b) Tunnel through dam at 700-foot level, into left canyon wall, and through left bank.

(c) Tunnel through dam at 700-foot level and surface penstock down canyon.

(7) Left bank cliffside powerhouse (300 feet downstream of dam).

(a) Tunnel under left abutment and through left bank.

(b) Tunnel through dam at 700-foot level, into left canyon wall, and through left bank.

(c) Tunnel through dam at 700-foot level and surface penstock down canyon.

All hydropower design options to the hydropower alternative except 1b and 2b were deleted from further consideration during the preliminary studies. Design options 5, 6, and 7 were deleted because of potential hydraulic and operational problems associated with the spillway. Design option 4c was deleted because existing low flow conduits through the dam would create significant head losses if they were used as penstocks, thereby wasting the energy potential (see paragraph 3c for further evaluation). Design options 4a and 4b were deleted because there is insufficient room for the powerhouse at the base of the dam. Design option 3 was deleted because of potential problems with the powerhouse being located in the canyon wall below a slide in the overburden material at the same location. Design option 2d was deleted because of potential problems associated with the penstock being located along the bottom of the rock canyon. Design options 1c and 2c, the design options originally proposed by R. W. Beck and Associates in their appraisal report for Grays Harbor Public Utility District (PUD) (see paragraph 3.06a in feasibility report), were deleted from further consideration by the Corps because their proposed penstock went through the joint between monoliths 6 and 7 in the dam, squeezed in between the elevator and the sluices, possibly endangering the structural integrity of the dam. Design options 1a and 2a were deleted because of potential problems associated with the penstock entering the canyon wall and the need to construct a full height multilevel intake structure underwater.

b. Fish Enhancement at Wynoochee Dam. Three alternatives are possible in the vicinity of Wynoochee Dam to enhance the anadromous fish runs: spawning channels, rearing ponds, and a fish hatchery. All three would take advantage of the gravity water supply from Wynoochee Dam.

Spawning channels would increase spawning capability only, would be dependent upon the river for rearing capacity, and would create minor enhancement benefits. Rearing ponds would be dependent upon the fish spawned at other locations and would also create minor enhancement benefits. A fish hatchery would include both spawning and rearing facilities, provide optimum use of the water supply from Wynoochee Dam, and create major enhancement benefits. A fish hatchery was considered to be the most viable fish enhancement alternative in the vicinity of Wynoochee Dam because it would provide optimum use of the opportunity at Wynoochee Dam in terms of production and efficiency.

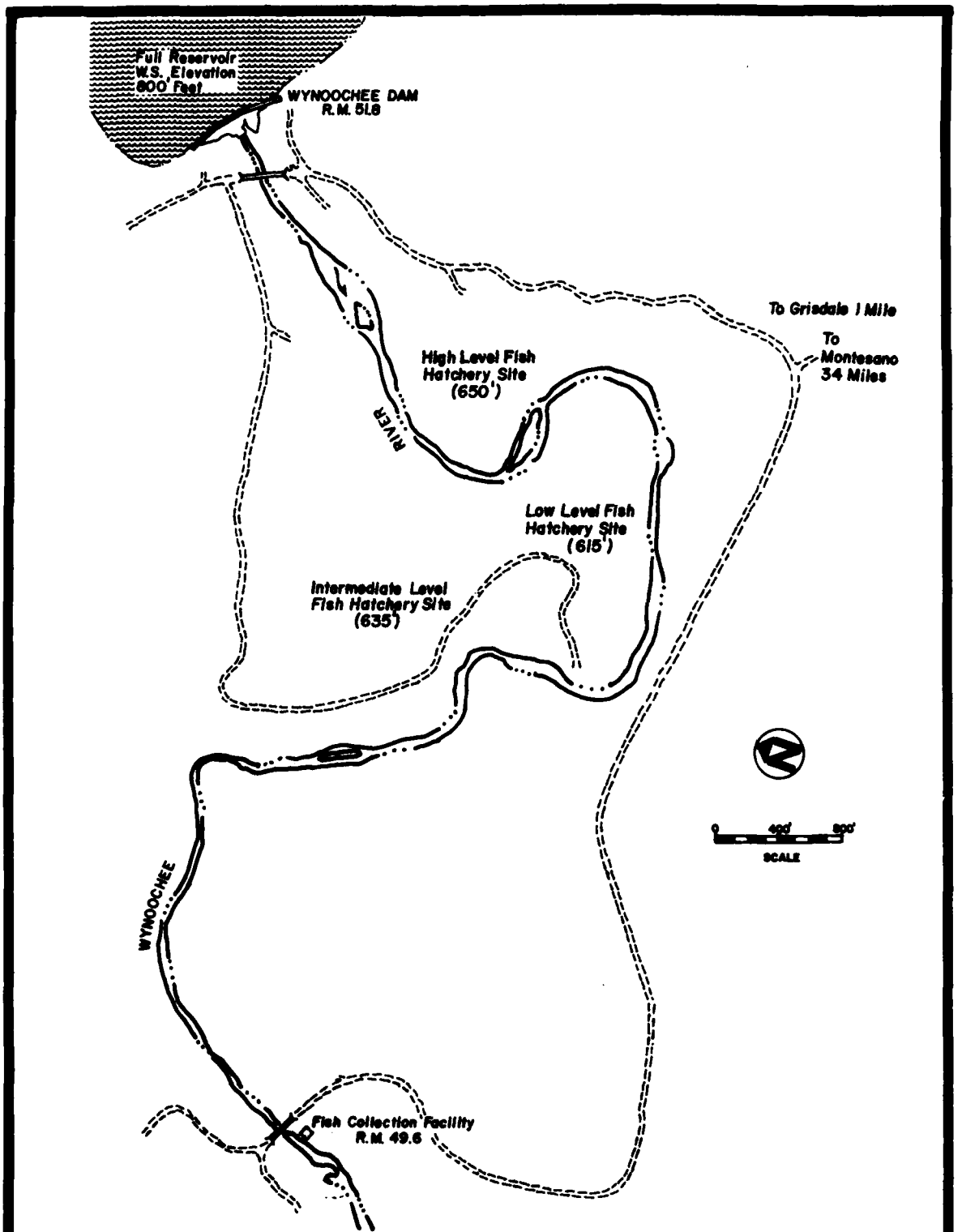
Three location options were available for the location of the fish hatchery alternative in the vicinity of Wynoochee Dam (figure G-2). A small site on a high level bench (elevation 650 feet) on the left bank 2,000 feet downstream of the dam was too small an area for a hatchery which could utilize the available water (190/140-c.f.s. minimum flow release), was not a flat site, and was too high above the river to be connected with a gravity flow pipeline from a hydropower facility. Two large sites approximately 3,000 feet downstream of the dam on the right bank were acceptable. The sites were similar except that one site was located on an intermediate level bench (elevation 635 feet) and the other on a low level bench (elevation 615 feet). Both sites could accommodate a hatchery which could utilize all the available water and could be connected with a gravity flow pipeline from a hydropower facility. A large fish hatchery on the right bank of the Wynoochee River 3,000 feet downstream of Wynoochee Dam offers a unique combination of factors that make development of an enhancement fish hatchery at either site very attractive because:

(1) A generous source of good quality water (190/140 c.f.s. minimum flow release) is available from Wynoochee Dam. This is one of the most important factors in locating a hatchery. In addition, the temperature of water from Wynoochee Dam is controllable as a result of the multilevel intake withdrawals.

(2) A fail-safe gravity flow from the dam or hydropower facility to the hatchery site could be developed, eliminating the usual energy requirement and associated costs for pumping water and the need for a standby emergency power source.

(3) A special cold water supply leading from the depths of the Wynoochee Dam Reservoir would make the hatchery especially adaptable to holding adult spring chinook salmon prior to spawning.

(4) A fish hatchery location above the traditional fishing areas near the head of the anadromous fish run would permit a sizable terminal fishing area for sportsmen and Indian fishermen.



WYNOOCHEE FISH HATCHERY LOCATION OPTIONS

FIGURE G-2

(5) A fish barrier dam and collection facility is part of the existing Wynoochee Lake project and could be used to capture spawning stock for the fish hatchery.

(6) There is a large area above the 100-year flood level suitable for construction of the hatchery.

In addition, the fish hatchery could meet fish and wildlife mitigation requirements onsite, would require no change in the operation of the existing project, and has strong public and agency support.

This unique combination of factors, together with the state's concern for the anadromous fish in the Northwest, including the Chehalis River Basin and Grays Harbor area, prompted the letter from the Governor of Washington requesting the study of a fish hatchery in conjunction with hydropower at Wynoochee Dam. Other fish hatchery sites in the Chehalis River Basin and Grays Harbor area could be developed by state and other Federal agencies, but the sites do not offer the unique combination of factors that make the Wynoochee fish hatchery site the most desirable hatchery site in the basin.

The lower level site at elevation 615 feet was selected over the intermediate level site at elevation 635 feet because a fish hatchery on the lower level site would cause less hydropower head loss if the fish hatchery had a direct pipeline connection from a hydropower facility. In addition, the lower fish hatchery site would be a source of suitable aggregate materials for construction of the hydropower facility.

Selection of the intermediate level fish hatchery site was preferred by the Grays Harbor PUD because they are interested in investigating the hydropower potential of the Oxbow Dam site at Wynoochee river mile 42.5. Construction of the fish hatchery on the lower level site would restrict future development of the Oxbow Dam site to a maximum pool elevation of 615 feet instead of 635 feet. Development of the Oxbow Dam site to elevation 635 feet would extend the Oxbow reservoir up to the Wynoochee hydropower outlet and allow full development of the 22-MW Oxbow powerplant. The 20-foot increment of head would produce approximately 2 MW of generation capability at the Oxbow Dam site and more than offset the loss of approximately 0.2 MW of generation capability associated with the 20-foot head loss for the one small unit in the Wynoochee powerhouse connected to the fish hatchery intake structure. Investigation of the intermediate level site during this feasibility study was not practical due to the uncertainty at this time regarding future development of the Oxbow Dam site. However, the Grays Harbor PUD has requested that the intermediate level fish hatchery site be investigated during further studies based on its interest in the Oxbow Dam site, although the Federal and state fisheries agencies and various interest groups believe that development of the Oxbow Dam site could jeopardize the Wynoochee hatchery.

Two Wynoochee fish hatchery design options to the selected alternative site were studied, with the gravity flow water supply for the hatchery either taken directly from the dam or taken from the tailrace of a powerhouse. (See paragraph 2b for discussion of pumping water supply directly from river at fish hatchery site.) The first fish hatchery design option would not be in conjunction with hydropower development at Wynoochee Dam and would have a water supply pipeline from a manifold connecting the outlets of the existing low flow passages through the dam to the fish hatchery. The second fish hatchery design option would be in conjunction with hydropower development at Wynoochee Dam and would have a water supply pipeline leading from an intake structure at the outlet of the powerhouse tailrace tunnel to the fish hatchery. The second fish hatchery design option would require that one small turbine in the powerhouse be sized to operate under the 190/140 c.f.s minimum flow releases required at Wynoochee Dam. This small turbine would have a minor reduction in power production (500 MWH per year) because the tailwater surface in the fish hatchery intake structure must be raised about 4 feet above the existing water surface elevation at 190 c.f.s. to gain sufficient head for gravity flow to the fish hatchery. During PP&E, the possibility of eliminating the minor reduction in power production would be examined.

c. No Action. Instead of developing the hydropower and/or fish enhancement alternatives at Wynoochee Dam, no Federal action would be taken at Wynoochee Dam at this time. There is a possibility of non-Federal hydropower development at Wynoochee Dam; however, there is no expressed interest in non-Federal hydropower development at Wynoochee Dam at this time. The probability of the region being without sufficient resources to meet electrical demands has caused power planners to focus on smaller renewable resource projects as well as conservation methods. Both structural and conservation methods are considered necessary to relieve the potential energy deficits in the Pacific Northwest. In accordance with the Pacific Northwest Electrical Power Planning and Conservation Act (Public Law 96-501, 5 December 1980), Bonneville Power Administration (BPA) must give highest priority to cost effective conservation programs, treating them as a resource preferable to all other means of responding to the demand for electrical energy. The energy conservation programs will be undertaken by public and private utilities and state and local governments with BPA's technical assistance and financial backing. Even though all resources, including small renewable resources and conservation methods, are employed to meet the regional loads, loads will probably exceed generating resources by at least 20 million MWH in the next decade and beyond. With the no-action alternative, the most probable future without Federal action, the opportunity for reducing this regional energy deficit by 36,900 MWH per year through Federal construction of a hydropower facility at Wynoochee Dam would be foregone.

Fish habitat improvements and fishery management are within the jurisdiction of the state and Federal fisheries agencies and are now being employed or planned where practicable by the agencies. Nonstructural fish enhancement measures include fish habitat improvement and fishery

management. Fish habitat could be improved by changes in streams such as removing silt from gravel, controlling flood runoff, increasing vegetation cover in the watershed, providing vegetation cover over streams, and improving water quality. Some stream areas could be improved to provide ideal spawning grounds by removing undesirable gravels and replacing them with desirable substrate. Rigorous management of the fisheries to sustain maximum yield is another measure implementable by the fisheries agencies. These fish enhancement measures should continue with or without implementation of a structural alternative such as a fish hatchery. However, the increasing need for anadromous fish cannot be completely met by these methods alone.

2. Detailed Studies.

a. Combinations of Design Options. Detailed design and cost estimate studies, geotechnical investigations, and environmental studies were conducted on the five possible hydropower and fish hatchery design options, or combinations of design options, which remained after the preliminary studies. The remaining design options (see figure 3 in feasibility report) were as follows:

(1) Underground hydropower only.

(2) Surface hydropower only.

(3) Fish hatchery only.

(4) Underground hydropower plus fish hatchery.

(5) Surface hydropower plus fish hatchery.

b. Design and Cost Estimate Studies. Design details were added and detailed cost estimates were prepared for the five design options. The project outputs and construction costs of each option were as follows:

Design Option	Description	Powerhouse Capacity (MW)	Average Annual Energy (MWH)	Fish Production (Pounds)	October 1981 Construction Costs (Million Dollars)
(1)	Underground hydropower only	11.3	37,400		25.6
(2)	Surface hydropower only	11.3	37,400		23.4
(3)	Fish hatchery only			405,000	20.1
(4)	Underground hydropower plus fish hatchery	11.3	36,900	405,000	41.6
(5)	Surface hydropower plus fish hatchery	11.3	36,900	405,000	38.5

Summaries of the cost estimates of these design options are presented in appendix E.

A combined hydropower and fish hatchery project would produce 500 MWH of energy per year less than a hydropower only project due to tailwater head losses associated with the fish hatchery intake structure. There was no difference in fish production among the design options which produce fish. Option 4 would have a cost savings of $4.1 million over a combination of option 1 plus option 3; option 5 would have a cost savings of $5.0 million over a combination of option 2 plus option 3. Most of these additional costs would be due to the need for the hydropower only options to include a downstream fish bypass facility to maintain the upstream anadromous fish run, while the hydropower/fish hatchery combinations would terminate the upstream anadromous fish run and incorporate mitigation of the loss of the run into the combined project. These cost savings showed an economic advantage to developing a hydropower/fish hatchery option in lieu of the hydropower only options, fish hatchery only option, or combination of hydropower and fish hatchery options built as two independent projects. In addition, the hydropower/fish hatchery options addressed both planning objectives while the hydropower only and fish hatchery only options addressed only one planning objective. Option 4 would be $3.1 million more expensive than option 5 due to the additional costs associated with the underground powerhouse.

The gravity flow water supply pipeline to the fish hatchery was selected in lieu of pumping directly from the river of the hatchery site because the pipeline and related features would have a lower average annual construction cost plus annual operation, maintenance, and replacement (OM&R) cost ($280,000) than a pumping plant ($354,000). The greater construction cost, on an amortized annual basis, of the powerhouse bypass, fish hatchery intake structure and portion of the tailrace, water supply pipeline, and two river crossings ($268,000), plus associated annual OM&R costs ($12,000), would be more than offset by the lower annual construction cost of the pumping plant ($107,000), plus much higher annual OM&R costs ($247,000), which includes $238,000 per year for electricity to run the pumps.

c. Geotechnical Investigations. According to the results of the preliminary hydropower studies, consideration was given to two powerhouse locations on the right bank: an underground location and a surface location. A conservative approach was used in siting the underground powerhouse about 200 feet downstream of the dam and 200 feet behind the canyon wall. Considerations included the length of existing rock bolts which stabilize stress relief joints in the canyon wall, possible structural disturbances to the existing visitor center, and a conservative margin of safety for tunnel blasting. The surface powerhouse site would be located about 900 feet downstream of the dam at the lower end of the bedrock canyon and at the toe of a slide in the overburden material. Foundation preparation for the surface powerhouse site would require excavation of both bedrock and overburden, leading to a potentially unstable slide condition and the possibility of requiring potentially expensive remedial measures not included in the cost estimate. Further downstream the bedrock surface drops rapidly and a bedrock foundation is not possible. The Seattle District, Corps of Engineers, determined that the cost of remedying potential geotechnical problems associated with the surface powerhouse offset the additional construction cost of the underground powerhouse, which has no known potential geotechnical problems. The underground powerhouse location was selected as the most favorable powerhouse location for the purposes of this feasibility study. Both sites will be considered during PP&E. Preliminary investigations of the selected fish hatchery site showed no apparent foundation problems would be expected for the facility. Adequate quantities of materials for the production of concrete aggregate for the hydropower facility appear available from the hatchery site. Additional geotechnical data is presented in section 4 of the feasibility report and appendix F.

d. Environmental Studies. Probable beneficial and adverse impacts of the development of hydropower and fish enhancement facilities at Wynoochee Dam were determined from analyses of data collected from literature search; field inventories of the plan area; and coordination with Federal, state, and local agencies and the public. Specific analyses were performed relative to threatened and endangered species, water quality, cultural resources, social environment, and fish and wildlife

resources. The bald eagle is the only threatened and endangered species known to occur in the plan area. Studies of this species included coordination with appropriate Federal and state agencies, review of available records of bald eagle sightings in the plan area, and field investigations. A biological assessment (BA) of the impacts of the hydropower and hatchery development on the bald eagle was prepared. The BA concluded that the plan would not impact the local, regional, and national bald eagle populations and would not jeopardize its continued existence. On 20 July 1981, the U.S. Fish and Wildlife Service (FWS) expressed their concurrence with the BA. Water quality analyses of parameters such as temperature, dissolved oxygen, and heavy metals have shown that the quality of Wynoochee Lake and River is very suitable for a fish hatchery water supply. Cultural resource studies included a cultural resource reconnaissance of the plan area and coordination with appropriate Federal and state agencies. No evidence of prehistoric or historic sites was found. Investigations of fish and wildlife and the social environment of the plan area were accomplished by field investigations; literature review; and discussions with Federal, state, and local agencies and interested public.

Development of the underground hydropower option would not significantly impact the environment and would have fewer potential impacts than the surface hydropower option. If a slide in the overburden material would occur at the surface powerhouse area, the slide material could move into the river and result in adverse impacts to the spawning and rearing habitat in the Wynoochee River below the dam. The esthetic impacts and disturbance to terrestrial wildlife habitat would also be less with the underground hydropower option than the surface hydropower option. Construction of a buried transmisson line is considered less environmentally damaging than an aerial transmission line and is consistent with U.S. Forest Service policy requiring burial of transmission lines on national forest land. Hydropower only options would provide no enhancement of the anadromous fisheries and would require a costly fish attraction and bypass facility at Wynoochee Dam to pass downstream migrants. The hatchery only option and the two hydropower plus fish hatchery options would result in termination of the anadromous fish runs above the existing Wynoochee Dam but would enhance the overall fishery resources in the Chehalis River Basin, Grays Harbor area, and northern Pacific Ocean. Further, the fish hatchery would include mitigation for the lost upstream fish runs and would incorporate the mitigation for the previous loss of steelhead and cutthroat trout spawning habitat associated with the existing Wynoochee Lake project. The hatchery only option would not contribute to meeting the need for energy in the Pacific Northwest as the hydropower/fish hatchery options would. There would be no significant difference in net environmental impacts between the hatchery only option and the underground hydropower plus fish hatchery option. The underground hydropower plus fish hatchery design option would result in the greatest net beneficial environmental impact and would address both planning objectives while minimizing adverse environmental impacts and eliminating the need for a costly fish attraction and bypass facility.

e. Summary of Detailed Studies. Detailed design and cost studies showed an economic advantage for developing a combined hydropower and fish hatchery project, with the underground powerhouse/fish hatchery option $3.1 million more expensive than the surface powerhouse/fish hatchery option. A combined hydropower and fish hatchery project would produce 500 MWH of energy per year less than a hydropower only project due to tailwater head losses associated with the fish hatchery intake structure. Detailed geotechnical investigations considered that the risk of potential slide problems associated with the surface powerhouse offset the additional construction cost of the underground powerhouse and determined that the underground powerhouse location is geotechnically sound with no known potential problems. Detailed environmental studies showed that an underground hydropower and fish hatchery option would result in the greatest net beneficial environmental impact. Therefore, based on present information, the combination of the underground hydropower and fish hatchery was the only design option which remained for consideration as an alternative plan during this feasibility study. Additional consideration will be given to the alternate project locations during PP&E to verify selection of the most advantageous design option. In response to coordination with state and Federal fish resource agencies, the fish hatchery plan was expanded by adding a satellite fish station on the lower Skookumchuck River. Detailed siting and design studies of the fish station would be accomplished during PP&E as the details of the hatchery and its management are formulated.

3. Hydropower Formulation and Optimization.

a. Streamflow Availability and Duration. Wynoochee River streamflow and Wynoochee Lake project operation are discussed in paragraphs 4.03b and 1.05 of the feasibility report, respectively. The mean annual Wynoochee River streamflow at the U.S. Geological Survey streamgage near Grisdale, Washington, located approximately 1/2 mile downstream of Wynoochee Dam, is 534 c.f.s. (period of record 1965-1979).

Mean monthly reservoir discharges used for estimating the hydropower potential were based on the Wynoochee Lake project water supply study which generated 214 years of average monthly regulated streamflow using statistic methods and maximum level of water supply demand. The average, maximum, and minimum regulated average monthly discharges from the Wynoochee Lake project based on the simulated 214-year record are as follows.

Month	Average	Maximum	Minimum
January	918 c.f.s.	2,525 c.f.s.	175 c.f.s.
February	751	1,725	175
March	478	1,175	175
April	211	837	187
May	255	787	137
June	277	787	137
July	235	405	195

Month	Average	Maximum	Minimum
August	266	324	175
September	473	975	175
October	388	1,675	175
November	711	1,625	175
December	885	2,125	225
Average	487		

Flow duration curves for November, December and January are presented in figures G-3, G-4 and G-5.

b. Energy Potential. Potential energy generation was estimated for four powerplant sizes - 800 c.f.s., 1,000 c.f.s., 1,200 c.f.s., and 1,400 c.f.s. The capacities of the four powerplants are 7.5 MW, 9.5 MW, 11.3 MW, and 13.3 MW, respectively. Streamflows were based on the 214-year monthly streamflow record with adjustments (1) to subtract streamflows that exceed the powerhouse hydraulic capacity and (2) to reduce monthly winter streamflows for losses caused by high daily streamflows. Forebay elevations used for computing hydraulic heads were based on the flood control pool, elevation 764 feet, during the winter (October-March) and conservation pools between elevation 765 feet and normal full pool, elevation 800 feet, during the remaining months. Hydraulic head losses included penstock losses (5 feet) and miscellaneous losses (2 feet). A constant tailwater elevation of 640 feet was used in all cases. Average energy production (MWH) with the four hydraulic capacities and total potential energy (MWH) were as follows:

	Energy Production Powerhouse Hydraulic Capacity				Total Potential
Month	800 c.f.s.	1,000 c.f.s.	1,200 c.f.s.	1,400 c.f.s.	Energy
Jan.	3529	4039	4655	5222	6206
Feb.	3600	3707	4307	4377	4645
Mar.	3280	3322	3329	3329	3329
Apr.	1598	1598	1598	1598	1598
May	2190	2190	2190	2190	2190
Jun.	2365	2365	2365	2365	2365
Jul.	2049	2049	2049	2049	2049
Aug.	2241	2241	2241	2241	2241
Sep.	3265	3265	3265	3265	3265
Oct.	2527	2601	2634	2649	2657
Nov.	3853	4262	4519	4633	4651
Dec.	3116	3745	4238	4142	5983
Annual	33,613 MWH	35,384 MWH	37,390 MWH	38,060 MWH	41,179 MWH

Actual annual energy production would be 500 MWH less for each powerhouse size due to raised tailwater elevations in the fish hatchery intake structure causing a reduction in head on the small unit in each powerhouse. During PP&E, the possibility of eliminating the minor reduction in power reduction would be examined.

FIGURE G-3 FLOW DURATION CURVE FOR REGULATED AVERAGE MONTHLY DISCHARGE, WYNOOCHEE LAKE PROJECT - NOVEMBER

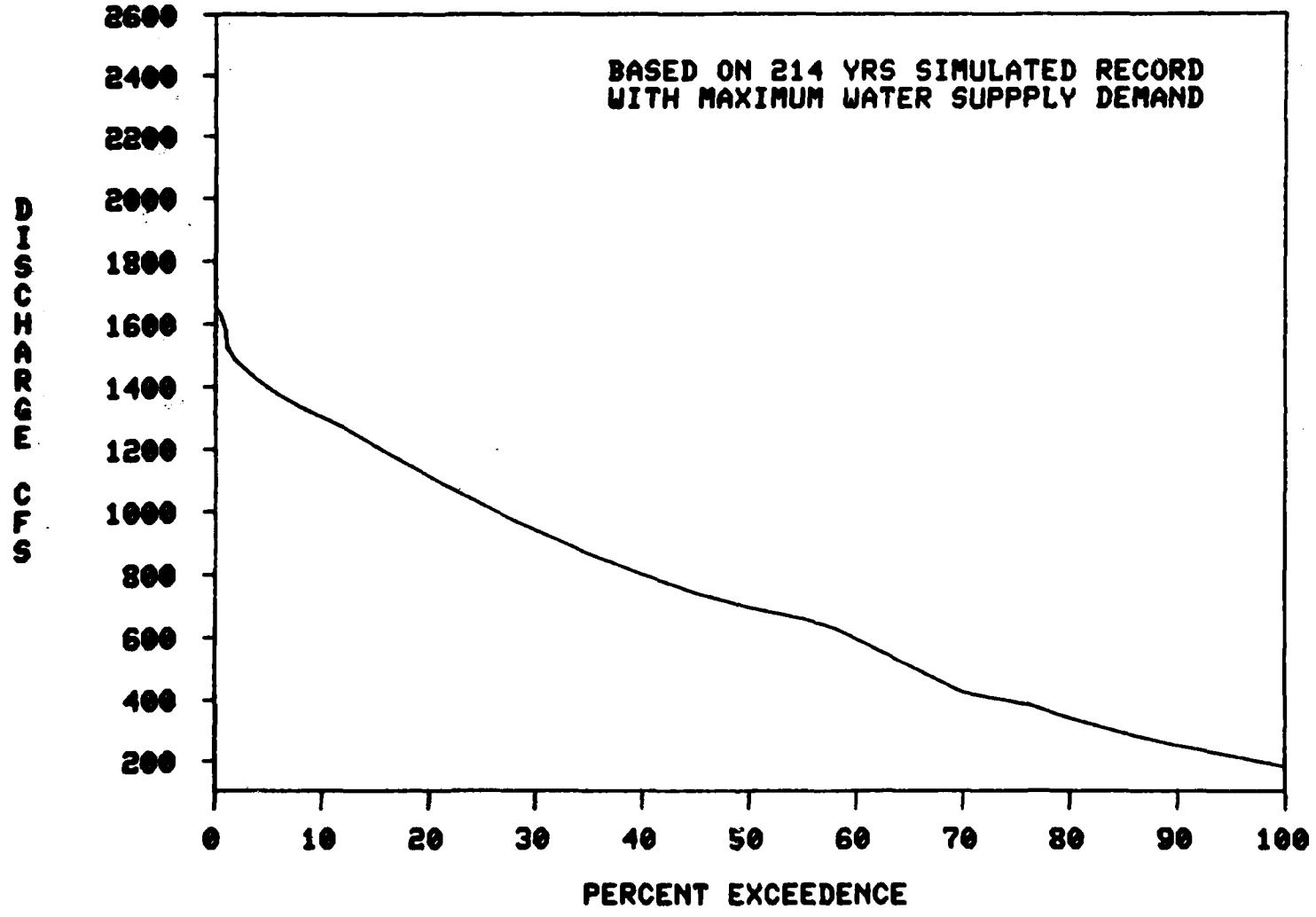


FIGURE G-4 FLOW DURATION CURVE FOR REGULATED AVERAGE MONTHLY DISCHARGE, WYNOOCHEE LAKE PROJECT - DECEMBER

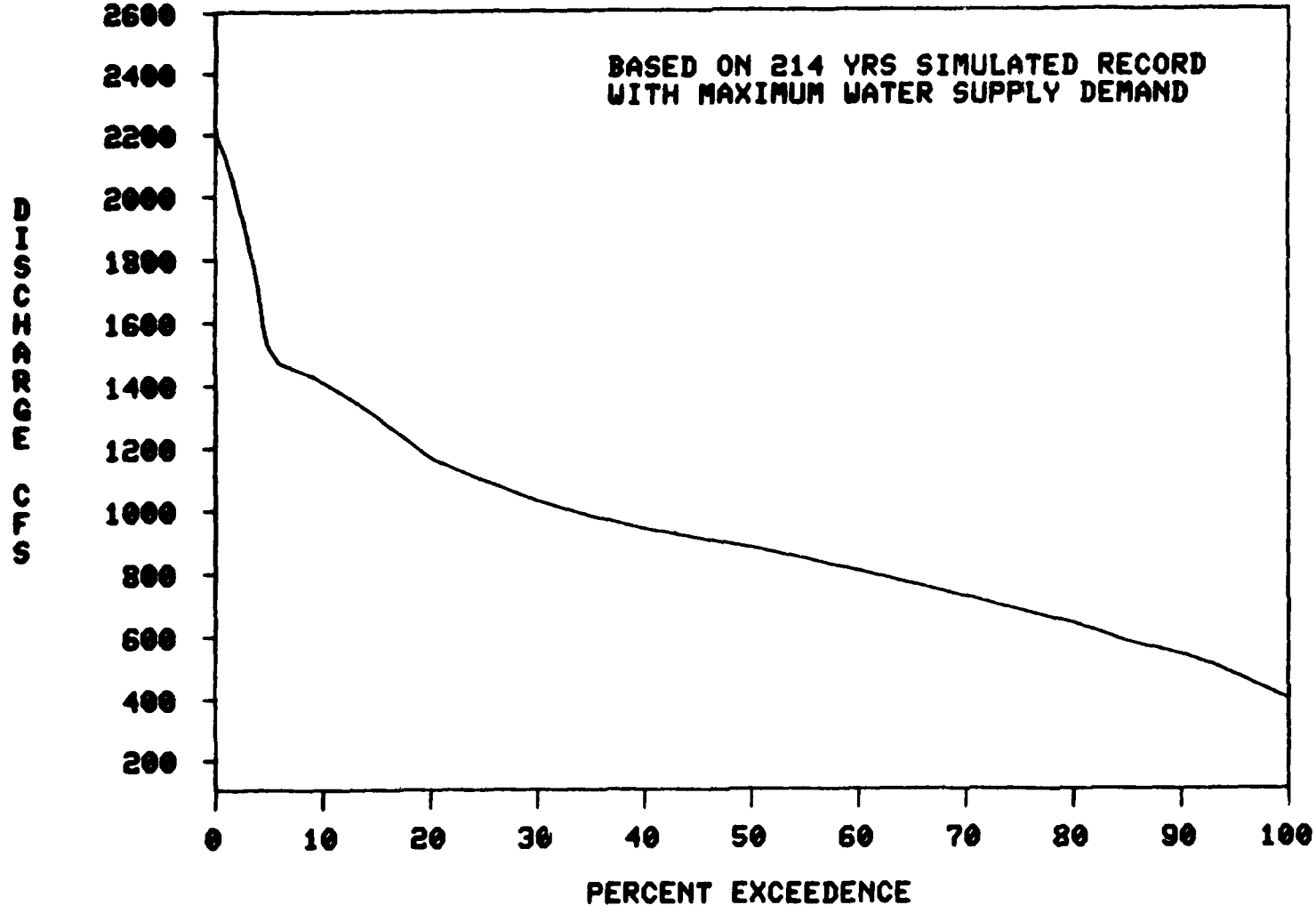
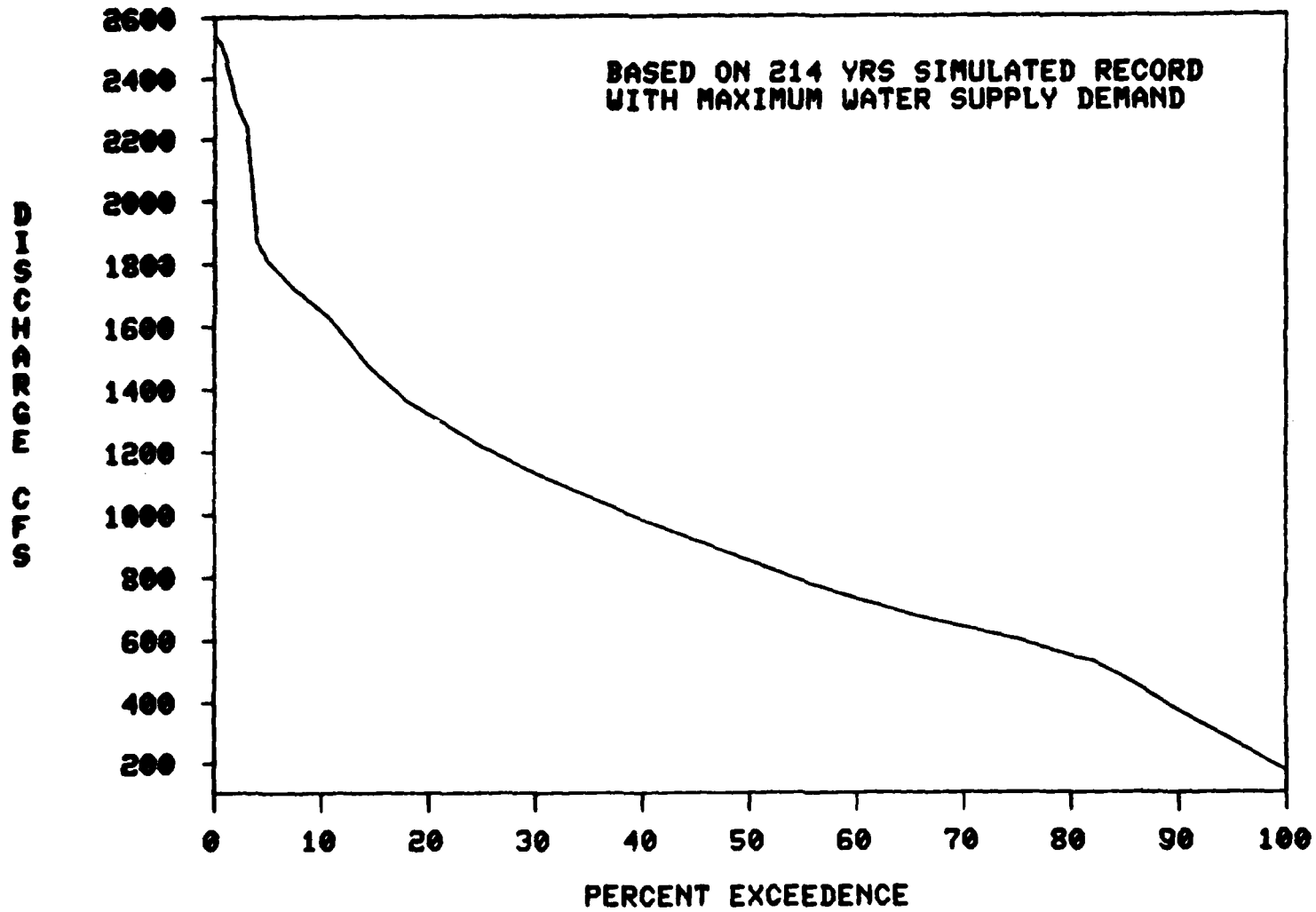


FIGURE G-5 FLOW DURATION CURVE FOR REGULATED AVERAGE MONTHLY DISCHARGE, WYNOOCHEE LAKE PROJECT - JANUARY



c. Hydropower Optimization. The optimum level of hydropower development was determined by evaluating the costs, benefits, and energy production of the hydropower facility with four different hydraulic capacities - 800 c.f.s., 1,000 c.f.s., 1,200 c.f.s., and 1,400 c.f.s. as part of a combined hydropower/fish hatchery project. The design of the intake structure, penstock, electrical equipment, draft tubes, and tailrace for the 800 c.f.s., 1,000 c.f.s., and 1,400 c.f.s. plants were modified from the 1,200 c.f.s. powerplant design to reflect the different hydraulic capacities. The cost of the powerhouse was not changed because the powerhouse size would be essentially the same for all levels of development. Cost estimate summaries for the combined underground hydropower plus fish hatchery designs for the four different hydraulic capacities are presented in tables G-1 through G-4. Annual operation, maintenance, and replacement costs for each hydropower facility were also determined.

Power data for the four powerplants were as follows:

	Powerhouse Hydraulic Capacity			
	800 c.f.s.	1,000 c.f.s.	1,200 c.f.s.	1,400 c.f.s.
Number of units	3	3	3	3
Hydraulic capacity of units	1-190 cfs 2-305 cfs	1-190 cfs 2-405 cfs	1-190 cfs 2-505 cfs	1-190 cfs 2-605 cfs
Size of Units	1-1.7 MW 2-2.9 MW	1-1.7 MW 2-3.9 MW	1-1.7 MW 2-4.8 MW	1-1.7 MW 2-5.8 MW
Total Capacity	7.5 MW	9.5 MW	11.3 MW	13.3 MW
Equivalent Thermal Capacity	5.2 MW	6.3 MW	7.1 MW	7.5 MW
Average Annual Energy	33.1 GWH	34.9 GWH	36.9 GWH	37.6 GWH
Percent Total Potential Energy	80%	85%	90%	91%

Average annual power benefits ($1,000) for the four hydraulic facilities, determined using the procedures described in appendix C, would be as follows:

	Powerhouse Hydraulic Capacity			
	800 c.f.s.	1,000 c.f.s.	1,200 c.f.s.	1,400 c.f.s.
Capacity	$618	$748	$843	$891
Energy	1,238	1,305	1,380	1,406
Total	$1,856	$2,053	$2,223	$2,297

TABLE G-1

COST ESTIMATE SUMMARY

UNDERGROUND HYDROPOWER PLUS FISH HATCHERY
800 CFS POWERHOUSE

Account No.	Feature or Item	Item Cost ($1,000)	Feature Cost ($1,000)
01	LANDS AND DAMAGES		$10
04	DAM		5,180
.4	Power Intake Works	$5,180	
06	FISH AND WILDLIFE FACILITIES		18,250
	Fish Hatchery (Phases I and II)	18,250	
07	POWERPLANT		10,190
.1	Powerhouse	5,220	
.2	Turbines and Generators	2,710	
.3	Accessory Electrical Equipment	850	
.4	Miscellaneous Powerplant Equipment	200	
.5	Tailrace	1,000	
.6	Switchyard	210	
19	BUILDINGS, GROUNDS, AND UTILITIES		280
20	PERMANENT OPERATING EQUIPMENT		190
	Subtotal		$33,190
30	ENGINEERING AND DESIGN		$2,730
31	SUPERVISION AND ADMINISTRATION		2,260
	TOTAL (October 1981 Price Level)		$38,180

TABLE G-2

COST ESTIMATE SUMMARY

UNDERGROUND HYDROPOWER PLUS FISH HATCHERY
1,000 CFS POWERHOUSE

Account No.	Feature or Item	Item Cost ($1,000)	Feature Cost ($1,000)
01	LANDS AND DAMAGES		$10
04	DAM		4,640
.4	Power Intake Works	$4,640	
06	FISH AND WILDLIFE FACILITIES		18,250
	Fish Hatchery (Phases I and II)	18,250	
07	POWERPLANT		11,010
.1	Powerhouse	5,250	
.2	Turbines and Generators	3,350	
.3	Accessory Electrical Equipment	880	
.4	Miscellaneous Powerplant Equipment	210	
.5	Tailrace	1,100	
.6	Switchyard	220	
19	BUILDINGS, GROUNDS, AND UTILITIES		280
20	PERMANENT OPERATING EQUIPMENT		190
	Subtotal		$34,380
30	ENGINEERING AND DESIGN		$2,820
31	SUPERVISION AND ADMINISTRATION		2,330
	TOTAL (October 1981 Price Level)		$39,530

TABLE G-3

COST ESTIMATE SUMMARY

UNDERGROUND HYDROPOWER PLUS FISH HATCHERY
1,200 CFS POWERHOUSE

Account No.	Feature or Item	Item Cost ($1,000)	Feature Cost ($1,000)
01	LANDS AND DAMAGES		$10
04	DAM		5,180
.4	Power Intake Works	$5,180	
06	FISH AND WILDLIFE FACILITIES		18,250
	Fish Hatchery (Phases I and II)	18,250	
07	POWERPLANT		12,290
.1	Powerhouse	5,320	
.2	Turbines and Generators	4,350	
.3	Accessory Electrical Equipment	960	
.4	Miscellaneous Powerplant Equipment	220	
.5	Tailrace	1,200	
.6	Switchyard	240	
19	BUILDINGS, GROUNDS, AND UTILITIES		280
20	PERMANENT OPERATING EQUIPMENT		190
	Subtotal		$36,200
30	ENGINEERING AND DESIGN		$2,950
31	SUPERVISION AND ADMINISTRATION		2,450
	TOTAL (October 1981 Price Level)		$41,600

TABLE G-4

COST ESTIMATE SUMMARY

UNDERGROUND HYDROPOWER PLUS FISH HATCHERY
1,400 CFS POWERHOUSE

Account No.	Feature or Item	Item Cost ($1,000)	Feature Cost ($1,000)
01	LANDS AND DAMAGES		$10
04	DAM		5,900
.4	Power Intake Works	$5,900	
06	FISH AND WILDLIFE FACILITIES		18,250
	Fish Hatchery (Phases I and II)	18,250	
07	POWERPLANT		13,980
.1	Powerhouse	5,420	
.2	Turbines and Generators	5,710	
.3	Accessory Electrical Equipment	1,090	
.4	Miscellaneous Powerplant Equipment	240	
.5	Tailrace	1,260	
.6	Switchyard	260	
19	BUILDINGS, GROUNDS, AND UTILITIES		280
20	PERMANENT OPERATING EQUIPMENT		190
	Subtotal		$38,610
30	ENGINEERING AND DESIGN		$3,140
31	SUPERVISION AND ADMINISTRATION		2,610
	TOTAL (October 1981 Price Level)		$44,360

Average annual separable power costs were determined for a combined hydropower/fish hatchery project for each different powerhouse size. Separable power costs were subtracted from power benefits to determine net average annual power benefits for each powerhouse size as follows:

	Powerhouse Hydraulic Capacity			
	800 c.f.s.	1,000 c.f.s.	1,200 c.f.s.	1,400 c.f.s.
Average Annual Power Benefits ($1,000)	1,856	2,053	2,223	2,297
Average Annual Separable Power Costs ($1,000)	1,643	1,775	1,969	2,219
Net Average Annual Power Benefits ($1,000)	213	278	254	78

A plot of power benefits versus power costs (figure G-6) showed the maximum net power benefits would be $289,000. A plot of net power benefits versus powerhouse hydraulic capacity (figure G-7) showed the maximum net power benefits would occur with a 1,060 c.f.s. hydraulic capacity. The 1,200 c.f.s. powerhouse was chosen over the 1,060 c.f.s. powerhouse as the selected level of hydropower development to capture the extra energy production (2,000 MWH/year) with only a slight decrease in net power benefits ($35,000/year).

The power potential of the six multilevel low flow outlets in the existing dam in combination with an underground facility was also evaluated. The invert elevations of the six low flow pipes are 786, 775, 764, 752, 721, and 688 feet, respectively. Since the power generation through the low flow outlets would be used to supplement power generation in the underground facility, only high flow releases from pipes normally used during the flood season could be used in combination with the underground facility to capture energy from high flows. High project outflows occur in November through February when the reservoir is drawn down to elevation 764 feet, at which elevation only low flow outlets 5 and 6 are normally used. At this elevation, outlets 5 and 6 have an average hydraulic capacity of 200 c.f.s. Average velocity in outlets 5 and 6 is 70 feet per second; therefore, head losses in the pipes are large. The average net power head of pipes 5 and 6 is 60 feet at reservoir elevation 764 feet and tailwater elevation 640 feet. The capacity of a hydropower unit(s) on outlets 5 and 6 would be approximately 1.7 MW based on 400 c.f.s. flow and 60 feet of head. The low flow outlet hydropower facility was dropped from further consideration because an evaluation showed that the cost of a hydropower facility at the end of low flow outlets 5 and 6 in combination with either a 800 or 1,000 c.f.s. underground hydropower facility would result in less net power benefits than the selected

FIGURE G-6 POWER BENEFITS VERSUS
POWER COSTS FOR FOUR POWERHOUSE SIZES

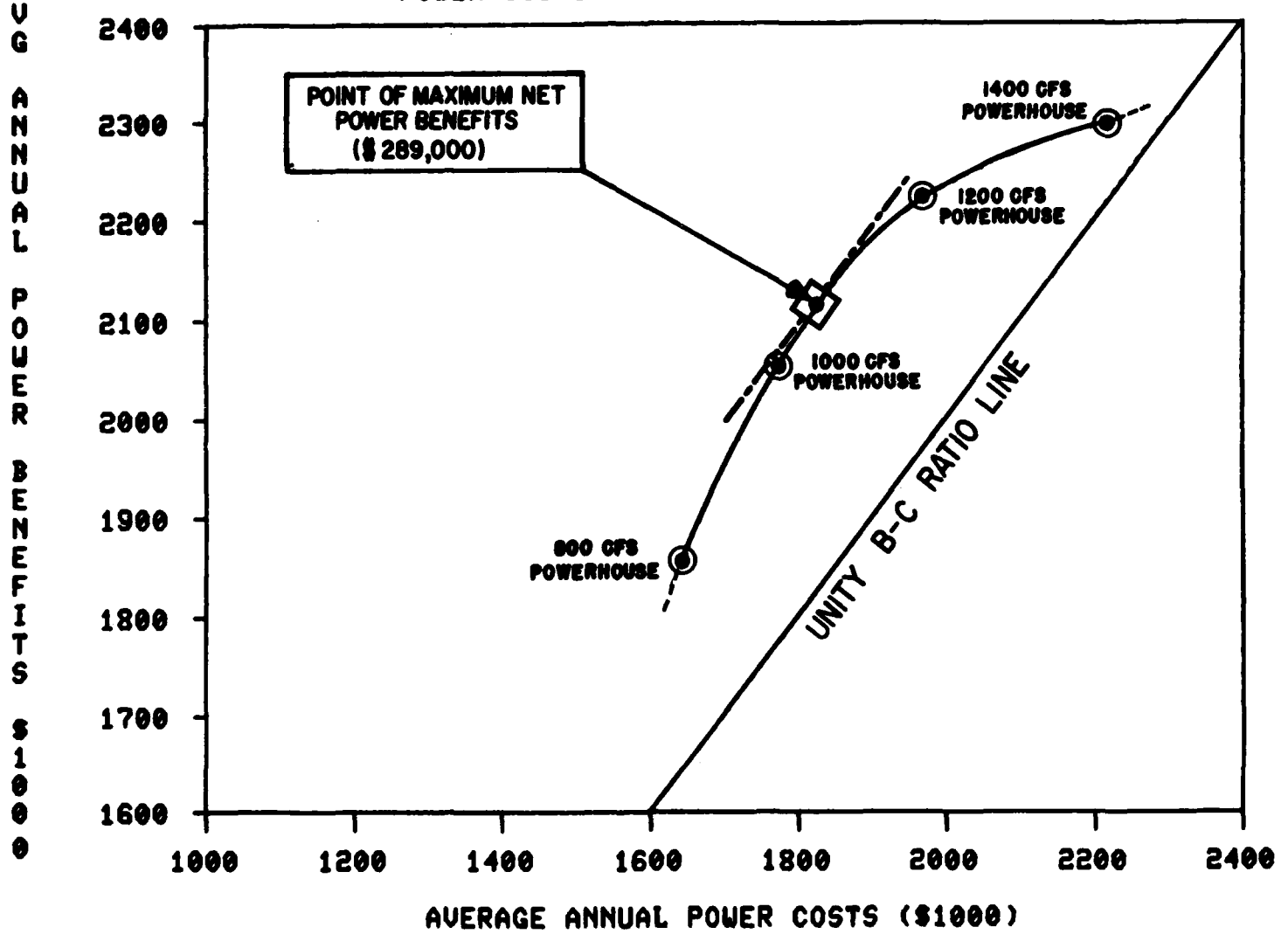
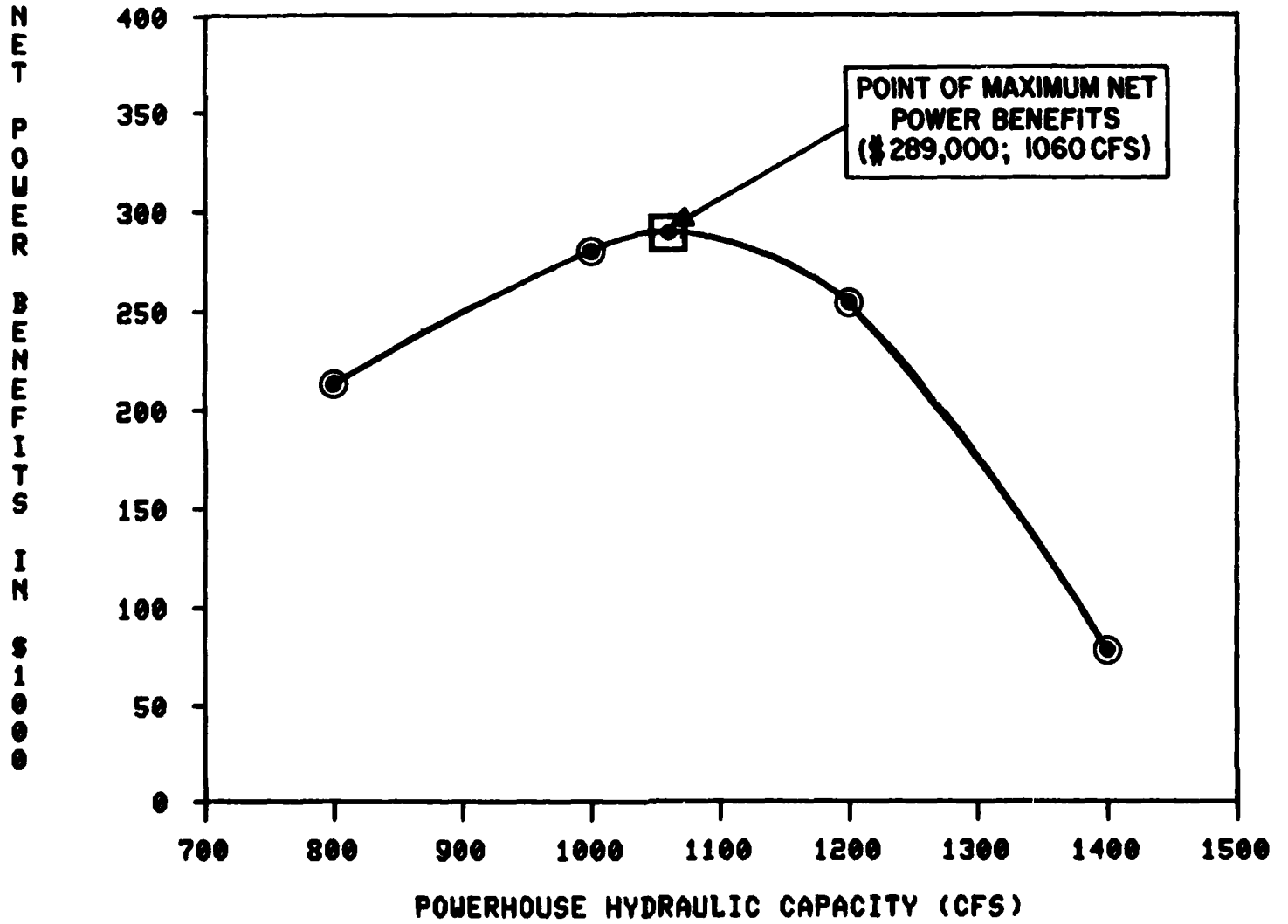


FIGURE G-7 NET POWER BENEFITS
VERSUS POWERHOUSE HYDRAULIC CAPACITY



1,200 c.f.s. underground hydropower facility. In addition, serious potential construction and operational problems associated with a hydropower facility at the base of the dam and under the sluice exits also eliminate such a facility from further consideration.

d. Operation. The proposed Wynoochee hydropower project would be operated in accordance with the approved criteria and procedures for the existing Wynoochee Lake project. Reservoir releases would be made by the Corps of Engineers to meet the congressionally authorized purposes of the existing project and the water quality and quantity needs of the proposed fish hatchery. The multilevel intake structure, penstock, powerhouse, draft tubes, and tailrace tunnel would be used as an alternate hydraulic outlet for reservoir releases during normal reservoir regulation operation. The hydropower operation would be subordinate to all other purposes and the facility would operate as a run-of-river plant producing baseload energy from the reservoir releases. The powerplant would be operated remotely because of its small size. An interface with the existing project and proposed fish hatchery would be required to automatically or manually adjust water temperature intake and powerplant hydraulic releases in response to adjustments in reservoir releases requirements.

4. Economics of Phased Fish Hatchery Construction. Based on the cost allocation in appendix C, construction of the fish hatchery portion of the recommended plan in two phases, with the second phase constructed up to 20 years after the first phase, would produce average annual net benefits of $8,056,000. This is more net benefits than initial construction of both phases of the hatchery ($7,805,000) since the second phase would be unused for up to 20 years, or construction of only the first phase ($7,453,000). The second phase would be incrementally justified whenever it is constructed, but construction at project year 20 would produce more average annual net benefits ($603,000) than construction at project year 0 ($352,000). A summary of the economics of the various fish hatchery construction options is presented in table G-5.

5. Comparison of Alternative Plans. A detailed comparison of the no-action plan and the combined hydropower and enhancement fish hatchery plan is presented in table G-6.

TABLE G-5

SUMMARY OF ECONOMICS OF VARIOUS FISH HATCHERY CONSTRUCTION OPTIONS

Construction Options	Average Annual Benefits	Average Annual Costs	Net Benefits	Benefit-to-Cost Ratio
(1) Phase I at year 0	9,580	2,127	7,453	4.5
(2) Phase II at year 20[1/] (benefits and costs discounted to year 0)	679	76	603	8.9
(3) Phase II at year 0[1/] (unused for 20 years; benefits discounted)	679	327	352	2.1
(4) Phase I at year 0 plus Phase II at year 20 (benefits and costs) discounted	10,259	2,203	8,056	4.7
(5) Phase I at year 0 plus Phase II at year 0 (unused for 20 years; benefits discounted)	10,259	2,454	7,805	4.2

1/Phase II could not be constructed without Phase I.

TABLE G-6

DETAILED COMPARISON OF ALTERNATIVE PLANS

	Alternative Plan 1 - No Action (Most Probable Future Without Federal Action)	Alternative Plan 2 - Combined Underground Hydropower and Enhancement Fish Hatchery
PLAN DESCRIPTION		
Major Features	Non-Federal hydropower development possible but no expressed interest at this time. Plan by Grays Harbor PUD would have included surface powerhouse and aerial transmission line. Fish habitat improvement measures and fishery management by state fisheries agencies.	Intake structure; penstock; 11.3-MW installed capacity underground powerhouse; switchyard; draft tubes and tailrace tunnel; hydropower outlet/fish hatchery intake structure; fish hatchery water supply pipeline; 405,000-pound fish hatchery, including residences and upgraded access road; one satellite station. Transmission line would be the responsibility of BPA.
Plan Outputs	Slight reduction in regional energy deficit. Provide 10.4-MW installed capacity which may produce approximately 35,900 MWH of energy per year. Some improvement of anadromous fish runs if other enhancement problems are implemented.	Slight reduction in regional energy deficit. Provide 11.3-MW capacity which produces 36,900 MWH of energy per year. Major enhancement of anadromous fishery; 118,660 adult spring chinook salmon and steelhead annual contribution to anadromous fish harvest.
Investment Costs	Not available.	
Federal		$41,601,000
Non-Federal		1,809,000
Total		$43,410,000

TABLE G-6 (con.)

	Alternative Plan 1 - No Action (Most Probable Future Without Federal Action)	Alternative Plan 2 - Combined Underground Hydropower and Enhancement Fish Hatchery
Annual Operation, Maintenance and Replacement Costs	Not available.	
Federal		$848,000
Non-Federal		205,000
Total		$1,053,000
Average Cost of Energy Produced	Not available.	57 mills/KWH
Benefit-to-Cost Ratio	Not determined.	Hydropower 1.1 Fish Hatchery 4.7 Combined Plan 2.9
CONTRIBUTION TO PLANNING OBJECTIVES		
Meets a portion of the increasing energy needs in the Pacific Northwest by development of the potential of Wynoochee Dam, Washington	Yes, if non-Federal hydropower is developed.	Yes.
Meets a portion of the increasing demand for anadromous fish in the Pacific Northwest by development of fish enhancement opportunities at Wynoochee Dam, Washington	No.	Yes.

TABLE G-6 (con.)

	Alternative Plan 1 - No Action (Most Probable Future Without Federal Action)	Alternative Plan 2 - Combined Underground Hydropower and Enhancement Fish Hatchery
ENVIRONMENTAL QUALITY IMPACTS		
1. Impacts on Wetlands (Executive Order (E.O.) 11990)	Minor impact depending upon fish habitat measure utilized.	Loss of 2 acres of sedge marsh. Potential of additional loss with construction of satellite station.
2. Impacts on Water Quality* and Supply	With hydropower development utilizing surface powerhouse, potential reduction in quality of 1,000-foot reach of Wynoochee River between dam and hydropower outlet. Water would be ponded in this reach when reservoir releases are no greater than that quantity of water diverted to the powerhouse. Short-term water quality impacts associated with potential construction of non-Federal hydropower and habitat improvement measures.	Potential water quality impact in 6,800-foot reach of the Wynoochee River between the weir and the hatchery outlet if extreme low flows occur (April-September). Impacts would primarily be reduced visual esthetics and reduced aquatic habitat. Potential water quality reduction in 250-foot reach between dam and the existing overflow weir. Water would be ponded in this reach when reservoir releases are no greater than the quantity of water diverted to the powerhouse. Impacts to water quality would not be significant. Hatchery discharge may result in increased aquatic productivity and an alteration in the aquatic benthic community in the area near the effluent outlet; a possible beneficial impact because aquatic productivity in the river is rather low naturally.

*Effect assessment item specifically listed under Section 122 of Public Law 91-611.

TABLE G-6 (con.)

	Alternative Plan 1 - No Action (Most Probable Future Without Federal Action)	Alternative Plan 2 - Combined Underground Hydropower and Enhancement Fish Hatchery
		Water supply downstream of the hatchery would not be affected. Short-term impacts to water quality would be associated with project construction. A multilevel intake structure would maintain existing project water quality from reservoir releases.
3. Construction Related Noise*	Short-term localized impact during construction of non-Federal hydropower facility. Long-term impact should be minimal.	Increased noise associated with project construction. Long-term permanent increase in noise levels and traffic due to project operation, residences, and increased recreational fishery.
4. Impacts on Air Quality*	Short-term associated with potential construction of non-Federal hydropower.	Short-term associated with construction. Long-term associated with increased traffic.
5. Impact on Flood Plain (E.O. 11988)	Minor potential impact from implementation of fish habitat improvements.	Minor potential impact from construction of satellite fish station.
6. Impacts on Threatened and Endangered species	Continued existence of bald eagle would not be expected to be jeopardized; although, use in the area could decrease with decreasing available food supply (anadromous fish).	Continued existence of bald eagle would not be jeopardized. Threatened and endangered species analysis for the satellite fish station would be accomplished in PP&E when the station is sited.

*Effect assessment item specifically listed under Section 122 of Public Law 91-611.

TABLE G-6 (con.)

	Alternative Plan 1 - No Action (Most Probable Future Without Federal Action)	Alternative Plan 2 - Combined Underground Hydropower and Enhancement Fish Hatchery
7. Impacts on Wildlife	Temporary disruption during potential construction of non-Federal hydropower and habitat improvement measures.	Temporary disruption during construction. Long-term permanent changes in habitat due to hatchery construction. Permanent losses would total approximately 50 acres of rain forest vegetation, of which 25 acres are considered old growth and constitute critical elk winter range. Without mitigation, big game use of the hatchery site would be lost. Use would be reduced in the area around the hatchery due to increased human disturbance. Two 2-acre elk mitigation pastures adjacent to the hatchery are included in the plan to provide a winter food source and thus reduce adverse impacts associated with the loss of elk habitat. The hatchery would be designed to reduce loss of vegetation; grounds would be revegetated. A vegetation buffer zone would be planted around the hatchery edge. Construction of the satellite fish station would impact wildlife due to loss of approximately 5 acres of habitat and increased human disturbance. Loss of habitat associated with buried transmission line and powerhouse would be minor. Hatchery water supply pipeline would be buried and the corridor revegetated. Reduced habitat in the 6,800-foot reach between the existing overflow weir and the hatchery outlet during critical low flow periods would have minimal impact on wildlife. Impacts to wildlife during ponding in the reach from the Wynoochee Dam to the existing weir would be negligible.

TABLE G-6 (con.)

	Alternative Plan 1 - No Action (Most Probable Future Without Federal Action)	Alternative Plan 2 - Combined Underground Hydropower and Enhancement Fish Hatchery
8. Impacts on Fish	Minor fish improvement. Mitigation facilities for impacts on fish runs could be needed with possible non-Federal hydropower development.	Enhancement of anadromous fish runs in the Grays Harbor area, in the Chehalis River Basin, and in the northern Pacific Ocean. Provides opportunity for improvement of anadromous fish runs in other streams within the Chehalis River and Grays Harbor watershed through development of a satellite fish station and implementation of an outplanting program. Anadromous fish runs above Wynoochee Dam would be terminated; the resident fishery in Wynoochee Lake should improve. Potential adverse impacts on resident fishery in the 6,800-foot reach of the Wynoochee River between the existing overflow weir and the hatchery outlet from reduced aquatic habitat during critical low flow periods (Apr-Sep). Impacts to fish as a result of ponding in the reach from the dam to the existing overflow weir would be negligible. Impacts to existing wild runs would be minimized by two-phased construction of the hatchery portion of the plan.
9. Impacts on Cultural Resources*	None expected.	No impact - no known cultural resources in the plan area.
10. Prime and Unique Farmlands	None.	None.
11. Wild and Scenic Rivers Value	Esthetic impacts associated with an aerial transmission line.	No impact expected from construction of a buried transmission line. The line would be routed under bridges over stream crossings.

*Effect assessment item specifically listed under Section 122 of Public Law 91-611.

TABLE G-6 (con.)

	Alternative Plan 1 - No Action (Most Probable Future Without Federal Action)	Alternative Plan 2 - Combined Underground Hydropower and Enhancement Fish Hatchery
12. Mineral Resources Resources	No significant impact on any known mineral resource deposits.	No significant impact on any known mineral resource deposits. Local borrow sources would not be significantly depleted by project construction.
REGIONAL ECONOMIC DEVELOPMENT IMPACTS		
1. Impacts on Employment*	Minor beneficial.	Minor beneficial.
2. Contribution to Community Development and Growth*	Minor beneficial.	Minor beneficial.
3. Increased Net Income to Region During Plan Implementation	Minor beneficial.	Positive contribution to regional economy as a result of enhancement of anadromous fish for harvest.
4. Impact on Public Services*	None.	Increased pressures on public services provided to study area due to project residences and increased recreation fishery.
5. Impacts on Community Cohesion*	None.	Minor beneficial.
6. Displacement of People, Businesses, and Farms*	None.	None.
7. Safety and Well-Being	Moderate contribution from provision of energy; minor contribution from fish habitat improvement measures.	Moderate contribution from provision of energy; major contribution to fishing livelihood in Chehalis River Basin and Grays Harbor area.

*Effect assessment item specifically listed under Section 122 of Public Law 91-611.

TABLE G-6 (con.)

	Alternative Plan 1 - No Action (Most Probable Future Without Federal Action)	Alternative Plan 2 - Combined Underground Hydropower and Enhancement Fish Hatchery
8. Long-Term Productivity	Makes use of a renewable resource for energy production; provides minor fish habitat improvements.	Makes use of a renewable resource for energy production with minimal environmental impacts; provides for major fish enhancement in the Chehalis River Basin and Grays Harbor area.
9. Recreation	Minor, due to some potential increase in recreational fishery. Potential short-term disruption to area recreational activities if non-Federal hydropower is developed.	Major increase in area recreational fishery. Loss of hunting use of hatchery site. Change in dispersed recreation character of the hatchery site from overnight camping and water-related activities to hatchery visitation and limited picnicking and hiking. Short-term disruption to area recreational activities during project construction.
10. Impact on Property Values and Tax Revenues*	An aerial transmission line would result in adverse impacts due to some removal of private lands for use as the transmission corridor if non-Federal hydropower is developed. No impact is expected if the transmission line is buried.	No impact expected.

*Effect assessment item specifically listed under Section 122 of Public Law 91-611.

TABLE G-6 (con.)

	Alternative Plan 1 - No Action (Most Probable Future Without Federal Action)	Alternative Plan 2 - Combined Underground Hydropower and Enhancement Fish Hatchery
11. Impact on Energy	May contribute approximately 35,900 MWH of energy to the Grays Harbor area.	Contributes 36,900 MWH of energy to the Pacific Northwest.
OTHER SOCIAL EFFECTS		
1. Impacts on Esthetics	Short-term effects during potential construction of non-Federal hydropower. Long-term effects due to powerhouse, switchyard, and transmission line.	Short-term effects during construction. Long-term effects due to hatchery, satellite fish station, switchyard, and by hatchery operation resulting in low flows in the reach of Wynoochee River between existing overflow weir and hatchery outlet in certain times of the year and ponding in reach between dam and existing weir. Instream flows will be determined during PP&E. Terrestrial esthetic impacts would be reduced by vegetation plantings. A buried transmission line would have minimal esthetic impact.
2. Energy Requirements and Energy Conservation	Would contribute energy to Grays Harbor area and provide station power to existing dam if non-Federal hydropower is developed.	Would contribute energy to the Pacific Northwest and provide station power to the existing dam. The energy requirement of this alternative is minimized by use of a gravity feed water supply pipeline to the hatchery.

TABLE G-6 (con.)

	Alternative Plan 1 - No Action (Most Probable Future Without Federal Action)	Alternative Plan 2 - Combined Underground Hydropower and Enhancement Fish Hatchery
3. Land Use	Extent of impact would depend upon transmission line alternative.	Construction of fish hatchery would result in a change in land use classification of the hatchery site from its current designation under the U.S. Forest Service timber management plan of "visual variety A." Powerhouse, switchyard, and a buried transmission line would have minimal impacts on land use.

TABLE G-6 (con.)

	Alternative Plan 1 No Action (Most Probable Future Without Federal Action)	Alternative Plan 2 Combined Underground Hydropower and Enhancement Fish Hatchery
RESPONSE TO PLANNING CRITERIA		
National Economic Development Criteria		
1. Reduce Energy Deficits in the Pacific Northwest	Yes	Yes
2. Enhance the Anadromous Commercial, Indian, and Sport Fisheries Harvest in the Pacific Northwest	Yes (minor)	Yes (major)
Environmental Quality Criteria.		
1. Enhance Runs of Salmon and Steelhead in the Chehalis River Basin and Grays Harbor Area.	Yes (minor)	Yes (major)
2. Minimize Adverse Impacts on Resident Fish and Wildlife in Plan Area	Yes	Yes
3. Minimize Energy Use	Not known	Yes
4. Maintain Water Quality of Wynoochee River Within Existing State Classification	Not known	Yes

TABLE G-6 (con.)

	Alternative Plan 1 — No Action (Most Probable Future Without Federal Action)	Alternative Plan 2 — Combined Underground Hydropower and Enhancement Fish Hatchery
5. Preserve or Salvage Significant Historic and Prehistoric Cultural Resources Sites Affected by Potential Project Construction or Effects in Accordance with Authorities Contained in the National Historic Preservation Act of 1966, the Reservoir Salvage Act of 1960 as Amended by Public Law 93-291, and E.O. 11593	Yes	Yes
6. Preserve Wetlands in Conformance with E.O. 11990	Yes	Yes
7. Preserve Flood Plain in Conformance with E.O. 11988	Yes	Yes
8. Protect Habitat of Any Threatened and Endangered Species	Yes	Yes
9. Allow for Appropriate Instream Flows in the Wynoochee River	Yes	Yes
10. Be Compatible with Existing Wynoochee Lake Project Mitigation Facilities	Yes	Yes
11. Provide State of Washington the Opportunity to Develop Mitigation Facilities for Previous Steelhead Losses Associated with Existing Wynoochee Lake Project Under 28 July 1977 Memorandum of Agreement	No	Yes
12. Minimize Adverse Impacts on Existing Wild Stocks of Anadromous Fish in the Chehalis River Basin and Grays Harbor Area	Yes	Yes
13. Assure that Wynoochee River Fluctuations Continue to be Compatible With the Fish Resource	Yes	Yes

TABLE G-6 (con.)

	Alternative Plan 1 No Action (Most Probable Future Without Federal Action)	Alternative Plan 2 Combined Underground Hydropower and Enhancement Fish Hatchery
Regional Economic Development Criteria.		
1. Reduce Energy Deficits in the Pacific Northwest	Yes	Yes
2. Enhance the Anadromous Commercial, Indian, and Sport Fisheries Harvest in the Pacific Northwest	Yes (minor)	Yes (major)
3. Increase Employment of Unemployed or Underemployed Resources in the Chehalis River Basin and Grays Harbor Area	Yes	Yes
4. Increase Recreational Opportunities in Chehalis River Basin and Grays Harbor Area	Yes (minor)	Yes (major).
Other Social Effects Criteria.		
1. Maintain Structural Soundness of Wynoochee Dam	Yes	Yes
2. Maintain Operation of Wynoochee Lake Project for Its Authorized Project Purposes	Yes	Yes
3. Minimize Adverse Social Impacts in Study Area	Yes	Yes
4. Provide Improved Indian Fisheries	Yes (minor)	Yes (major)
5. Assure That River Fluctuations Continue at Existing Safe Levels	Yes	Yes
6. Provide Water Quality Consistent With Existing State Classification for Wynoochee River	Not known	Yes

APPENDIX H

ENVIRONMENTAL ANALYSES

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PREFACE

Appendix H contains the water quality evaluation performed to assess the suitability of Wynoochee Lake and River as a water supply source for a salmonid fish hatchery and the results of select environmental analyses performed as part of the Corps of Engineers Wynoochee Hydropower/Fish Hatchery Feasibility Study. The analyses are presented as back-up information to the Wynoochee feasibility report/EIS in order to fully respond to the major environmental concerns raised during the study of hydropower and fish enhancement opportunities at Wynoochee Dam. These concerns relate to instream flow determinations for the Wynoochee River from the Wynoochee Dam to the hatchery outlet, fish hatchery management, and elk habitat and dispersed recreation losses due to construction of the fish hatchery.

SECTION 1. WATER QUALITY EVALUATION OF FISH HATCHERY SUPPLY WATER

1.01 Introduction. Seattle District conducted a feasibility study of the development of an 11.3-MW hydropower addition to Wynoochee Dam and a salmonid fish enhancement hatchery downstream of the dam. Wynoochee Lake and River water quality data was evaluated to assess its suitability as a supply source for a salmonid fish hatchery and to obtain background information.

1.02 Methodology. Wynoochee Lake is routinely monitored for pH, temperature, dissolved oxygen, total dissolved gases, and conductivity at strategic lake stations during summer conservation periods. Concurrent with lake sampling, the river sampling was conducted for similar water quality parameters. The routine sampling was augmented by an intensive sampling in 1980 and 1981. This intensive study principally involved the collection and analysis of samples for those parameters necessary to characterize the water and evaluate use as a salmonid hatchery water supply. The methodology used in the monitoring program is presented below.

a. Wynoochee Lake. Monthly water column profiles (taken at 6-foot intervals from the surface to 39 feet; 16-foot intervals from 39 feet to the bottom) were conducted for pH, conductivity, dissolved oxygen, and temperature. Discrete water samples were collected from the surface and bottom of the water column for laboratory analyses of other parameters. Environmental Protection Agency (EPA) approved procedures were used for all laboratory analyses. Daily turbidity readings were taken in the surface forebay with a Hach Nephlometric turbidity meter. Total suspended solids (TSS) measurements were made on water samples whenever turbidity exceeded 10 Nephelometric Turbidity Units (NTU)

b. Wynoochee River. Daily field analyses for turbidity were begun in June 1980. TSS measurements were made when turbidity exceeded 10 NTU. Samples were collected bimonthly for heavy metals, major anions and cations, and monthly for ammonia, alkalinity, total organic carbon, chlorophyll a, 5-day biochemical oxygen demand, nitrogen, and phosphorus during the period December 1980 through May 1981. Inflow temperatures were measured with a mercury thermometer just above the reservoir in the main stem Wynoochee River monthly from June to October during 1974 to 1981. Outflow temperatures were measured in the tailwater below the dam during the same period. Additional outflow temperatures were occasionally recorded from November to April during periods of high reservoir releases.

Total dissolved gas measurements were made with a Weiss saturometer monthly during June to October from 1974 to 1981. Winter/spring measurements were made only during periods of high releases from the dam.

1.03 Results.

a. Water Chemistry. Analytical results (presented in table H-1) indicate that waters of Wynoochee Lake are of good chemical quality and suitable for salmonid hatchery supply. The water is soft, has a low dissolved mineral content, is slightly acidic, and is only mildly buffered. Concentrations of dissolved solids, nutrients, and chlorophyll were all indicative of a low productivity or oligotrophic lake system.

Metal analyses in the forebay and tailwater indicated that heavy metal concentrations were generally low (table H-1). However, there were a few instances when mercury and silver exceeded EPA criteria for aquatic life. Discussions with the chemical analytical laboratory revealed that the accuracy of measurements at the lower limit of detection is greatly affected by interference from other elements and insensitivity of the background noise inherent in the instrumental technique. Potential contamination during sampling and in laboratory sample preparation could also have affected the accuracy of the measurement. The concentrations of metals measured in the discrete samples collected from the reservoir were generally higher than the concentrations of metals from composite samples taken below the dam. Since there are no known point sources of heavy metals, it is assumed that the metals detected in the lake water samples, if truly representative, were associated with natural runoff in the watershed. While the higher levels detected exceed criteria, they do not necessarily present a cause for alarm. The instances of exceedence were infrequent and slight enough to be considered only as a potential low-level contaminant if not analytical error. An examination of the tissue of fish reared in Wynoochee River water is recommended in preconstruction planning and engineering (PP&E) to determine the degree, if any, of accumulation of heavy metals in the fish.

b. Temperature. Wynoochee Reservoir is stratified during the summer low flow conservation period from June to October (figure H-1). The average surface temperature during this time ranges from 60° F (August) to 56.3° F (October), while the bottom waters remain at about 45° F.

During November, thermal stratification begins to break down due to the decrease in air temperature and the reservoir fall drawdown. The water becomes mixed and isothermal, remaining at 39° F to 45° F from some time in November-December through April (figure H-2 and table H-2).

The existing selective withdrawal system in Wynoochee Dam provides the means for controlling outflow temperature to approximate preproject conditions to the extent possible. Reservoir outflow temperatures exceed inflow temperatures by about 2.5° F to 8° F during June to October due to warming of the lake surface water (figure H-2 and table H-2).

The plan for the hydropower/hatchery project under study includes a selective withdrawal system for the powerhouse intake and a cold water supply pipeline from the base of the dam. The ideal temperature for raising salmonids is in the range of 45° to 55° F. Water within this range can be provided the hatchery by utilizing the selective withdrawal structure.

Springs located at the hatchery site have been identified as a potential additional water source. The springs may provide a constant source of 47° to 51° F water in small quantities. Investigations to determine the quantity and quality of water available from the springs would be conducted in PP&E.

c. Dissolved Oxygen. During summer thermal stratification, the lake waters are essentially divided into two volumes horizontally. Oxygen levels in the upper layer are at or near saturation. Thermal stratification prevents dissolved gases at the lower level from equilibrating with the atmosphere. Oxygen consuming processes in these bottom levels may reduce dissolved oxygen concentrations below 5 mg/l in the lower levels of the lake (figures H-3 and H-4). The selective withdrawal structure would be operated to assure hatchery supply waters have adequate oxygen levels for salmonid production.

d. Total Dissolved Gases. Unlike dissolved oxygen, dissolved nitrogen gas has little biological or chemical consumption; consequently, levels of this gas entering the reservoir at saturated conditions may become supersaturated when occluded from the atmosphere and subjected to temperature increases. Table H-3 shows influent and effluent dissolved nitrogen and total gases in Wynoochee Reservoir waters. Reservoir total dissolved gas levels are typically at saturation. Gas levels below the dam are increased due to entrainment during spilling or sluicing. Nitrogen gas will not be entrained from powerhouse operation. Additionally, water to the hatchery will pass through a head tank at the hatchery where deficiencies or excesses of nitrogen and oxygen will become equilibrated.

e. Turbidity. Turbidity and/or TSS are parameters which affect fish feeding behavior and egg incubation. Turbidity and suspended solids at Wynoochee Reservoir are very low from June through November (figure H-5, table H-4). During winter and spring, turbidity and suspended solids increase due to storm events and snowmelt with associated turbulence and runoff (figure H-5, table H-4). Even the higher turbidity and TSS values are relatively low and should not affect hatchery operation.

TABLE H-1. Chemical analysis of water from Lake Wynoochee reservoir during 1980 and 1981. From June to October water samples were collected at the surface and bottom of the forebay water column. During November through May, surface water samples were collected in the tailwaters below Wynoochee Dam.

a. Forebay

	June 80		July 80	August 80		June 81	
	1/S	B	Composite	S	B	S	B
Arsenic ug/l	1	1	1	1	1	1	1
Barium ug/l	15	15	6	--	--	--	--
Beryllium ug/l	2	2	--	3	5--	--	
Cadmium ug/l	1	1	1	0.3	0.3	L0.1	L0.1
Copper ug/l	1	8	2	3	4	2	1
Iron ug/l	17	111	153	33	85	24	150
Lead ug/l	L10	L10	40	42	47	1	2
Mercury ug/l	0.7	2.2	0.4	1.4	0.4	L0.2	0.9
Nickel ug/l	18	13	7	6	6	1	2
Selenium ug/l	7	5	7	1	5	L2	L2
Silver ug/l	L0.5	L0.5	1	0.4	0.6	L0.3	L0.3
Zinc ug/l	4	13	8	8	11	11	15
Calcium mg/l	7.8	7.8	8.0	9.4	7.7	6.6	6.8
Chloride mg/l	1.5	1.95	1.00	1.4	1.5	L1.0	L1.0
Fluoride mg/l	0.31	0.25	0.3	0.3	0.3	L0.1	L0.1
Magnesium mg/l	1.34	0.90	1.41	1.00	1.12	1.00	1.00
Potassium mg/l	0.17	0.17	0.1	0.43	0.52	0.10	0.10
Silica mg/l SiO_2	4.2	4.4	12.3	6.0	6.0	5.6	5.6
Sodium mg/l	1.18	0.88	1.2	1.0	1.0	1.07	1.00
Sulfate mg/l	L1.0	L1.0	1.0	1.5	1.5	3.0	2.0
Dissolved Solids mg/l	32.4	32.8	36.0	34.0	33.0	--	--
Ammonia mg/l	0.01	0.006	--	L0.005	L0.005	--	--
Cyanide mg/l	L0.002	L0.002	--	L0.002	L0.002	--	--
Sulfide	2.9	L0.05		L0.1	L0.1	--	--
Color	0.5	0.5	1	1	10	--	--

L = Less than

1/S indicates surface; B indicates bottom.

2/As of July 1980, all chlorophyll values are phaeophytin corrected.

TABLE H-1 (con)

a. Forebay (con.)

	June 80		July 80	August 80		June 81	
	S	B 1/	Composite	S	B	S	B
Suspended Solids mg/l	2	8	2	0.5	31	--	--
Total Organic Carbon mg/l	L2	L2	L2	L2	L2	--	--
pH	6.13	6.1	6.4	6.72	6.11		
Alkalinity mg/l $CaCO_3$	25	21	26	30	25	23	23
Chlorophyll a ug/l	1.04	1.82	1.76 2/	LO.5	LO.5	0.73	--
Specific Conductance	56	52	47	62	47	54	56

L = Less than

1/S indicates surface; B indicates bottom.

2/As of July 1980, all chlorophyll values are phaeophytin corrected.

TABLE H-1 (con.)

b. Below Wynoochee Dam

	January 1978[1/]	October 1978[1/]	December 1980[2/]	January 1981	February 1981	March 1981	April 1981	May 1981	June 1981
Arsenic ug/l	--	--	8	--	2		1	1	--
Cadmium ug/l	L10	10	0.1	--	0.1	--	L0.1	L0.1	--
Chromium ug/l	L10	20	--	--	--	--	--	--	--
Copper ug/l	2	L2	4	--	3	--	2	1	--
Iron ug/l	50	2,000	220	--	430	--	50	39	--
Lead ug/l	L20	L50	L1	--	1	--	L1	L1	--
Mercury ug/l	0	0	L0.2	--	L0.2	--	L0.2	L0.2	--
Nickel mg/l	--	--	1	--	1	--	1	1	--
Selenium mg/l	--	--	L2	--	L2	--	L2	L2	--
Silver ug/l	--	--	L0.3	--	L0.3	--	L0.3	0.3	--
Zinc ug/l	L10	L10	5	--	5	--	7	5	--
Calcium mg/l	4.8	4.8	5.5	--	5.4	--	5.9	6.5	--
Chloride mg/l	2	2	3.1	--	L1	--	L1	1.7	--
Magnesium mg/l	0.82	0.8	1.3	--	0.8	--	0.9	0.8	--
Potassium mg/l	0.1	0.2	0.19	--	0.2	--	0.07	L0.01	--
Silicate mg/l SiO_2	--	--	6.4	--	6.0	--	7.3	5.8	--
Sodium mg/l	1.2	2.0	0.69	--	1.0	--	1.3	1.4	--
Sulfate mg/l	--	--	2.8	--	5.9	--	4.7	2.4	--
Orthophosphate mg/l-P	L0.02	0.01	0.007	L0.005	0.012	0.018	L0.005	L0.005	L0.005
Total Phosphorus mg/l-P	--	--	0.02	0.03	0.03	0.02	0.01	L0.005	0.27

L = Less than

1/Chemical analysis by Washington Department of Fisheries

2/Data collected by Corps of Engineers.
December 1980, January through June 1981 analyses by Corps of Engineers.

TABLE H-1 (con.)

b. Below Wynoochee Dam

	January 1978[1/]	October 1978[1/]	December 1980[2/]	January 1981	February 1981	March 1981	April 1981	May 1981	June 1981
Nitrite mg/l & Nitrate mg/l-N	0.02	0.7	0.13	0.10	0.10	0.06	0.08	0.06	0.21
Total Kjeldahl Nitrogen mg/l-N	--	--	L0.50	L0.5	L0.5	L0.5	L0.5	L0.5	L0.5
Ammonia mg/l-N	--	--	0.064	0.04	0.019	0.008	L0.005	0.012	L0.005
Suspended Solids mg/l	--	--	2.0	--	--		--	--	--
Total Organic Carbon mg/l	--	--	L2	L2	L2	L2	--	--	3
Alkalinity mg/l $CaCO_3$	--	--	23	15	19	--	22	23	--
Chlorophyll a ug/l	--	--	L0.5	L0.5	L.05	L0.5	L0.5	L0.5	0.73
BOD_5 (mg/l)	--	--	1.0	2	1	2	1	1	2
Specific Cond	--	--	51.0	42	39	46	46	48	--

L = Less than
1/Chemical analysis by Washington Department of Fisheries
2/December 1980, January through June 1981 analysis by Corps of Engineers

TABLE H-2

Temperature of inflow and outflow to Lake Wynoochee. Mean of samples collected from 1973 through 1980.

	Temperature Degrees Fahrenheit			
	Inflow	N	Outflow	N
January			38.3	2
February			38.8	3
March			39.0	3
April			42.6	2
May			45.9	2
June	45.9	3	52.1	8
July	48.9	5	57.2	13
August	56.7	8	59.2	17
September	51.8	9	54.3	15
October	47.5	7	49.5	13
November			43.5	2
December			41.5	2

N = No. of observations

TABLE H-3. Total dissolved gas analysis completed in Lake Wynoochee. 1973 through 1980 mean of samples collected from June through October, single samples collected on November 1980 and January through May 1981.

	Total % Saturation				Nitrogen (N2) % Saturation			
	Inflow	N	Outflow	N	Inflow	N	Outflow	N
January			105.7	1			106	1
February			114.8	1			114.5	1
March			105.9				104.4	1
April			104	1			104.5	1
May								
June	101.3	5	107.3	6	100.2	5	105.4	6
July	102.1	6	106.0	7	100.8	6	104.8	7
August	102.5	8	106.7	9	101.5	8	106.2	9
September	101.2	11	106.1	11	100.2	11	105.8	11
October	100.4	6	105.8	8	97.3	6	104.2	8
November	101.0	2	107.0	1	101.7	2	105.7	1
December	101.0	2	112.9	7	86.2	2	111.3	7

N = No. of observations

Washington State Department of Ecology Criterion for total dissolved gas is 110 percent saturation

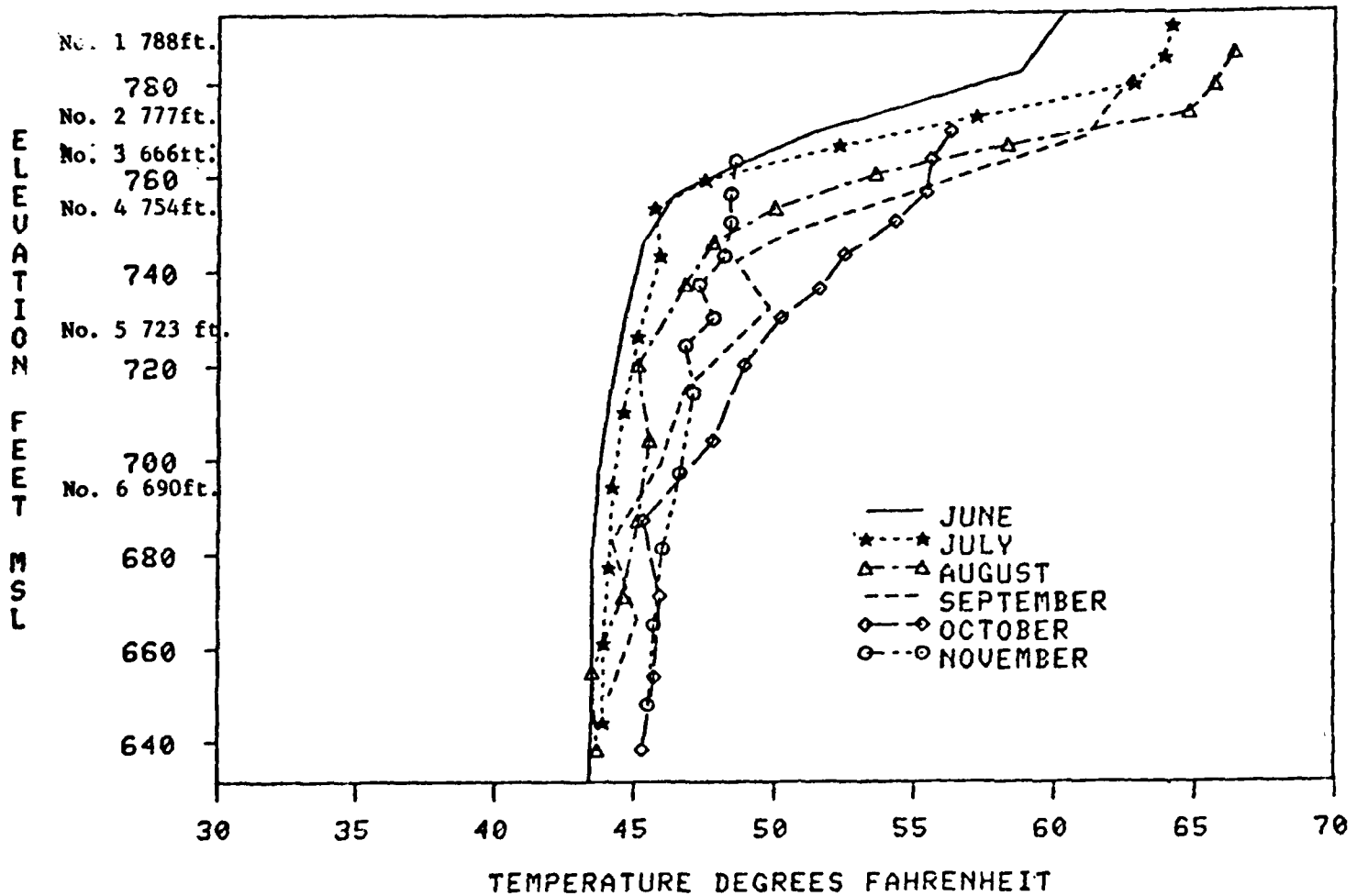
Note: Routine sampling is performed during June through October. Samples taken during winter and spring months are only collected during high periods of spills when gas saturated levels are expected to be elevated. Therefore, December through May data do not represent average conditions.

TABLE H-4

Total suspended sediments (milligrams per liter) measured in Wynoochee Dam forebay and tailwater.

Date	Tailwater	Forebay
29 Dec 80	20	
30 Dec 80	18	
05 Jan 81	7	
06 Jan 81	7	
08 Jan 81	15	
09 Jan 81	4	
12 Jan 81		19
16 Jan 81		7
04 Feb 81	4	
09 Feb 81		7
20 Feb 81	14	
24 Feb 81		10
06 Mar 81		

Figure H-1 TEMPERATURE PROFILE OF WYNOOCHEE DAM; FOREBAY
1973 THROUGH 1980



No. 1 - 6 - Invert elevations of selective withdrawal system at Wynoochee Dam.

Figure H-2 INFLOW AND OUTFLOW TEMPERATURE AT LAKE WYNOOCHEE
1973 THROUGH 1980

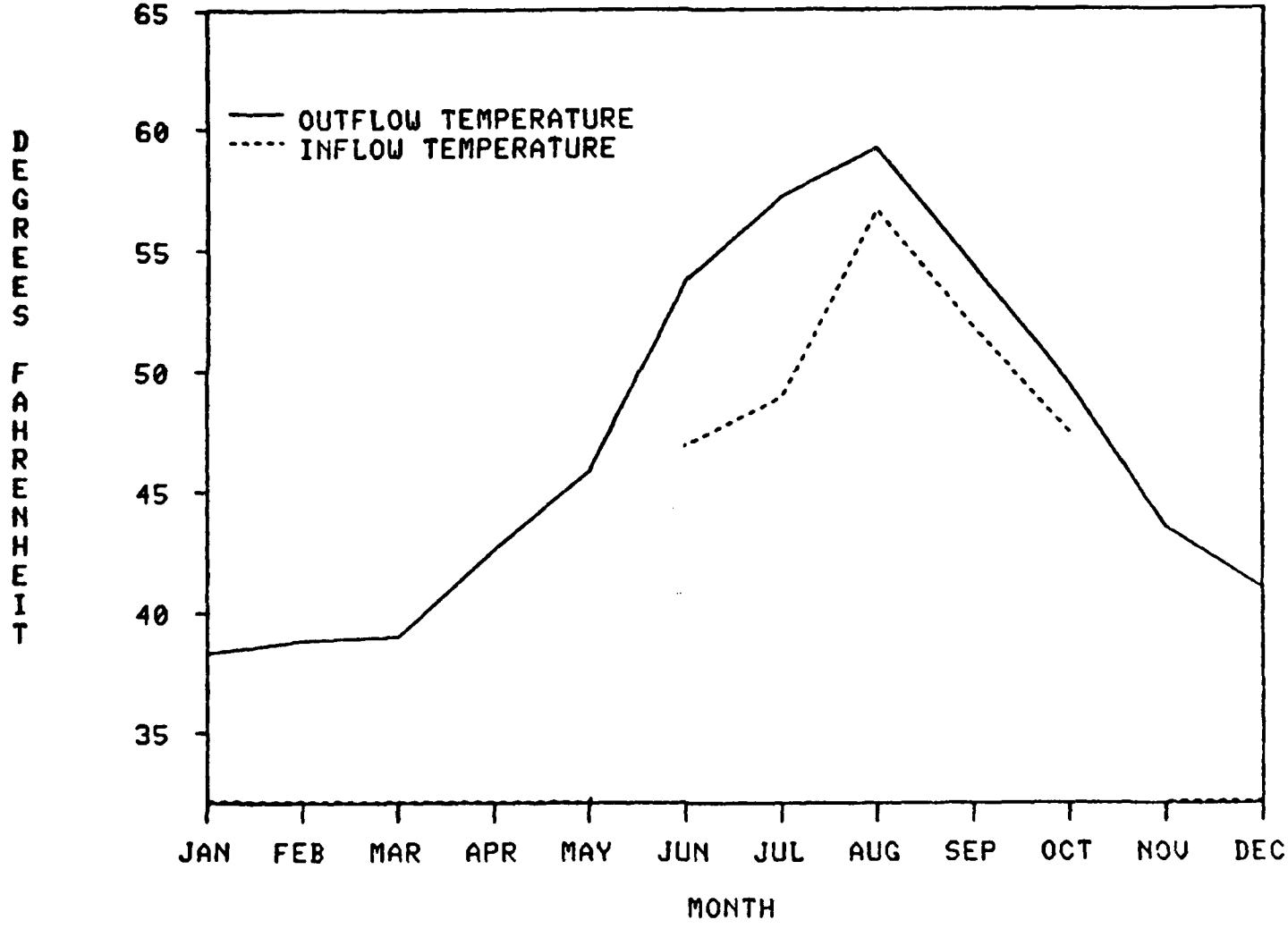


Figure H-3 DISSOLVED OXYGEN PROFILE OF WYNOOCHEE DAM, FOREBAY
1973 THROUGH 1980

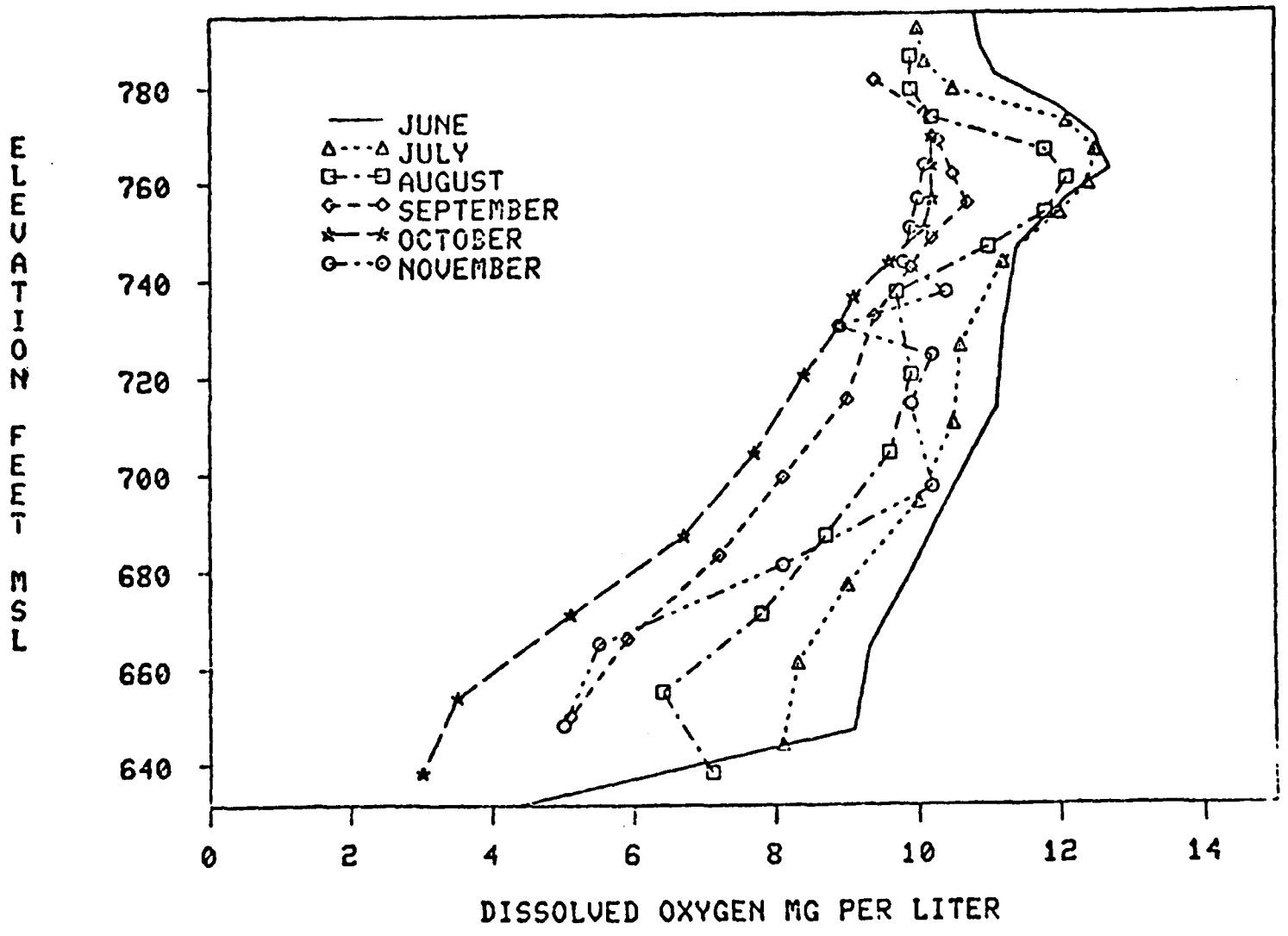


Figure H-4 DISSOLVED OXYGEN PROFILE OF WYNOOCHEE RESERVOIR, FOREBAY
DECEMBER 1980 TO APRIL 1981

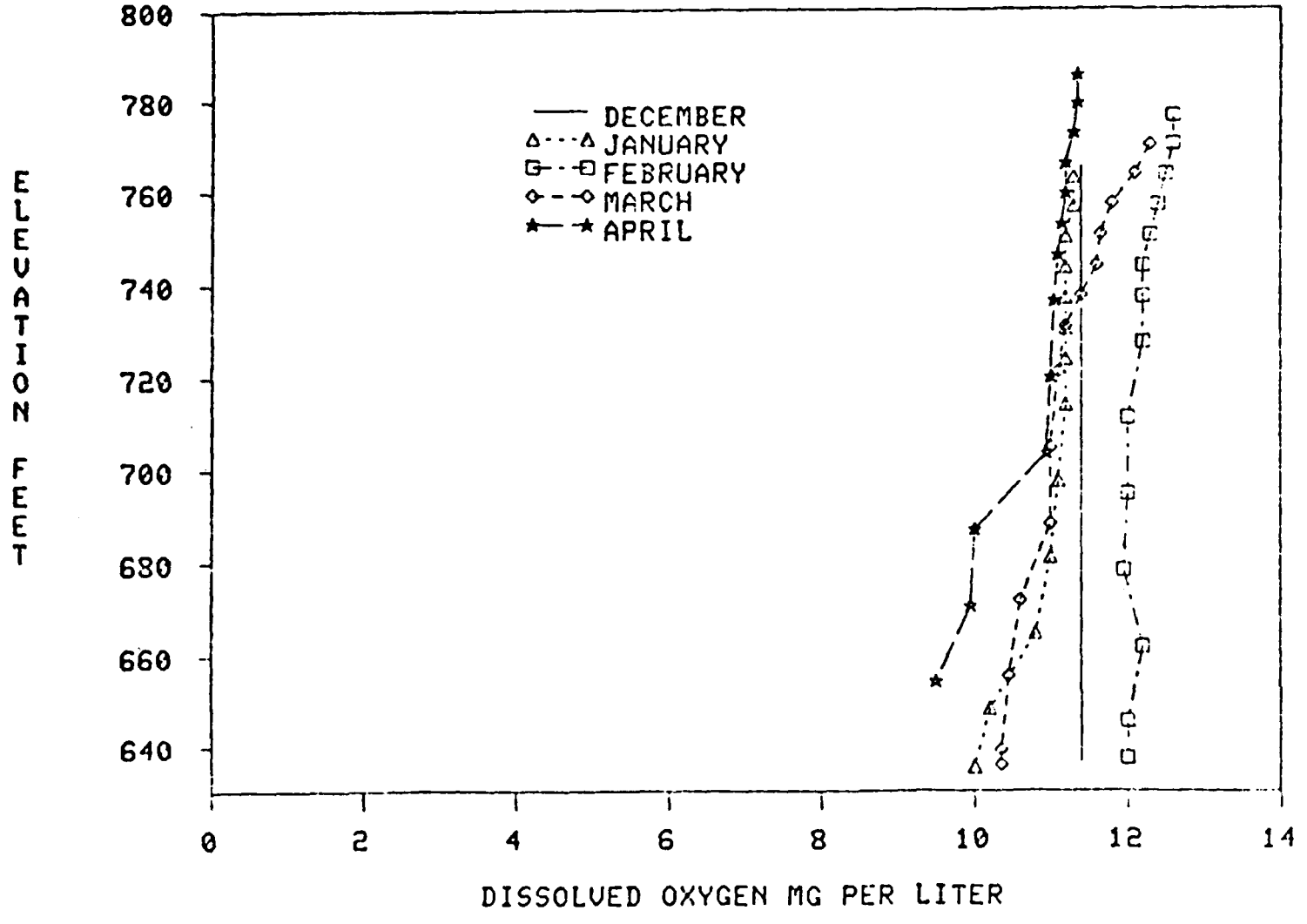
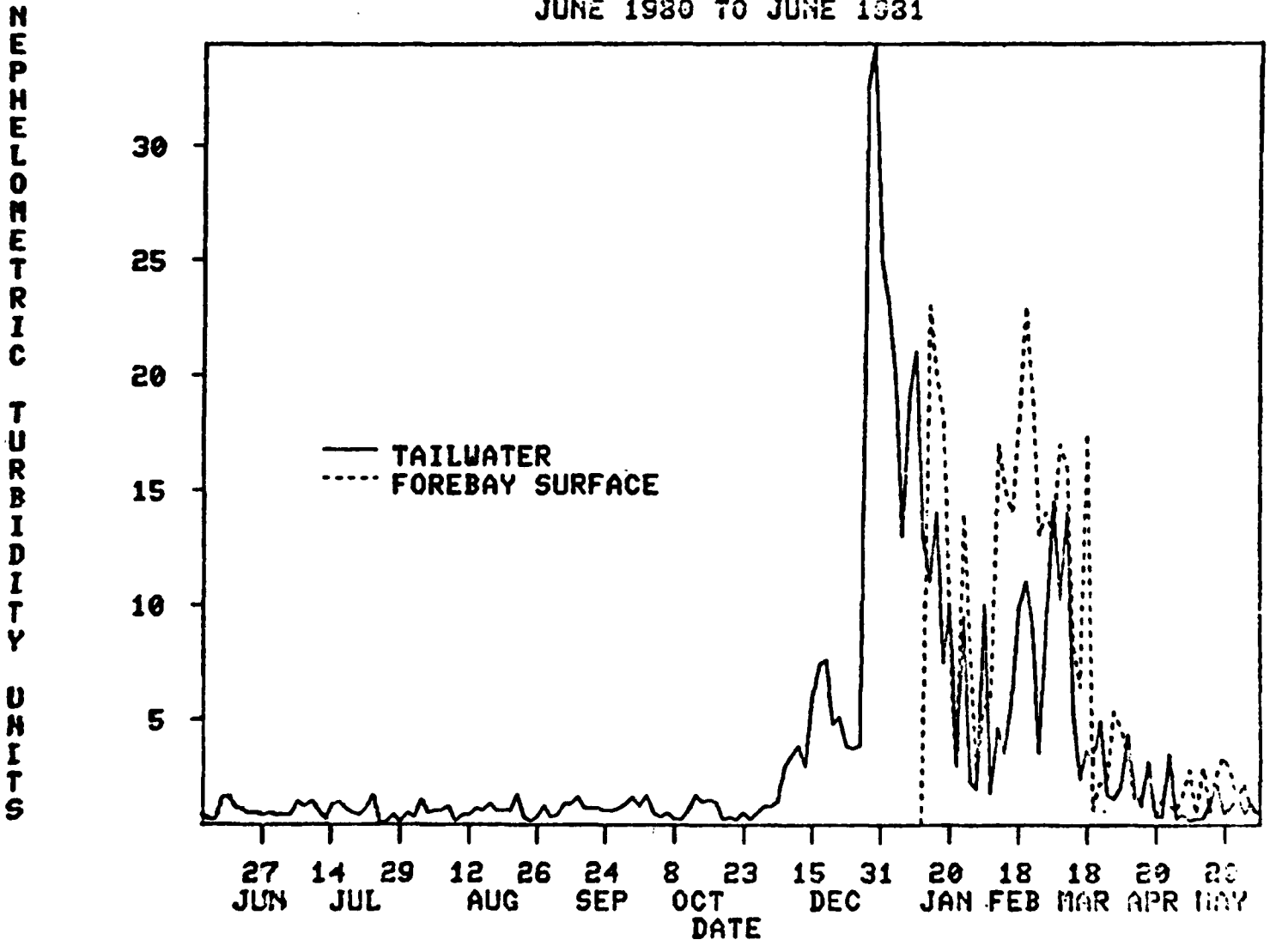


Figure H-5 TURBIDITY MEASURED IN WYNOOCHEE FOREBAY AND TAILWATER
JUNE 1980 TO JUNE 1981



SECTION 2. INSTREAM FLOW ANALYSIS

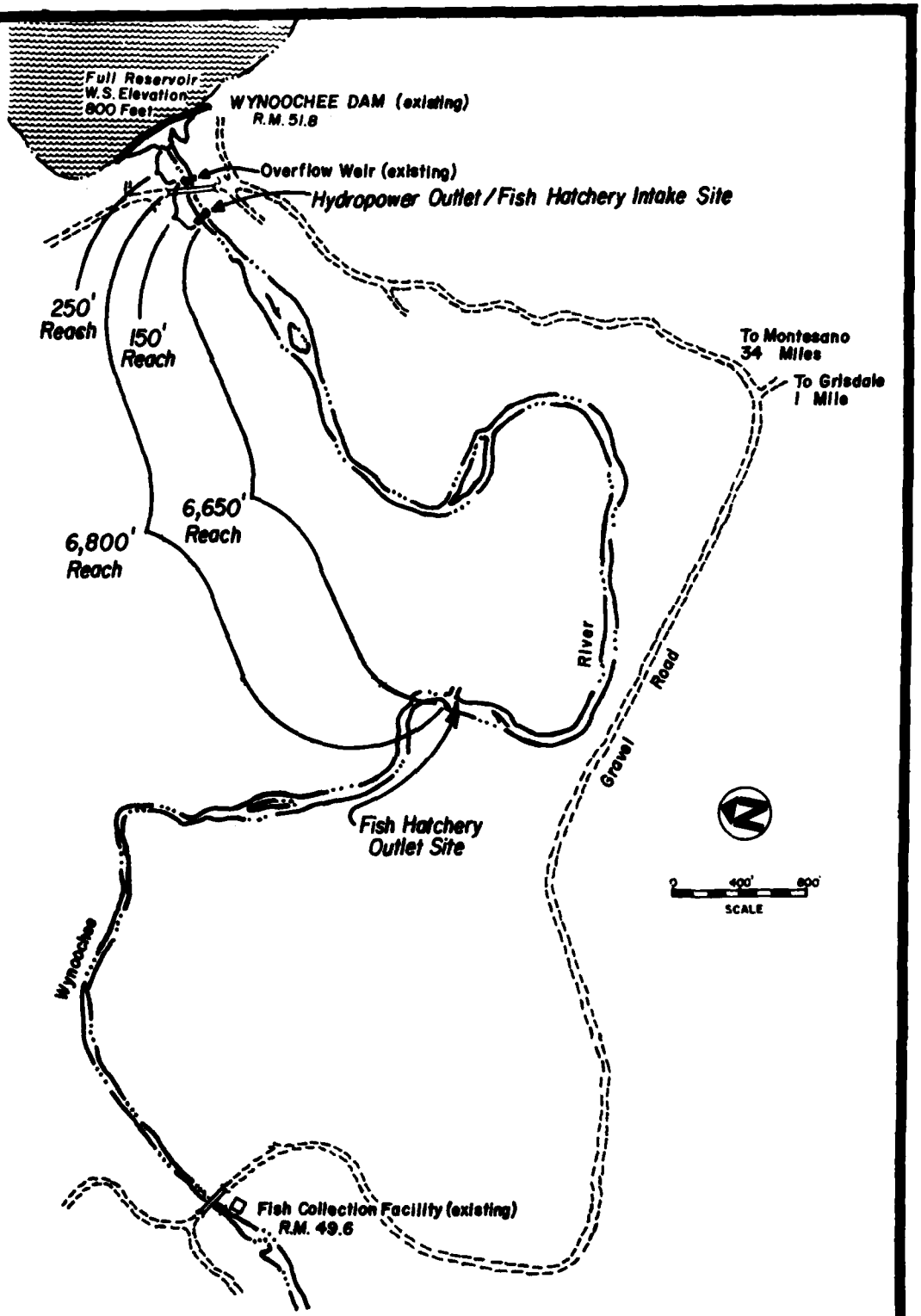
2.01. General. The Wynoochee fish hatchery was designed for a water supply of 190 c.f.s. Except for the months of May and June, 190 c.f.s. is the operational minimum flow from the existing Wynoochee Dam. In May and June, the operational minimum flow may drop to 140 c.f.s. The proposed powerhouse is designed to utilize the 190/140 c.f.s. minimum flow from the existing project up to a hydraulic capacity of 1,200 c.f.s. With the hydropower/fish hatchery plan, water from the reservoir that is not passed through the powerhouse would be discharged from the existing dam's spillways, and/or multilevel outlets. Flows from the powerhouse that are not passed to the hatchery would be discharged to the Wynoochee River via a tailrace tunnel structure located about 400 feet downstream of Wynoochee Dam (refer to plate 2 of the feasibility report/EIS). An existing concrete overflow weir in the river just upstream from the powerhouse tailrace would assure water in the river between the main dam and powerhouse tailrace. The water supply system to the hatchery is designed with an intake structure at the hydropower outlet, which can be alternatively supplied with water from the powerhouse or dam discharges. Accordingly, should the powerhouse be shut down for any reason, water supply to the hatchery would not be interrupted.

2.02 Water supply to the hatchery and the operation of the powerhouse would not result in a change to the existing operational mode of Wynoochee Dam. River discharge frequency in the Wynoochee River below the hatchery outlet would not change from existing conditions. The hydropower operation would be subordinate to all other purposes, and the facility would operate as a run-of-river plant producing baseload energy from the reservoir releases.

2.03 With Project Instream Flow Conditions.

a. Reach of Wynoochee River between Dam and Existing Overflow Weir (refer to figure H-6). Due to the diversion of up to 1,200 c.f.s. of reservoir releases to the proposed hydropower facility, the water in the 250-foot reach of the Wynoochee River from the dam to the existing overflow weir would be ponded rather than flowing when releases from the reservoir are 1,200 c.f.s. or less and that quantity is discharged through the powerhouse. This condition could occur in the late spring through summer months and its duration would depend to a large degree on the meteorologic conditions of any particular year. The principal impacts associated with this condition would potentially be reduced water quality and esthetics in the 250-foot reach between the Wynoochee Dam and the existing overflow weir.

b. Reach of Wynoochee River between the existing overflow weir and the proposed hatchery outlet (includes 150 feet from weir to the hydropower outlet/fish hatchery intake structure and approximately 6,650 feet from that structure to the hatchery outlet (refer to figure H-6)).



WYNOOCHEE HYDROPOWER/ FISH HATCHERY PLAN AREA

(Showing Referenced River Reaches)

FIGURE H-6

Flow in the Wynoochee River in the 6,800-foot reach between the existing overflow weir (located approximately 150 feet upstream of the hydropower outlet/fish hatchery intake structure, shown on plate 2 of the feasibility report/EIS) and the hatchery outlet could become extremely low should the full complement of water (190/140 c.f.s.) be supplied to the hatchery during a time of minimum discharge (190/140 c.f.s.) from the reservoir. The reservoir is generally filled from elevation 764 feet to elevation 800 feet between 15 March and 1 June to provide up to 59,500 acre-feet of conservation water supply. The critical period when discharge from the reservoir may potentially be 190 c.f.s. is April-September; the critical period when discharge could drop to 140 c.f.s. is May-June. During the spring refill period (April-May) for the reservoir, the Grisdale streamgage located 2,000 feet downstream of Wynoochee Dam appears to record approximately 20 c.f.s. more streamflow than the Wynoochee Lake project releases according to operational controls. This flow is probably due to groundwater inflow from seeps and springs. Due to this flow, it is generally not anticipated that the reach of the river between the existing overflow weir and the hatchery outlet would be dry when the supply to the hatchery equals the total discharge of the powerhouse.

In addition to low flows when the full 190/140 c.f.s. minimum discharge from the reservoir is supplied to the hatchery, the 150-foot reach between the existing overflow weir and the hydropower outlet/fish hatchery intake structure (refer to figure H-6) would be receiving no discharge from the Wynoochee Dam when releases from the reservoir are 1,200 c.f.s. or less and that quantity is diverted to the powerhouse. This condition would occur in the late spring through early fall and potentially could occur throughout most of the year (e.g. during 1973-1978, 97 percent of the flows from Wynoochee Dam were less than 1,200 c.f.s.). When the minimum discharge from the reservoir would be 190/140 c.f.s. (April-September), it is expected that the 150-foot reach would probably receive some inflow from groundwater springs and seepage. During times when minimum reservoir discharge exceeds 190 c.f.s. and all reservoir releases (up to 1,200 c.f.s.) are diverted to the powerhouse, any flow above 190 c.f.s. would be released to the river at the hydropower outlet/fish hatchery intake structure and would create a backwater effect in the 150-foot reach. It is, therefore, expected that impacts associated with low flows in the 150-foot reach would essentially be the same as those associated with low flows in the 6,650-foot reach of the Wynoochee River from the hydropower outlet/fish hatchery intake structure to the hatchery outlet. Depending upon the quantity of discharge from the hydropower outlet/fish hatchery intake structure, the 150-foot reach may experience low flow conditions for a longer period of time than the remainder of the reach, but the impacts between the two segments of the 6,800-foot reach would not be significantly different. For purposes of impact discussion, the 150-foot reach plus the 6,650-foot reach are treated as one 6,800-foot reach from the existing overflow weir to the hatchery outlet.

The impacts of a potential low flow in the 6,800-foot reach would primarily be reduced visual esthetic value and reduced aquatic habitat with resulting effects to fish and wildlife which utilize the area. Downstream of the hatchery outlet, the flow of the Wynoochee River would be the same as that without a hatchery and powerhouse project.

The impacts of a potential low flow between the dam and the hatchery outlet are described in the following paragraphs for the "worst case" situation in which no instream flow exists in the reach during critical periods other than the probable 20 c.f.s. from groundwater springs and seepage. If higher instream flows are determined to be appropriate during PP&E, then the impacts to instream resources would be less than those discussed for the "worst case" situation.

2.04 Wildlife Impacts. The reach of the Wynoochee River from Wynoochee Dam to the proposed hatchery outlet is characterized by steep rock canyon walls in the first several hundred feet followed by steep earthen river banks down to the hatchery site where the slope of the right bank flattens to form a bench. The vegetation along the river banks is that typical of the Olympic rain forest, the canopy being dominated by mixed stands of western hemlock and Douglas fir, interspersed with large stands of bigleaf maple. Wildlife usage in the 250-foot reach of the Wynoochee River from the dam to the existing overflow weir is negligible, thus direct impacts to wildlife as a result of the potential ponding of this reach due to implementation of the hydropower/fish hatchery project would not be significant. Wildlife usage typical of other riparian areas of the Wynoochee River Basin can also be expected in the 6,800-foot reach of the Wynoochee River from the existing overflow weir to the hatchery outlet. Such usage would include small mammals, such as beavers, minks, muskrats, and some river otters, some big game use by Roosevelt elk and Columbian blacktailed deer, and small numbers of game bird and waterfowl populations. With the project, potential low flows could occur in this reach during the period April through September, adversely impacting small mammal and waterfowl populations directly through a reduction in available aquatic habitat and indirectly through a reduction in the food supply of those wildlife species that rely on aquatic organisms for their sustenance. Big game mammals would not be impacted by the potential low flow condition. Fur harvest, upland-game hunting, and waterfowl hunting in the plan area are minor and would not be significantly impacted by any impacts to wildlife populations as a result of potential low flow conditions in this reach.

2.05 Fish Impacts. Under existing conditions, adult anadromous fish are collected at the barrier dam/fish collection facility 2.2 miles below Wynoochee Dam (see figure H-6), trucked to a fish release site above Wynoochee Dam, and released to spawn in the upstream reaches of the Wynoochee River below Wynoochee Falls. Fish use of the reach of the Wynoochee River from the Wynoochee Dam to the hatchery outlet site consists of use by resident fish species and use as a transportation corridor by juvenile anadromous outmigrants which have passed through

the sluiceway or through the existing multilevel outlets in the Wynoochee Dam. Resident game fish in the reach are rainbow and cutthroat trout, most of which are thought to have passed through Wynoochee Dam from the reservoir. Nongame species, such as suckers and squawfish, which are typical of those found in other Pacific Northwest streams, can be expected to occupy this reach of the Wynoochee River.

2.06 If the hydropower/fish hatchery plan is constructed, the anadromous fish runs above Wynoochee Dam would be terminated. As a result, the reach between the dam and the hatchery outlet would no longer be utilized as a transportation corridor for juvenile anadromous outmigrants from above Wynoochee Dam. Other than use by juvenile outmigrants, fish use of the 250-foot reach of the Wynoochee River from the dam to the existing overflow weir is negligible. Thus impacts to fish as a result of ponding in this reach under low flow conditions associated with the hydropower/fish hatchery project would be minor.

2.07 Reduced streamflow in the reach between the existing overflow weir and the hatchery outlet as a result of construction of the hydropower/fish hatchery plan would limit resident fish populations through a reduction in available aquatic habitat. Existing resident populations are small, and although they would be locally impacted by reduced flows, in terms of the resident fish populations of the Wynoochee River as a whole, impacts would not be significant. Fishing in this reach of the Wynoochee River is currently closed to the public, although fishing may be permitted with implementation of the hydropower/fish hatchery plan. Through provision of sufficient instream flows, the potential exists for use of the area between the hatchery intake/hydropower outlet structure and the hatchery outlet for anadromous fish that are in excess of the hatchery needs. This potential would be explored in PP&E as the details of hatchery management and operation are developed. No constraints on hatchery operation due to the potential water supply reduction from 190 c.f.s. to 140 c.f.s. during May and June have been identified by the fisheries agencies. Flexibility in hatchery operation could accommodate reduced water supply during those months.

2.08 Water Quality Impacts. If the reservoir releases are less than 1,200 c.f.s. and the 1,200 c.f.s. are routed through the powerhouse rather than the existing dam, approximately 9 acre-feet of reservoir water would be ponded in the area between the existing overflow weir and the Wynoochee Dam. If the water is trapped during April and allowed to remain throughout the summer without any mixing, it would begin to resemble a shallow, stable pond, although some seepage into this area from the reservoir would be expected. Water temperatures in the ponded area would reach equilibrium with air temperatures. Theoretically, the average daily water temperature during mid to late summer may reach 76 degrees Fahrenheit (F) during a warm year. As a result of ponded conditions, chemical elements and biological organisms would increase in the area between Wynoochee Dam and the existing overflow weir. Primary productivity which is dependent upon solar radiation would be limited by shading as a result of the topographical location of the pond within a

steep sided gorge. When the reservoir releases exceeded 1,200 c.f.s., the water would be forced to pass out of the ponded areas and into the mainstream of the Wynoochee River. During the initial release, there may be a small quantity (less than 9 acre-feet) of warm (76 degrees F), high nutrient water flowing through the Wynoochee River downstream of the existing overflow weir; however, the temperature and dissolved elements in the ponded water would be rapidly diluted by the reservoir releases and would have no significant impact on the overall water quality of the reach of the Wynoochee River between the dam and the hatchery outlet. When the water finally would mix with the 190 c.f.s. hatchery outflow, there would be no measurable change from ambient hatchery outflow conditions.

2.09 During extremely low flow periods when the reservoir releases may be reduced to 190 c.f.s./140 c.f.s., the only water in the 6,800-foot reach from the exiting overflow weir to the hatchery outlet would be approximately 20 c.f.s. probably due to groundwater springs and seepage. The river in this reach would probably flow in a small primary channel with a wide gravel and rock streambed and pools possibly formed in shallow holes. If the flows remain low for an extended period of time (15 to 30 days), the pools may increase in temperature and provide habitat for a small aquatic community of algae and invertebrates. However, as soon as the reservoir releases are increased, any shallow water communities would be scoured by the increased discharge. The low flow condition would be temporary and of short duration and would not be expected to result in significant impacts from nuisance algal growth, odor problems, or low dissolved oxygen levels. Some stranding and subsequent mortality of resident fish could occur from a rapid reduction in stream discharge. Decomposition of fish carcasses would cause some minor organic nutrient loading to the river. Any contribution would be diluted in the Wynoochee River below the hatchery outlet.

2.10 Esthetic Impacts. During low flow periods associated with operation of the hydropower/fish hatchery plan, visual esthetics in the reach of the Wynoochee River from the dam to the hatchery outlet would be altered from the existing condition of a flowing river. Water would be ponded in the 250-foot reach from the Wynoochee Dam to the existing overflow weir and a small stream with a wide gravel and rock streambed and possibly some pools formed in shallow holes would be expected to exist in the 6,800-foot reach from the existing overflow weir to the hatchery outlet. Access to river views are limited in this reach of the Wynoochee River and consist of views primarily from the hatchery site, the road on the left bank across from the hatchery site, the Wynoochee Dam, the Wynoochee Lake project visitors center, and the Forest Service road bridge adjacent to Wynoochee Dam. Views of the river from the hatchery site on the right bank, from the road above on the left bank, and from the Forest Service bridge would be that of an exposed rock and gravel streambed with a small stream resulting from approximately 20 c.f.s. probably due to groundwater springs and seepage. Adverse esthetics from nuisance algae and odors in pools that may form along the streambed are not expected to occur. The possibility of such impacts

occurring is dependent in part on the amount of solar radiation and the duration of the low flow period. No impact to recreation is expected from the potential low flow conditions. Lack of access to most of the plan area reach due to steep banks precludes most recreational use in the reach from the Wynoochee Dam to the hatchery site. The Wynoochee plan area is in a remote location and probably will not become a major visitor attraction center with or without the hydropower/fish hatchery project.

2.11 The 250-foot reach of the Wynoochee River between the dam and the existing overflow weir would be visible from the dam, existing visitors center, and Forest Service bridge. Views would be from approximately 100 feet above looking down on a ponded area below the dam in a steep canyon gorge. As discussed in paragraph 2.09 above, nuisance algae and odor problems are not expected to occur in the ponded area. Therefore, the esthetic impact would primarily result from a change from a flowing to a ponded condition for a maximum period of April-September. This impact would not be significant.

2.12 Coordination. Coordination has been ongoing with the State of Washington including the Washington Departments of Ecology (WDE), Fisheries (WDF), and Game (WDG) regarding the instream flow issues related to the Wynoochee hydropower/fish hatchery plan. The WDE has used as a general guideline the 7-day, 10-year, historical low flow as a lower limit of permitted flow in a river reach. The 7-day, 10-year, unregulated flow in the Wynoochee River is 55 c.f.s. The minimum flow that could be expected in the reach of the Wynoochee River between the existing overflow weir and the hatchery outlet during a critical low flow period with the hydropower/fish hatchery project appears to be 20 c.f.s. probably due to groundwater springs and seepage. The determination of an instream flow requirement is based primarily on fish, wildlife, water quality, recreation, navigation and esthetic considerations, none of which are now or are expected to be significant in the reach of the river from the Wynoochee Dam to the hatchery outlet. In this case, another consideration in determining an instream flow would be the impacts of any flow requirement on the hatchery operation and production capability. Until the hatchery details, including its management flexibility, are determined in PP&E, establishment of an instream flow would be premature and could jeopardize making full use of the available water supply in design of the fish hatchery. This approach to the instream flow issue has been coordinated with WDG, WDF, and WDE, and all parties have agreed that instream flows for the reach of the Wynoochee River between the Wynoochee Dam and the hatchery outlet would be determined during PP&E, rather than at the feasibility stage of planning (refer to letter, dated 28 October 1981, from WDE in appendix B).

SECTION 3. WYNOOCHEE HATCHERY MANAGEMENT

3.01 Introduction. A report entitled, "Biological Report for Wynoochee Hatchery Management Planning," by S. B. Mathews, 1981, was prepared under contract with the Corps of Engineers. The findings of the report are summarized in the report's executive summary provided in paragraphs 3.02 through 3.07 below. The findings were incorporated into the conceptual management planning for the Wynoochee hydropower/fish hatchery draft feasibility report/EIS. Since that time some of the fish hatchery concepts have been revised to reflect the current thinking of the fisheries agencies. Those revisions are reflected in the final feasibility report/EIS and are summarized in paragraph 3.08 of this section.

3.02 Executive Summary.[1/] The site beneath the Wynoochee reservoir offers an excellent opportunity to build a large, gravity-fed hatchery, of approximately six times the rearing capacity of an average sized salmon or steelhead hatchery. Water quality and quantity appear very good, and temperatures could be held within a near optimal annual range by drawing water at various depths from the reservoir.

3.03 Salmon and steelhead runs in Grays Harbor and adjacent streams are among the most depressed in the State. Catches from this region are tending to decline relative to catches elsewhere in the State. Enhancement efforts in this region have not generally been in proportion to the relative importance of the fisheries there. Thus, about 15 percent of the state's chinook and coho and about 10 percent of the state's steelhead are caught in the Grays Harbor region, yet only about 7 percent and 5 percent of the state's salmon and steelhead hatchery plants, respectively, are made in this region.

3.04 Not only are many of the runs depressed, but the Boldt decision has caused a severe reapportionment of the dwindling resources from one class of fishermen to another. Grays Harbor is in the Boldt case area and has in effect been promised a substantial Federal salmon enhancement effort by passage of a $37.5 million enhancement act in 1980. However, no funds for such enhancement projects have yet been authorized.

3.05 The Wynoochee hatchery project offers an opportunity to subtantially enhance the depressed salmon and steelhead runs over much of coastal Washington, from the Hoh River to the upper Chehalis watershed. The potential to rebuild commercial Indian and non-Indian fisheries, revitalize a sagging ocean recreational fishing industry, and create a steelhead sport fishery equivalent to the high-success lower Columbia area steelhead fishery with this facility should be utilized.

1/Executive Summary from: Mathews, S. B., 1981. Biological Report for Wynoochee Hatchery Management Planning. University of Washington, Seattle, Washington. Prepared under contract with the U.S. Army Corps of Engineers, Seattle District.

3.06 The Wynoochee site is potentially very cost-effective when compared with other hatchery sites and other recently completed hatcheries. The amount of fish that could be reared per dollar of capital cost, as a measure of cost-effectiveness, is as high as several of the most recent, efficient hatcheries built by the Washington Department of Fisheries. Water could be provided entirely by gravity, thus obviating the need to pump by electric power. As energy costs rise in the future, the relative efficiency of gravity-fed hatcheries over pumped-water hatcheries will substantially increase.

3.07 Specific recommendations are as follows:

a. This should be a regional hatchery designed to enhance runs throughout Grays Harbor as well as depressed north coastal Washington runs such as the Queets and the Hoh, two large rivers which have no hatcheries on them.

b. The hatchery should be utilized to improve all non-Indian commercial and sport fisheries negatively impacted by the Boldt decision and related Federal court actions, as well as coastal Indian fisheries negatively impacted by depressed salmon runs to their rivers.

c. Priority species should be steelhead, spring chinook, and coho. Because of the large volume of high quality water available, yearling releases of these three species should be emphasized. Local steelhead and spring chinook stocks should be utilized if possible. Coho production should emphasize both the local stocks as well as the early running outside Soleduc stock. However, use of Soleduc stock should be phased in with the rebuilding of depressed native Grays Harbor fall chinook stocks with which Soleduc coho would overlap in terminal timing.

d. Any fall chinook rearing should utilize local stocks from various streams and emphasize outplantings for the purpose of rebuilding potential spawning populations of those runs particularly depressed.

e. Rearing of other species such as chum should be experimental initially.

f. Hatchery production and harvest of these fish should be coordinated with an overall fishery management policy for Grays Harbor and north coastal Washington that emphasize natural production. The latter policy implies common harvest rates on any mixtures of natural and hatchery runs should be no greater than is optimal for the natural runs.

g. A percentage of the annual operating funds should be earmarked for research and evaluation. The use of a dam to improve salmonid production by providing both hatchery water and improved natural rearing environment in the river below represents a turnaround over the past history of negative impacts of dams on salmonid runs. Wynoochee Dam represents a prototype multiple-use facility wherein salmonid production

is of high and equal priority to hydropower and other uses. Experience and knowledge gained at Wynoochee would be invaluable for application at other salmonid rivers on which dams are planned.

h. To avoid the possibility of overextending the carrying capacity of any segment of the nearshore or marine environment from large outplants from the hatchery, release strategy should be broad in terms of time, space, and species.

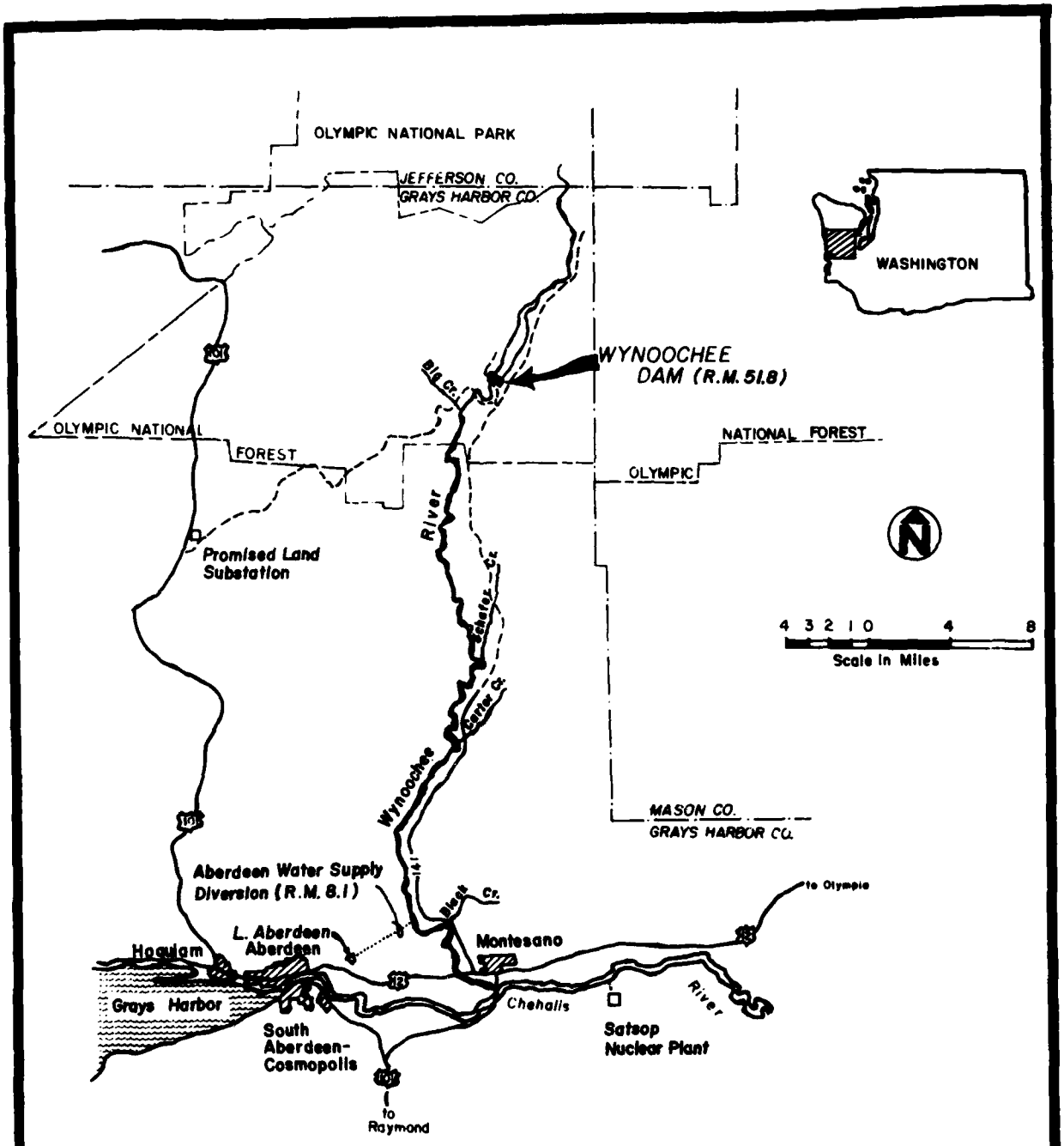
3.08 Revisions to Fish Hatchery Management Concepts Since Publication of the Draft Feasibility Report/EIS. The fisheries agencies responsible for salmon concerns have recently determined that spring chinook salmon would be the only salmon species reared at the hatchery without further study. WDF proposes to utilize the spring chinook salmon run from the Skookumchuck River, a tributary of the Chehalis River, as a source of spawning stock for the Wynoochee hatchery. This run, which is depressed, would provide the preferred genetic characteristics and be free of disease associated with stock from the Cowlitz River, a tributary to the Columbia River. Spring chinook salmon from the Skookumchuck River stock would contribute extensively to terminal fisheries in Grays Harbor and its tributaries but would make a relatively small contribution to the coastal sport and commercial fisheries. The rearing of other species/strains of salmon at Wynoochee hatchery is not planned at this time because of possible impacts on wild runs. A management plan, which would be periodically updated, would determine management stategies involving use of other species/strains of salmon. The desire to use the local spring chinook salmon stock prompted the agencies to recommend constructing the hatchery in two phases to allow for the gradual rebuilding of this small local stock. Additionally, the two satellite stations on coastal rivers proposed in the draft feasibility report have been deleted, and one satellite salmon station in the Chehalis River system on the lower Skookumchuck River has been added. Steelhead native to the Chehalis River system are proposed for spawning stock in the Wynoochee hatchery; however, "summer run" steelhead may also be reared. This would be determined in PP&E.

SECTION 4. ELK IMPACT ASSESSMENT

4.01 Without Project Condition. The plan area for the Wynoochee hydropower/fish hatchery study is located in the vicinity of the Corps of Engineers Wynoochee Lake project in the 37,649-acre Wynoochee River basin which lies within the Shelton Ranger District of the Olympic National Forest (figure H-7). The Wynoochee Lake project consists of a 177-foot-high dam which provides 70,000 acre-feet of total storage and is presently operated for city of Aberdeen industrial water supply, winter flood control, and fisheries. The existing project includes mitigation lands for elk habitat inundated by the reservoir and a fish collection facility and trucking program for anadromous fish. A visitors center and day-use facilities for swimming, boating, and picnicking at the project are managed by the Corps of Engineers. Overnight camping facilities in the area around the Wynoochee reservoir are owned and managed by the U.S. Forest Service (USFS).

4.02 The Shelton Ranger District consists of the Wynoochee and Skokomish River basins and includes 112,874 acres of national forest under administration by the USFS. Of the 112,874 acres, approximately 104,900 acres are commercial forest. Approximately 74,500 acres of the commercial forest are classified as being standard commercial forest available for harvesting under a cooperative sustained yield agreement with Simpson Timber Company. Of that acreage, about 59,000 acres of old growth timber had been harvested through 1979, and the remainder is expected to be logged in the next 10-year harvest cycle. Commercial forest that is not classified under the cooperative agreement is categorized as either marginal timber or for special use.

4.03 Both migratory and resident Roosevelt elk (Cervus canadensis roosevelti) are present in the Shelton Ranger District (Taber and Raedke, 1980). Migratory elk move into the high country to spend the summer, while resident elk remain in the valley bottoms the year round. Both types of elk use the forested areas below 1,500-foot elevation as winter range; snow accumulation precludes the use of the higher areas during the winter. Since the mid-1960's, the elk population in the Shelton Ranger District has shown a constant and dramatic decline in numbers. The elk population size estimate for 1968 was approximately 1,200 elk and for 1978 had declined to approximately 500 elk (Taber and Raedke, 1980). In addition to harvest mortality, winter mortality and illegal kill appear to be important mortality factors in this area of the Olympic National Forest (Taber and Raedke, 1980). Current winter carrying capacity of the elevations below 1,500 feet ranges from approximately 10-35 elk per square mile, which is perhaps four times greater than the number of elk that summer in the lowland areas (Smith, 1980).



LOCATION OF WYNOOCHEE DAM

FIGURE H-7

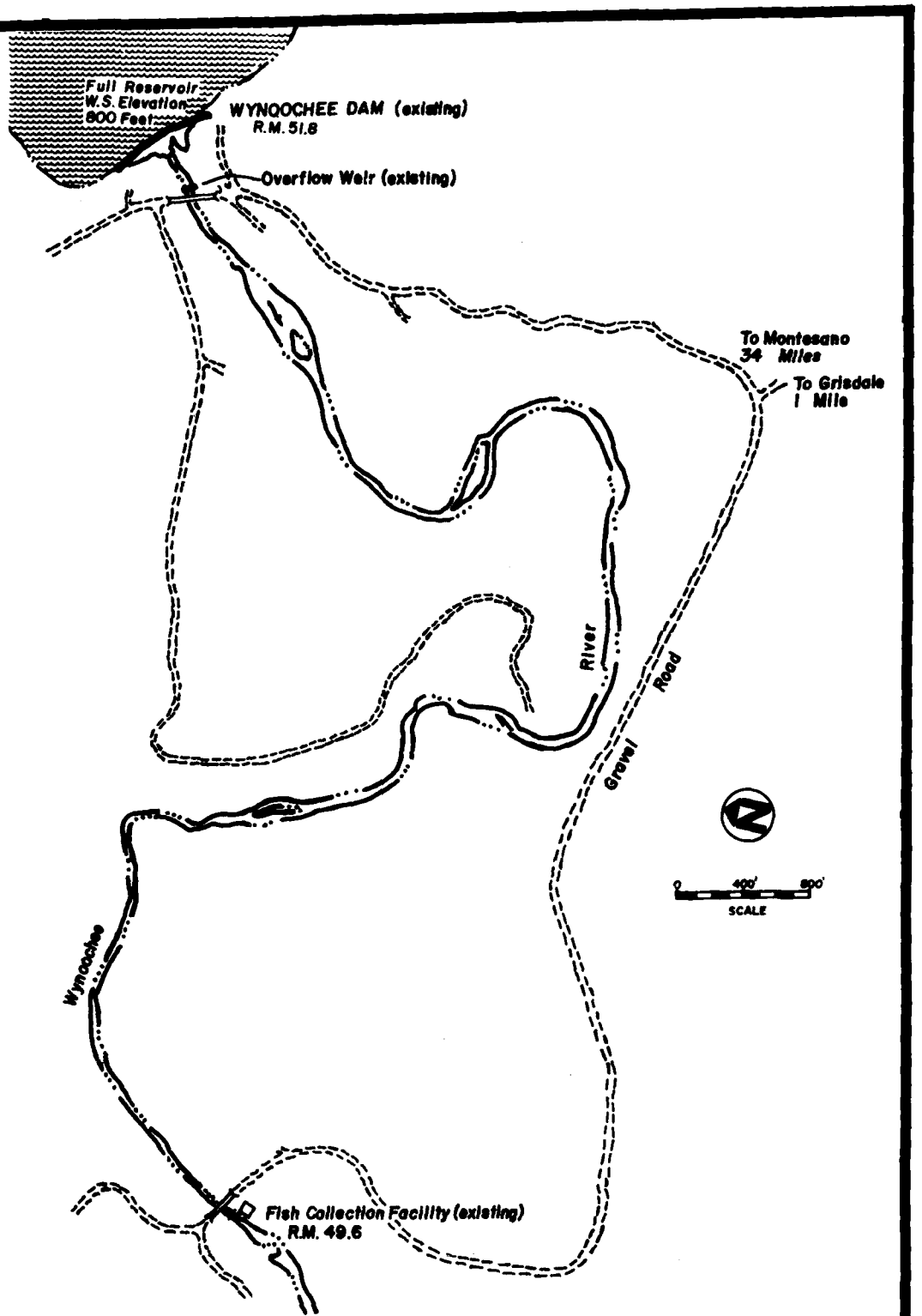
4.04 Old growth[1/] vegetation is critical to elk in times of severe winters since the old growth canopy intercepts much of the snowfall and the windfall, and forest floor vegetation still provides adequate forage. The elk population in the Shelton Ranger District is currently thought to be limited by the carrying capacity of the winter range below 1,500-foot elevation, which is further limited by the amount of old growth, the preferred winter habitat (Taber and Raedke, 1980). The amount of old growth is declining as logging proceeds. Summer range has not been a limiting factor in the past in the Shelton Ranger District but may become so in the future as the young regenerating forest shades out the forage.

a. Fish Hatchery Site. Under the USFS timber management plan, the 50-acre Wynoochee fish hatchery site is classified special use as "visual variety A" and is on a 200-year harvesting rotation. The objective of this special use category is to maintain or enhance a visually pleasing landscape. To obtain this objective, management of timber on the site is modified to yield less than full biological timber production. Because this site is on a longer harvesting rotation and is managed for a less than optimum timber production, its importance to elk as critical winter range may increase as harvesting of old growth on other winter range continues over the next 10-year period.

The fish hatchery would be constructed adjacent to the Wynoochee River on a low elevation bench forested predominantly by deciduous bottomland species interspersed by mature coniferous trees. Away from the river, at the higher elevations next to the proposed hatchery location, vegetation is principally mature coniferous forest. The USFS has classified this area as old growth forest (Shelton Ranger District, 1981). For the purposes of this analysis, a conservative estimate of 50 percent of the hatchery site or 25 acres has been considered "old growth." Two to three small bands of elk (approximately 10 elk total) are estimated to utilize the area of the proposed hatchery as part of their winter range, although no specific population studies have been performed (Beckstead, 1981). The site is also a popular dispersed recreation area which limits it use by resident elk as summer range. An unimproved road provides access to the site. The Wynoochee Lake project is approximately 5,000 feet upstream from the site, and a fish collection facility is located approximately 7,000 feet downstream of the site (figure H-8).

The fish hatchery water supply pipeline leading from the proposed hydropower facility to the hatchery intake would be a buried pipeline 2,400 feet long. It would cross the Wynoochee River in two places and would transverse approximately 5 acres of forest classified by the USFS as winter range. None of this acreage is considered old growth forest.

1/Old growth is defined by U.S. Forest Service (Shelton Ranger District) as a stand of trees dominated by coniferous trees which are an average age of 334 years old. Stands will usually contain a multi-layered canopy and trees of several age classes.



WYNOOCHEE HYDROPOWER/ FISH HATCHERY PLAN AREA

FIGURE H-8

b. Hydropower Facility. The site of the hydropower facility is the existing visitors parking lot for the Wynoochee Lake project. The site of the switchyard is shrub/grass vegetation approximately 100 feet set back from the road adjacent to the existing visitors parking lot.

c. Transmission Lines. The route of the proposed transmission line extends from Wynoochee Dam along Donkey Creek Road to the Promised Land Substation at the junction of Donkey Creek Road with U.S. Highway 101. The total length of the route is 22 miles, approximately 14 of which are gravel road and 8 of which are paved. The road travels through national forest land and is utilized as an access road by the USFS and by Simpson Timber Company. The USFS classifies this road as a scenic corridor and has a combination of easements and public use agreements with Simpson Timber Company along the gravel segment of the road. Along the 8 miles of paved road, the USFS owns a 100-foot wide corridor on both sides of the roadway and has classified that corridor as partial retention for scenic purposes.

4.05 With Project Condition. Because winter range is considered limiting to elk production in the Shelton Ranger District, an analysis was performed to determine how much winter range would be impacted by construction of the Wynoochee hydropower/fish hatchery plan. The results of the analysis are described in the following paragraphs.

a. Fish Hatchery. The construction of the hatchery and associated facilities would result in the permanent loss of 50 acres of elk winter range, 25 acres of which are being considered old growth and constitute critical winter range. The water supply pipeline would have temporary impacts on approximately 5 acres of winter range; however, the pipeline would be buried and the corridor revegetated, and habitat would reestablish in time. Table H-5 summarizes the evaluation of permanent losses of elk winter range associated with implementation of the Wynoochee fish hatchery.

The loss of 50 acres of elk winter range represents 0.3 percent and 0.1 percent of the winter range in the Wynoochee drainage basin and Shelton Ranger District, respectively. Twenty-five acres of that loss are old growth, considered critical elk winter habitat. Its loss represents 0.4 percent and 0.2 percent of the critical winter range in the Wynoochee drainage basin and Shelton Ranger District, respectively. Without mitigation, the loss of winter range would eliminate elk use of the hatchery site.

According to the USFS, an additional 100 acres of winter range would be secondarily impacted by the increased human and vehicular disturbance associated with the hatchery complex. The impact would be an expected reduction in use of the area by elk similar to that reported to occur within 1/4 to 1/2 mile from roadways (Lyon, 1979). Under the existing condition, the hatchery site lies within areas of secondary impact as a result of the Wynoochee Lake project, the existing hatchery site access road, and the recreational use of the site. The construction of the

TABLE H-5

ELK WINTER RANGE HABITAT LOSSES ASSOCIATED WITH THE WYNOOCHEE HYDROPOWER/FISH HATCHERY (HP/FH) PLAN

Winter Range	Existing Acres	With HP/FH Plan Acres	With HP/FH Plan Percent Loss
I. Local (Wynoochee Drainage)[1/]			
a. Old Growth	5,018	4,993	0.4
b. Other Seral Stages	9,532	9,507	0.3
c. Total	14,550	14,500	0.3
II. District-Wide (Shelton Ranger District)[2/]			
a. Old Growth	11,872	11,847	0.2
b. Other Seral Stages	28,947	28,922	0.1
c. Total	40,819	40,769	0.1

1/ Total Wynoochee drainage includes 37,649 acres.
2/ Shelton Ranger District includes 112,874 acres administered by the USFS and consists of the Wynoochee and Skokomish River Basins.

hatchery would contribute to the reduced availability of the habitat surrounding the hatchery site to some unknown extent. Secondary impacts would be minimized by a vegetative buffer zone around the hatchery complex and by leaving stands of trees in wind-firm areas.

Considering both primary and secondary impacts, the total elk impact area associated with hatchery construction would be 150 acres or 1.0 percent and 0.4 percent of the total winter range in the Wynoochee drainage basin and Shelton Ranger District, respectively. In the context of the overall carrying capacity of the Shelton Ranger District and the Wynoochee drainage basin, impacts to elk winter range are not considered to be significant. However, as logging of winter range continues over the next 10 years in the Shelton Ranger District and the availability of critical winter range becomes greatly reduced, the impact to elk of losing the hatchery site may increase in the future. In addition, the flat bottomland habitat of the hatchery site is high quality winter habitat for elk and has a higher carrying capacity than the steeper side slopes which are also considered elk winter habitat. Therefore, loss of the habitat on the hatchery site is more significant than an overall calculation of average winter habitat loss would indicate.

To partially mitigate for the habitat related losses of elk habitat associated with construction of the fish hatchery, two 2-acre pastures

have been included in the recommended plan. These pastures would be planted with species of high food value to elk and would serve to provide a winter food source. The pastures would be located adjacent to the hatchery and would be maintained by hatchery personnel. The exact siting of the pastures and the planting scheme would be developed during PP&E.

b. Hydropower Facility. The powerhouse and switchyard would have no impact on elk populations or existing elk habitat in the Shelton Ranger District.

c. Transmission Lines. Construction of a buried transmission line along Donkey Creek Road from the Wynoochee Dam to the Promised Land Substation would have no impact on elk populations. Construction of an alternative aerial transmission line could adversely impact elk populations by attraction of elk to the transmission line corridor with a resulting increase in road kill along Donkey Creek Road. An estimated 25 percent of the 22-mile route from Wynoochee Dam to the Promised Land Substation would be away from the road and would traverse both summer and winter elk range. The cleared corridor would provide some benefits to elk through provision of increased forage. Some critical old growth habitat would be lost; however, this habitat would be lost as a result of logging with or without the hydropower/fish hatchery plan. Impacts to elk and other wildlife from loss of habitat could be reduced through planting in the transmission line corridor.

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SECTION 5. RECREATION IMPACT ASSESSMENT

5.01 Existing Facilities. Within the Olympic National Forest, the Shelton Ranger District of the USFS provides five developed recreation areas and estimates that another 140 areas are customarily used by the public for dispersed recreation activities. Developed recreation areas include Coho, Tenas, Wynoochee Falls, Chetwoot, and Brown Creek campgrounds. In addition, the Corps of Engineers operates and maintains a visitor's center and day-use facilities for swimming and picnicking within the Shelton Ranger District at the existing Wynoochee Lake project.

5.02 Dispersed recreation is defined as outdoor recreation in which visitors are diffused over relatively large areas and, where facilities or developments are provided, they are more for access and protection of the environment than for the comfort or convenience of people (U.S. Department of Agriculture (USDA), 1981). Dispersed recreation activities occur primarily during the summer and fall and include driving for pleasure, hiking, fishing, hunting, photography, rock collecting, and berry picking (USDA, 1978). As described by the USFS (Eldredge, 1981), dispersed recreation in the Shelton Ranger District also includes overnight camping outside of the developed campgrounds, picnicking, woodcutting, and various water-related activities such as wading, tubing, and swimming where access to a stream is available.

5.03 Visitation estimates for the period 1976-1980 show that the developed recreation areas in the Shelton District averaged about 38,000 visitor days annually, while dispersed recreation activities averaged about 85,000 visitor days use. Activities which account for the greatest use on national forest lands include camping (30 percent), driving for pleasure (27 percent), hiking (7 percent), fishing (10 percent), and hunting (15 percent). The remaining 11 percent includes winter sports, water sports, picnicking, and gathering of forest products.

5.04 Future Without Project Conditions. In their long-range development plans, the USFS proposes three additional campgrounds in the Wynoochee Basin to be developed as demand warrants. It is anticipated that the Wynoochee Lake area will never be a significant recreation attraction due to its distance from major roadways and the competition from major recreational attractions in the area, such as Lake Quinault, Olympic National Park, and Pacific Ocean beaches. Currently, the existing campgrounds are not being utilized to their capacity, and all of the future demand should be satisfied by the existing and proposed facilities. Dispersed recreation use is expected to increase in the future in the Shelton Ranger District based on the current trend of visitors preferring the undeveloped camping experience while still maintaining the ability to bring their vehicles to the campsite. This poses potential future management problems for the USFS as increasing human use in undeveloped areas impacts wildlife and increases the need for sanitation facilities and water.

5.05 With Project Conditions.

a. Fish Hatchery.

(1) Probable Impacts. The principal beneficial recreation impact of the hatchery would be the enhancement of the recreational anadromous fishery in the Chehalis River Basin, Grays Harbor area, and northern Pacific Ocean. The increased fishery would also result in an increased utilization of fishery support businesses and facilities in the area and an increased use pressure on existing day-use and overnight camping facilities in the Shelton Ranger District. One or more fisherman access sites could be provided below the hatchery. The plans and locations of these sites would be the responsibility of the hatchery owner and operator.

The 50-acre hatchery site is owned and managed by the USFS and under their timber management plan is classified as "visual variety A" with the objective of maintaining a visually pleasing landscape. According to USFS estimates, the Wynoochee hatchery site is customarily used for dispersed recreation activities at an average rate of 300 visitor days per year (Davis, 1980).1/ Peak use of the site is estimated by the USFS at about 20 people per day. Although no figures are available on the origin and length of stay of the typical dispersed recreation user, USFS personnel of the Shelton Ranger District estimate that the majority of users reside within a 100-mile radius, with many families and individuals customarily using a particular, or "favorite," site each visit. The USFS has stated that the hatchery offers a fairly unique recreation opportunity as it is one of the few water related dispersed recreation areas within the Wynoochee drainage. Implementation of the recommended plan would permanently impact recreation use of the hatchery site. The nature of the impact would be a change in the recreational character of the site from that of an undeveloped camping and day-use site to an area dominated by the hatchery and its associated visitor facilities. Hunting, overnight camping, and water-related activities would be precluded by hatchery construction. Fishing in the area of Wynoochee River from the existing fish collection facility to Wynoochee Dam is currently not permitted, but may be permitted sometime in the future. The hatchery complex would provide some day-use recreation opportunities such as sightseeing and would provide limited visitors facilities. The area around the hatchery grounds would still be available for hiking and picnicking, and fishing opportunities in the Shelton Ranger District would be enhanced by the hatchery. Resident recreational fishing should also increase in Wynoochee Lake where WDG and Simpson Timber Company currently have a cooperative fish stocking program because of the increased recreational fishing demand.

Visitors who currently utilize the hatchery site as a camping area may seek out new dispersed recreation areas in the vicinity or may be displaced to other customarily used dispersed recreation areas with resulting increased use pressure and secondary impacts to wildlife resources.

1/U.S. Forest Service treats a visitor day as a 12-hour period in which a visitor is engaged in a recreation pursuit. Twenty-four hours equal 2 visitor days.

Some visitors may be completely displaced from the Wynoochee drainage if they are unable to find comparable water-related dispersed recreation opportunities within the drainage.

Estimates of total dispersed recreation use within the Shelton District for the period 1976-1980 range from a low of 65,000 visitor days in 1980 to a high of 92,700 visitor days in 1979. The average annual use during the period 1976-1980 was about 85,000 visitor days. This use may increase with the increased recreational fishing opportunities provided by the fish hatchery. The 300 visitor days use of the proposed hatchery site represents 1/3 of 1 percent (0.353 percent) of the total dispersed recreation use in the Shelton District. The reduction in recreation use of the hatchery site as a result of hatchery construction and the loss and possible displacement of some of the existing dispersed recreation activities are not considered significant adverse impacts.

(2) Replacement Facilities. At the request of the Shelton Ranger District, analysis was undertaken of replacing dispersed recreation use of the hatchery site at two alternate sites located about 1 mile downstream as shown on figure H-9. These two sites were selected by the Shelton Ranger District as the only sites along the Wynoochee River that were similar to the hatchery site. The analysis was conducted using the planning criteria and objectives of the USFS as presented in their recently published, Viewshed Plan, Skokomish Corridor and Wynoochee Corridor, Olympic National Forest. The Viewshed Plan categorizes national forest acreage according to its value for scenery, recreation, wildlife, or streamside protection. If found valuable for any of these purposes, land is given a "special category" designation whereby future timber management activities are conducted according to their effect on the values. Each parcel of land with a "special category" designation is given a "cell" number and rated on a scale of 1 to 3, with 1 generally the highest, for each category of Visual, Recreation, Wildlife, and Timber. Based upon overall values, each cell is then designated as a "key" area for either visual resources, wildlife resources, visual and wildlife, or recreation. The two alternative dispersed recreation sites have been classified as key wildlife sites by the USFS and both have been found to have no specific recreational opportunities now or for the future. The overall designations for the two sites are shown in table H-6.

(3) Development Analysis. Replacement of dispersed recreation at either of the two alternate sites would require provision of road access. Existing wildlife usage of the alternate sites includes elk calving and use in the vicinity by at least one pair of osprey (Beckstead, 1981). Although USFS management guidelines do not preclude recreation use of key wildlife areas, in the case of the two alternate sites with their low ratings for recreational development, the probable impacts to wildlife values as a result of development may outweigh any benefit gained by replacement of dispersed recreation lost as a result of the fish hatchery. The USFS has indicated that provision of road access to the river's edge would not be desirable on these two sites due to probable adverse impacts to wildlife as a result of increased human disturbance. The existing hatchery site has access to the Wynoochee River which is thought to be one of the key attractions contributing to

Figure H-9

LOCATION OF ALTERNATE DISPERSED RECREATION SITES

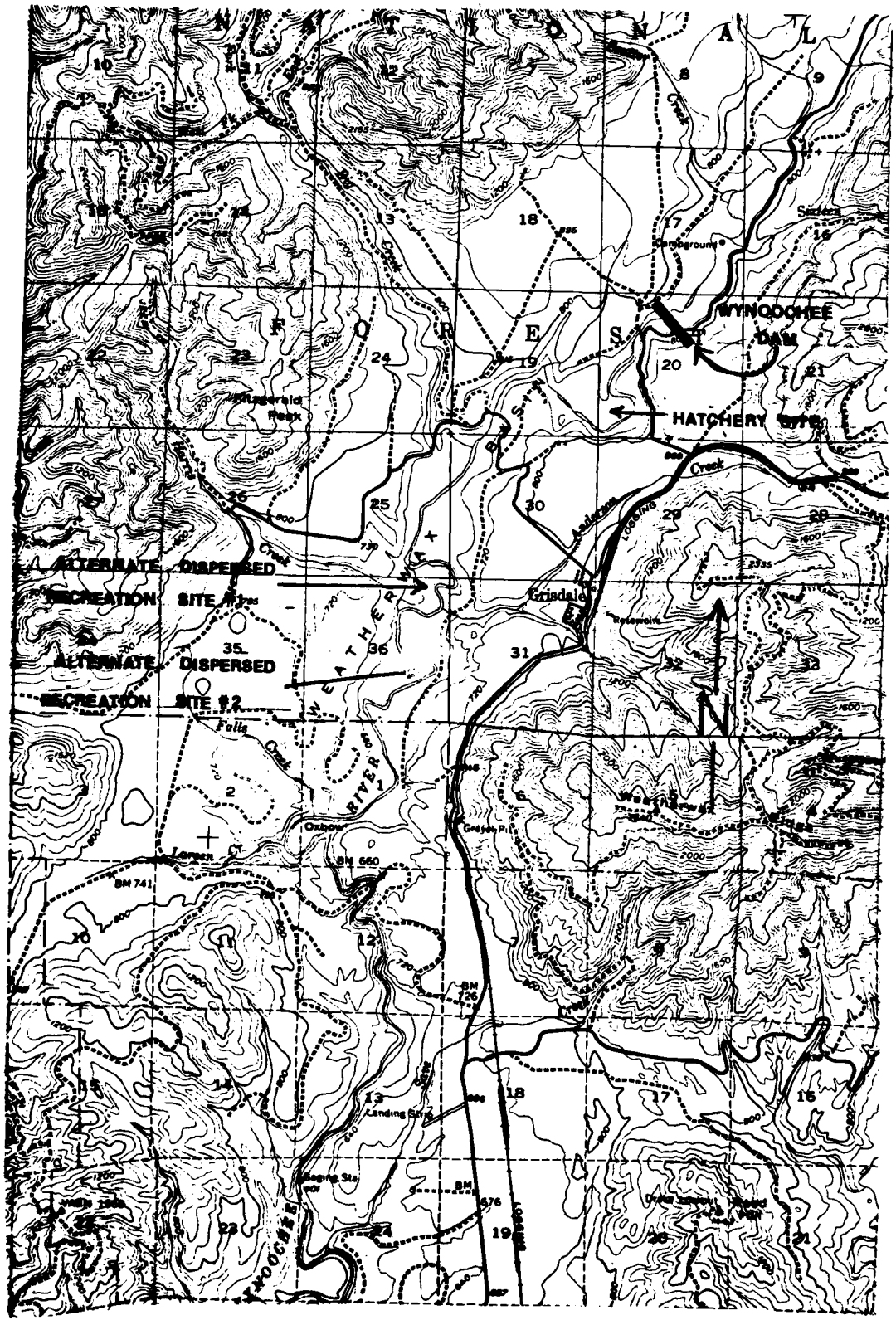

TABLE H-6[1]/

RESOURCE BASE CLASSIFICATION

	SITES			
	Alternate Site #1		Alternate Site #2	
	Cell 98	Cell 34	Cell 66	Cell 16
VISUAL				
V-1 Visible from primary roads, trails, use sites, and water bodies.		X		
V-2 Not seen unless vegetation is removed, modified, or added.				
V-3 Not seen due to observer position, landforms, and/or viewing distance.	X		X	X
RECREATION				
R-1 High potential for developed recreation.				
R-2 High potential and ideally suited for dispersed recreation.				
R-3 No specific recreation opportunity exists now or is planned for the future.	X	X	X	X
WILDLIFE				
W-1 Vital areas for providing basic habitat requirements for fish and wildlife.	X	X	X	X
W-2 Area adjacent to W-1. Important for terrestrial wildlife.				
W-3 Limited plant and animal diversity.				

1/Compiled from U.S. Forest Service Document, "Viewshed Plan, Skokomish Corridor and Wynoochee Corridor, Olympic National Forest."

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TABLE H-6[1/] (con.)

	SITES			
	Alternate Site #1		Alternate Site #2	
	Cell 98	Cell 34	Cell 66	Cell 16
TIMBER				
T-1 Commercial forest with marketable timber.				X
T-2 Precommercial forest with immature marketable timber.				
T-3 No recognized commercial value.	X	X	X	

1/Compiled from U.S. Forest Service Document, "Viewshed Plan, Skokomish Corridor and Wynoochee Corridor, Olympic National Forest."

its popularity to dispersed recreationalists. Without access to the river, use of either alternate site could be expected to be limited. For these reasons, development of the two alternate dispersed recreation sites has not been included as part of the recommended plan. Further, because dispersed recreation use at the hatchery site represents 1/3 of 1 percent of the total dispersed recreation use in the Shelton Ranger District, additional analysis of alternate sites to replace that portion of the use that is lost due to construction of the fish hatchery was not considered justified.

b. Hydropower. Other than minor short-term impacts associated with the powerhouse and switchyard construction, the hydropower facility would have no impacts on recreation.

c. Transmission Lines. A buried transmission line along Donkey Creek Road from Wynoochee Dam to the Promised Land Substation would have no impact on recreation. An aerial line would result in both esthetic impacts and timber resource losses. Extensive coordination with the USFS would be necessary to avoid significant conflicts in current land use along an aerial transmission corridor.

d. Construction. Depending on the season, construction activities could inconvenience visitors to the Wynoochee Dam area due to curtailment of some activities (such as boating and swimming) during construction of the hydropower/fish hatchery intake system and from traffic congestion. These impacts would be minor and short term. During construction of the hydropower facility under the existing parking lot at the visitors center for the Wynoochee Lake project, alternative visitors parking would be provided.

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