TIER ONE:
DRAFT ENVIRONMENTAL
IMPACT STATEMENT

Volume 2

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Realignment of Mountain Home Air Force Base and Proposed Expanded Range Capability

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February 1990

U.S. AIR FORCE
Tactical Air Command

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DOCUMENT ORGANIZATION

This Tier 1 Draft Environmental Impact Statement (DEIS) addresses a realignment of aircraft and personnel at Mountain Home Air Force Base. This action will primarily affect environmental resources on the base and surrounding communities in Elmore County, Idaho. This Tier 1 DEIS also assesses the generic impacts of a proposed expanded range capability. This proposed action would primarily affect environmental resources in Owyhee County, Idaho. The difference in the land area and resources impacted by the realignment and proposed expanded range capability is a primary reason for the division of chapters 3 through 5 into chapters M3 through M5 and S3 through S5. This division was done at the request of the Bureau of Land Management to accommodate their information needs.

A Tier 2 EIS process would be implemented to assess site-specific impacts if a decision is made to pursue a proposed expanded range capability. However, all potential environmental impacts of the realignment of Mountain Home Air Force Base are assessed in this Tier 1 DEIS. The Tier 2 EIS would not contain any further environmental impact analysis of the realignment.

Chapter 1 — PURPOSE OF AND NEED FOR THE ACTIONS, sets the stage for this DEIS, and is contained in both volumes 1 and 2.

Chapter 2 — DESCRIPTION OF THE ACTIONS AND ALTERNATIVES, presents a detailed discussion of the Air Force actions and any viable alternatives, and is contained in both volumes 1 and 2.

Chapter M3 — AFFECTED ENVIRONMENT: MOUNTAIN HOME AIR FORCE BASE REALIGNMENT, discusses the environmental and socioeconomic baseline conditions, and is presented in Volume 1 only.

Chapter M4 — ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES: MOUNTAIN HOME AIR FORCE BASE REALIGNMENT, covers the potential impacts of the action and proposed means of mitigating those impacts, and is contained in Volume 1 only.

Chapter M5 — UNAVOIDABLE IMPACTS: MOUNTAIN HOME AIR FORCE BASE REALIGNMENT, discusses the unavoidable impacts resulting from the action, and is presented in Volume 1 only.

Chapter S3 — AFFECTED ENVIRONMENT: PROPOSED EXPANDED RANGE CAPABILITY, discusses the environmental and socioeconomic baseline conditions, and is contained in Volume 2 only.

Chapter S4 — ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES: PROPOSED EXPANDED RANGE CAPABILITY, covers the potential impacts of the proposed action and proposed means of mitigating those impacts, and is presented in Volume 2 only.

Chapter S5 — UNAVOIDABLE IMPACTS: PROPOSED EXPANDED RANGE CAPABILITY, discusses the unavoidable impacts resulting from the proposed action, and is contained in Volume 2 only.

Chapter 6 — CUMULATIVE IMPACTS, evaluates the realignment and proposed expanded range capability and other major actions, ongoing or proposed for the near future, which could impact the same area or resources, and is contained in both volumes 1 and 2.

An Acronyms and Abbreviations list is provided immediately following the Table of Contents.

COVER SHEET

Draft Environmental Impact Statement
Realignment of Mountain Home Air Force Base
and Proposed Expanded Range Capability

Responsible Agency: United States Air Force

Action: In response to the recommendations of the Defense Secretary's Commission on Base Realignments and Closures and the requirements set forth in the Base Closure and Realignment Act (Public Law 100-526), George Air Force Base is to be closed. Aircraft, materials, and personnel now at George AFB will be moved. Mountain Home AFB (MHAFB), Idaho was selected to receive the majority of the George AFB assets.

Contact for Further Information: Mr. Alton Chavis
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Designation: Draft Environmental Impact Statement (DEIS)

Abstract: This DEIS assesses the potential environmental impacts of the realignment of 94 F-4E and G aircraft and associated personnel from George AFB to MHAFB and removal of 35 F-111A aircraft from MHAFB. This statement also addresses, at a programmatic level, the potential impacts of expanding range capability to accommodate the increased training requirements of MHAFB and other Air Force units. Site-specific analyses for a second EIS would be conducted to evaluate alternatives for determining the exact location and boundaries for a proposed expanded range capability.

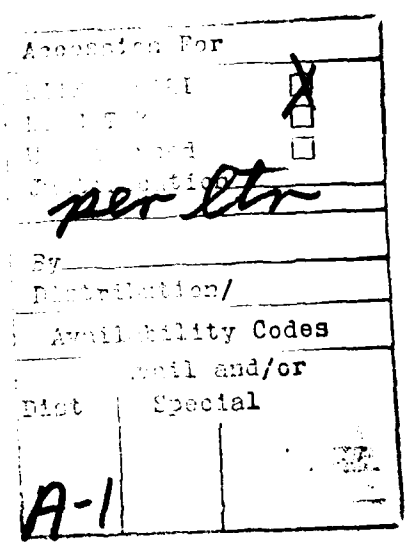
All impacts of the realignment are addressed in this DEIS.

Comments on this DEIS should be addressed to Mr. Chavis at the address noted above. The comment period ends on 16 April 1990. Comments must be postmarked by 16 April 1990. Public hearings will be held on this DEIS. Notice of these hearings will appear in the local media. Mr. Chavis can also be contacted for information on this meeting.

TIER ONE:
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Volume 2
Realignment of Mountain Home Air Force Base and Proposed Expanded Range Capability

February 1990



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U.S. Air Force
Tactical Air Command

EXECUTIVE SUMMARY

This (EIS) is prepared in accordance with Air Force regulations, the National Environmental Policy Act (NEPA), and the President's Council on Environmental Quality (CEQ) guidelines to assess the combined impacts of the Mountain Home Air Force Base (MHAFB) realignment and a proposed expanded range capability.

This EIS is the beginning or Tier 1 of an environmental analysis process that addresses the specific impacts to MHAFB and its environs. This Tier 1 EIS, in addition to evaluating the specific impacts of the MHAFB realignment actions, identifies and evaluates in general terms the potential expansion of range capability in southwestern Idaho and any reasonable alternatives available to meet training requirements. Air Force short-term, intermediate, and long-term training requirements are also identified in this Tier 1 EIS. Tier 1 will contribute to the decision to either proceed further with detailed studies and analysis for a range capability expansion in southwestern Idaho, or to select other alternatives. This Tier 1 EIS provides the initial framework (operational requirements, range development criteria, environmental attributes for the area, and description of environmental impacts associated with ranges) for use in a subsequent Tier 2 EIS if the decision is made to pursue a range expansion option.

This Tier 1 EIS will be completed in June 1990, and will conclude with a Record of Decision (ROD). The ROD will include decisions regarding the impacts of (1) relocating the 94 F-4E/G aircraft from George AFB; (2) removing the F-111 aircraft from MHAFB; (3) proposed modifications to special use airspace; (4) a proposal to allow supersonic operations above 5,000 feet AGL in Idaho special use airspace; and (5) whether to proceed further with ongoing studies to expand range capability in southwestern Idaho. The Air Force is currently participating in a citizen/government working group being facilitated by the Bureau of Land Management (BLM) to help ensure that all public concerns regarding the proposed expansion of range capability are addressed. The working group process will be conducted in parallel to Tier 1 and will develop proposals and alternatives to be evaluated in Tier 2 to meet short, intermediate, and long-term Air Force requirements.

The Tier 2 EIS is currently scheduled to begin in the spring of 1990 to evaluate alternatives for determining the exact size and location of an expanded range capability. Tier 2 would be a complete NEPA process for an EIS. It would include a Notice of Intent, public scoping meetings, public hearing and comment on a Draft EIS, and filing of a Draft and Final EIS with the Environmental Protection Agency (EPA), followed by a ROD. The subjects evaluated in Tier 2 will evolve through the NEPA process, including scoping meetings. This tiered approach permits

evaluation of the environmental impacts associated with the proposed expanded range capability at each phase of the planning process.

The MHAFB realignment is a result of the recommendations of the Defense Secretary's Commission on Base Realignment and Closure and legislative requirements in the Base Closure and Realignment Act (Public Law 100-526). This action, designed to improve efficiency in the Department of Defense, resulted in a series of base and facility closings and realignments. The MHAFB realignment results in increased activity at MHAFB and increased demand for use of the Saylor Creek Range (SCR) and associated airspace. The realignment will add 94 F-4E and G aircraft and transfer out 35 F-111A aircraft for a net increase of 59 aircraft at MHAFB. EF-111A aircraft currently based at MHAFB will not be moved. Realignment will result in a net increase of approximately 2,000 to MHAFB's current 4,250 personnel. The proposed expanded range capability would meet the expanded training requirements and improve training efficiency for the expanded MHAFB and for other missions. Volume II of this EIS examines at a programmatic level the proposed expanded range capability, proposed changes to special use airspace, the increased use of low-level military training routes, and proposed supersonic maneuvers at altitudes higher than 5,000 feet above ground level.

For MHAFB, the existing environment consists of a base-oriented supportive community, the city of Mountain Home, and a sparsely populated area of southern Idaho. The city of Mountain Home (population 8,900) is located in Elmore County (population 23,500), an agricultural and government-employee-based county in southern Idaho. Residents praise the relatively mild climate, low cost of living, low crime rate, and access to recreation when describing what they value in their community.

The study area evaluated for a proposed expanded range capability includes parts of Elmore County, but is chiefly in Owyhee County (population 8,400). The local residents are principally dependent upon ranching and agriculture. The rural natural environment has been impacted by grazing but remains relatively undisturbed by people. It is an environment where observant visitors may become aware of an inquisitive pronghorn scrutinizing their every move. It also is an area where Air Force aircraft on training missions have been part of the existing environment for many years.

Table M-1 summarizes the resources addressed as a result of public input during scoping, impacts by resource, and potential mitigations for the MHAFB realignment. Impacts on the city of Mountain Home will result from increased population and community expansion. In most cases, the negative impacts can be mitigated through proper planning, improvements in needed services, and coordinated efforts among local, state, and federal agencies.

Table S-1 summarizes the corresponding information for a proposed expanded range capability. The impacts of this proposed action were assessed at a programmatic level of analysis. Though many of these impacts were evaluated as potentially significant, the level of impact will be better defined in site-specific analyses performed for Tier 2.

The primary impacts of an expanded range capability result from aircraft overflights, land withdrawal, and ground disturbance. These impacts include fires and other ground disturbances associated with ordnance delivery, displaced economic activities, sonic booms from high altitude maneuvering, and low-level training flights in sensitive areas. Avoidance of identified sensitive areas can reduce the direct overflight impacts.

However, as Table S-1 demonstrates, there will be substantial difficulty in formulating a package of mitigations that will be acceptable to all involved parties. As part of this programmatic level EIS, decisionmakers will evaluate the needs of different involved parties and seek to balance the use and protection of southwestern Idaho's natural and human environment.

Decisionmakers at the local, state, federal, and other levels will need to coordinate their efforts to define how best to meet and resolve potential conflicts. At the heart of the issue is the future of Air Force operations in Idaho into the 21st century. Limited funds and potential reductions in DOD resources will affect future decisions. There presently exists, and there will be in the future, an acute need for cost-effective training areas that permit the use of today's aircraft and can be adapted to tomorrow's. Over the next decade, limited Air Force resources must be channeled to where adaptability and efficiency can be supported by local communities and the surrounding region. The proposed expanded range capability, combined with continued positive relationships among local residents, BLM, the Air Force, and others, has the potential to make MHAFB one of the most valuable assets in the Air Force inventory. This Tier 1 EIS is one tool designed to contribute to the decisionmaking process. The decisions will not be easy and cannot be unilateral.

Table M-1

SUMMARY OF MOUNTAIN HOME AIR FORCE BASE REALIGNMENT POTENTIAL IMPACTS AND MITIGATIONS

Potential Impact	*Evaluation of Significance*	*Potential Mitigations*
AIRSPACE MANAGEMENT		
o Increased military air traffic in MHAFB vicinity.	Moderate but insignificant impact.	None required.
o Congested terminal area airspace.	Potentially significant impact.	Upgrade MHAFB air traffic control capability. Establish new approach and departure procedures between MHAFB and Salt Lake City Air Route Traffic Control Center.
AIR RESOURCES		
o Increase in aircraft emissions.	Moderate but insignificant impact.	None required.
o *Fugitive dust from* construction activities.	*Moderate* but insignificant impact.	Use water for dust suppression. Minimize time period that newly graded sites are exposed.
NOISE		
o Increase in day and night air operations.	Moderate but insignificant impact.	None required.
BIOLOGICAL RESOURCES		
o Construction activities		
- On base	No significant impact.	None required.
- Off base	Moderate but insignificant impact.	Survey off-base construction sites for presence of habitats suitable for threatened and endangered species. Comply with Endangered Species Act. Avoid wetlands and riparian habitats.

Table M-1

SUMMARY OF MOUNTAIN HOME AIR FORCE BASE REALIGNMENT POTENTIAL IMPACTS AND MITIGATIONS

Potential Impact	*Evaluation of Significance*	*Potential Mitigations*
o Increased aircraft operations.	Potentially significant impact.	Monitor raptor nest sites and population along runway flight paths. Work with BLM to mitigate significant effects. Analyze bird-aircraft strike data. Work with BLM to modify significant effects.
o Population increase.	Potentially significant impact.	Provide information to realignment-related personnel regarding Idaho game laws and BLM seasonal restrictions on recreation. Coordinate MHAFB recreational program with BLM monitoring program for recreational effects on biological resources.
CULTURAL RESOURCES		
o Construction activities.		
- On base	Moderate but insignificant impact.	Develop Programmatic Agreement (PA) and Management Plan outlining procedures for handling/documenting cultural resources.
- Off base	Potentially significant impact.	Mitigation procedures in PA and management plan will mitigate impacts.
o Increased population.	Potentially significant impact.	Develop educational information for MHAFB realignment-related personnel regarding cultural resources. Monitor recreational effects on cultural resources.
VISUAL RESOURCES		
o On-base construction.	No significant impact.	None required.
o Increased flight activity.	No significant impact.	None required.

Table M-1

SUMMARY OF MOUNTAIN HOME AIR FORCE BASE REALIGNMENT
POTENTIAL IMPACTS AND MITIGATIONS

Potential Impact	*Evaluation of Significance*	*Potential Mitigations*
o Off-base construction.	Moderate but insignificant impact.	Encourage rehabilitation of historic structures. Encourage residential or commercial expansion consistent with city of Mountain Home Land Use Plan, particularly on urban design portion of the plan.
EARTH RESOURCES		
o Construction activity effects on topography and soils.	Moderate but insignificant impact.	Minimize size of areas distributed by construction. Stockpile and protect soils that have been displaced. Landscape and revegetate disturbed areas.
o Increased popuiation effects on cave and paleontological resources.	Potentially significant impact.	Identify resources susceptible to impacts. Limit access to and monitor known resources. Educate public to the value of resources. Work with BLM and other state and federal agencies to reduce adverse effects.
LAND USE		
o Increased flight activity.	Moderate but insignificant impact.	None required.
o Increased population effects on residential and recreation resources.		
- Urban land	Moderate but insignificant impact.	Encourage dispersal of residential development in city of Mountain Home and vicinity. Work with Elmore County Impact Steering Committee and local government officials in planning for possible park expansion.

Table M-1

SUMMARY OF MOUNTAIN HOME AIR FORCE BASE REALIGNMENT POTENTIAL IMPACTS AND MITIGATIONS

Potential Impact	*Evaluation of Significance*	*Potential Mitigations*
- Rural/wilderness land	Potentially significant impact.	Coordinate MHAFB excursion programs with land use management agencies to minimize impacts on overused recreation resources. Conduct periodic education programs to promote safe and appropriate use of ORVs.
TRANSPORTATION		
o Increased traffic.	Moderate but insignificant impact.	Retime signal at intersection of I-84B and SH67 for peak hours. Stagger MHAFB working hours to decrease peak-hour traffic. Support intersection improvement and underpass replacement program.
SOCIOECONOMICS		
o Increased population effects		
- Housing	Potentially significant impact.	Implement development of on-base housing. Pursue development of section 801 housing in city of Mountain Home and vicinity. Encourage development of new or rehabilitation of existing housing.
- Education	Potentially significant impact.	Work with Elmore County Impact Steering Committee and local government officials to conduct further analysis to determine more precisely facility and personnel needs, including possible financial needs.
- Community facilities and services	Potentially significant impact.	Work with Elmore County Impact Steering Committee and local government officials to identify solutions to community facility and service needs, including those for police and fire protection.

Table M-1

SUMMARY OF MOUNTAIN HOME AIR FORCE BASE REALIGNMENT POTENTIAL IMPACTS AND MITIGATIONS

Potential Impact	*Evaluation of Significance*	*Potential Mitigations*
WATER RESOURCES		
o Increased population-generated demand.	No significant impact.	None required.
SAFETY		
o Increased flight operations		
- Fire/mishaps	Potentially significant impact.	Assign additional equipment to flightline and crash safety. Increase disaster response training for potential mishaps.
- Bird strikes	Moderate but insignificant impact.	Follow BASH plan and related procedures to minimize bird-strike potential.
- Hazardous materials	No significant impact.	None required.
o Construction activity		
- Asbestos	No significant impact.	None required.
o Increased on-base population		
- New housing	Potentially significant impact.	Consider an additional fire house and the acquisition of additional equipment and personnel.

Table S-1

SUMMARY OF PROPOSED EXPANDED RANGE CAPABILITY POTENTIAL IMPACTS AND MITIGATIONS

Potential Impact	*Evaluation of Significance*	*Potential Mitigations*
AIRSPACE MANAGEMENT		
o Potential conflicts with general aviation due to increased military flight operations.	Moderate but insignificant impact.	Coordinate with FAA and Salt Lake City Air Route Traffic Control Center for additional MOA and ATCAA airspace. Disseminate scheduled military activity in special use airspace to civil pilots in area. Coordinate release of unscheduled MOA and restricted airspace back to civil ATC control. Upgrade radar coverage in special use airspace. Avoid public use airports in vicinity by 3 NM or 1,500 feet AGL. Note airports in military aeronautical charts and FLIP.
AIR RESOURCES		
o Fugitive dust from construction.	Moderate but insignificant impact.	Use water for dust suppression.
o Fugitive dust from operations.	Potentially significant impact.	Use soil stabilizers or wetting agents on firebreaks. Establish windbreaks. Use gravel or wetting agents on parking areas.
o Plume blight from aircraft.	Potentially significant impact.	Avoid Jarbidge Wilderness Area.
NOISE		
Subsonic		
o Increased noise level, startle effect.	Potentially significant impact.	Minimize or avoid overflight of sensitive receptors through horizontal and vertical separation.
Supersonic		
o Overpressure, startle effect.	Potentially significant impact.	Minimize or avoid overflight of sensitive receptors through horizontal and vertical separation.

Table S-1

SUMMARY OF PROPOSED EXPANDED RANGE CAPABILITY POTENTIAL IMPACTS AND MITIGATIONS

Potential Impact	*Evaluation of Significance*	*Potential Mitigations*
BIOLOGICAL RESOURCES		
Vegetation		
o Removal of vegetation.	Potentially significant impact.	Restrict grazing to restore habitat value in exclusive use areas.
o Intrusion of non-native species in disturbed areas.	Potentially significant impact.	Seed with native species. Monitor composition of plant communities. Work with BLM to minimize adverse impacts.
o Fires from live ordnance and flares.	Potentially significant impact.	Minimize live ordnance use.
Wildlife (especially mule deer, pronghorn, bighorn sheep)		
o Loss of habitat.	Potentially significant impact.	Conduct site-specific surveys. Locate targets and other range facilities away from sensitive areas. Work with BLM and state and local governments to mitigate impacts.
o Startle response.	Potentially significant impact.	Site targets away from canyons. Limit low-altitude flights over canyons.
o Fire hazard.	Potentially significant impact.	Limit the use of live ordnance and flares.
Birds (especially raptors)		
o Increased human presence.	Potentially significant impact.	Identify and avoid nest sites. Plan construction sites to avoid sensitive habitat.
o Startle response and bird-aircraft strikes.	Potentially significant impact.	Minimize low-altitude flights over canyons.

Table S-1

SUMMARY OF PROPOSED EXPANDED RANGE CAPABILITY
POTENTIAL IMPACTS AND MITIGATIONS

Potential Impact	*Evaluation of Significance*	*Potential Mitigations*
CULTURAL RESOURCES		
Archaeological, Historical, and Architectural		
o Construction activities and use of ordnance.	Potentially significant impact.	Develop a Programmatic Agreement and Management Plan. Conduct site-specific Class II and III surveys.
o Increased access leading to vandalism.	Potentially significant impact.	Restrict access and monitor resources.
o Overflight vibration to historic structures.	Moderate but insignificant impact.	Identify any historic structures. Minimize impacts through avoidance.
Native Americans		
o Disturbance to sacred sites.	Potentially significant impact.	Consultation with Native Americans to avoid sites.
o Noise intrusion on sacred ceremonies.	Potentially significant impact.	Limit overflights and coordinate in regard to ceremonies.
VISUAL RESOURCES		
o Construction of facilities in Visual Resource Management Class II areas.	Moderate but insignificant impact.	Avoid construction of range facilities in Owyhee and Bruneau/Jarbidge canyon systems and Wilderness Study Areas in ROI. Work with BLM to mitigate impacts.
o Aircraft overflight activities.	Potentially significant impact.	Limit flights along long axis of sensitive areas within MOAs (e.g., river canyons). Maintain maximum feasible horizontal or vertical separation from sensitive receptors along MTRs.

Table S-1

SUMMARY OF PROPOSED EXPANDED RANGE CAPABILITY POTENTIAL IMPACTS AND MITIGATIONS

Potential Impact	*Evaluation of Significance*	*Potential Mitigations*
EARTH RESOURCES		
o Restricted access to areas of interest to geologists and miners.	Potentially significant impact.	Conduct mineral resources survey in study area. Coordinate with BLM and other agencies to provide maximum feasible access.
o Disturbance to soils and potential for erosion.	Moderate but insignificant impact.	Identify and avoid areas with high potential for erosion (e.g., steep slopes). Prepare dust control and erosion plan. Minimize size of disturbed area associated with construction sites. Surface heavily used roads and parking areas (e.g., gravel).
o Increased access to caves and paleontological sites.	Potentially significant impact.	Identify resources susceptible to impacts. Avoid construction in areas of high potential. Mitigate site disturbance if avoidance not possible. Limit access to and monitor known resources. Educate public to value of resources.
LAND USE		
o Reduction in private land ownership or restricting access to grazing and water allotments.	Potentially significant impact.	Compensate private land owners. Minimize the development of exclusive use areas on private land. Work with BLM to minimize impacts.
o Aircraft overflights of recreation areas, especially primitive recreation areas.	Potentially significant impact.	Minimize low-level flights over sensitive recreation areas. Curtail low-level flights during specified times of the year when recreational activities increase (e.g., whitewater boating in the spring). Work with concerned agencies -- federal and state -- to minimize impacts.

Table S-1

SUMMARY OF PROPOSED EXPANDED RANGE CAPABILITY POTENTIAL IMPACTS AND MITIGATIONS

Potential Impact	*Evaluation of Significance*	*Potential Mitigations*
TRANSPORTATION		
o Potential changes to road network.	No significant impact.	None required.
o Increase in traffic in area.	No significant impact.	None required.
SOCIOECONOMICS		
o Land withdrawal effect on livestock grazing and mining activities.	Potentially significant impact.	Allow continued access to grazing, mining, and water rights. Compensate for loss of grazing, mining, and water rights on public lands. Minimize acquisition of private lands.
o Land withdrawal effect on Owyhee County revenues.	Potentially significant impact.	Minimize acquisition of private land where possible.
o Economic impacts of overflights.	Moderate but insignificant impact.	Coordinate training activities with recreational use patterns and monitor noise complaints to identify sensitive receptors.
WATER RESOURCES		
o Restriction of access to water rights.	Potentially significant impact.	Negotiate with individual users to protect access to existing water rights. Minimize limitations on access to water rights.
SAFETY		
Flight Risks		
o Increased flight operations would increase the risks associated with bird strikes and the potential for mishaps.	Moderate but insignificant impact.	Follow BASH procedures. Increase disaster response training requirements.

Table S-1

SUMMARY OF PROPOSED EXPANDED RANGE CAPABILITY POTENTIAL IMPACTS AND MITIGATIONS

Potential Impact	*Evaluation of Significance*	*Potential Mitigations*
Aircraft Malfunctions		
o Hung ordnance.	No significant impact.	None required.
Fire		
o Wildfires from ordnance.	Potentially significant impact.	Limit use of live ordnance. Expand fire detection capability. Increase fire prevention and suppression capability.
o Intrusion by more flammable vegetation.	Potentially significant impact.	Reseed with native species.
Hazardous Materials		
o Increased use of ordnance.	No significant impact.	None required.
o Increased fuels and lubricants for equipment.	No significant impact.	None required.

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Acronyms and Abbreviations

AAA	Antiaircraft Artillery
ACBM	asbestos-containing building materials
ACEC	Areas of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
ACM	Air Combat Maneuvers
ACMI	Air Combat Maneuvering Instrumentation
ACT	Air-to-Air Combat Training
ADA	Average Daily Attendance
ADT	average daily traffic
AFB	Air Force Base
AFFIRMS	Automated Forest Fire Information Retrieval Management System
AFR	Air Force Regulation
AGE	Aerospace Ground Equipment
AGL	above ground level
AGM	air-to-ground missile
AHC	aircraft handling characteristics
AICUZ	Air Installation Compatible Use Zone
ALC	Air Logistics Center
ALCM	air-launched cruise missile
APZ	Accident Potential Zone
AQAM	Air Quality Assessment Model
ARTCC	air route traffic control center
ASP	ammunition storage point
ASR	airport surveillance radar
ATIS	automatic terminal information service
ATV	all-terrain vehicle
AUM	animal unit month
BAI	Battlefield Air Interdiction
BASH	bird-aircraft strike hazard
BFM	basic fighter maneuvers
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BOPA	Birds of Prey Area
B.P.	before present
BRA	Bruneau Research Area
CAS	Close Air Support
CERCLA	Comprehensive Environmental Responses, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CFT	composite force training
CHABA	Committee on Hearing, Bioacoustics, and Biomechanics
CRMP	Cultural Resource Management Plan
CSEL	C-weighted sound exposure level
CZ	Clear Zone
DACT	dissimilar air combat training
DAR	defense access roads
dB	decibel
DEIS	Draft Environmental Impact Statement
DOD	Department of Defense
DOI	Department of the Interior
DOPAA	Description of Proposed Action and Alternatives
DOT	Department of Transportation
ECISC	Elmore County Impact Steering Committee
ECM	Electronic Counter-Measures
ECS	Electronic Combat Squadron
EDA	Economic Development Administration
EIS	environmental impact statement
EOP	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
EW	electronic warfare
EWO	electronic weapons officer
FAA	Federal Aviation Administration
FCF	functional check flight
FEBA	Forward Edge of Battle Area
FEIA	Federal Education Impact Aid
FEIS	final environmental impact statement
FIA	fiscal impact assessment
FL	flight level
FLIP	Flight Information Publication
FLPMA	Federal Land Policy and Management Act
FMZ	Fire Management Zone
FmHA	Farmers Home Administration
FTU	Formal Training Unit
gpm	gallons per minute
HMA	housing market area
HUD	Housing and Urban Development
Hz	Hertz
IANG	Idaho Air National Guard
IAQB	Idaho Air Quality Bureau
IBHW	Idaho Board of Health and Welfare
IDFG	Idaho Department of Fish and Game
IDOT	Idaho Department of Transportation
IDWR	Idaho Department of Water Resources
IFR	Instrument Flight Rules
IRP	Installation Restoration Program
JRA	Jarbidge Research Area
KGRA	Known Geothermal Resource Area

KTAS	knots true airspeed
LADL	low-altitude drogue delivery
LCR	local contribution rate
LC_{dn}	day-night average C-weighted sound level
L_{dn}	day-night average sound level
LOS	level of service
LTRA	long-term response action
LTO	landing and take-off
MATES	mobilization and training equipment site
MDS	Mission Debriefing System
MFH	Military Family Housing
mg	million gallons
mgd	million gallons per day
MHAFB	Mountain Home Air Force Base
MOA	Military Operations Area
MPRC	multipurpose range complex
MSL	mean sea level
MTR	Military Training Route
NAAQS	National Ambient Air Quality Standards
NDEP	Nevada Division of Environmental Protection
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NM	nautical mile
NOI	Notice of Intent
NPL	National Priorities List
NRHP	National Register of Historic Places
NWF	National Wildlife Refuge
NZ	noise zone
O&M	operations and maintenance
ODEQ	Oregon Department of Environmental Quality
OEA	Office of Economic Adjustment
ORA	Owyhee Research Area
ORV	off-road vehicle
OSHA	Occupational Health and Safety Act
OTA	Orchard Training Area
PA	programmatic agreement
PFT	programmed flying training
PILT	payments in lieu of taxes
PLO	Public Land Orders
ppm	parts per million
psf	pounds per square foot
RA	Resource Area
RAPCON	Radar Approach Control
RCAG	remote communications air/ground
RCO	range control officer
RCRA	Resource Conservation and Recovery Act
RHC	reactive hydrocarbons
RIMS II	Regional Input/Output Modeling System II
RIS	Range Instrumentation System
RMP	Resource Management Plan
ROI	region of influence
ROD	record of decision
RTU	replacement training unit
SAC	Strategic Air Command
SAM	Surface-to-Air Missile
SARA	Superfund Amendments and Reauthorization Act
SCR	Saylor Creek Range
SEL	sound exposure level
SHPO	State Historic Preservation Office
SNRA	Sawtooth National Recreational Area
SOA	supersonic operations area
SOF	supervisor of flying
SRMA	Special Recreation Management Area
TAC	Tactical Air Command
TFW	Tactical Fighter Wing
TFTW	Tactical Fighter Training Wing
TFTS	Tactical Fighter Training Squadron
TFWC	Tactical Fighter Weapons Center
TO	Touch and Go
THC	total hydrocarbons
TOSS	Television Ordnance Scoring System
TSP	total suspended particulates
UBAQ	Utah Bureau of Air Quality
UBC	Uniform Building Code
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USFWS	U.S. Fish and Wildlife Service
USFS	U.S. Forest Service
USGS	U.S. Geologic Survey
UST	underground storage tanks
UTTR	Utah Test and Training Range
VFR	Visual Flight Rules
VQO	Visual Quality Objectives
VRM	Visual Resource Management
VMS	Visual Management System
WSA	Wilderness Study Area
WSO	weapon systems officer

FOREWORD

Recently, the Air Force met with a number of Idaho residents to discuss the proposal for an expanded range capability. This included scoping meetings in accordance with the National Environmental Policy Act in early September in Boise, Twin Falls, Glenns Ferry, and Grand View. Additional meetings were held in October with state and local officials, local trade associations, environmental organizations, businessmen, and representatives of the Bureau of Land Management. As a result of public input from these meetings, the Air Force, with BLM, adjusted the environmental impact analysis process for the realignment of Mountain Home Air Force Base (MHAFB) and the accompanying proposal to expand range capability. A two-tiered Environmental Impact Statement (EIS) approach was developed. Tier 1 will assess the impacts of the MHAFB realignment and the generic impacts of a proposed expanded range capability. If a decision is made to pursue a range expansion option, the site-specific impacts of a proposed expanded range capability and alternatives would be addressed in a Tier 2 EIS. Although airspace actions and decisions may be made as a result of the Tier 1 EIS, no range boundary decisions would be made until after the completion of the Tier 2 EIS.

During the scoping process, the Air Force received considerable public input regarding issues that need to be addressed. Most of the comments related to a proposed expansion of range capability, and not the realignment of MHAFB. Public and agency concern was expressed regarding impacts from proposed supersonic flight activity, impacts on recreational resources, effects upon ranching and grazing, threats to public safety, and numerous other issues. These issues are addressed programmatically in the Tier 1 EIS. More detailed, site-specific analyses would be performed for the Tier 2 EIS. Consequently, public scoping comments pertaining to potential site-specific impacts of the proposed expansion of range capability would be incorporated in the Tier 2 EIS.

The Air Force is committed to working with the people of Idaho to complete a process by which everyone can fully understand the proposals, alternatives, and potential impacts related to expanding range capability. The Air Force recognizes the need for public comment and participation in the decisions regarding a proposed expansion of range capability.

1.0 PURPOSE OF AND NEED FOR THE ACTIONS

1.1 INTRODUCTION

1.1.1 The Commission on Base Realignment and Closure

The Defense Secretary's Commission on Base Realignment and Closure (Commission or CBRC) was chartered on 3 May 1988 by the Secretary of Defense to recommend military installations within the United States, its commonwealths, territories, and possessions for realignment and closure. Subsequently, the Base Realignment and Closure Act (Public Law 100-526, 24 October 1988) endorsed the Secretary's Commission and required the Secretary of Defense to implement its recommendations unless he rejected them in their entirety or the Congress passed (and the President signed) a Joint Resolution Disapproving the Commission's recommendations.

The primary criterion used by the Commission for identifying candidate bases was the military value of the installation. However, cost savings were also considered, as were the current and projected plans and requirements for each military service. Lastly, the Commission focused its review on military properties and their uses, not military units or organizational/administrative issues.

On 29 December 1988, the Commission recommended the realignment and closure of 145 military installations. Of this number, 86 are to be closed fully, 5 are to be closed in part, and 54 will experience a change (either an increase or decrease) as units and activities are relocated.

On 5 January 1989, the Secretary of Defense approved those recommendations and announced that the Department of Defense would implement them. The Congress did not pass a Joint Resolution disapproving the recommendations within the time allotted by the Act.

Therefore, the Act now requires the Secretary of Defense, as a matter of law, to implement those closures and realignments. Implementation must be initiated by 30 September 1991, and must be completed no later than 30 September 1995. Thus, the realignment portion of this environmental impact statement (EIS) addresses only implementation; realignment decisions are by law final.

As part of the realignment and closure decisions, the Commission determined that the Tactical Air Command (TAC) assets at George Air Force Base (AFB), California, should be relocated. Mountain Home AFB (MHAFB), Idaho, was selected to receive the majority of the George AFB assets. The Air Force is preparing this EIS to examine and evaluate the impacts of implementing the decision to relocate the aircraft, equipment, and personnel to MHAFB. This EIS also assesses the generic impacts of a proposed expanded range capability. The Council on Environmental Quality (CEQ) has

confirmed the requirement for the Air Force to assess the impact of a proposed expanded range capability as part of the same EIS process as the base realignment.

Although this EIS addresses the impacts of both the realignment and a proposed expanded range capability, realignment of forces at MHAFB is not contingent upon an expansion of MHAFB's air-to-ground range, the Saylor Creek Range (SCR). However, the proposal for an expanded range capability in the vicinity of MHAFB is designed to improve the efficiency of training opportunities and avoid either costly deployments or elimination of some training operations. The Commission recognized a preliminary range expansion proposal and commented in their report that the military services should take steps to combine, consolidate, and expand airspace and training ranges to ensure a combat capability for the future.

1.1.2 Purpose and Need

1.1.2.1 Mountain Home Air Force Base Realignment

The Commission recommended transfer of assets from George AFB to MHAFB involving 94 F-4E and F-4G electronic combat aircraft and approximately 3,500 personnel. To accommodate the additional aircraft and personnel at MHAFB, the 366th Tactical Fighter Wing (TFW) at MHAFB will transfer 35 F-111A aircraft and approximately 1,600 personnel to other units. This will result in a net increase of 59 aircraft operating from MHAFB. The realignment of MHAFB will enhance command and control of electronic warfare operations by consolidating F-4 electronic combat and surface-to-air suppression functions with EF-111 electronic jamming air defense suppression aircraft (described in Appendix A) and will increase mission effectiveness at a reduced cost. The nature of the missions and combat roles assigned to the F-4s being transferred to MHAFB will require more range time per aircraft than for the departing F-111As.

1.1.2.2 Proposed Expanded Range Capability

Background

The SCR, located in southwestern Idaho, is one of TAC's smallest air-to-ground ranges. The SCR has historically supported the training needs of units located at MHAFB, the Idaho Air National Guard (IANG) stationed in Boise, Strategic Air Command (SAC) units based in the northwest, and TAC units based at Nellis AFB, Nevada; Cannon AFB, New Mexico; and other TAC units. Increasing activity of current users as well as increased demand as a result of the Base Closure and Realignment Act will result in increased range requirements near MHAFB.

In early 1984, the 366 TFW at MHAFB recognized a need to expand the SCR to accommodate the training realism shortfall for the F-111 mission and the new EF-111 electronic combat mission. A broad-based, long-range internal evaluation of the greater Saylor Creek vicinity was prepared to determine the potential for an expanded capability to serve aircraft systems requirements. Preliminary results indicated that there was substantial potential to meet Air Force range needs near MHAFB; thus, the Air Force began a formal effort to develop an expansion proposal and alternatives. The Air Force planned to begin the public scoping process under NEPA in early fall 1989.

In January 1989, while the Air Force was still conducting the preliminary work on their proposal to expand the SCR, the Secretary of Defense's Commission recommended the MHAFB realignment. This highlighted a need for an expanded range capability that would enable the Air Force to meet its current and future training requirements. In addition, airspace modification in the vicinity of MHAFB would be required to permit aircrews at MHAFB to fulfill their intercept and air-to-air mission requirements.

Range Characteristics

The training of tactical fighter aircrews, using the latest operational weapons systems and tactics, is the foundation upon which the Air Force builds, maintains, and ultimately achieves combat readiness of its operational fighter forces.

Air Force range complexes provide the only peacetime arena for aircrews to practice combat training. A range and its airspace must be sufficient in scope and depth to allow aircrews to train daily with a realistic mix of operational weapons, tactics, and electronic combat systems. These specialized ranges provide a unique simulated combat training environment in which aircrews can learn how to most effectively use their airborne weapons systems to successfully attack assigned targets. A conceptual or generic range complex is shown in Figure 1.1-1.

It is Air Force policy for all range complexes to be planned, developed, maintained, and improved consistent with their unique potential to provide realistic environments for training and testing. Realism in both threat and target design is important for today's range complexes since they represent the only peacetime opportunity for aircrews to practice necessary combat skills with the actual weapons systems and tactics they would employ in combat. It is essential for combat readiness that tactical fighter aircrews train as they will fight.

For scheduling purposes, available range hours are divided into periods. The length of this period is predicated upon several factors, including training requirements of the users, fuel endurance, scenario, or type of mission, etc. The optimum length, considering these factors and scheduling effectiveness, is 30 minutes per period. Therefore, when defining range capacity, it is necessary to quantify the requirement in terms of available periods. The number of sorties associated with one period varies

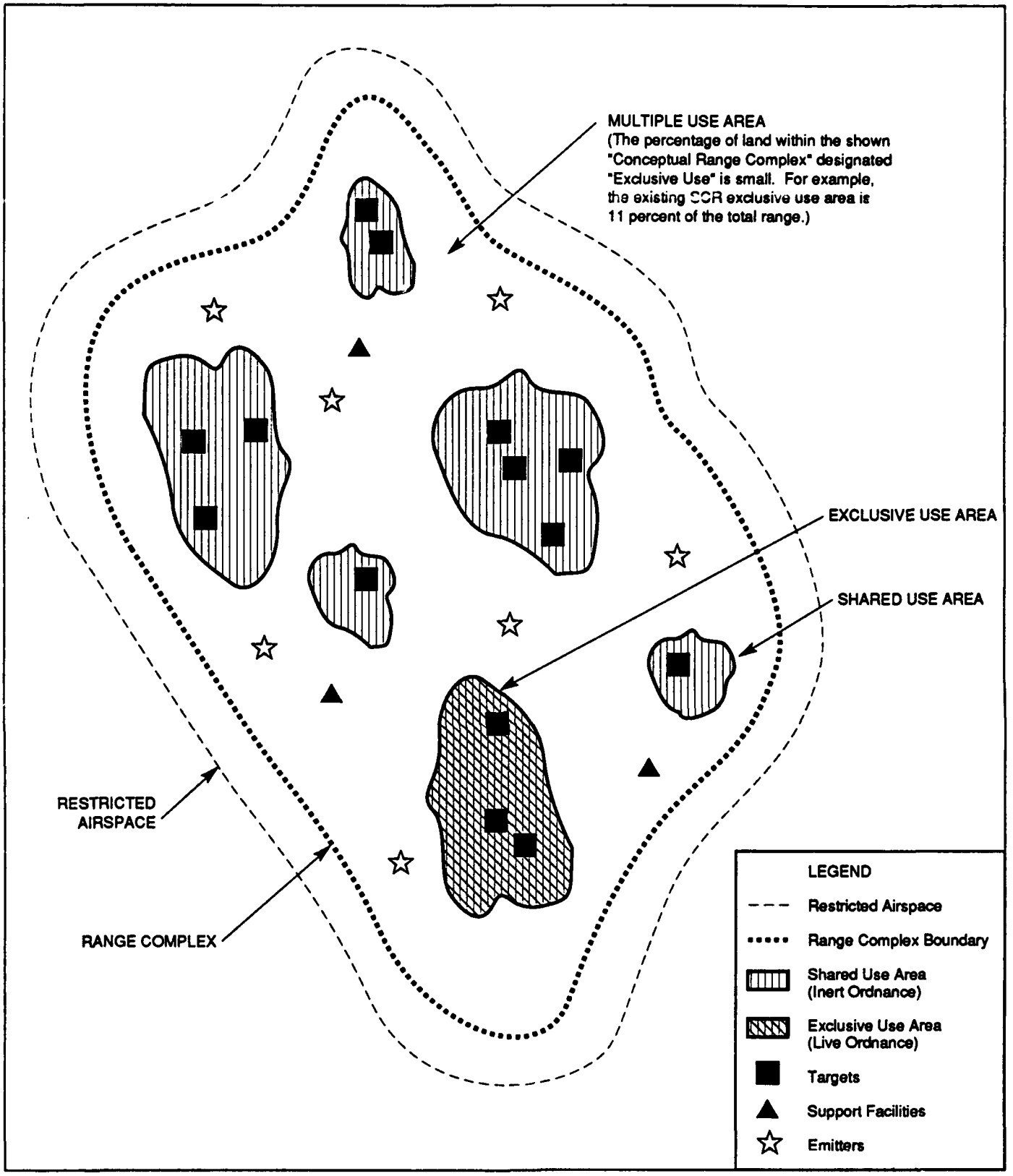


Figure 1.1-1

CONCEPTUAL RANGE COMPLEX LAYOUT

according to the user's type of aircraft, mission, and training objectives. For instance, most F-4 and F-16 missions involve either two or four aircraft while an EF-111 mission may involve only a single aircraft.

Optimizing the utility of individual range complexes is best achieved by tailoring them to the operational mission of the local unit. Considerable planning is required to acquire suitable airspace (i.e., restricted airspace, military operations areas [MOAs], and military training routes [MTRs]) and real estate. The Air Force coordinates with cooperating federal, state, and local agencies and the public to ensure multiple use can be achieved whenever possible. The objective is to maximize local mission training requirements within the available lands and airspace and minimize the impact on the public.

Safety considerations for the public and the military are paramount in range complex design. Aircrew safety is provided through central range control and flight pattern design. Civilians and their property are provided maximum protection through careful planning and ongoing review and analysis of range procedures.

Range complex land and airspace management are coordinated by the Air Force with all other users. This minimizes conflicts between a specific type of public use and Air Force mission requirements. In the case of the SCR, grazing is the primary public land use. Grazing is managed by the Bureau of Land Management (BLM) based on Public Land Orders (PLO) 1027 and 4092. The majority (almost 90 percent) of the SCR, approximately 97,000 acres of the total 109,000 acre withdrawal area, is available for multiple use, and public access is not restricted. For safety considerations, a small portion of the withdrawal area at the SCR, the 12,000-acre impact area, is fenced and designated as "exclusive use" for the Air Force.

Current Capability

The current capacity of the SCR is approximately 3,700 range periods per year.[1] With perfect scheduling and 100-percent utilization of available days (225 days per year), there should be a total of 5,400 range periods available per year on the range. However, experience has shown that 63 to 68 percent effective utilization is realistic, which means that between 3,400-3,700 effective periods can actually be used. This reduced capacity results from unflyable weather at the range or base, aircraft problems causing cancellation of the flight, non-effective student training, and unscheduled non-flying days (i.e., exercises, no-fly days, and safety days). The projected 225 use-days are extracted from the current and forecasted MHAFB programmed flying training (PFT) calenders. PFT calenders are developed from historical data and operational experience to provide a baseline number of flying days

1. When calculating actual usable range periods, the present range is considered a conventional range. Appendix B contains definitions of conventional and electronic combat ranges.

available to an Air Force base. At MHAFB, the baseline number of flying days on the PFT is 225 days. Planners use the PFT calenders to develop annual training programs and flying hour projections.

The range has a limited inventory of electronic combat equipment and cannot accommodate complex tactics, escape maneuvers, weapon deliveries, and composite-force training that must be applied in realistic combat training exercises. In addition, the 12,000-acre impact area is among the smallest in the TAC inventory, and no live ordnance can be dropped.

The size of the SCR also limits the range flexibility and imposes constraints on training (e.g., restricted range bombing patterns) that severely degrades realism. As a result, aircrews attack the same targets, in the same location, from the same direction, in the same ways, day after day -- a situation atypical of a real combat environment. Such an unrealistic environment creates bad habit patterns that could be carried into combat.

Need for an Expanded Range Capability

SHORT-TERM NEEDS. After realignment, the mission of EF-111 and F-4 aircraft based at MHAFB will be defense suppression through electronic jamming of enemy air defense radars by EF-111s; and destruction of enemy surface-to-air radars and missile sites by F-4E/Gs. Electronic combat training for MHAFB EF-111s and F-4s will require a range complex that electronically and physically replicates an enemy air defense and target array to include both electronic emitters, ground targets, and the land and airspace around them.

INTERMEDIATE-TERM NEEDS. There will be a need for an expanded range capability to allow for more electronic combat threats and targets, as well as a need for more practice ordnance areas and live ordnance areas. To optimize Air Force training requirements for MHAFB in addition to other projected users, an expanded range complex should be tailored to give aircrews the visual and electronic appearance of a high-intensity battlefield that is defended in depth. This requires two sets of geographically separated enemy lines of defense and a variety of deep interdiction targets to provide composite-force training. It also calls for numerous electronic combat threats and state-of-the-art electronic scoring instrumentation throughout the simulated battlefield (see figures 1.1-2 and 1.1-3).

LONG-TERM NEEDS. New aircraft, new tactical missions, and enemy weapons systems upgrades require the Air Force to build as much flexibility as possible into range design today, to prepare for the long-term challenges of the future.

Additional discussion of short-term, intermediate-term, and long-term requirements is provided in Chapter 2.0.

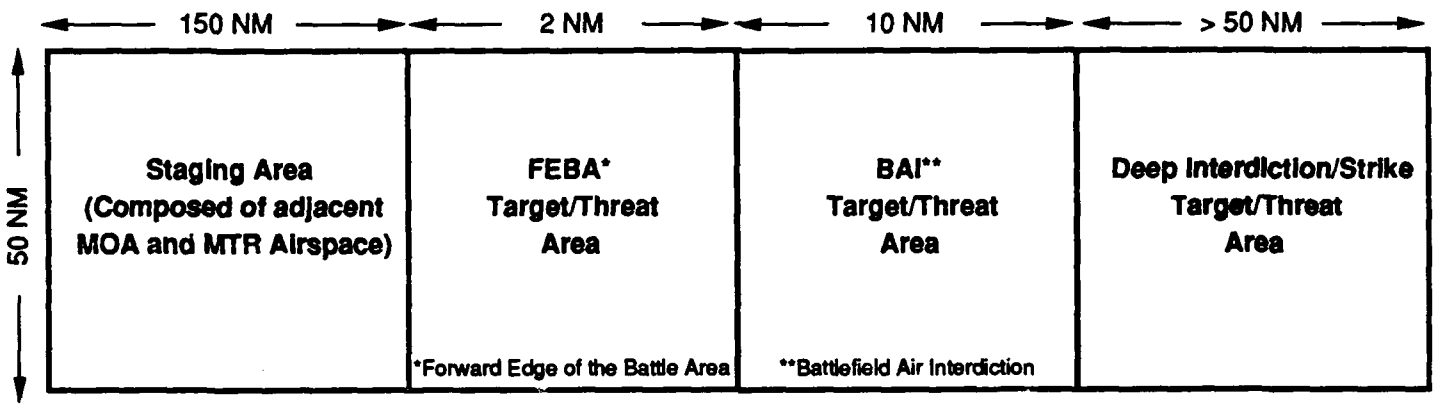


Figure 1.1-2

APPROXIMATE SIZE REQUIREMENTS FOR A RANGE SIMULATING A HIGH-THREAT BATTLEFIELD (IN NAUTICAL MILES [NM])

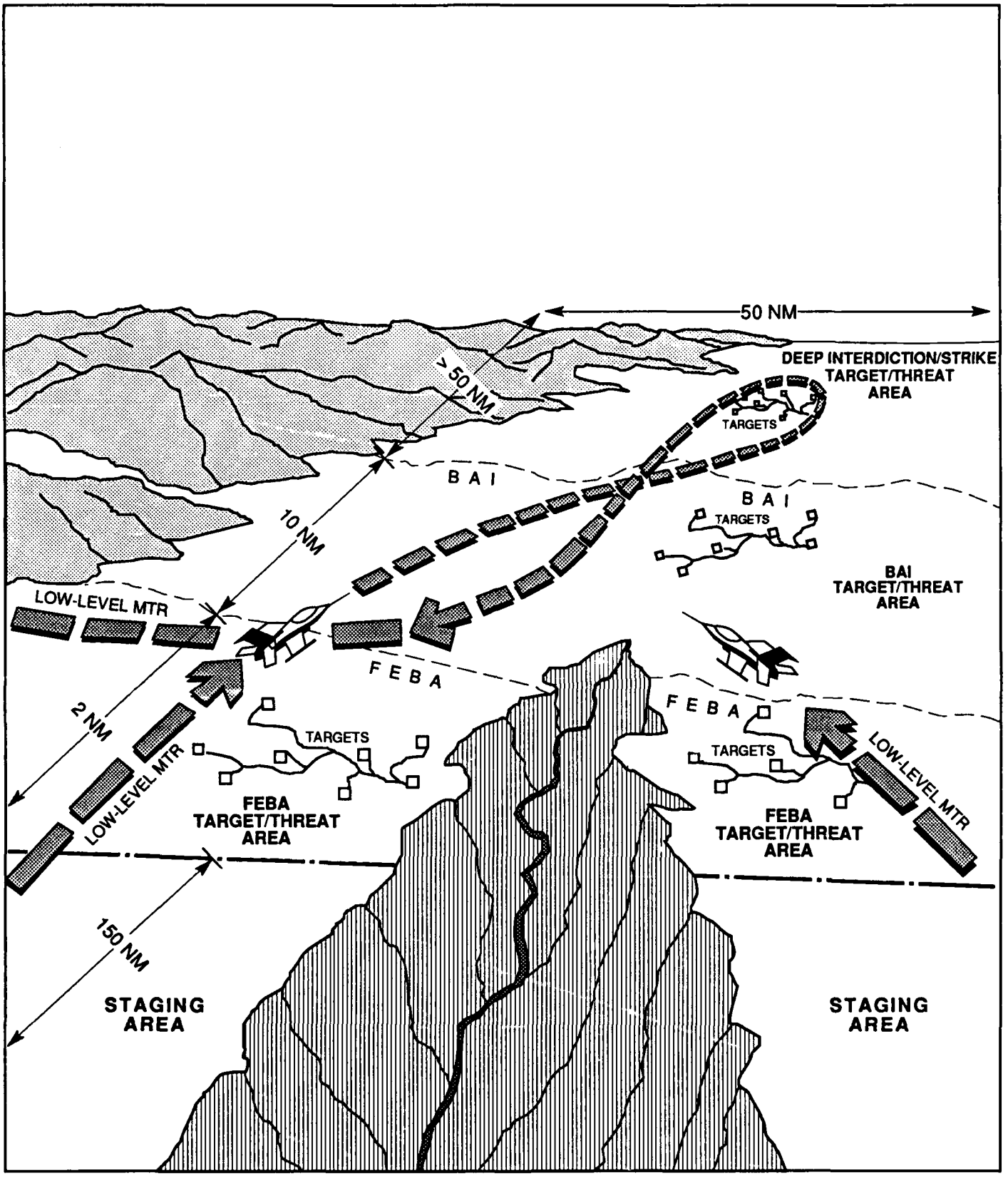


Figure 1.1-3

SCHEMATIC DIAGRAM OF TRAINING ON A SIMULATED HIGH-THREAT BATTLEFIELD

Expanded Range Requirements

AIR-TO-SURFACE RANGE CAPABILITY. The Air Force need for an expanded range capability stems from post-realignment training requirements for approximately 4,600 effective conventional range periods and approximately 9,000 tactical and electronic combat range periods. The current and anticipated SCR users will require range capability for 13,600 range periods. The present capacity of the SCR (3,700 range periods) is much smaller than the required capacity after realignment. Without expanded range capacity, there would be a 9,900 range period shortfall.

ELECTRONIC COMBAT CAPABILITY. Electronic combat is a fundamental part of the Air Force mission. Combat experience and studies indicate that if aircrews are to be effective in combat against increasingly capable defenses, they must be thoroughly trained in the use of state-of-the-art electronic countermeasures and sophisticated ordnance, as well as precision teamwork among several aircraft. They must be able to find, attack, or penetrate a diverse array of enemy defense systems in a fluid combat/threat environment. Most of these threats are supported by various types of radar, optical, or infrared guidance systems. To survive, aircrews require regular practice using tactics, weapons, and electronic countermeasures. The existing electronic combat range capability at the SCR cannot accommodate the electronic combat mission of the F-4Gs arriving from George AFB, the EF-111 aircraft stationed at MHAFB, or other users.

COMBINED CONVENTIONAL AND TACTICAL/ELECTRONIC COMBAT CAPABILITY. A conventional range is designed for teaching and practicing basic bombing techniques. The SCR is a conventional range with some tactical targets. Due to size limitations, it cannot be used for simultaneous conventional and tactical training. A tactical/electronic combat range allows aircrews to sharpen skills learned on a conventional range in a realistic environment. However, the SCR cannot provide sufficient realism when used as a tactical range.

To meet the Air Force's training requirements (approximately 13,600 effective range periods) following the MHAFB realignment, a combination of one conventional and four tactical/electronic combat ranges (within a larger range complex) will be needed. The five-range requirement results from both the stated requirements above and historical data on range use throughout the Air Force (see tables 1.1-1 through 1.1-3). All five ranges within the range complex would support delivery of training (inert) ordnance, and at least one area would be needed for live ordnance delivery training. A tactical/electronic combat range is typically used 190 days per year. The lower utilization rate (compared to a conventional range) is due to periodic closure for range maintenance.

PROXIMITY TO A MILITARY AIRFIELD. Airfield proximity is required to support aircraft using a range. Proximity to a military airfield maximizes training time on the range while minimizing fuel costs. In the case of student pilot training it optimizes the integration of classroom instruction with hands-on

experience. An airfield in close proximity to the range also provides the logistics support (e.g., parts and fuel) required to maintain and operate aircraft using the range. The airfield also provides the administrative and personnel support facilities needed to conduct exercises over an extended period of time, and acts as a depot and staging area for supporting the range itself.

Table 1.1-1

Range Capability and Needs
(Stated in Range Periods)

	Needed	*Available* [1]
Pre-realignment	950 conventional + 950 tactical/electronic combat = 1,900	3,700 total
Post-realignment	4,581 conventional + 8,963 tactical/electronic combat = 13,544	3,700 total

Note: 1. The SCR conventional and tactical/electronic combat targets are currently co-located. The total usable annual range periods at the SCR conventional range is approximately 3,700 range periods.

Table 1.1-2

Requirement for One Conventional Range

Capability	3,700 range periods per year
Need	4,581 range periods per year
Difference	(881) range periods per year [1]

Note: 1. Training associated with the 881 annual range period shortfall could be completed on a scoreable tactical range without substantially impacting aircrew training. Doing so allows the Air Force to reduce costs by not building a second conventional range and reducing the long-term costs of hiring personnel to man a second conventional range.

Table 1.1-3

Requirement for Four Tactical/Electronic Combat Ranges

Capability	3,100 range periods per year multiplied by 4 ranges	= 12,400 [1]
Need	8,963 range periods per year plus 881 conventional range periods per year (from above)	= 9,844
Difference		= 2,556

Note: 1. The total usable annual range periods at the SCR tactical/electronic combat range is approximately 3,100. The difference in use rates between conventional and tactical/electronic combat ranges is due to fewer use days on a tactical/electronic combat range because of clean up, multiple use, and other factors.

In the case of MHAFB, a proposed range complex with expanded capability within 150 nautical miles[2] (NM) would provide 1 1/2 hours of training for student aircrews. The 150 NM distance to a range complex would give aircrews 30 minutes of tactical flight training prior to entering a range, 30 minutes on the range, and 30 minutes while returning to the base. While the average training flight durations will vary with the type of aircraft (less than 1 1/2 hours for F-4s, more than 1 1/2 hours for F-111s), a 150 NM radius provides a goal for range location regardless of the type of aircraft assigned to MHAFB -- current or projected.

Based on a proposed range complex located 150 NM from MHAFB, F-4s would expend 900 gallons of fuel to reach the range, leaving approximately 1,000 gallons of fuel or about 30 minutes of flying time available for tactical training. The remaining 900 gallons of fuel would be used for returning to base and for reserve for unforeseen adverse weather conditions or for emergency situations. Any range located greater than 150 NM from MHAFB would increase transit time and fuel required, resulting in less time to accomplish effective training and an increase in the overall cost of that training.

RANGE SIZE/REALISTIC DESIGN. A range complex should be designed to meet intermediate and long-term Air Force needs. The optimum size of a complex should approximate the size of a representative high-threat battlefield or area as shown in figures 1.1-2 and 1.1-3. As a result, the ideal area in which a range complex would be confined is 62 by 50 NM. The elements of a range complex would be within such an optimum area and would provide aircrews with realistic training for defense in depth or for layered defenses that they would encounter in a possible conflict (see Figure 1.1-3). The entire complex area would be overflown by military aircraft using the individual target areas. During target runs, aircraft would be maneuvered to avoid simulated ground threats and engage in air-to-air combat (see Figure 1.1-3). While the entire airspace above the 62-by-50-NM area would be used, the Air Force would only need control of the exclusive use and shared use target areas, the threat/emitter sites, and supporting facilities (see Figure 1.1-1). Additionally, the Air Force would need to control access to certain areas within the entire complex. Access control is required to ensure safety of individuals and livestock.

Such a complex would also provide flexibility for practicing tactics such as multiple run-ins with supporting aircraft. These tactics cannot be adequately practiced on the SCR, which consists of a ground impact area of approximately 3 by 6 NM. This size physically limits the number of aircraft that can participate in a training event.

The size of a range complex should allow each conventional and tactical range within the complex to operate realistically (independently or together) for an integrated training scenario. The size for a standard tactical range layout is approximately 15 miles in diameter. More space is needed in order to

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2. One nautical mile = 1.15 statute mile.

provide training flexibility by reconfiguring the range. This can be accommodated by an increase in length or width.

Each target array should be of sufficient size to support the needed scenario. The Forward Edge of the Battle Area (FEBA) target array(s) should be at least 10 by 10 NM. The Battlefield Air Interdiction (BAI) and Deep Interdiction target array(s) should be no less than 20 by 18 NM. Inert ordnance impact areas should approximate a 15,000-foot radius circle around each target. Prototypical FEBA, BAI, and Deep Interdiction target arrays are depicted in figures 1.1-4 through 1.1-6.

AIRSPACE. Airspace is needed to practice basic aircraft maneuvers, advanced air-to-air tactics, standoff electronic combat, stand-off weapons delivery procedures, or staging for composite force training. To be effective, this airspace must be contiguous with an expanded range complex. To maximize training and replicate the airspace previously available to the F-4s at George AFB, the airspace should extend from ground level to unlimited altitude with lateral dimensions of 150 by 50 NM.[3] Further, changes to military training routes (MTRs) may be needed for accessing a range with expanded capability.

LIVE ORDNANCE AREAS. An expanded range complex should contain at least one live conventional ordnance target area.[4] Various types of live ordnance must be employed by F-4s, other existing and future aircraft to provide combat realism and reinforce skills needed to prepare for and execute live ordnance delivery missions. Live ordnance training is presently not allowed on the SCR. Typical live conventional munitions to be used include 500-pound (lb) general purpose bombs (Mk 82s), 750-lb general purpose bombs (Mk 117s), 1,000-lb general purpose bombs (Mk 83s), 2,000-lb general purpose bombs (Mk 84s), cluster bombs (CBU 52/58), 30-mm cannon rounds, and illumination flares (LUU 2). Illustrations of both live and inert bombs are provided in Appendix A.

SUPERSONIC FLIGHT OPERATIONS. An expanded range capability and associated airspace should support supersonic flight. Modern combat tactics and the handling characteristics of high performance aircraft dictate flight within the transonic and supersonic regimes by aircrews on a recurring basis.

1.1.3 Tiered Decisionmaking and Analysis

The CEQ approach called "tiering" allows environmental analyses to proceed prior to the completion of project design and development. Tiering is especially appropriate when the environmental analyses and documents evaluate decisions proceeding from the general to the site-specific.

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3. Restricted airspace should be of altitudes (surface to unlimited) to allow all types of weapon deliveries.

4. To ensure public safety, this range should be at least 17 by 17 miles in area.

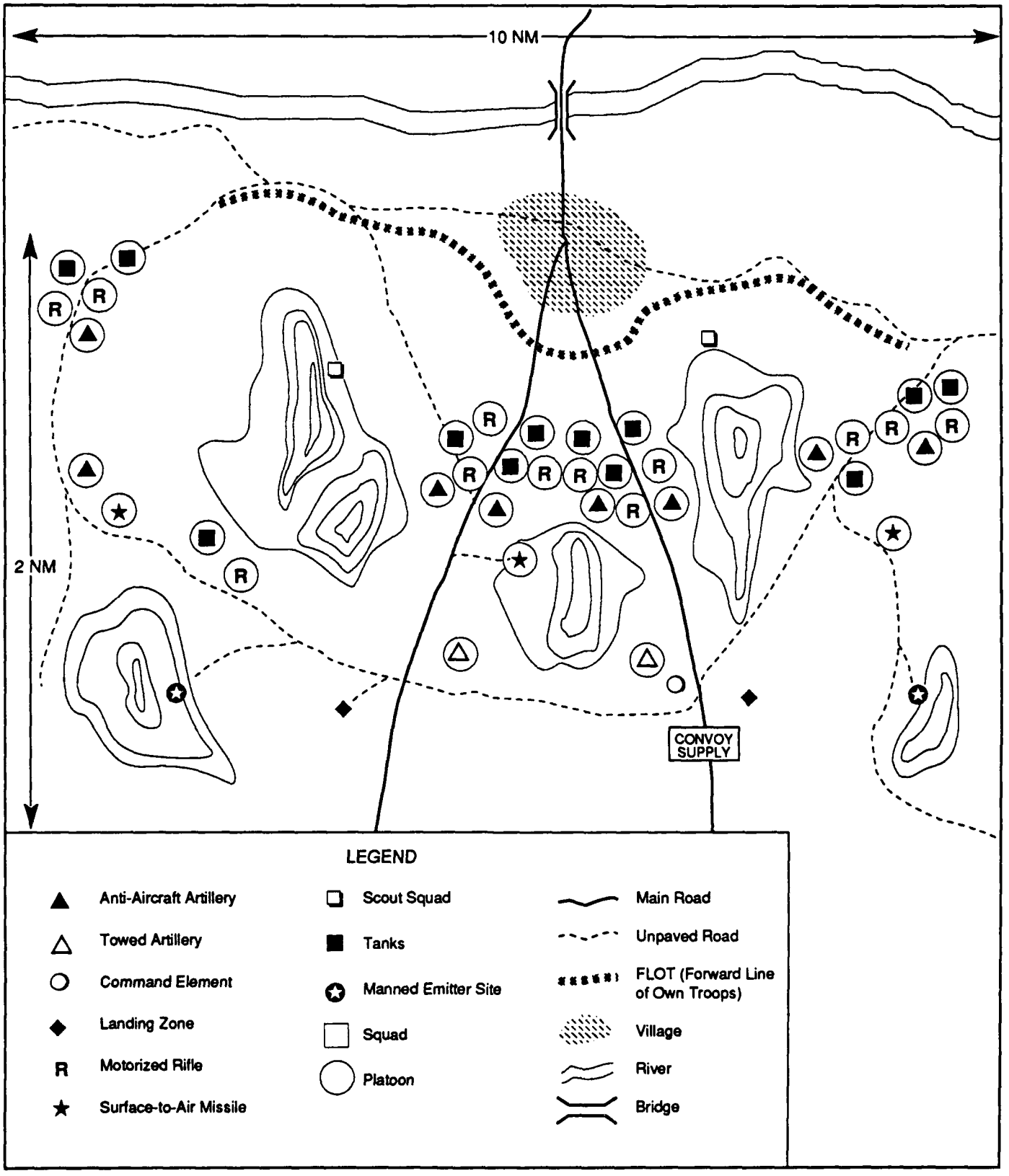


Figure 1.1-4

PROTOTYPICAL FORWARD EDGE OF THE BATTLE AREA

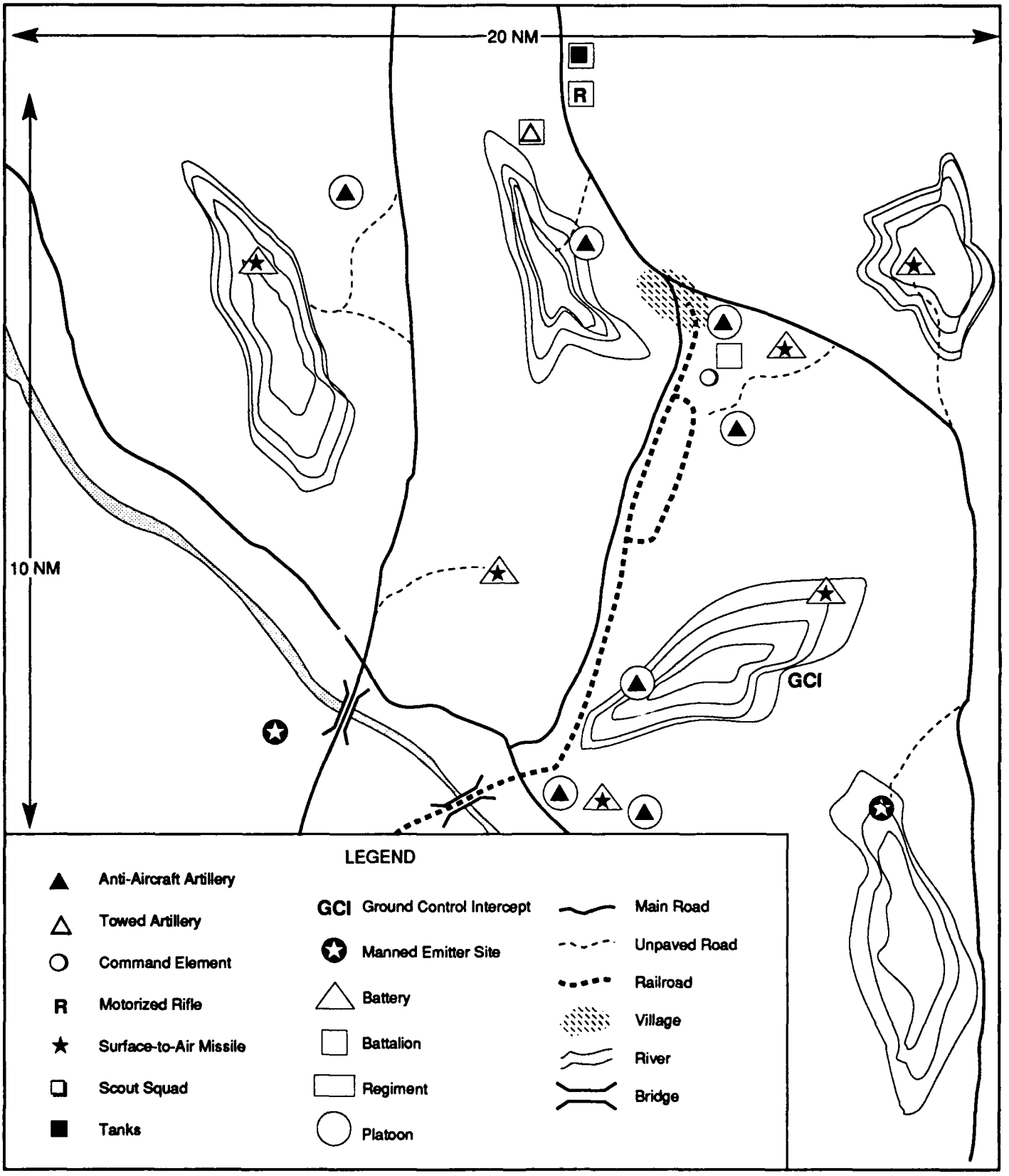


Figure 1.1-5

PROTOTYPICAL BATTLEFIELD AIR INTERDICTION

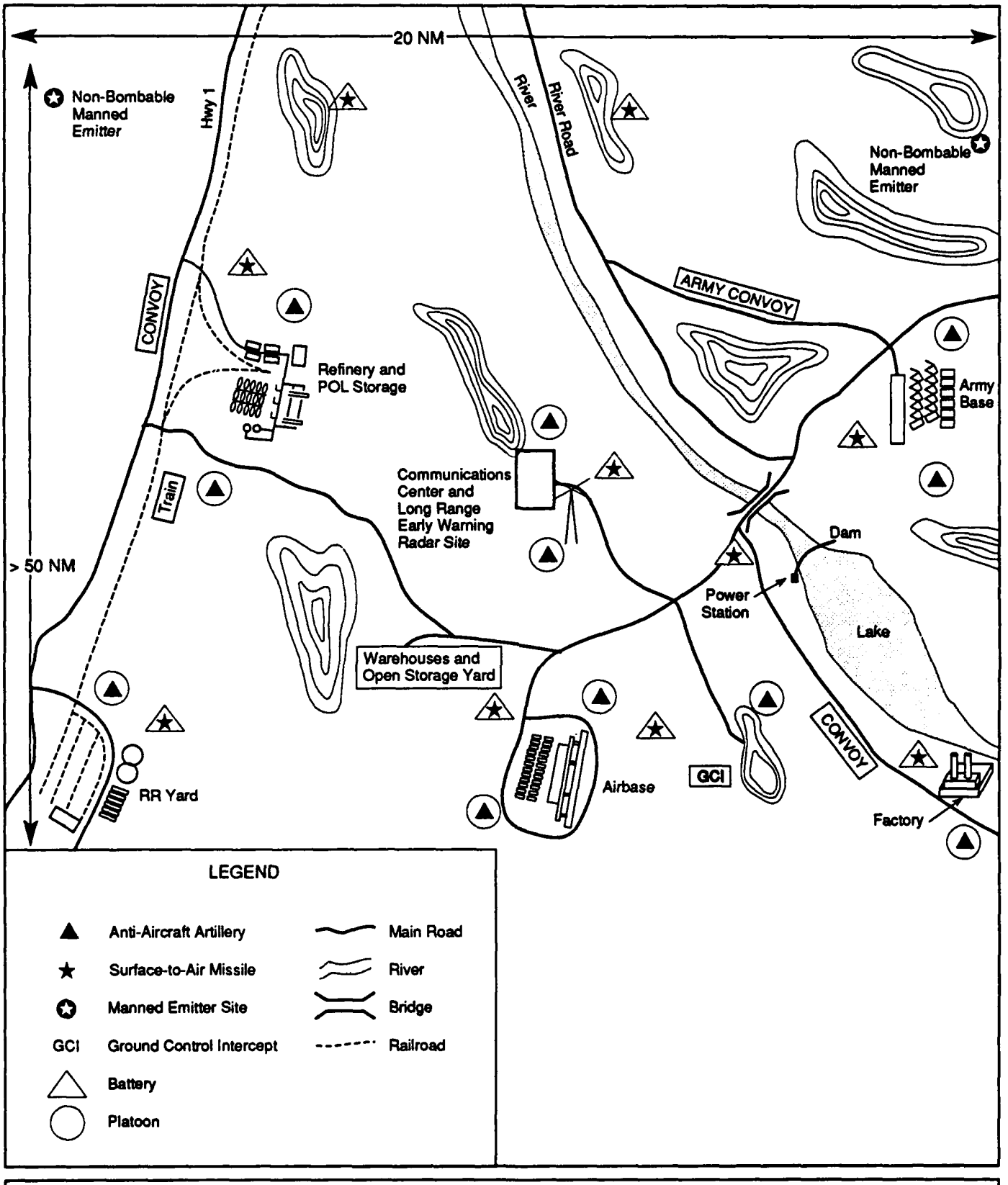


Figure 1.1-6

PROTOTYPICAL DEEP INTERDICTION

This Tier 1 EIS, in addition to evaluating the specific impacts of the MHAFB realignment actions, identifies and evaluates in general terms the potential expansion of range capability in southwestern Idaho and reasonable alternatives available to meet training requirements. An example of other possible actions to meet training needs would be to use air-to-air refueling missions to fly the aircraft to other locations for training sorties. Air Force short-term, intermediate, and long-term training requirements are identified in this Tier 1 EIS. Tier 1 will contribute to the decision to either proceed further with detailed studies and analysis for a range capability expansion in southwestern Idaho, or to select other alternatives. This Tier 1 EIS will also provide the initial framework (operational criteria, environmental attributes for the area, and description of environmental impacts associated with ranges) for use in the subsequent Tier 2 EIS if the decision is made to pursue a range expansion option.

Thus, the Tier 1 EIS will accomplish the following:

1. Assess the impact of realignment actions on the MHAFB and surrounding community.

2. Describe a set of criteria and operational requirements to be used in developing range site(s). These requirements are stated in terms of short, intermediate, and long-term training needs.

3. Assess the impact of other reasonable alternatives to the proposed range expansion (e.g., air refueling missions to other ranges, temporary duty).

4. Describe the existing environmental baseline and characterize the sensitivities of all areas to current land uses and proposed range activities.

5. Develop a baseline of potential environmental impacts of range operations (e.g., aircraft noise, munitions effects, land-use compatibility, etc.).

6. Identify and assess proposals for revisions to existing special use airspace, and for supersonic operations above 5,000 feet AGL.

This Tier 1 EIS will be completed in June 1990 and will conclude with a Record of Decision (ROD). The ROD will include decisions regarding the impacts of (1) relocating 94 F-4E/G aircraft from George AFB; (2) removing F-111 aircraft from MHAFB; (3) proposed modifications to special use airspace; (4) a proposal to allow supersonic operations above 5,000 feet AGL in Idaho MOA airspace; and (5) whether to proceed further with ongoing studies to expand range capability in southwestern Idaho. The Air Force is currently participating in a citizen/government working group being facilitated by the BLM to help ensure all public concerns regarding the proposed expansion of range capabilities are addressed. The working group process will be conducted parallel with Tier 1 and will develop pro-

posals and alternatives to be evaluated in Tier 2 to meet short, intermediate, and long-term Air Force requirements.

The Air Force plans to start preparation of the Tier 2 EIS in the spring of 1990. Tier 2 would be a complete NEPA process for an EIS. It would include a Notice of Intent, Public Scoping, public hearing and comment on a Draft EIS, and a filing of a Draft and Final EIS with the Environmental Protection Agency (EPA), followed by an ROD. The subjects to be evaluated in Tier 2 would evolve through the public process, including scoping meetings. The main objective of that process would be to determine how the needs and requirements of all parties could be addressed in the Tier 2 EIS.

1.2 LOCATION OF THE ACTIONS

MHAFB and the SCR are located in southwestern Idaho (see Figure 1.2-1). The TAC fighter base lies in Elmore County, near the communities of Mountain Home, Grand View, Bruneau, and Glenns Ferry (see Figure 1.2-2). Boise is 50 miles northwest of the base. A map of the installation is provided in Figure 1.2-3.

The northern boundary of the SCR is located about 20 miles from MHAFB. The range is approximately 11.5 miles wide by 15 miles long for a total area of 174 square miles. The current ordnance impact area, which contains all the targets, is a fenced area consisting of approximately 12,200 acres near the center of the range (see Figure 1.2-4). It is designated as an exclusive use area with a surrounding safety buffer area that is a multiple use area.

The range is situated on a relatively flat plateau that is bounded by the Snake River about 6 miles north of the range boundary and by the Bruneau River canyon along the western boundary. Outside the 12,200-acre exclusive use area, the withdrawn area is a multiple use area (over 96,000 acres) where sheep and cattle grazing are permitted and managed by the BLM. A public county road with no public restrictions crosses part of the range area and leads to a scenic viewpoint and to southern parts of Idaho. The nearest occupied communities are Bruneau, about 7 miles northwest of the range, and Hammett, about 6.5 miles north of the range.

The SCR is associated with restricted airspace R-3202, which is composed of restricted areas R-3202A, R-3202B, and R-3202C (see Figure 1.2-5). Restricted area R-3202A is located about 20 air miles southeast of MHAFB (55 miles by road) in southern Idaho and covers about 297 square miles. Restricted areas R-3202B and C are adjacent to the south and cover about 199 square miles.

Restricted area R-3202 extends into Elmore County to the east. R-3202 is bordered on the south by the Saylor MOA, on the west by the Sheep Creek MOAs, and on the east by the Bruneau MOAs. Both

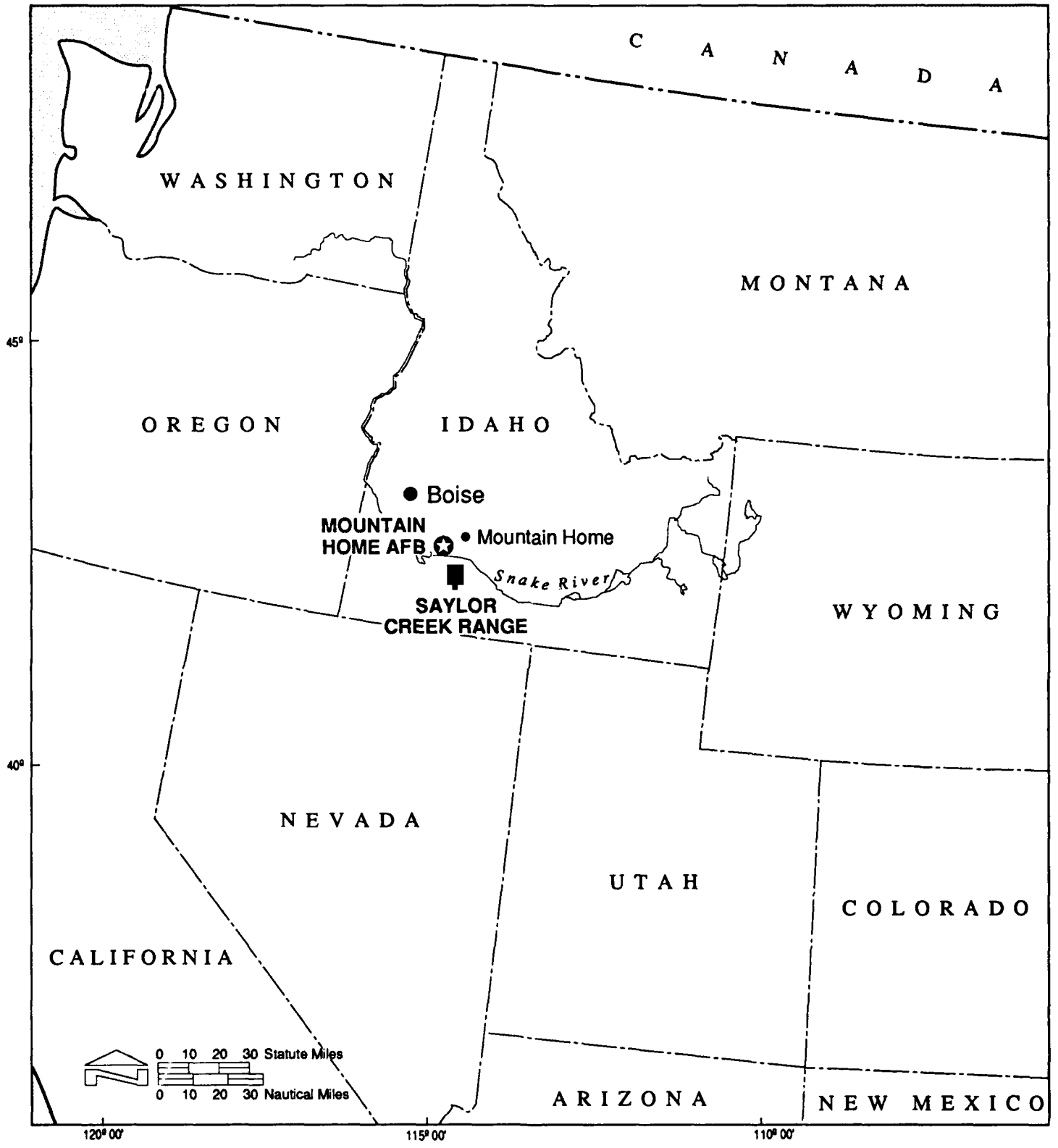


Figure 1.2-1

REGIONAL LOCATION OF MOUNTAIN HOME AFB AND SAYLOR CREEK RANGE

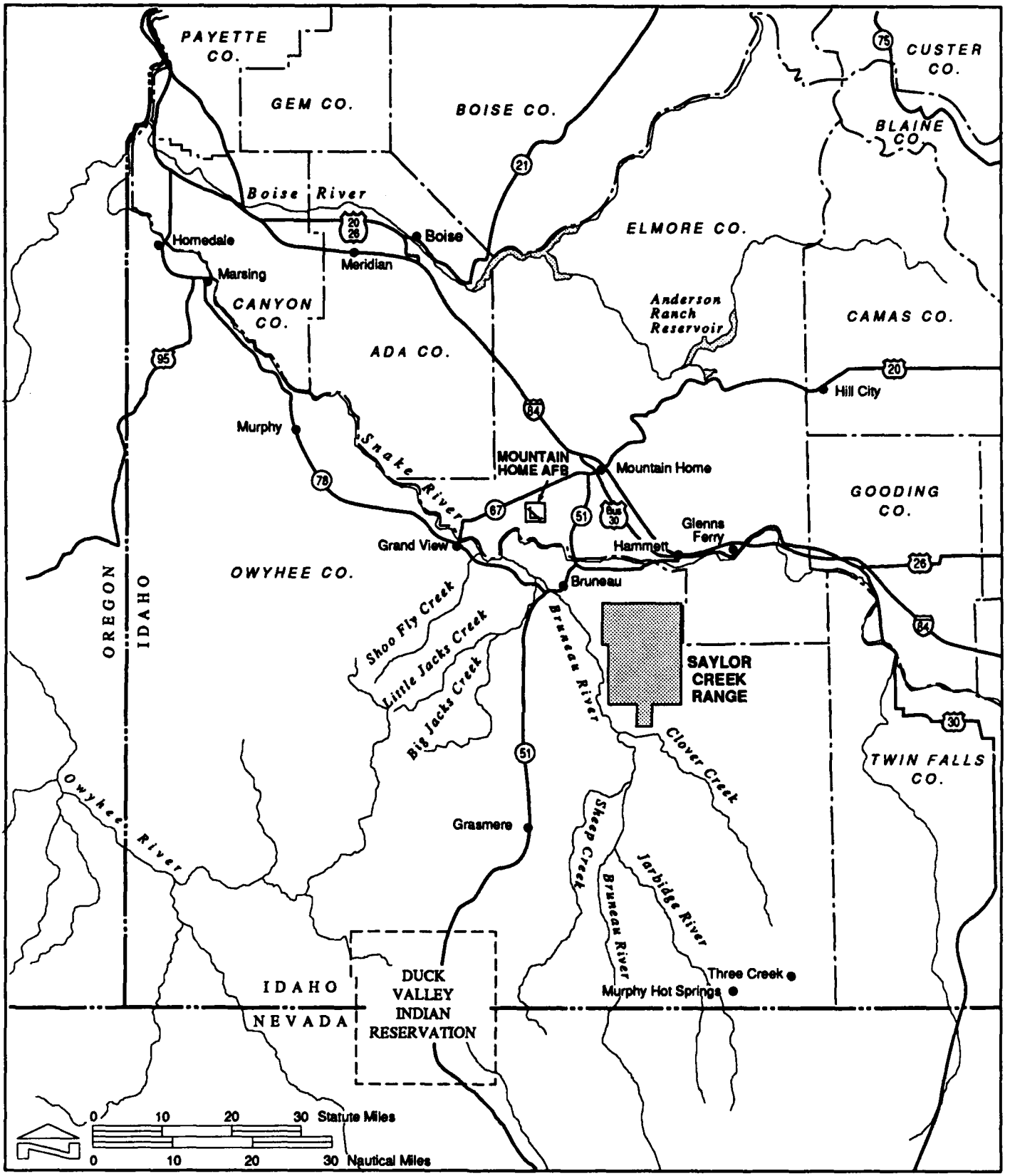


Figure 1.2-2

VICINITY MAP OF MOUNTAIN HOME AFB AND SAYLOR CREEK RANGE

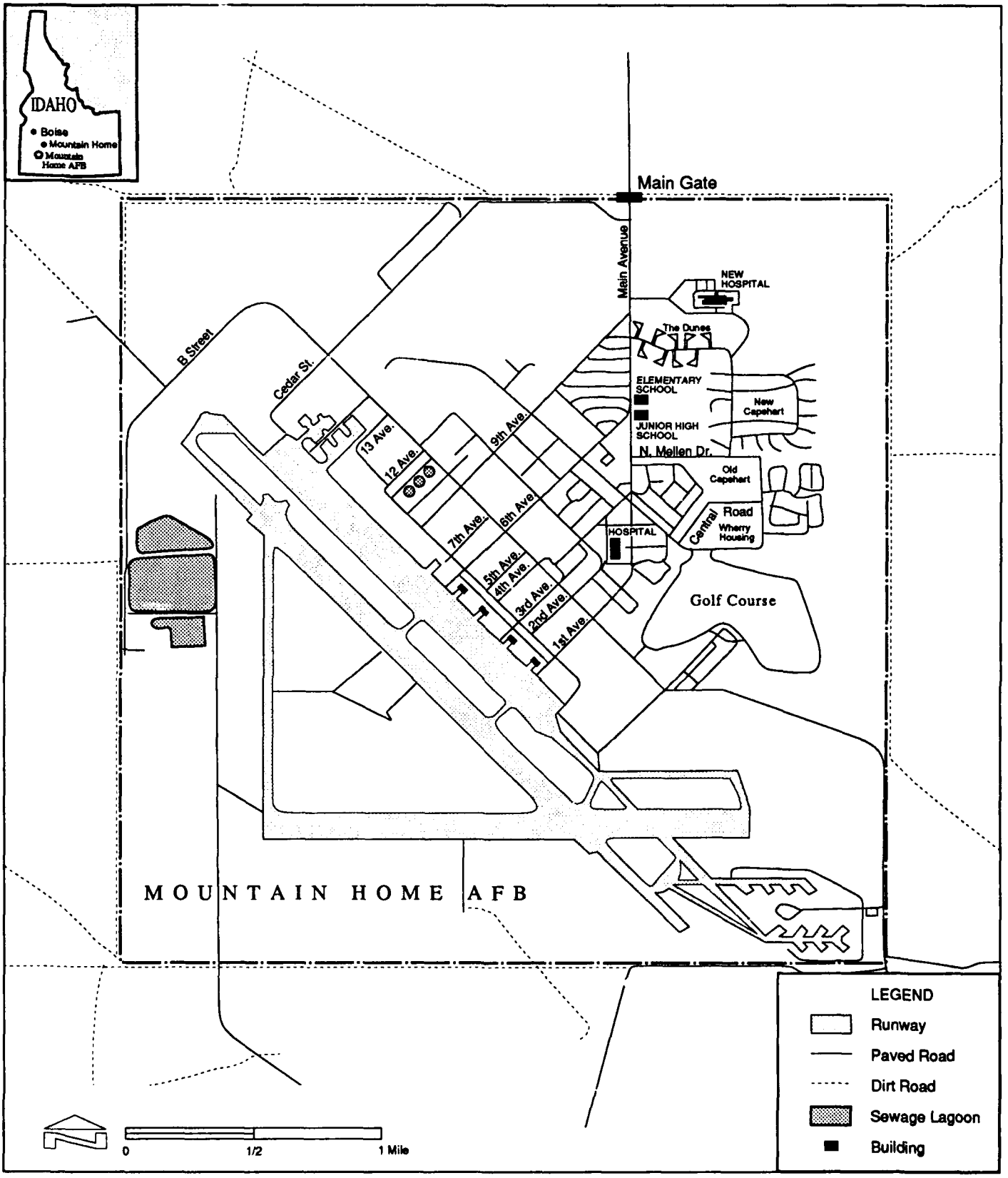


Figure 1.2-3

MOUNTAIN HOME AIR FORCE BASE

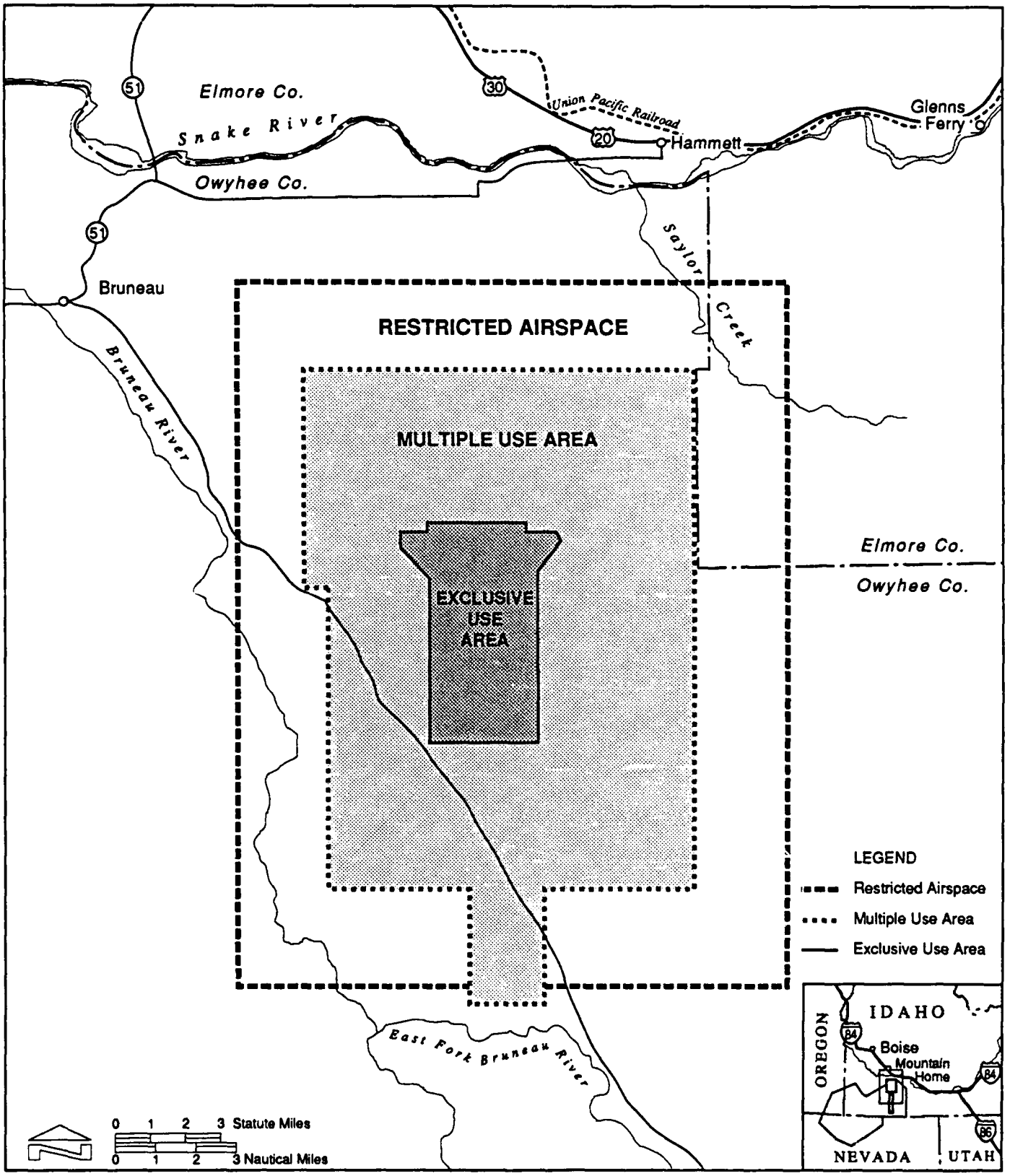


Figure 1.2-4

SAYLOR CREEK RANGE

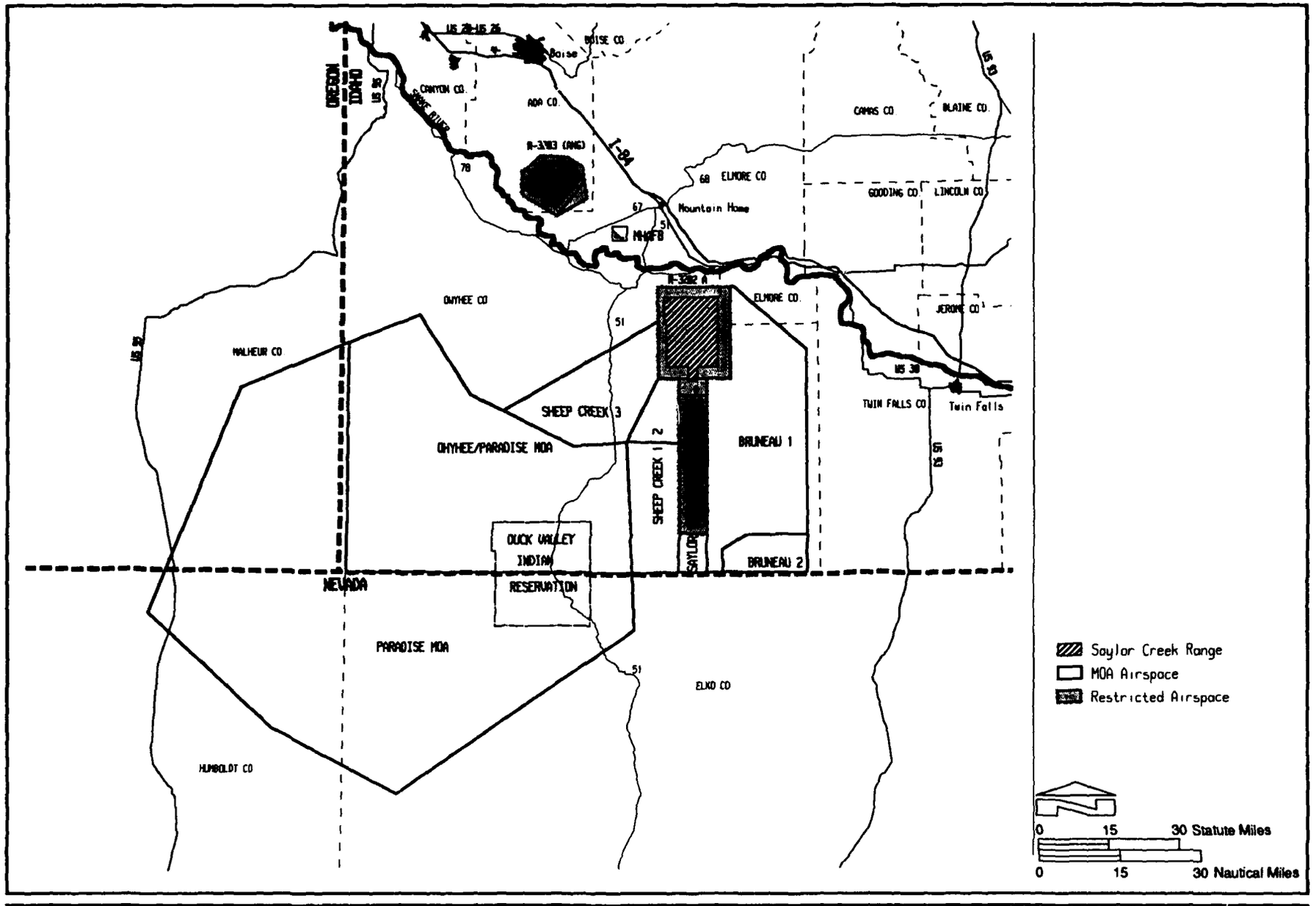


Figure 1.2-5

SAYLOR CREEK RANGE AND ASSOCIATED MOA AND RESTRICTED AIRSPACE

the range and the MOAs are controlled, maintained, and scheduled by the 366 TFW. MTRs used by MHAFB aircraft are shown in Figure 1.2-6.

A proposed expanded range capability would involve land area located in southwest Idaho. Proposed airspace modifications to accommodate the increased mission requirements of MHAFB units would occur in airspace located over eastern Oregon and southwest Idaho. No airspace changes would be required over Nevada. The land area and airspace boundaries of the study area for a proposed expanded range capability are shown in Figure 1.2-7.

1.3 SCOPING PROCESS AND PREPLANNING ANALYSIS

Air Force regulations regarding the National Environmental Policy Act (NEPA) process state that there shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. This process is called scoping. As part of scoping, the Air Force as lead agency invited agency and public participation to determine the scope of the EIS and the significant issues to be analyzed in it. Those issues which are not significant or which have been covered by other environmental review are identified and referenced.

The scoping process for this EIS began in February 1989 with the publication of a notice of intent (NOI) in the *Federal Register* (see Appendix C). On March 16, 1989, a scoping meeting was held in Mountain Home, Idaho. The subject of this scoping meeting was the relocation of the 35 TFW from George AFB to MHAFB. At that time, it was announced that there was a requirement to expand the SCR to support the increased training activities. The Air Force stated that when those requirements had been better defined, information on the range expansion would be made available.

On August 14, 1989, the original NOI (see Appendix C) was amended and additional scoping meetings were held between September 5 and 11, 1989 in four locations in southern Idaho (Boise, Twin Falls, Glenns Ferry, and Grand View). The focus of those scoping meetings was the proposed expanded range capability and supersonic flight activity. Updated information on the realignment was also presented.

In the interim period between the March and September scoping meetings, the Air Force held several public information meetings with a wide variety of special interest groups, issued press releases, and sent announcement letters to federal, state, and local government officials and civic leaders. A list of the issues raised in the September scoping meetings is contained in Appendix D. Based on the issues raised at the March scoping meeting and subsequent interaction with the public, the Air Force compiled the following list of environmental resources requiring analysis:

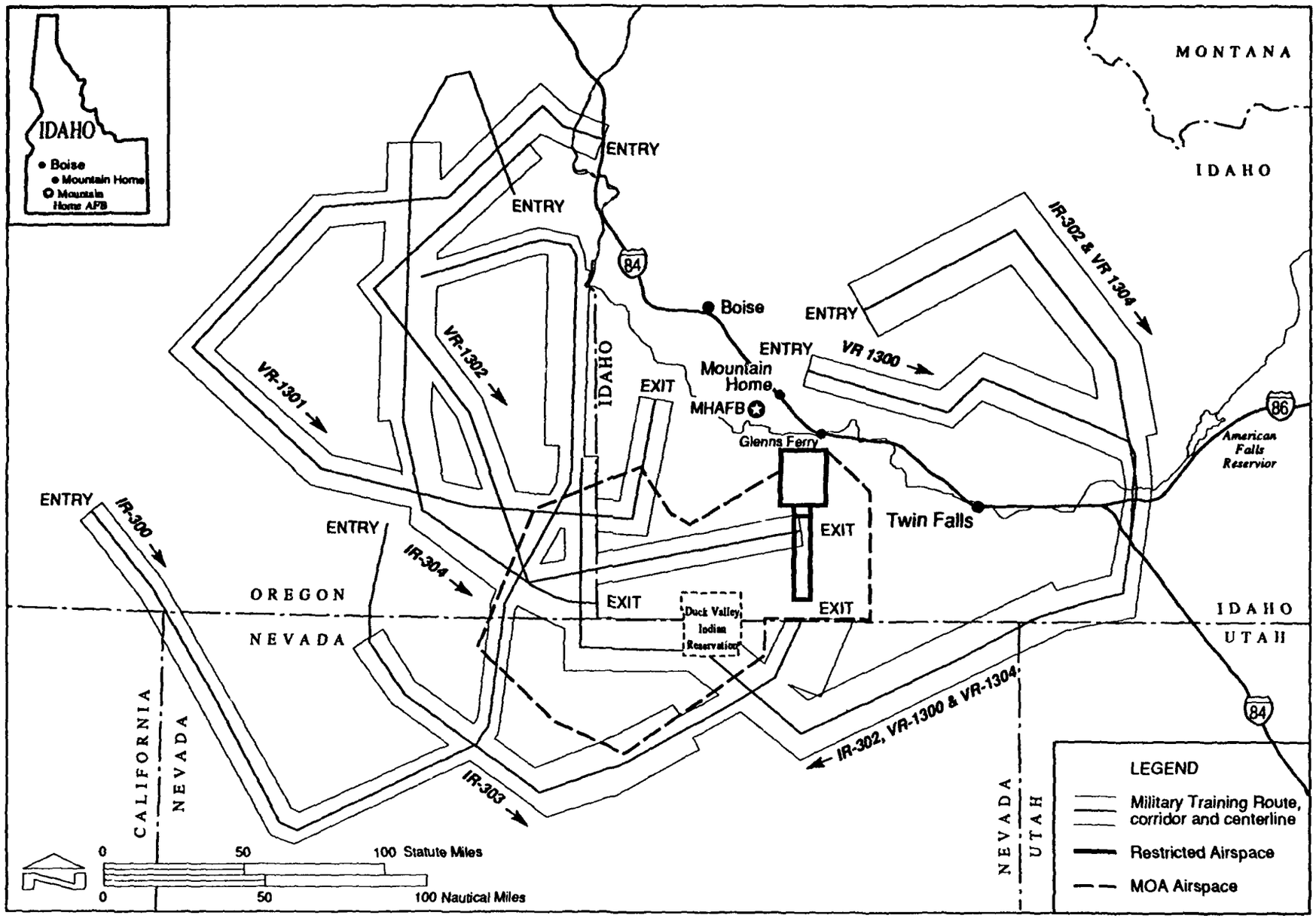


Figure 1.2-6

MILITARY TRAINING ROUTES ASSOCIATED WITH MOUNTAIN HOME AFB

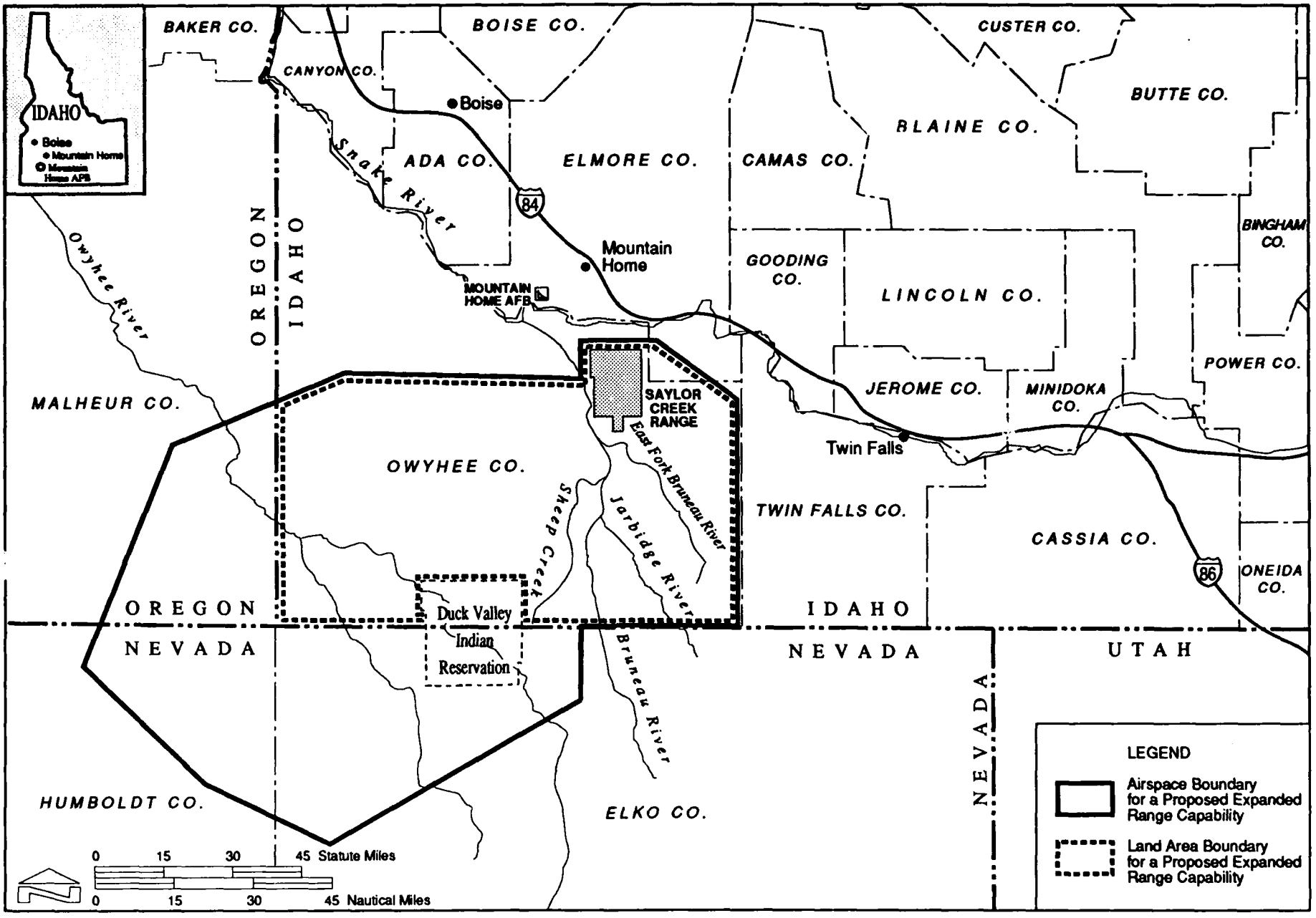


Figure 1.2-7

STUDY AREA FOR A PROPOSED EXPANDED RANGE CAPABILITY

- o Airspace Management
- o Air Resources
- o Noise
- o Biological Resources
- o Cultural Resources
- o Visual Resources
- o Earth Resources
- o Land Use
- o Transportation
- o Socioeconomics
- o Water Resources
- o Safety/Hazardous Materials

At the scoping meetings held in September, the Air Force announced that it would implement a two-tiered approach to the environmental analysis to evaluate the impacts of the realignment and the proposed expanded range capability. Further details regarding the Tier 1 and Tier 2 environmental studies are provided in section 1.1.3, Tiered Decisionmaking and Analyses.

1.4 RELEVANT FEDERAL, STATE, AND LOCAL STATUTES, REGULATIONS, AND GUIDELINES

This document was prepared in compliance with NEPA, PL 91-190 (42 USC 4321 et seq.), and implementing regulations (40 Code of Federal Regulations [CFR] 1500 et seq.) established by the CEQ.

This document also addresses the relevant sections of the Clean Air Act, Clean Water Act, Resources Conservation and Recovery Act, Wilderness Protection Act, Rivers and Harbors Act, Threatened and Endangered Species Act, National Historic Preservation Act, as well as state environmental laws and local regulations and ordinances. The above acts and regulations are discussed in the resources sections to which they apply (e.g., Biological Resources section discusses the Threatened and Endangered Species Act).

The purpose of this EIS is to assess the impacts of the MHAFB realignment and proposed expanded range capability. The draft EIS (DEIS) has been filed with the Environmental Protection Agency (EPA) and circulated to the public and concerned agencies for review and comment. Public hearings will be held to facilitate the public review process. In addition, written comments on the DEIS during the 45-day public review period will be addressed in the final EIS (FEIS).

BLM, a bureau within the Department of the Interior (DOI), and the Federal Aviation Administration (FAA) are cooperating agencies on this EIS. BLM's Boise District office has made significant contributions to this EIS by way of data inputs, the development of the document outline, and reviewing the document. The Boise District office's focus has been primarily on the proposed expansion of range capability, as BLM would be responsible for processing any potential land withdrawal request made by the Air Force after the completion of a Tier 2 EIS. Appendix E briefly describes the land withdrawal, rights-of-way, and land acquisition processes. This appendix is included for information purposes only; no specific land withdrawal will occur based on the results of the Tier 1 EIS.

2.0 DESCRIPTION OF ACTIONS AND ALTERNATIVES

2.1 THE ACTIONS

As described in section 1.0, the realignment of MHAFB results from the Base Closure and Realignment Act that was signed into law on October 24, 1988. One of the 86 installations selected for closure was George AFB, California. All of the F-4 units currently stationed at George AFB will be transferred to MHAFB, Idaho. To make room at MHAFB for the George AFB aircraft and personnel, it will be necessary to move 35 F-111 aircraft and associated personnel from MHAFB. These F-111s and personnel will be transferred to other units to better consolidate command and control of the F-111 fighter/bomber assets.

As an adjunct to this action, the Air Force has also proposed to expand range capability to provide the 117 fighter aircraft based at MHAFB after realignment with adequate training facilities, to accommodate many other user aircraft whose training requirements on the range have increased and will continue to increase in the future, and to integrate the training requirements of new aircraft and weapons systems.

2.1.1 Relocation of George AFB Assets to MHAFB

The transfer of assets from George AFB to MHAFB will involve 94 F-4E and F-4G aircraft and their aircrews and support personnel. This group is composed of the following squadrons and detachments:

- 20th Tactical Fighter Training Squadron (TFTS) (German Air Force Training) consisting of 18 USAF F-4E aircraft;
- 21 TFTS consisting of 30 F-4E aircraft;
- 562 TFTS consisting of 12 F-4G and 7 F-4E aircraft;
- 561 Tactical Fighter Squadron (TFS) consisting of 24 F-4G aircraft; and
- Tactical Air Warfare Center, Detachment 5, consisting of three F-4G aircraft.

These units will be integrated into the newly formed 831 Air Division at MHAFB after realignment, consisting of the 366 TFW and the 35 TFW. The personnel associated with this action and other programs planned for the base between fiscal 1990 and 1992 are shown in Table 2.1-1 below.

Table 2.1-1

Realignment-Related Personnel Changes at MHAFB

Personnel	*Officers*	*Enlisted*	*Civilian*	*Total*
Arriving (A)	367	2,979	249	3,595
Departing (B)	201	1,375	75	1,601
Net Increase (A - B)	166	1,654	174	1,994

2.1.2 Relocation of MHAFB Assets

All 35 F-111A will be transferred from MHAFB to other units. The outbound personnel flow will be integrated with the inbound personnel flow to approximate current manning levels. A gradual increase in personnel will then occur from June 1990 to April 1991. The two affected squadrons are:

- the 389 TFTS, consisting of 17 F-111A aircraft, will be deactivated and moved during October through December 1991; and
- the 391 TFS, consisting of 18 F-111As, will be deactivated and moved during July through September 1990.

These two squadrons will be converted to F-4 units as the George AFB F-4s arrive at MHAFB.

The 23 EF-111 aircraft currently based at MHAFB will not be transferred. The configuration of the newly formed 831 Air Division at MHAFB after realignment is shown in Table 2.1-2. The number of additional aircraft based at MHAFB as a result of the realignment will be 59, for a total number of 117 fighter aircraft.

A loss of about 1,600 personnel authorizations associated with the transfer of F-111s and a corresponding gain of approximately 3,600 personnel authorizations associated with the transfer of F-4s from George AFB and other programmed changes will result in a net increase of 1,994 personnel authorizations (see Table 2.1-1). During the period when the F-111s begin to depart MHAFB and the F-4s begin to arrive, net personnel departures are not anticipated to exceed 250 due to many F-111-associated personnel filling the new F-4 authorizations.

Table 2.1-2

Aircraft Composition of 831 Air Division at MHAFB

Unit	*Squadron*	*Number of Aircraft*	*Type of Aircraft*
366 TFW	389 TFS	19	F-4E/G
	390 ECS	22	EF-111
	391 TFS	24	F-4G
35 TFW	561 TFS	30	F-4E
	562 TFS	18	F-4E
	392 ECRS	---	---
DET3/DET5	---	3	F-4G
	---	1	EF-111

On-Base Construction to Support the Realignment

New construction and modification of existing facilities at MHAFB is planned to support the increase in aircraft and personnel. The facility construction projects range from military family housing to hangars and munitions storage. The projects, the fiscal year in which each will occur, and the type of construction (new, modification, or repair) are shown in Table 2.1-3. The proposed locations of these construction projects are shown in figures 2.1-1 through 2.1-4.

Planning for the construction projects was conducted by MHAFB engineering and planning staffs in accordance with guidance and standards established by Air Force directives. In late December 1988, MHAFB's Base Civil Engineer assembled a team of on-base staff with the functional expertise to develop the facility requirements needed to support the realignment of aircraft and personnel from George AFB. This team drew its guidance for siting new facilities from MHAFB's Long-Term Improvement Plan which, in turn, was developed in accordance with Air Force regulations for base comprehensive planning. The Long-Term Improvement Plan sets forth land use areas for the base (e.g., industrial, commercial, administrative, and residential). The sizing of facilities, new or modified, was done in accordance with Air Force standards for facility requirements.

Numerous siting factors were considered, including the general and specific guidance set forth in a variety of Air Force regulations governing the development of airfields; airspace; contaminated areas being investigated or remediated in accordance with the Installation Restoration Program (IRP); quantity-distance zones around explosives storage sites; AICUZ noise zones; an evaluation of existing facilities for contribution to or impact on the new functional uses; existing and projected traffic patterns and volumes; infrastructure demands; operational requirements; and functional relationships.

Table 2.1-3

REALIGNMENT-RELATED CONSTRUCTION PROJECTS ON MHAFB

Construction Project	*Fiscal Year* [1]	*Type*	*Figure*	*Number*
Convert Bldg 278 to Squadron Operations	1990	Modification	2.1-1	1
Aircraft Engine Shop	1990	New	2.1-1	2
Munitions Magazine	1990	New	2.1-1	3
Taxiway "D"	1990	Repair	2.1-1	4
Fuel Fill Stand	1990	New	2.1-1	5
432 Units of Military Family Housing	1991	New	2.1-2	1
208 Person Dormitory	1991	New	2.1-2	2
Avionics Add-on to Bldg 1327	1991	Modification	2.1-2	3
Munitions Facility	1991	New	2.1-2	4
Radar Calibration Add-on to Bldg 1333	1991	Modification	2.1-2	5
Squadron Operations/AMU	1991	New	2.1-2	6
Heating Plant	1991	New	2.1-2	7
AGS/WRSK Add-on to Bldg 1361	1991	Modification	2.1-2	8
Squadron Operations Facility	1991	New	2.1-2	9
Aircraft Hanger	1991	New	2.1-2	10
Inert Munitions Storage	1991	New	2.1-2	11
AMU Add-on to Bldg 277	1991	Modification	2.1-2	12
Sewage Treatment Plant	1991	Modification	2.1-2	13
Flight Simulator Add-on to Bldg 840	1992	Modification	2.1-3	1
Armament Shop Add-on to Bldg 1225	1992	Modification	2.1-3	2
Supply Warehouse	1992	New	2.1-3	3
Squadron Operations Add-on to Bldg 272	1992	Modification	2.1-3	4
Washrack Corrosion Control	1992	New	2.1-3	5
Dining/Troop Issue	1992	New	2.1-3	6

Note: 1. Variation in construction schedules will occur due to fiscal funding.

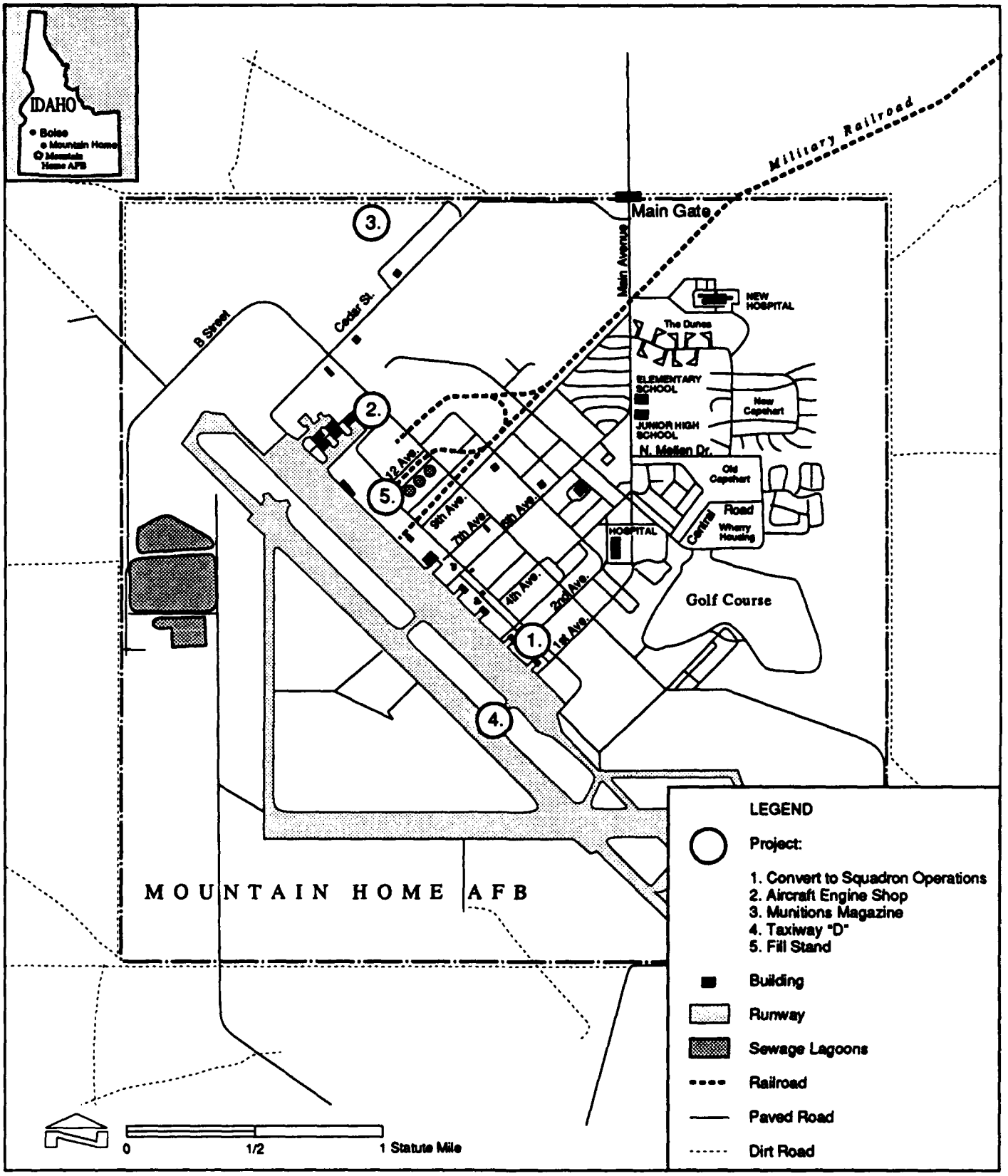


Figure 2.1-1

REALIGNMENT-RELATED PROJECTS FOR FISCAL YEAR 1990

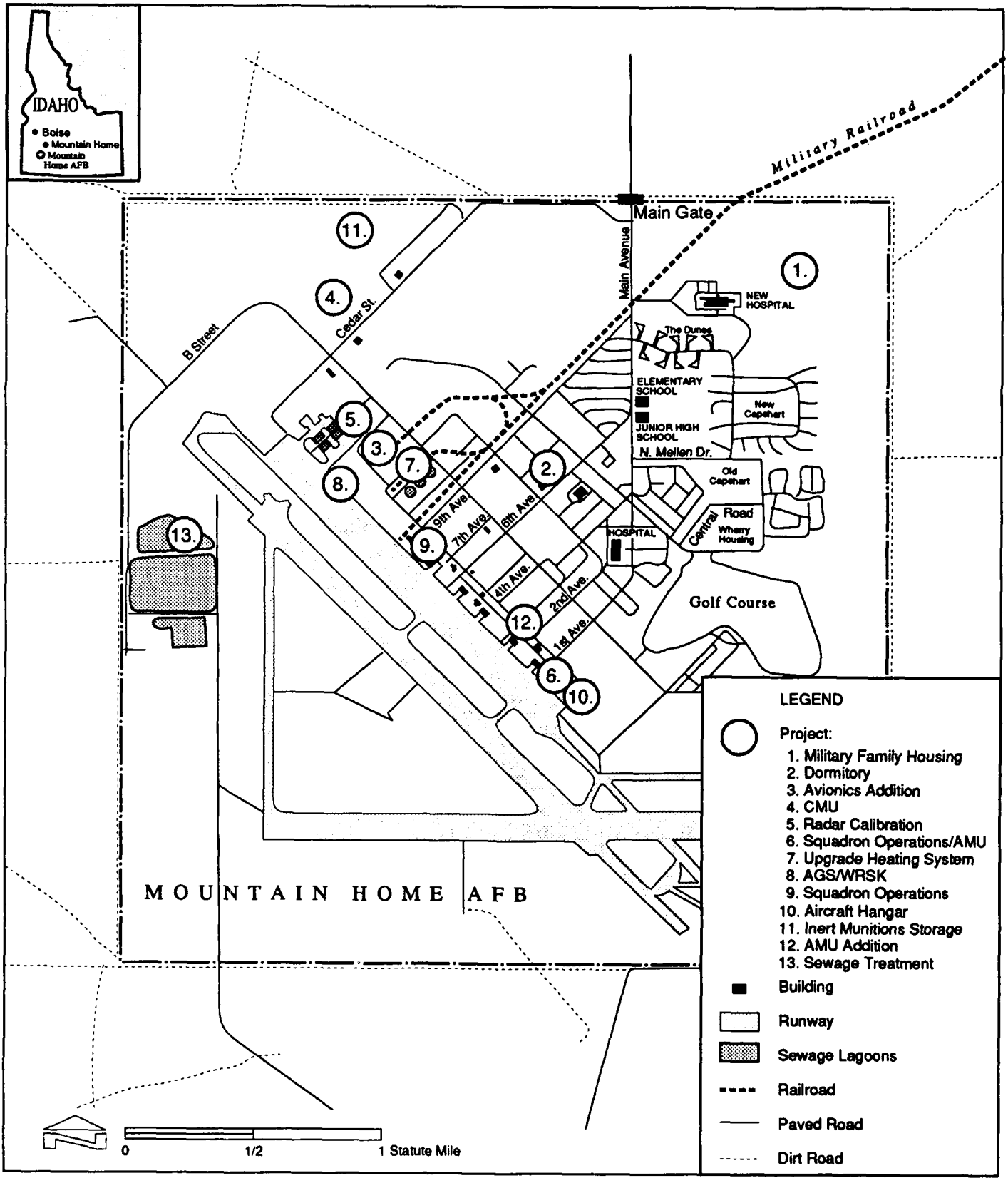


Figure 2.1-2

REALIGNMENT-RELATED PROJECTS FOR FISCAL YEAR 1991

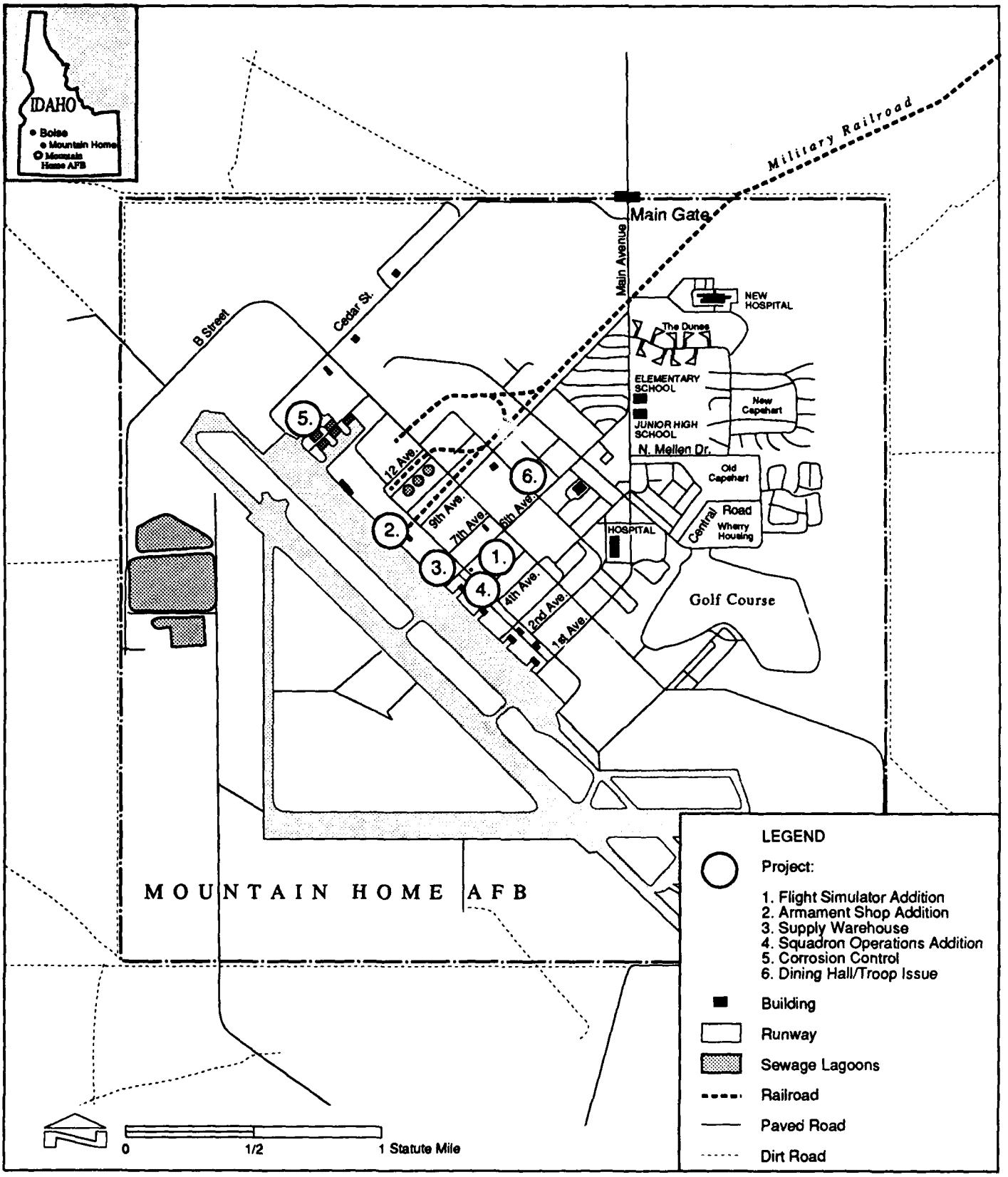


Figure 2.1-3

REALIGNMENT-RELATED PROJECTS FOR FISCAL YEAR 1992

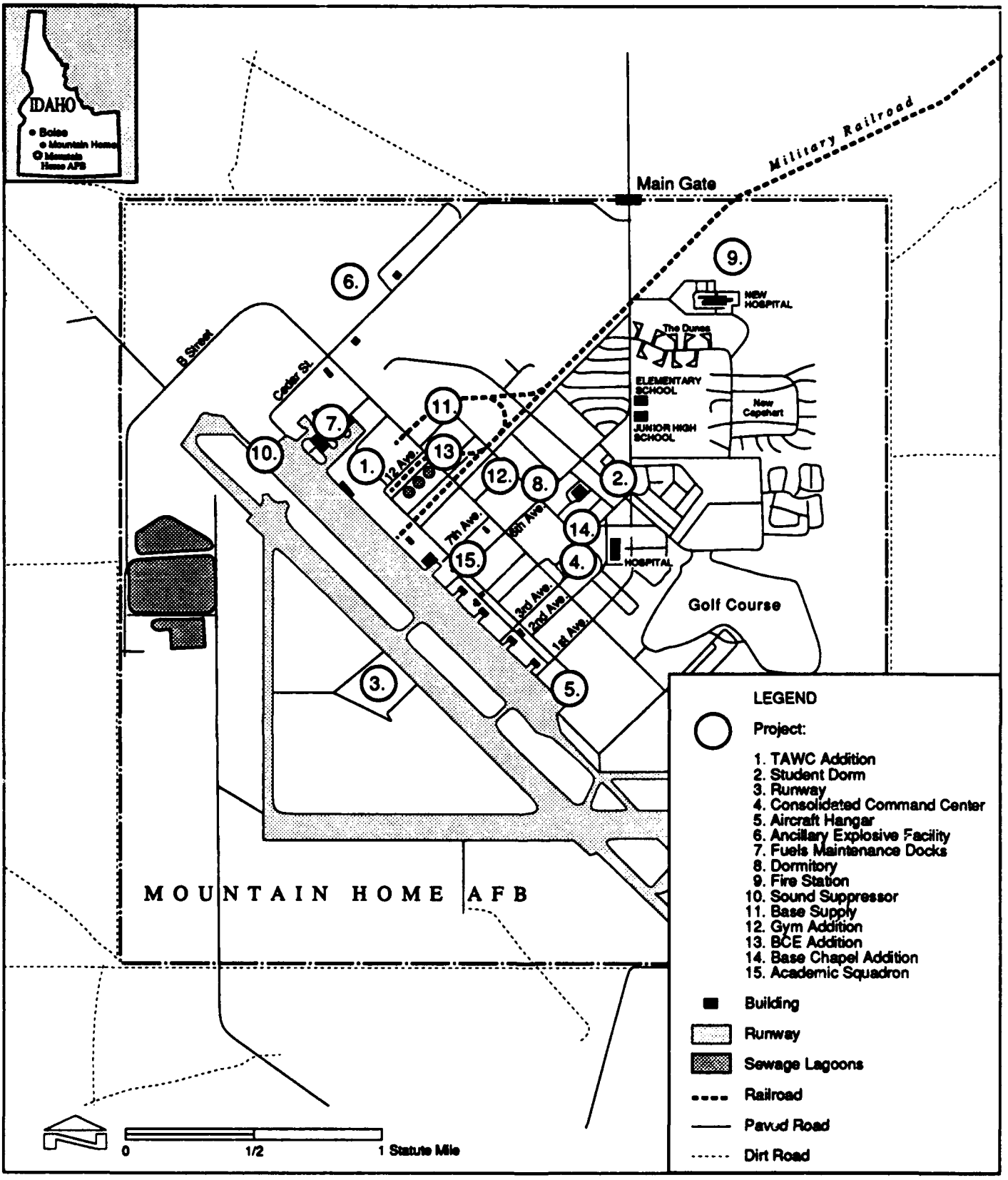


Figure 2.1-4

OUT-YEAR PROJECTS

Where possible, operational/functional groupings of facilities were established with consideration given to interface with existing compatible uses, consolidation with similar facilities where possible, spatial requirements, and physical limitations. Existing facilities that would be consolidated, displaced, and/or relocated to other sites were also evaluated. The goal was to build the most efficient and cost-effective operation.

The initial realignment planning process culminated in late January 1989 with a presentation made at MHAFB to HQ TAC's site-survey team. The site-survey team included, in addition to HQ TAC staff, representatives from Air Staff (Civil Engineering, Bases and Units) and from George AFB. The site-survey team validated the requirements set forth by the MHAFB team.

Eleven of the 24 construction projects included in Table 2.1-3 are modifications or repairs to existing facilities. The sites for these construction projects were predetermined by the location of each existing facility. Thirteen of the construction projects are new facilities. They are listed in Table 2.1-4, which also identifies the primary siting factors determining the proposed locations for each new facility.

Table 2.1-4

Siting Factors for Realignment-Related Construction at MHAFB

New Facility	*Adjacent to Existing Similar Facility*	*Adjacent to Flightline*	*Adjacent to Base Operations*	*Quantity-Distance Criteria*	*AICUZ Noise Criteria*
Aircraft Engine Shop	X	X			
Munitions Magazine	X			X	
Fuel Fill Stand	X	X			
Military Family Housing	X				X
Dormitory	X				X
Munitions Facility	X			X	
Squadron Operations/AMU		X			
Squadron Operations Facility		X			
Aircraft Hangar	X	X			
Inert Munitions Storage	X			X	
Supply Warehouse		X	X		
Washrack Corrosion Control	X	X			
Dining/Troop Issue	X				

2.1.3 Proposed Changes to Special Use Airspace

2.1.3.1 Introduction

The special use airspace currently used in the area surrounding MHAFB has supported training for TAC, SAC, and other DOD aircraft, including the Idaho Air National Guard (IANG). With the proposed realignment of George AFB's F-4s to MHAFB, additional demands that will require airspace changes will be placed on the special use airspace. The nature of the current operations include aircraft advanced handling, standoff electronic warfare training, and IANG RF-4 reconnaissance training.

Aircraft Advanced Handling Characteristics. This flight training is designed to give aircrews proficiency in and ability to exploit the flight envelope of the aircraft, consistent with operational and safety constraints. This training involves single aircraft only.

Standoff Electronic Warfare Training. This training concerns the use of aircraft equipment to jam simulated surface-to-air missile (SAM) and anti-aircraft artillery (AAA) sites. Mission profiles are based on providing electronic combat support for strike aircraft. The training includes the actual detection and disruption of the ability for ground-based SAM and AAA sites to function effectively.

Reconnaissance Training. This training consists of safely flying and navigating the aircraft at low altitude while simultaneously devoting attention to searching for and recognizing enemy aircraft threats. The training includes the performance of an obvious recognition/defensive maneuver in reaction to the enemy threat.

The addition of the George AFB's F-4s to the MHAFB special use airspace will put additional requirements on the airspace, which includes intercept training, air-to-air combat training (a requirement the F-111s now at MHAFB do not have), and supersonic operations.

Intercept Training. During intercept training, student F-4 aircrews need adequate time and distance to learn how the F-4 radar systems operate, to analyze the intercept geometry involved between the F-4 and a target aircraft, to maneuver the F-4 to successfully complete the tactical intercept, and to make appropriate adjustment to counter changes in geometry. During an intercept, when two fighter aircraft are flying toward one another at 500 mph each, their combined closing speed is 1,000 mph. Starting an intercept with aircraft 40 NM apart provides an aircrew with approximately 2 1/2 minutes to complete all of the necessary procedures and actions to successfully complete the intercept. The needed altitude envelope provides adequate vertical airspace to effectively practice three-dimensional aircraft maneuvering. The F-4 achieves optimum flight performance between ground level and 25,000 feet AGL.

Air-to-Air Combat Training. Air-to-air combat training (ACT) may include two or more aircraft. In ACT flying training, the aircrew practices and progresses from two-ship basic fighter maneuvers (BFM) to advanced multiple aircraft ACT. Any of the types of air-to-air training described above would be required for both fully mission-capable aircrews and formal training unit (FTU) squadrons. Air-to-air flying skills must be continually practiced to maintain optimum aircrew proficiency.

Supersonic Operations. Supersonic operations above 5,000 feet AGL are proposed for MOAs in Idaho. Tactics and flight operations to test aircraft handling characteristics require speeds in the transonic and supersonic regimes on a recurring basis. The EF-111As are "high value" assets in the Air Force inventory. There are a limited number of aircraft, and they serve a critical role in all Air Force tactical missions. The EF-111s, which are unarmed, jam threat radar associated with SAM and AAA sites. Their only means of escape from a hostile environment, whether operating at low-level (less than 1,000 feet AGL) or mid-level (5,000 to 10,000 feet AGL) altitudes, is to accelerate to supersonic speed. Presently, aircrews are unable to practice this maneuver in MHAFB special use airspace. The F-4s moving to MHAFB will also need to practice supersonic flight as part of their training. During basic fighter training, this aircraft can attain supersonic speeds while performing air combat maneuvers. These maneuvers allow the F-4 to acquire or evade adversary aircraft. Supersonic flight is also needed for functional check flights. These flights test operational capability of aircraft after a major overhaul.

2.1.3.2 Proposed Action

The proposed changes in the MHAFB MOAs will accommodate the additional airspace requirements needed to accomplish the training events of the aircraft assigned to MHAFB, in addition to IANG and SAC aircraft.

The realignment brings missions that place increased demands on special use airspace in the vicinity of MHAFB. After the F-4s arrive at MHAFB, the need for MOA airspace will increase by more than 7,500 30-minute MOA periods annually. Further, the IANG RF-4 unit projects a new requirement for more than 1,000 MOA periods beginning in 1990. This increased demand, along with the current EF-111 need for 1,000 MOA periods annually, dictates efficient use of existing MOAs and shows a need to modify the existing MOAs. The present MOA configuration cannot easily be subdivided into smaller subunits for simultaneous use by a number of users. Consequently, the present level of air-to-air tactical training achieved by F-4 aircrews at George AFB could be negatively affected. Similarly, degraded EF-111 training could result from limited MOA training time resulting from competition for MOA airspace. Several modifications and changes to the existing MOAs are required to provide needed flexibility to maintain current levels of aircrew training (see Figure 2.1-5).

In summary, the proposed changes include consolidating the existing eight MOAs into four MOAs, expanding MOA airspace north of the existing Owyhee/Paradise and Sheep Creek 3 MOAs and west

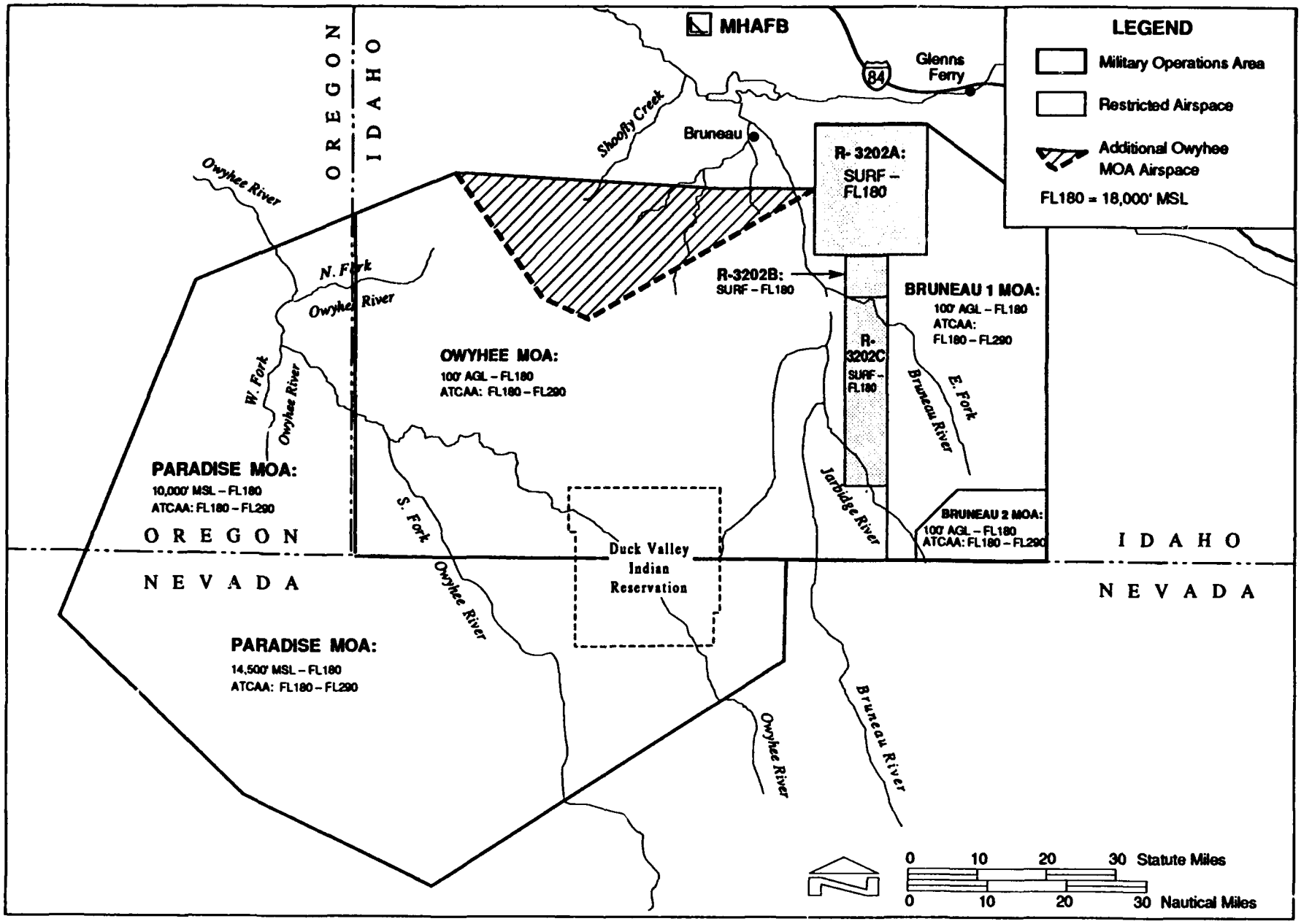


Figure 2.1-5

PROPOSED AIRSPACE CONFIGURATION

of the SCR, and lowering the floors of the Paradise MOA in Oregon and the Bruneau 2 MOA. Details of the proposed changes are described in section S4.1, Airspace Management. The MOAs in Idaho would be combined into three MOAs: Owyhee and Bruneau 1 and 2 MOAs. The floors of all MOAs in Idaho would be 100 feet AGL, in Oregon 10,000 feet MSL, and in Nevada 14,500 feet MSL. The ceiling for all MOAs would be 18,000 feet MSL. The ATCAA airspace would extend up to 29,000 feet MSL. Supersonic operations, above 5,000 feet AGL, will be conducted within the Owyhee and Bruneau 1 and 2 MOAs.

The proposed changes to the MOA airspace provide flexibility to easily subdivide MOA airspace, thus allowing further simultaneous use. Through maximum simultaneous use, all user needs as described in section S4.1, Airspace Management, could be met.

2.1.4 Proposed Expanded Range Capability

2.1.4.1 Introduction

The SCR historically has supported the training needs of TAC fighters and SAC bombers located at and near MHAFB, and the IANG. In recent years, the range has experienced a considerable increase in use by these units as well as requests for additional access from other units. This increased demand for SCR time along with a need for more realistic aircrew training has revealed serious limitations and deficiencies of the range. These deficiencies will be magnified in the short-term, immediately following the F-4 beddown at MHAFB.

The Air Force's short-term requirements will be over the next five years. In the short-term, the Air Force must satisfy the immediate training needs of aircrews stationed at MHAFB with only existing range facilities. The SCR is inadequate to meet the immediate needs of MHAFB, along with other users cited above. Therefore, in the intermediate-term the Air Force proposes to expand range training capacity to satisfy all potential military users in a realistic training environment.

Recent rapid changes in the geopolitical world order and subsequent evolutionary changes in the U.S. defense force structure make the long-term outlook difficult to predict. However, better, more realistic train[illegible]or an expected smaller, better-equipped fighting force will be at a premium.

Short-Term (Present - 1995; Pre-Expanded Range Capability). The short-term Air Force requirements include all current user and post-realignment F-4 range requirements. However, the current range configuration results in a significant shortfall in range capacity and capability to meet Air Force requirements. In the short-term, MHAFB aircraft range requirements would exceed present capacity. Table 2.1-5 depicts the short-term range period requirements.

Table 2.1-5

PROJECTED SHORT-TERM ANNUAL RANGE REQUIREMENTS [1]
(Stated in 30-Minute Range Periods)

Unit	*Aircraft*	*Conventional*	*Tactical*	*Tactical with EC*	*Total*
MHAFB[2]					
35 TFW	F-4	3,308	1,720	2,894	7,922
DET 3, 4443 TEG	F-4	---	---	72	72
DET 5, 4443 TEG	F-4	60	18	234	312
390 ECS	EF-111A	---	---	525	525
TOTAL		3,368	1,738	3,725	8,831
Other Users[3]					
124 TRG, IANG	RF-4C	---	775	1,444	2,219
388 TFW, TAC	F-16	8	15	15	38
419 TFW, AFRES	F-16	5	23	28	56
SAC	B1-B, B-52	1,200	---	1,200	2,400
TOTAL		1,213	813	2,687	4,713

Notes:
1. The data listed reflect the number of effective range periods required after normal expected attrition.
2. Units stationed at MHAFB would be given top priority for range utilization. The required capacity to accommodate the training needs of these units in the short-term is 8,831 annual 30-minute range periods.
3. Other users would be assigned lower priority for range utilization in the short-term. However, training requirements would be fully met in the intermediate-term after a proposed expansion of range capability is implemented (see Table 2.1-6).

Intermediate-Term (Year 1995 - 2000; Post-Expanded Range Capability). The Air Force goal is to provide substantial, realistic training for MHAFB-based aircrews as well as other primary users of the SCR. This training includes tactical and conventional bombing, air-to-air, electronic warfare, and composite force training. Further, new missions and new weapons systems would be accommodated within an expanded capability. Table 2.1-6 depicts the intermediate-term range period requirements.

Long-Term (Year 2000 and Beyond). In the next five to 10 years, the Air Force will be receiving new aircraft, systems upgrades, and new weapons with enhanced capability that may require further range capability expansion, redesign, or reconfiguration. Range utilization requirements for follow-on to F-4, F-16, F-111, and F-15 aircraft that are designed for air-to-surface missions are expected to have the same range needs as current Air Force aircraft with the same mission. The Air Force expects to continue to have a minimum of three squadrons of aircraft at MHAFB. Future aircraft assigned to MHAFB are anticipated to be air-to-surface aircraft that perform at medium and low altitude, in all weather conditions and at night, and employ weapons similar to those currently in existence. Additionally, it is anticipated that the use of the SCR by other users and for other missions will increase. Table 2.1-7 depicts anticipated annual long-term range period requirements.

Proposed Action. The proposed action is to provide MHAFB and the Air Force the ability to meed short-, intermediate-, and long-term training requirements in the region. This action may require adequate airspace and land to accommodate the continuation and basic flying training requirements as well as realistic flying training for all MHAFB aircraft and other Air Force users in order to maintain a credible deterrent fighting force. An expansion of the range capability in the area near MHAFB could satisfy these needs. As such, this document discusses criteria, need, and impacts of such an expansion. An expanded range capability should be designed to meet all short-, intermediate-, and long-term requirements.

2.1.4.2 Criteria for Developing Range Sites

The criteria described in this section provide an initial framework that will be used in the Tier 2 EIS if a decision is made to pursue a range expansion option. These criteria are applicable to the process of selecting an existing range to meet training requirements, as well as the development of a new or expanded range.

Air Force range design is based on operational requirements. In order for a geographic area to be considered a feasible site for a range, it must have certain attributes: special use airspace; DOD-controlled land; and proximity to a military airfield.

Special use airspace and DOD-controlled land are needed to meet the safety and security requirements associated with operating a training range. A military airfield is needed to support the aircraft using

Table 2.1-6

PROJECTED INTERMEDIATE-TERM ANNUAL RANGE REQUIREMENTS
(Stated in 30-Minute Range Periods)

Unit	*Aircraft*	*Conventional*	*Tactical*	*Tactical with FC*	*Total*
35 TFW, MHAFB	F-4	3,308	1,720	2,894	7,922
DET 3, 4443, MHAFB	F-4	---	---	72	72
DET 5, 4443, MHAFB	F-4	60	18	234	312
390 ECS, MHAFB	EF-111A	---	---	525	525
124 TRG, IANG	RF-4C	---	775	1,444	2,219
388 TFW, TAC	F-16	8	15	15	38
419 TFW, TAC	F-16	5	23	28	56
SAC	B-1B, B-52	1,200	---	1,200	2,400
TOTAL		4,581	2,551	6,412	13,544

Table 2.1-7

PROJECTED LONG-TERM ANNUAL RANGE REQUIREMENTS
(Stated in 30-Minute Range Periods)

	Range Periods
MHAFB aircraft	2,990
Other Tac aircraft	2,000
Air National Guard	1,500
SAC	3,600
Other users	2,000
TOTAL	12,090

the range. All locations with this combination of attributes can be considered as potential sites for a range.

Exclusionary Criteria. Once a site is determined to have the above attributes, its suitability can be assessed by the application of exclusionary and evaluative criteria. The initial stage of site selection is the application of exclusionary criteria. The exclusionary criteria for selecting a site for a range complex to meet the training and operational requirements of the MHAFB mission are as follows:

- o ADEQUATE AIRSPACE. As discussed in Section 1.1.2.2, the airspace required for a proposed expanded range capability is 150 by 50 NM. This is the minimum airspace required to perform both the basic aircraft maneuvers required of student pilots and the advanced air-to-air tactics that must eventually be mastered. This amount of airspace is also required for composite force training and to practice standoff electronic combat training.

- o ADEQUATE LAND AREA. In the case of a proposed expanded range capability, the size is determined by the requirement for the range to replicate the high-threat battlefield described and illustrated in Section 1.1.2.2. Such a range complex would fit within a 62-by-50-NM optimum area (see section 1.0 for a discussion of range complex sizing). These dimensions make it possible to achieve the required realism in training by allowing enough room for the placement of threat simulator systems and target arrays which together simulate actual battlefield conditions.

- o PROXIMITY TO A MILITARY AIRFIELD. As described in Section 1.1.2.2, proximity to a military airfield maximizes time on the range and minimizes fuel costs associated with accessing the range. A range within 150 NM of an airfield provides approximately 1 1/2 hours of flying training time for aircrews. The 150-NM distance to the range gives aircrews 30 minutes of tactical training prior to entering the range, 30 minutes of tactical flying training time on the range, and 30 minutes of tactical training while returning to the base.

Evaluative Criteria. Once sites have been assessed using the exclusionary criteria, evaluative criteria are applied to determine the most feasible alternatives. The evaluative criteria are based on the following four factors:

- o COMPATIBILITY: This factor refers to the degree to which the operational characteristics of the training requirements are compatible with the existing mission. This factor involves not only current use but includes overall compatibility with Air Force mission capabilities.

- o CAPACITY: This factor addresses the ability of the candidate range to accommodate the new training requirements without displacing existing missions. This factor can be evaluated by examining current utilization levels and the potential for growth.

- o SUITABILITY: This factor examines a site's ability to meet the technical and physical support needs dictated by the training requirements. This involves looking at the land area in terms of suitability of terrain for the placement of targets and the flexibility to devise alternative layouts. Criteria for evaluating land area suitability also include safety and security issues as well as potential conflict with existing land uses. Suitability also involves airspace issues such as conflicts with civil aviation and access to the range via low level training routes.

- o ENVIRONMENTAL: This factor includes environmentally sensitive areas and potential conflicts with the protection and use of these areas. Environmentally sensitive areas include national and state parks, monuments, and landmarks; critical habitats of endangered species; wilderness and wilderness study areas; and national and regional recreational areas.

Examples of evaluative criteria are discussed below.

Safety. Safety considerations for both Air Force and public operations are paramount in range design. Two key design considerations are safety in flight pattern design and safe boundaries for target impact areas.

Terrain. A range with expanded capability should be located in terrain that simulates a high threat battlefield scenario. This requires the flat to rolling topography suitable for airfield construction as well as the movement and staging of ground troops and armored vehicles.

Realism. Combat experience and studies have indicated that aircrew survival is greatly enhanced by realistic training. It is essential for student aircrews to complete training missions under the stress of highly sophisticated combat environments. This imposes a requirement for training realism that has implications on range complex design and training scenarios. Principally, training realism requires that the training ranges be designed to simulate an anticipated theater of hostilities and the offensive/defensive doctrines of possible enemy forces.

Multiple Land Use. The design of an expanded range complex should incorporate multiple uses of government land whenever possible. This is the ongoing Air Force policy today at the SCR, where 97,000 acres of the 109,000-acre withdrawal are available for public use. On a proposed range with expanded capability, all of the land inside any withdrawal that is not specifically fenced as a target

impact area would be available for other compatible uses. Whenever possible, shared and seasonal use would be permitted, even in training ordnance impact areas. This would allow hunting, grazing, and other compatible land uses to continue. Air Force implementation of multiple use allows the public maximum use of valuable government lands. Appendix B contains definitions for multiple, shared or seasonal, and exclusive land uses.

Impact on Existing Public Activities. Location, size, and use of impact areas on an expanded range must be planned to allow realistic training while minimizing effects on existing activities and risks to public safety. Further, proposals for supersonic sorties should take into consideration the use of land or airspace by the public. Operational altitudes available for supersonic flight must be low enough to accommodate realistic missions but still be compatible with effective air route traffic control and general aviation traffic. In addition, since ground sonic boom effects are proportional to the altitude of the aircraft above the ground, the minimum operational altitudes must be planned to allow realistic scenarios while minimizing the sonic boom effects on the public and environment beneath the airspace.

Impact on Civil Aviation. As required by Air Force and FAA regulations, a range with expanded capability should be located in airspace transited by few commercial airways and servicing limited established airports and general aviation traffic. The range complex should be sited to avoid and minimize the impact that military flight operations may have on other airspace users.

Impact on Population. An expanded range capability should be provided in an area that is sparsely populated so that the fewest number of people are affected by dislocation or noise resulting from flight training activity, including supersonic operations.

2.1.4.3 Potential Alternatives Including the Proposed Action

Some alternatives considered for meeting short, intermediate, and long-term range requirements include (1) using simulator training devices, (2) using the SCR in conjunction with other ranges within 150 NM of MHAFB, (3) using ranges beyond 150 NM of MHAFB, (4) temporarily using satellite operating locations, (5) utilizing inflight refueling of aircraft to reach ranges with adequate training capability, (6) building another range within 150 NM of MHAFB, and (7) expanding range capability in southwestern Idaho.

Using Simulator Training Devices to Fulfill Range Requirements. Currently, no simulators exist that simulate actual combat realism and dynamics of tactical combat. F-4E/G and EF-111A simulators have no motion, limited visual capability, and limited scoring capability. No tactical improvements or new F-4/EF-111 simulators are being developed. This alternative would not meet even minimum requirements.

Using the SCR in Conjunction with Other Ranges within 150 NM of MHAFB. The only range other than the SCR located within 150 NM of MHAFB is the Orchard Range. The Orchard Range is an artillery and tank training range controlled by the IANG. The impact area is too small to be used for aerial bombing. This alternative would not permit the Air Force to meet its training needs.

Using Ranges Beyond 150 NM of MHAFB. Since there are several ranges beyond 150 NM of MHAFB that could be used, one option considered was joint use by MHAFB aircraft and the managing unit. This alternative would involve higher economic and operational costs. However, on a limited basis, some Air Force range requirements could be fulfilled in this fashion. Figure 2.1-6 depicts alternative ranges and their associated airspace.

Under this alternative, aircraft would operate from MHAFB directly to and from joint use ranges with no requirement for inflight refueling. The problem encountered is the distance to these joint use ranges. The closest joint use range to MHAFB usable by F-4s is the Eagle Range at the Utah Test and Training Range (UTTR), which is 173 NM away. Due to the unrefueled range of the F-4, the 346 NM of round-trip travel would result in only 10 to 20 minutes of range utilization time for each sortie (see Appendix B). In this situation, the operational cost in relation to training derived would be prohibitive.

Further, the UTTR is already scheduled at near-maximum capacity and is not anticipated to have the capability to support all MHAFB training requirements. Because the UTTR is a prime testing range for Air Force weapons systems, the MHAFB training mission would not possess the priority to dislodge the UTTR's present mission. As a result, MHAFB F-4 aircraft would be able to gain only limited access to UTTR. Similarly, the Fallon Naval Air Station (NAS) range in Nevada is unable to support Air Force needs other than on a "catch as catch can" basis. Such a basis for necessary training is unacceptable. Nellis would have ranges available for use by the F-4Es and F-4Gs, but the 300-NM one-way flight would make it unusable without inflight refueling or deploying aircraft to Nellis AFB.

Three of the four F-4 squadrons being assigned to MHAFB are student FTU squadrons. An FTU squadron's mission is to provide initial qualification training for F-4 aircrew members. As such, a major portion of the training is conducted in a classroom environment or in a training device such as a simulator.[1] In the student environment, it is absolutely necessary to achieve maximum training on each mission. In an FTU, training flights start with the most basic tasks and methodically progress to the more advanced. This results in a complex sequence of training activities consisting of academics, training devices (e.g., simulators and mock-ups), and flights. Thirty-minute periods on a range are considered the standard minimum to allow a student to achieve the maximum training on each mission.

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1. Training is scheduled according to the B Syllabus: 247 hours of classroom instruction and up to 53 hours of either cockpit familiarization, part task trainer, or simulator missions.

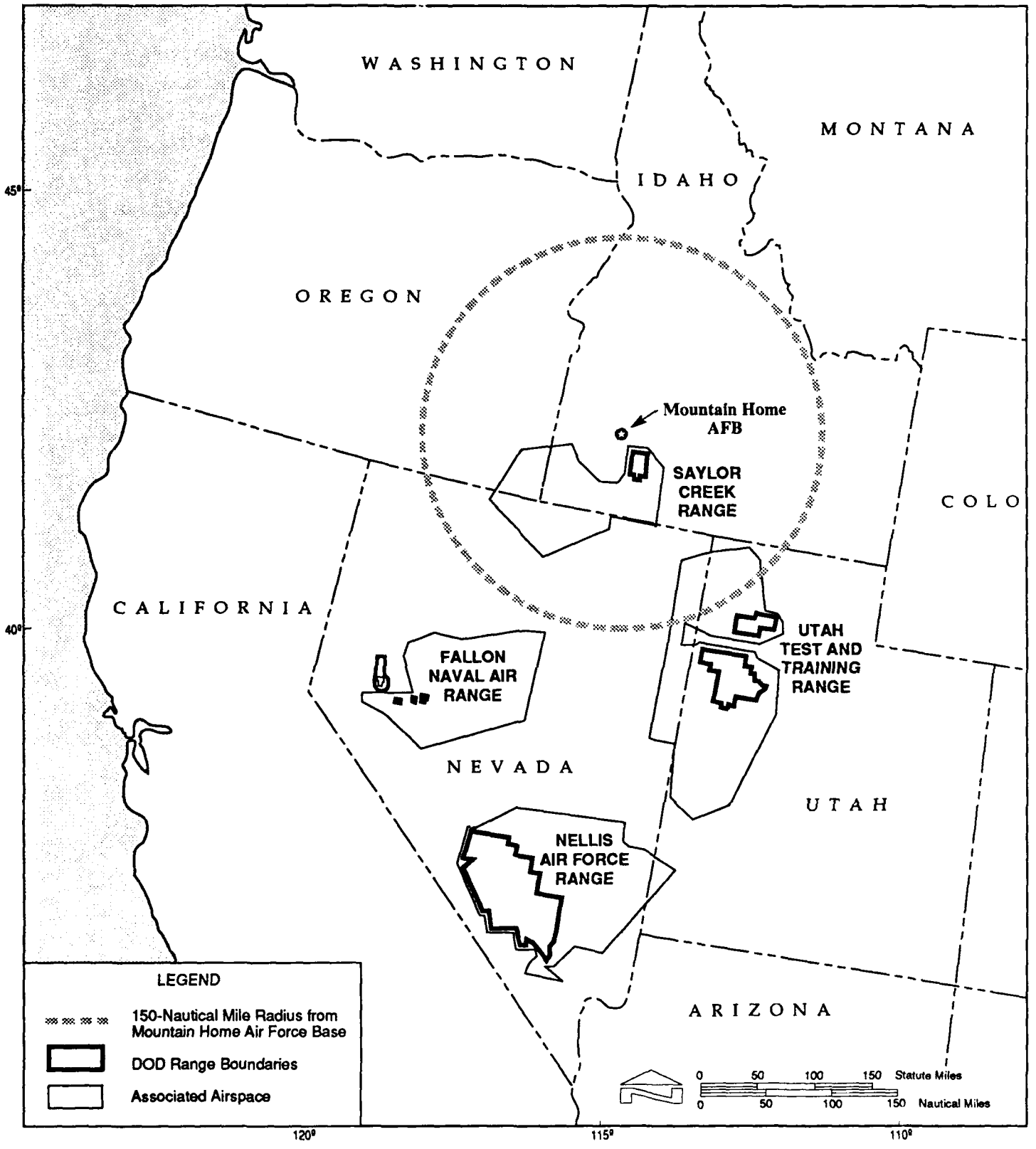


Figure 2.1-6

ALTERNATIVE RANGES AND ASSOCIATED AIRSPACE

Flying long distances to ranges such as UTTR does not permit maximum sortie effectiveness. Doing so would require up to a threefold increase in sortie production requirements. Such an increase would prohibitively increase fuel and maintenance costs and, at the same time, unacceptably degrade aircrew training production. Further, the requirement to fly at high altitude for optimum fuel conservation in order to reach distant ranges, reduces the ability to conduct required low-level training events. Consequently, much realistic training is lost flying to and from the range and at the range, for both the FTU student and the mission-ready aircrews.

Continuation combat training for mission-ready aircrews would be impacted in terms of aircrew proficiency and combat capability. Crew members would not be able to attain adequate proficiency if forced to fly long distances at high altitude and use an air-to-surface range for less than 20 minutes. To achieve the needed level of readiness would require up to a two-fold increase in the number of missions.

Temporarily Using Satellite Operating Locations to Obtain Range Time. The following analysis evaluates the feasibility of obtaining range times by one of two methods: (1) flying "out-and-back" sorties to Hill AFB, and (2) temporarily deploying MHAFB units to operating locations with access to ranges within 150 NM. Either of these options would be feasible on a limited basis for mission-ready aircrews, but not to the extent needed to absorb all unfulfilled requirements from the SCR after beddown of the F-4s.

Flying "out-and-back" sorties to Hill AFB would involve flying a mission to a nearby range (probably UTTR) and landing at Hill to refuel and reload munitions. The return trip would involve taking off from Hill AFB, flying another mission to the nearby range, and landing back at MHAFB. Hill AFB was chosen for this option because it is an Air Force installation with facilities in place that could handle recovering, reloading, and relaunching Air Force tactical aircraft. Further, Ogden Air Logistics Center (ALC) is co-located with Hill. Ogden ALC provides depot maintenance for F-4s and could provide some emergency F-4 maintenance if required. For these reasons, Hill AFB provides the best case for analysis.

MHAFB F-4Es and F-4Gs could operate on a limited basis using an "out-and-back" mission profile. A typical profile would be to fly at high altitude to UTTR (Wildcat Range) for 30 minutes of range activity and then land at Hill AFB. After landing, refueling, and rearming at Hill, the aircraft could fly a low-level navigation mission to arrive at UTTR with enough fuel (2,000 gallons) to use 10 to 20 minutes of range time.

An "out-and-back" scenario has several drawbacks that make this alternative infeasible on a large scale basis due to delays in aircrew training continuity and range time availability. Deploying to Hill AFB would be constrained by UTTR saturation and the priority of test missions. UTTR ranges are already

scheduled to near capacity and do not have the ability to absorb the additional eight hours per day range time needed solely for MHAFB F-4s.

Temporarily deploying units from MHAFB to obtain range time would entail stationing an entire squadron (aircraft, aircrews, and support personnel) at another operating location for up to 60 consecutive days. Nellis AFB was chosen as a suitable operating location because F-4G aircraft at George AFB currently use some of the Nellis ranges

This alternative would be of limited value for the three FTU squadrons being transferred to MHAFB. FTU academic and simulator training to be provided at MHAFB is not provided at other locations. This training is to be spread throughout the course and must be accomplished.

To avoid the prohibitive expense of maintaining a complete on-site parts inventory, replacement aircraft parts would be maintained at MHAFB and transported to the operating location when required. In addition to increased transportation costs, the delay in getting parts from MHAFB would reduce aircraft in commission rates at the operating location. The wing's world-wide defense capability would be seriously degraded if the operational F-4G squadron deployed away from MHAFB on a long-term basis.

The adverse impact on the morale of Air Force personnel required to support this alternative is another factor that must be considered. While deployed to Nellis, families of operations and maintenance personnel would have to remain at MHAFB. The necessity for family separation is accepted in the military; however, the validity of forced family separation to accomplish air-to-surface training at a satellite location when that flying could be reasonably accomplished closer to MHAFB is questionable.

The following data summarize three major costs required to deploy and maintain an F-4 squadron (24 aircraft) at Nellis AFB. Cost estimates are based on deploying/maintaining a squadron-size detachment at Nellis AFB for one year with a rotation of personnel back to MHAFB every 60 days. A squadron-size operation requires approximately 300 enlisted and 67 officers for a total personnel package of 367. The total cost per year to accomplish this alternative is estimated to be $2,071,262. The total includes deployment costs, temporary duty personnel costs, and personnel rotation costs. Computations used to derive both individual and total operating costs are provided in Appendix B.

Utilizing Inflight Refueling to Increase Area Flight Time. Aircraft from MHAFB could operate on a very limited basis to and from other ranges in the western United States such as UTTR, Fallon, or even Nellis AFB. Because of the greater distance involved, the operational cost per F-4 sortie to these ranges will be nearly twice the cost per sortie to the SCR. The additional costs are attributable to the increased F-4 flight time and the inflight refueling support necessary to accomplish sorties to UTTR,

Fallon, or Nellis. An F-4 sortie to the SCR requires a total flight time of 1.5 hours or less. A typical mission profile would include a low level training route mission followed by 30 minutes of activity at the SCR. In order to accomplish the same training (same profile) followed by 30 minutes of range time at UTTR, Fallon, or Nellis would require between 2.4 hours and 3.0 hours for a round trip.

Missions to the SCR can be flown without inflight refueling, while each sortie to UTTR, Fallon, or Nellis would require aerial refueling to and/or from the area to accomplish 30 minutes of range time. Five KC-135 refueling aircraft would be required per day. The total flight time for each KC-135 mission would average approximately five hours. Using current costs per flying hour, the cost per F-4 sortie for 30 minutes of range flight time at the SCR is $4,123, whereas the UTTR cost per sortie would be $8,497. A summary of these computations is provided in Appendix B. In addition to cost constraints, daily tanker support for MHAFB missions is not feasible because of a lack of available tankers.

The additional costs resulting from F-4 operations at UTTR or Fallon using aerial refueling are acceptable on a limited scale since each mission-ready aircrew member must maintain refueling proficiency and each upgrading crew member requires aerial refueling training as part of the FTU syllabus. This training can be accomplished in conjunction with a range mission. However, an alternative requiring large-scale refueling support on a daily basis is impractical due to excessive cost, unavailability of adequate range time, and unavailability of adequate tanker support. Because Nellis is located 300 NM southwest of MHAFB, aircraft would require refueling before and after using the range.

Building Another Range within 150 NM of MHAFB. The area within a 150-NM radius of MHAFB includes portions of western Oregon, northern Nevada, Utah, and most of Idaho, excluding the northern and eastern regions of the state. Figure 2.1-6 shows those portions of Oregon, Nevada, Utah, and Idaho within the 150 NM radius. A range located within 150 NM of MHAFB would be economically and operationally feasible for aircrew training. In addition, since much of this area is sparsely populated, a range with expanded capability could be developed at several locations without adversely impacting major population concentrations. However, many potential locations are restricted, as explained below.

NORTH. Locating a range within 150 NM north of MHAFB would place target areas in mountainous terrain including the Sawtooth Range, encompass a large amount of private land within the suitable terrain available, and conflict with at least five airways: V253, V4, V293, V330, and V444-500.

SOUTH. Developing an expanded range capability south of the SCR appears feasible. Further studies will be conducted in Tier 2 if the decision is made to continue range expansion plans.

EAST. This option would place target areas near Buhl, Jerome, Twin Falls, Kimberly, Gooding, Wendell, Shoshone, Castleford, and other towns. Other factors include Interstate Highway 84, Highway 93, and other major roadways, the Snake River, a power plant, and power lines. Also, it would interfere with airports at Buhl, Jerome, Twin Falls, Gooding, and others. Additionally, there are at least five airways traversing the area. They include V253, V293, V4, V484, and V444. This option would affect a large amount of private land and conflict with a numerous established population areas and facilities.

WEST. This option would place targets in the vicinity of the Snake River and into eastern Oregon. Building a new range in southwestern Idaho west of the current range and Highway 51 is viable. However, this option would disrupt the integrity of the needed scenario (see section 1.1.2.2) since the target areas would be geographically separated by land not owned or controlled by the Air Force. Essentially, the Air Force would have to operate two separate ranges at already increased cost. In addition, there are numerous airways traversing the area in eastern Oregon located within 150 NM of MHAFB. Consequently, locating an expanded range capability in eastern Oregon and the Snake River is infeasible.

As indicated above, locating a large contiguous range and developing new MTR, MOA, and restricted airspace in most areas within 150 NM of MHAFB is not feasible due to potential conflicts with civil airspace, unsuitable terrain, and the need for realistic training. The most feasible location for an expanded range capability is the southwestern portion of Idaho, where existing airspace is available.

Expanding Range Capability in Southwestern Idaho. Under this alternative, an ideal area of up to 62 by 50 NM would contain elements of a range complex to be used by the Air Force as described in section 1.0. Such an Air Force range complex could include the approximately 110,000 acres that constitutes the SCR. The ground area under study for expansion is identified in Figure 2.1-7. The expansion area could be contiguous with the SCR. This proposal best satisfies the Air Force's short- and intermediate-term requirements and the criteria set forth to meet those requirements. Additionally, this proposed expanded range capability would establish the flexibility to accommodate unknown long-term requirements. The proposal would provide the capacity to accommodate the approximately 13,600 required 30-minute range periods and the flexibility for joint use. No conflicts with established civilian airways exist. The area is sparsely populated, which allows flexibility and has minimal effect on existing civilian activities. Realism, particularly within the tactical/electronic combat ranges, would also be satisfied.

A 1987 analysis of war fighting skills conducted within TAC revealed the training most needed was practicing real-world tactics and threat reactions (see Appendix B). TAC aircrews were asked what areas of their training environment they considered to be less than adequate. The area most cited was reactions to threats, either physically moving the aircraft, or using some type of countermeasures. To

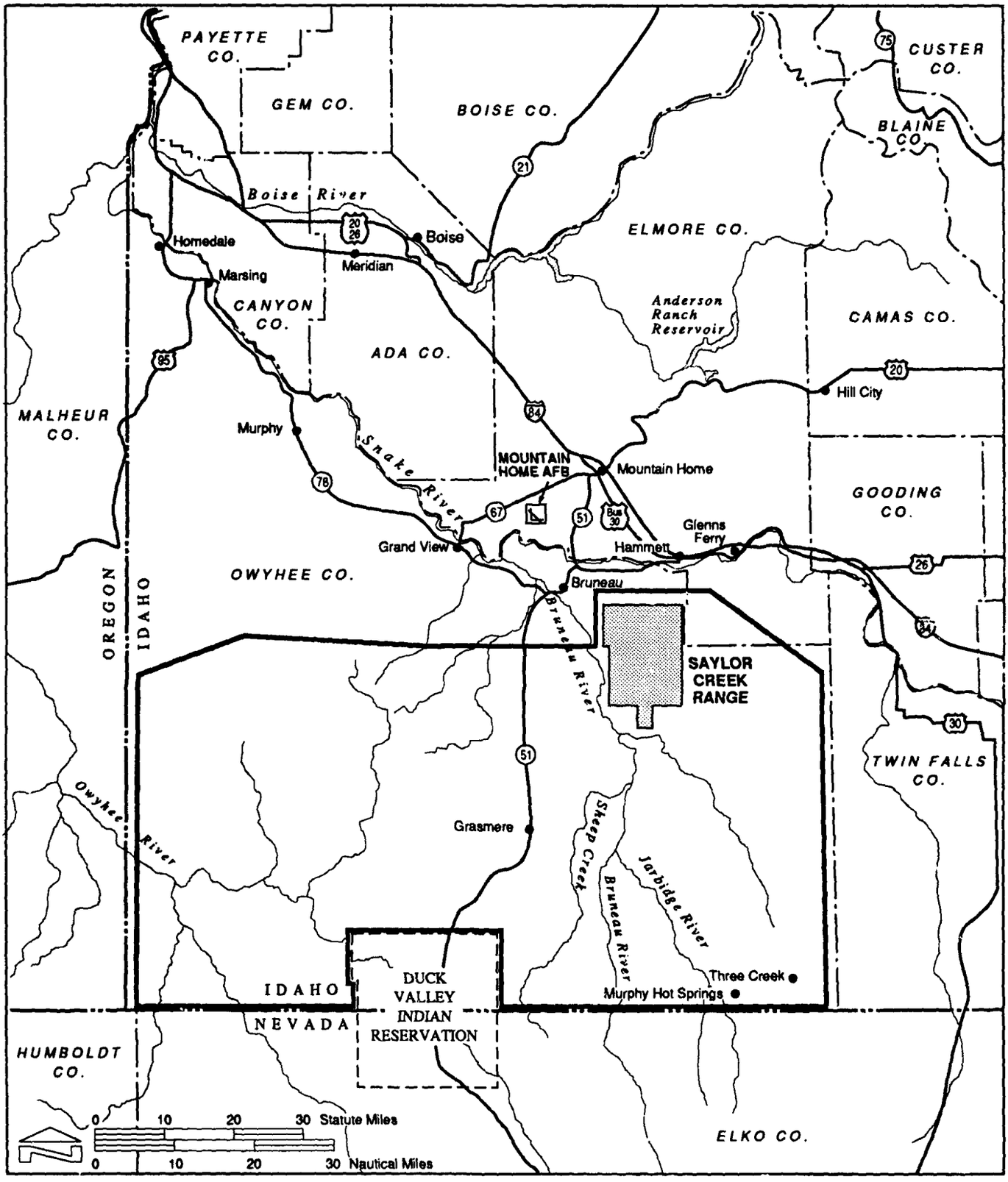


Figure 2.1-7

STUDY AREA FOR PROPOSED EXPANDED RANGE CAPABILITY

survive in high-threat environments, aircrews require regular practice in an environment as close to real combat as possible. In such an environment, aircrews are required to sort through numerous threat signals, determine the most threatening and the most appropriate reaction among several possibilities, then perform the reaction. All this must take place within a split second while staying in flight formation, navigating (often at low altitude), finding the target, and attacking it successfully. An expanded range capability could provide the space, with the variety of targets, and the spatial relationships needed to conduct this type of necessary realistic training.

Considering mission needs both present and future, an expansion of range capability in southwest Idaho best meets established criteria and best satisfies overall Air Force requirements.

2.1.4.4 No-Action Alternative

Introduction. The realignment of F-4 aircraft to MHAFB was recommended by the Commission as one of a series of actions designed to increase operational efficiency and thereby decrease operational costs throughout the DOD. F-4 aircrews must continue to fly on a range and use its associated airspace for their training. In order for the F-4 aircrews based at MHAFB to meet their air-to-air training requirements, the MOA changes described in section 2.1.3 will be necessary. Under the no-action alternative, an expanded range capability would not be available, and aircrews based at MHAFB would have to utilize current range capability.

Impact of Not Modifying the Special Use Airspace. The aircrews to be stationed at MHAFB would not be able to complete their required air-to-air training requirement if the special use airspace is not modified as proposed. The existing area is not large enough to accommodate a net gain of 59 aircraft. The expansion of the airspace is required for F-4 aircrews to practice intercept training and prevent overcrowding of the existing airspace. The reorganization of the existing MOAs is to enable the airspace to be better utilized. Failure to reorganize the MOAs will result in inefficient utilization of the available airspace.

Supersonic operations is another training requirement that could not be met if the special use airspace is not designated for supersonic operations. Without the ability to practice flight operations in a supersonic mode, aircrews would not be able to stay current in all of their required mission roles.

Training Scenarios Without an Expanded Range Capability. The SCR is the only usable range within 150 NM of MHAFB and does not, in its present configuration, possess the needed capacity for the short-, intermediate-, or foreseeable long-term training needs for Air Force aircrews. Further, the small size of the SCR does not permit required scenario development and the conduct of realistic CFT.

To identify a means by which the range could be used without acquiring additional property, a scenario was developed in which the existing target area would be reconfigured into an eastern and western half. Pilots would ingress the range from the south and would turn east or west as they left the range (depending on which side of the range they were on) after dropping practice munitions on the targets. This would effectively double the current range's capacity without requiring any additional land. The two parallel courses would be scheduled differently in order to separate the aircraft as much as possible. However, since most of this training would involve student pilots who are learning how to operate the aircraft, their timing would not be precise. In a worst case scenario, it is possible that two student aircrews could end up flying parallel to each other on courses 300 feet apart at 450 miles per hour. Training in this scenario is still under study.

In addition to the operational and safety difficulties mentioned above, the limitations imposed by this range configuration (e.g., the obvious requirement for the pilots to pull out from every delivery on the targets in a sharp left or right turn) would substantially degrade training realism.

In the short term, the SCR does not possess sufficient range capacity to meet all Air Force training requirements. Therefore, except when absolutely necessary, users based at MHAFB should receive priority for using the SCR. Other regular SCR users will be required to train elsewhere until a proposed expanded range capability is implemented. Other user training will be negatively impacted. However, even with priority, MHAFB F-4 and EF-111 aircrews cannot satisfy their continuation and basic training requirements on the SCR. MHAFB requirements can be partially satisfied using "work-arounds":

- EXPAND RANGE OPERATING HOURS. Current projections on requirements are based on range utilization of 12 hours per day. Expanding daily usage would provide some additional range periods. As an example, using the range 16 hours per day instead of the current 12 hours (during long daylight days) would provide an additional 600 range periods per year. This solution does not fulfill all requirements and does not address the Air Force need for realistic training. Further, working longer hours could negatively impact aircrews through fatigue and lowered morale.

- TRAIN WITH NO WEAPONS DELIVERY. Some F-4E/G and EF-111 tactical with electronic combat requirements could be accomplished in one of the overlying MOAs (airspace permitting) but with reduced training achieved. Under this scenario, some training that normally ends with an F-4G weapons delivery would be conducted "dry," conducting all the tactics but not releasing a weapon. These missions could be conducted against electronic combat emitters located on the SCR but at an altitude and distance that would provide safe clearance from aircraft flying on the range. Also, additional emitters could be placed at various locations in the MOAs where

there are no emitters today. Using this action, an estimated 2,011 F-4G range periods and 525 EF-111 range periods could be accommodated, but with significant trade-offs in training. Not only is continuation training reduced, realism is further degraded by not releasing a weapon.

- o USE AIR REFUELING AND DEPLOYMENTS. In addition to the work-arounds mentioned above, the Air Force could use air refueling, out-and-backs, and deployments on an interim, limited basis to fulfill training needs, all with detriments to training. Table 2.1-8 represents estimates of other possible range use using these schemes. The operational and economic costs are detailed in the previous section.

Table 2.1-8

Projected Annual 30-Minute Range Periods Available at Other DOD Ranges

Nellis	*Fallon NAS*	*UTTR*	*China Lake*	*Other*
1,000	350	350	100	200

Environmental Impacts of the No-Action Alternative. In contrast to the environmental impact analysis of the realignment, a no-action alternative to a proposed expanded range capability must be addressed. The environmental impacts associated with no-action are addressed in Chapter S-4 at the end of the impact assessment section for each environmental resource. Since no action means no expansion of range capability, the environmental impacts of the no-action alternative are assessed with respect to flight operations required to train using a reconfigured (split between east and west halves) target area. This represents a worst case analysis since the concentration of flights into a very small area maximizes potential impacts. If a new range were developed or the existing range were expanded, the separation of targets would be much greater and many of the impacts would be lessened.

Potential impacts resulting from work-arounds to other ranges would normally be expected to occur from aircraft emissions and noise. Given the number of range periods planned for these ranges (see Table 2.1-8) -- an average of less than two per day at Fallon NAS, UTTR, and China Lake Naval Weapons Station -- and the extremely high level of flight activity at these ranges (especially Nellis AFB), there would not be a substantial change in existing conditions. Consequently, the noise and air quality impacts would be insignificant. This conclusion is based on comparisons of the existing operations at these ranges, current MTR utilization, and MOA activity compared to the small increase caused by flight operations from MHAFB.

S3.0 AFFECTED ENVIRONMENT: PROPOSED EXPANDED RANGE CAPABILITY

S3.1 AIRSPACE MANAGEMENT

S3.1.1 Definition of Resource

The existing airspace environment associated with military flight activities at the SCR is composed of four elements. These are (1) special use airspace (SUA), consisting of military operations areas (MOAs) and restricted areas developed for flight training relative to military requirements; (2) military training routes (MTRs), used by the military for conducting low-altitude, high-speed flight training; (3) transition areas to accommodate direct routing to and from the SCR or to other Air Route Traffic Control Center (ARTCC) airspace; and (4) Control Areas (airways) that intersect the MTRs.

S3.1.2 Region of Influence

The ROI comprises the SCR restricted area; the area associated with the Owyhee, Bruneau, and Paradise MOAs; and the land beneath the eight MTRs that are used to access the SCR. This includes portions of southwestern Idaho, northcentral Nevada, and southeastern Oregon. The configuration and geographical coverage of the MTRs would be modified if a proposed expanded range capability were developed. Alternative configurations would be evaluated in the Tier 2 EIS.

S3.1.3 Military Operations Areas

MOAs are airspace areas of defined vertical and lateral limits established to separate certain military training activities such as air combat maneuvers, air intercepts, or aerobatics from civil and military IFR traffic. Military activity in MOAs does not include the use of ordnance. Non-participating aircraft operating visual flight rules (VFR) do not require air traffic control (ATC) clearance to operate within a MOA when military training is underway.

Eight MOAs are currently used for MHAFB military training activity. These are the Bruneau 1 and 2 MOAs, Saylor MOA, Sheep Creek 1, 2, and 3 MOAs, Owyhee MOA, and Paradise MOA.

Air Traffic Control Assigned Airspace (ATCAA) is available above the Paradise MOA. In general, ATCAA is an area of defined vertical and lateral limits that is assigned by ATC to provide separation between specified participation aircraft and other transiting instrument flight rule (IFR) aircraft. ATCAAs are not depicted on aeronautical charts. This ATCAA is under the control of the Salt Lake ARTCC, and it can be released to the military for air-to-air operations. The boundaries of this ATCAA are coincident with the boundaries of the Paradise MOA. The floor of the ATCAA is at flight

level (FL) 180; the ceiling of the ATCAA is currently FL290 (personal communication, FAA, Mountain NW 1989).

Whenever the SCR is scheduled, the adjacent MOAs (Bruneau 1 and 2, Saylor, Sheep Creek 1, 2, and 3) are automatically scheduled for use in conjunction with the range activity. The Owyhee and Paradise MOAs are scheduled separately for other, non-SCR, training missions. Figure S3.1-1 identifies the lateral limits of the MOAs. Table S3.1-1 defines the vertical limits of the MOAs. Tables S3.1-2 through S3.1-4 summarize sortie utilization of the SCR and MOAs for the period July 1988 to June 1989.

S3.1.4 Restricted Areas

Restricted airspace is a designated area in which aircraft activity, while not prohibited, is subject to certain restrictions. Most restricted areas are designated "joint-use," wherein flight operations may be authorized by the controlling ATC facility when the airspace is not in use. Two restricted areas, both of which are multiple joint space use areas, interact with the transition area airspace associated with MHAFB.

Restricted areas denote the existence of hazards to flight from activities such as aerial gunnery, guided missile firing, or air-to-ground ordnance delivery. Restricted areas within the special use airspace established for the SCR include R-3202A, R-3202B, and R-3202C. R-3202A is about 15 by 19 statute miles and completely overlies the SCR. R-3202B and R-3202C are adjacent to the south forming a rectangular corridor approximately 6 by 34 statute miles that accommodates aircraft ordnance delivery flight patterns and connects the ingress and egress routes to the range.

R-3202A, R-3202B, and R-3202C are designated as multiple joint space use areas. Figure S3.1-2 depicts the lateral limits of R-3202A, R-3202B, and R-3202C. The vertical limits are:

Restricted Area	*Altitudes*
R-3202A	Surface to 18,000 feet MSL
R-3202B	Surface to 14,000 feet MSL
R-3202C	Surface to 11,000 feet MSL

S3.1.5 Military Training Routes

MTRs associated with the SCR consist of IRs and VRs. Non-participating aircraft may fly along or cross MTRs without restriction and may obtain the status of these routes from the nearest FAA flight service station (FSS). Increased vigilance must be used when flying through or near these routes. MTR hours of operation can vary from specific time periods to continuous.

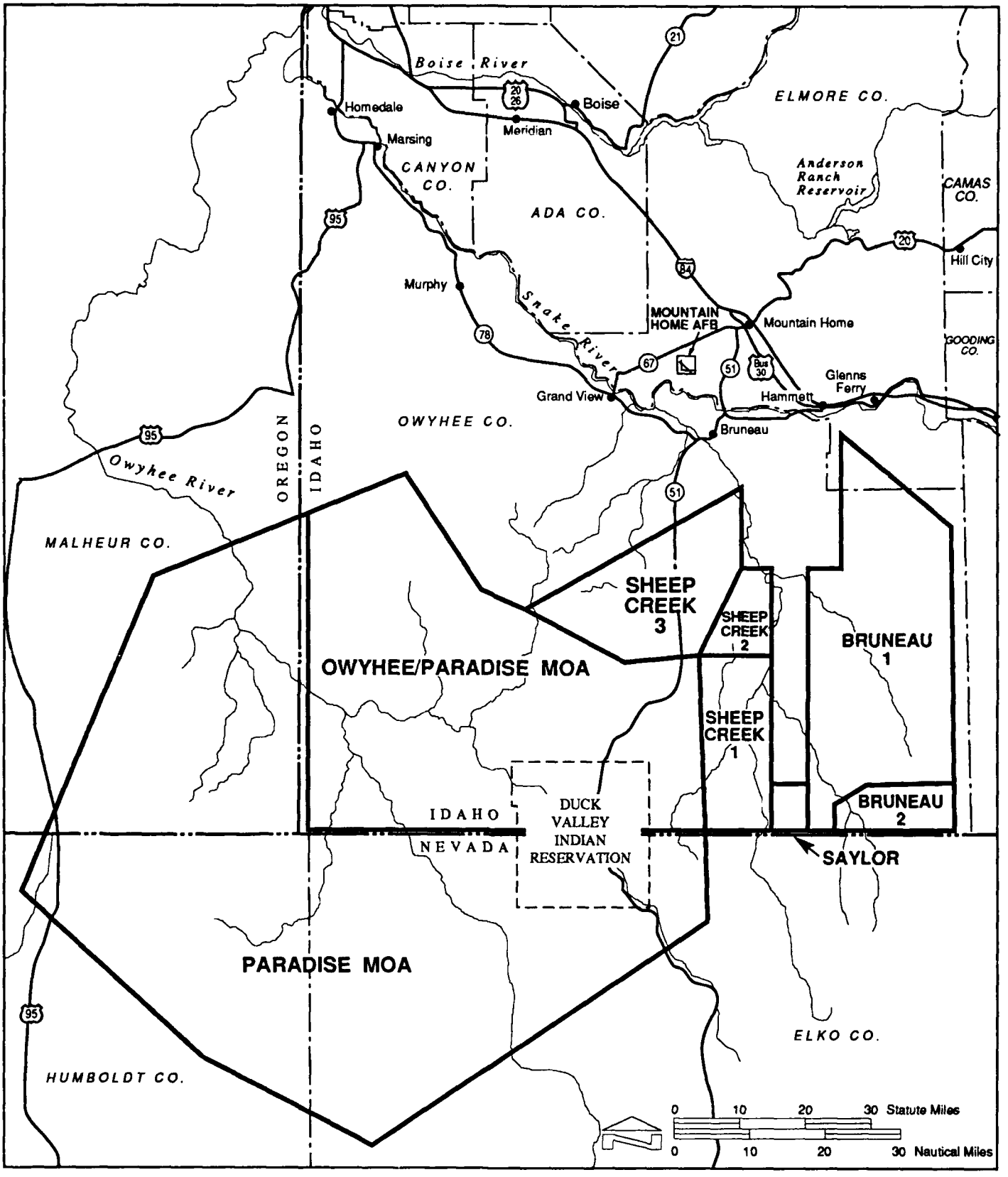


Figure S3.1-1

CURRENT MOA CONFIGURATION

Table S3.1-1

MILITARY OPERATIONS AREAS (MOAs)
OPERATING ALTITUDES

MOA Name	*Floor Altitude (feet)*	*Ceiling Altitude (feet)*
Bruneau 1	100 AGL[1]	14,500 MSL[2]
Bruneau 2	2,000 AGL	14,500 MSL
Saylor	100 AGL	14,500 MSL
Sheep Creek 1	100 AGL	11,000 MSL
Sheep Creek 2	100 AGL	8,500 MSL
Sheep Creek 3	100 AGL	up to but not including 7,000 MSL
Owyhee	100 AGL	up to but not including 14,500 MSL
Paradise	14,500 MSL	up to but not including 18,000 MSL

Notes:
1. Above ground level.
2. Above mean sea level.

Table S3.1-2

NUMBER OF SORTIES BY AIRCRAFT - SAYLOR CREEK RANGE [1]
July 1988 - June 1989

Aircraft Type	1988 Jul	Aug	Sep	Oct	Nov	Dec	1989 Jan	Feb	Mar	Apr	May	Jun	Total
EF-111A	52	26	22	41	9	32	28	75	41	42	61	37	466
FB-111A		42							4		2		48
F-111A	331	359	274	255	287	265	189	230	282	263	246	216	3,197
F-111D		6	4		1				12		7	16	46
F-117A		24			20				9				53
AC-130		1	1	1					2				5
RF-4C	71	92	38	60	74	64	23	74	44	15	47	44	646
EA-6B									2	8			10
F-16		12		24	26	36	29	22	4		3	59	215
B-52	11	52	22	20	18	17	5	27	11	22	10	14	229
A-6	5	2	4	6	3	4			15	50	10	25	124
A-7			4							10	12	204	230
F-4			4						9				13
Total	470	574	415	407	438	418	274	428	435	410	396	617	5,282

Note: 1. Includes adjacent MOAs (Bruneau 1 and 2, Saylor, Sheep Creek 1, 2, and 3) that are scheduled concurrently with range activity, but it does not include additional B-52 and B-1B aircraft that are now authorized to use the SCR.

Table S3.1-3

NUMBER OF SORTIES BY AIRCRAFT - PARADISE MOA
July 1988 - June 1989

Aircraft Type	1988 Jul	Aug	Sep	Oct	Nov	Dec	1989 Jan	Feb	Mar	Apr	May	Jun	Total
EF-111A	23	33	13	53	42	7	49	72	95	73	46	23	529
FB-111A	61	70	46	29	89	57	22	71	67	55	99	59	725
F-111D												16	16
AT-38A												14	14
RF-4C	70	77	102	106	96	95	15	56	25	8		68	718
EA-6B								2	8			2	2
F-16												59	59
B-52	1												1
A-4	4												4
A-6												20	20
F-14		8											8
Total	159	188	161	188	227	159	86	199	187	136	145	261	2,096

Table S3.1-4

NUMBER OF SORTIES BY AIRCRAFT - OWYHEE MOA
July 1988 - June 1989

Aircraft Type	1988 Jul	Aug	Sep	Oct	Nov	Dec	1989 Jan	Feb	Mar	Apr	May	Jun	Total
EF-111A	53	72	48	32	54	45	49	87	97	11	107	68	823
F-111A	108	96	87	99	79	70	70	110	61	116	82	57	1,035
F-111D												16	16
AT-38A												12	12
RF-4C	105	105	111	134	162	107	23	68	61	4		87	967
EA-68								3					3
F-16								10				65	75
A-6												20	20
A-7		12									4	19	35
F-4			12										12
F-14		8											8
Total	266	293	258	265	295	222	142	278	219	231	193	344	3,006

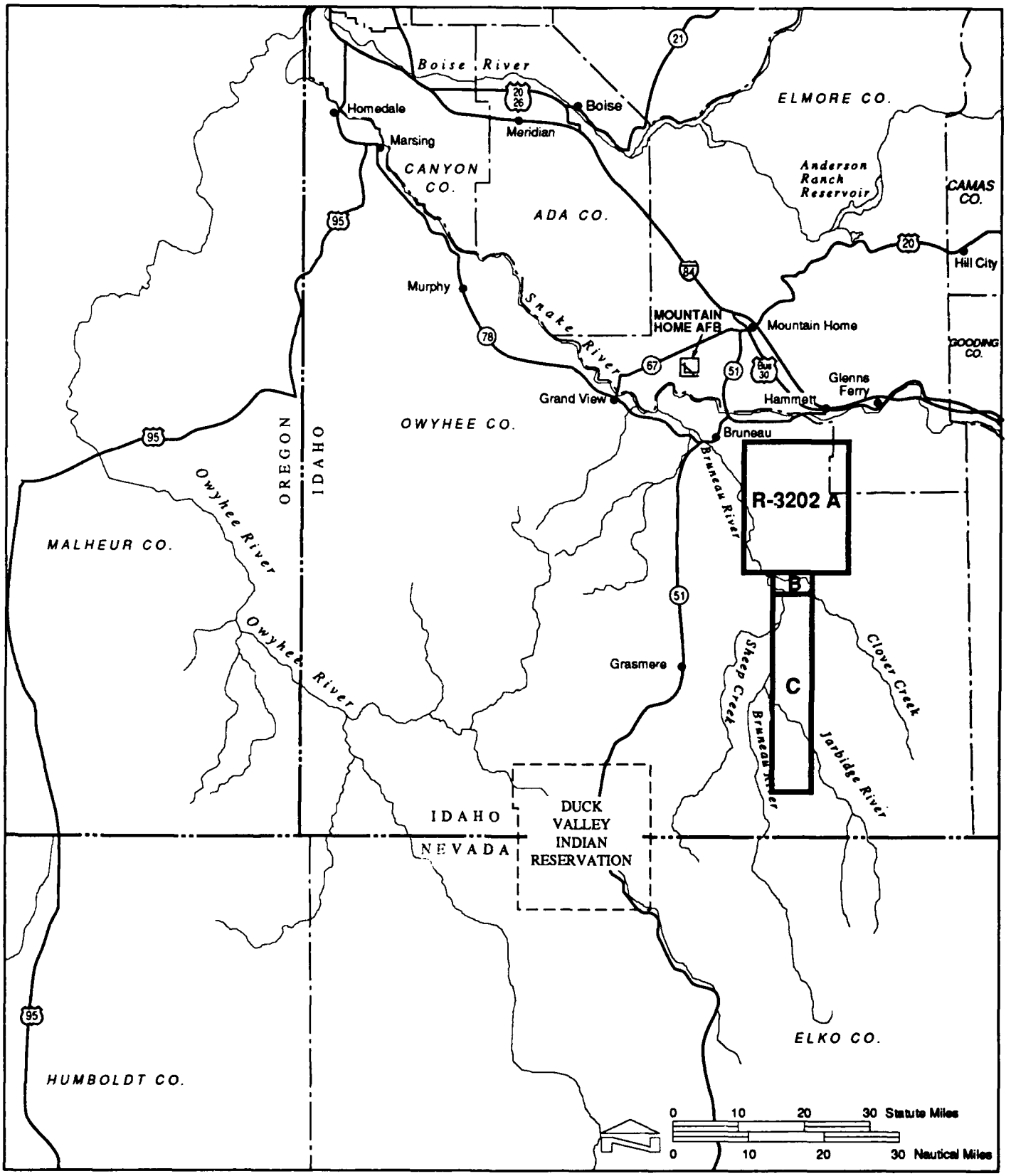


Figure S3.1-2

RESTRICTED AREA LATERAL LIMITS

Eight MTRs support military flight training activity in the vicinity of the SCR. These MTRs are depicted individually in figures S3.1-3 through S3.1-10. Figure S3.1-11 shows the spatial relationship between all routes and the current SCR. All eight of these MTRs are operated on a continuous basis. Table S3.1-5 summarizes MTR use for the period July 1988 to June 1989.

S3.1.6 Control Areas

Control areas include the airspace designated as federal airways, VHF Omnidirectional Range (VOR) federal airways, certain portions of the jet route system, and area low routes. The vertical extent of the various categories of airspace covered under control areas is defined in FAR Part 71. Control areas are depicted on Low Altitude Enroute, World Aeronautical, Sectional, and Terminal Area Control charts compiled and published by the National Oceanic and Atmospheric Administration (NOAA).

Control area airspace frequently intersects military IRs and VRs. Federal airways, in which the corridor width is 4 statute miles either side of the centerline and applicable altitudes are between 1,200 feet AGL and up to, but not including, 18,000 feet MSL, commonly cross MTRs. Civil aircraft operating VFR in visual meteorological conditions (VMCs) on federal airways may do so without contact or guidance from the controlling ATC facility for that area. Therefore, civil VFR traffic could be unaware of scheduled military flight operations on active IRs and VRs that cross or parallel the federal airway. If civil VFR traffic on a federal airway were to transit an active IR or VR, a potential air safety problem could be created. Civil VFR aircraft in contact with the controlling ATC facility or with a FSS facility and all IFR aircraft would be directed, either horizontally or vertically, away from active IRs and VRs to minimize conflicts. Figure S3.1-12 depicts federal airways intersected by MTRs in the vicinity of the SCR.

S3.1.7 Civil Airports

Civil airports are generally classified in two broad categories: commercial airports and general aviation airports. Commercial airports are those that serve scheduled airlines, including both the large national air carriers and the smaller regional/commuter air carriers. General aviation airports are those that serve all aircraft other than those used in scheduled commercial service. Commercial airports, in addition to serving scheduled airlines, also accommodate some general aviation aircraft operations.

Civil airports are categorized with respect to their usage by the aviation community. *Public-use airports* are those that are available for use by any aircraft operator. They can be owned by either a public entity (i.e., city, county, state, federal, or airport authority) or by a private entity or individual. *Private-use airports* are those that are restricted for use by only designated persons or organizations. Private-

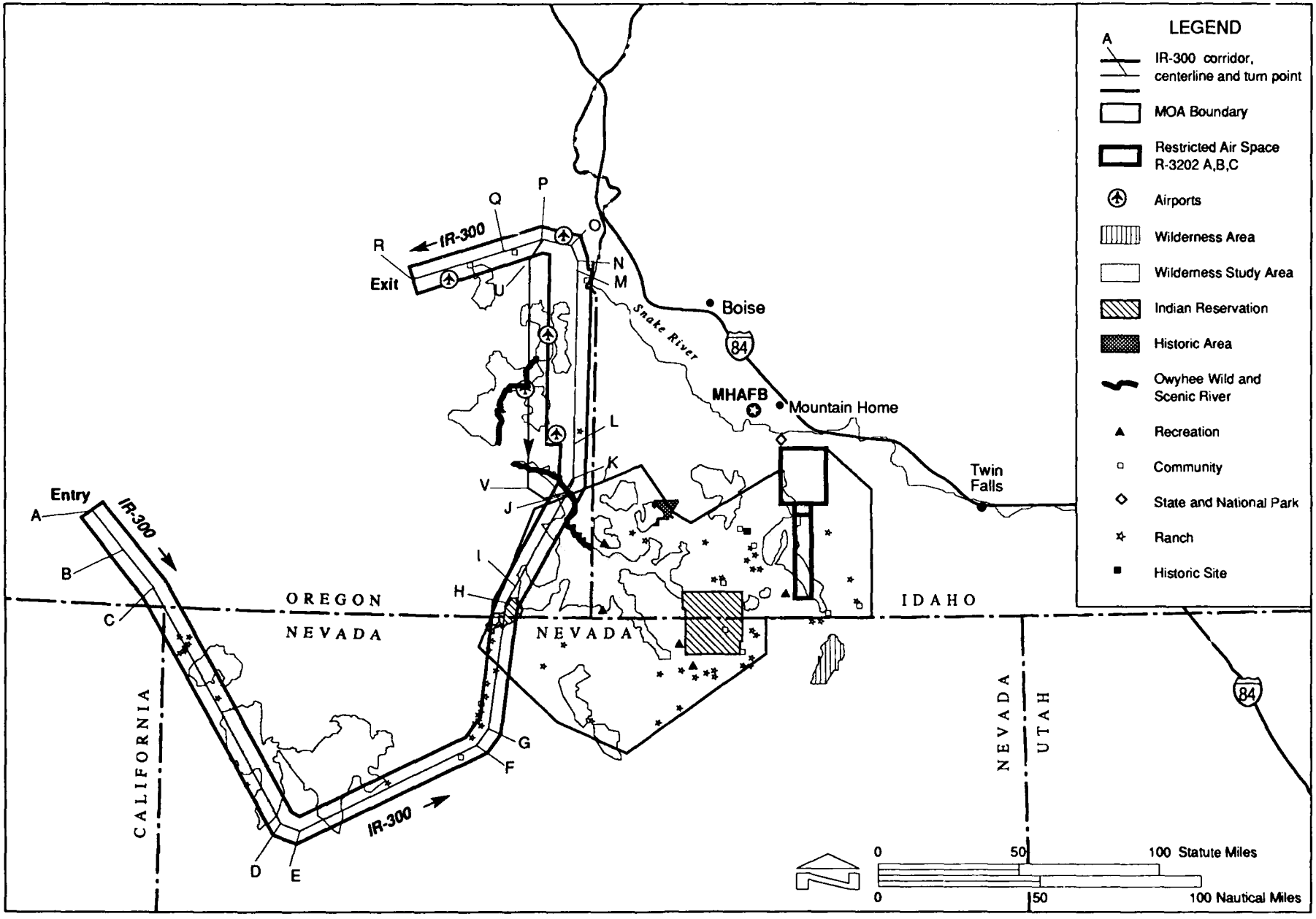


Figure S3.1-3

SENSITIVE RECEPTORS IN THE VICINITY OF MILITARY TRAINING ROUTE IR-300

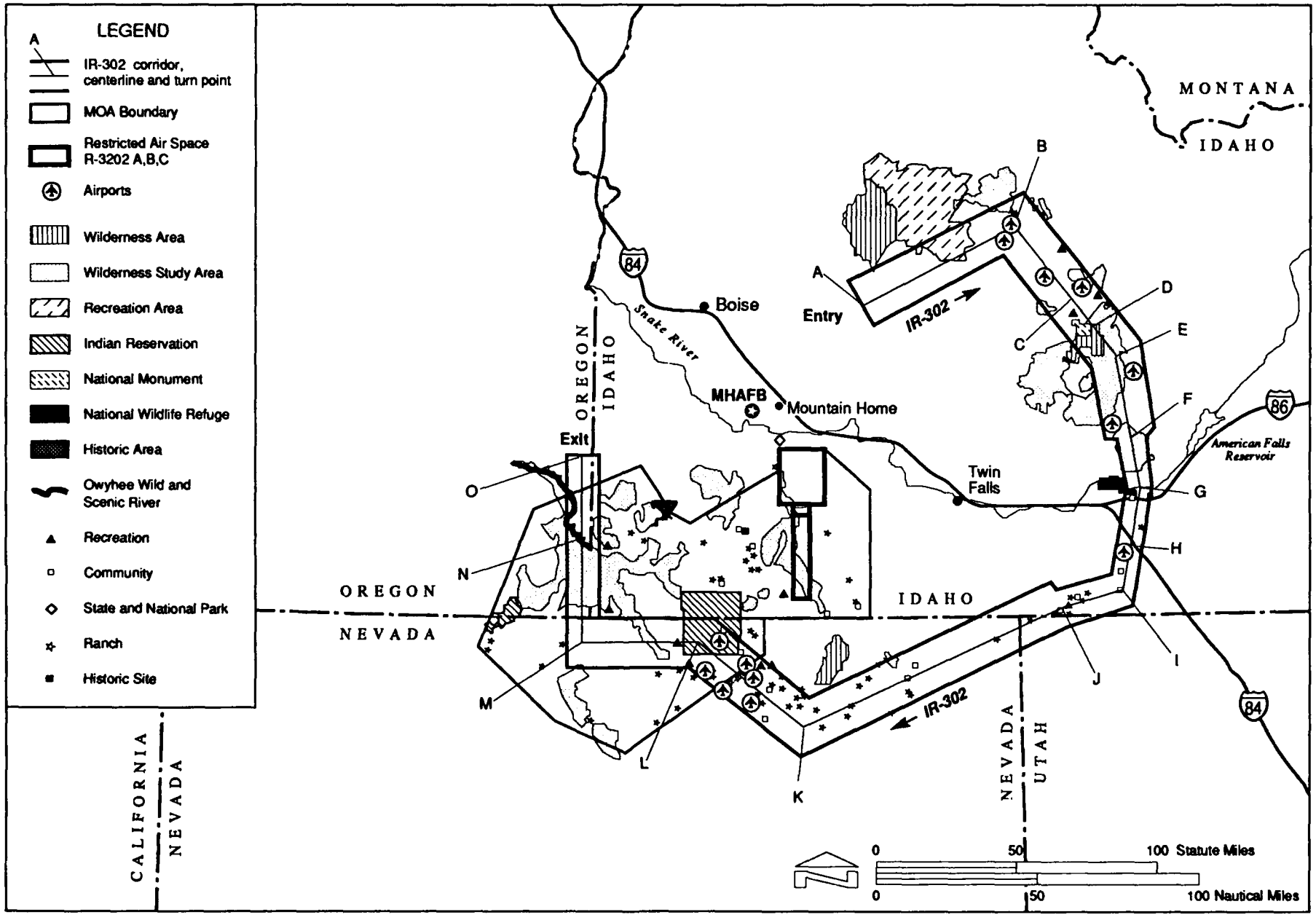


Figure S3.1-4

SENSITIVE RECEPTORS IN THE VICINITY OF MILITARY TRAINING ROUTE IR-302

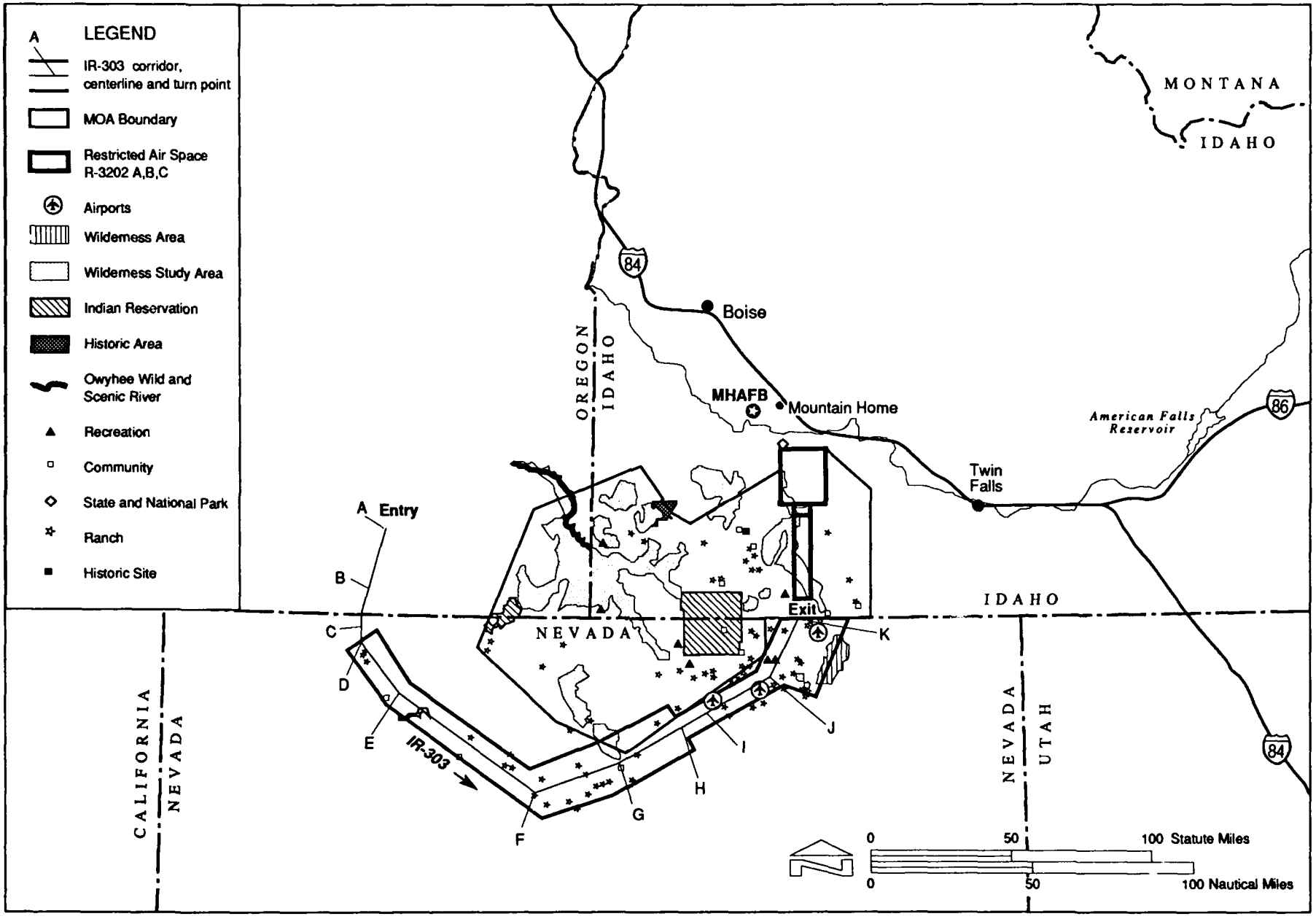


Figure S3.1-5

SENSITIVE RECEPTORS IN THE VICINITY OF MILITARY TRAINING ROUTE IR-303

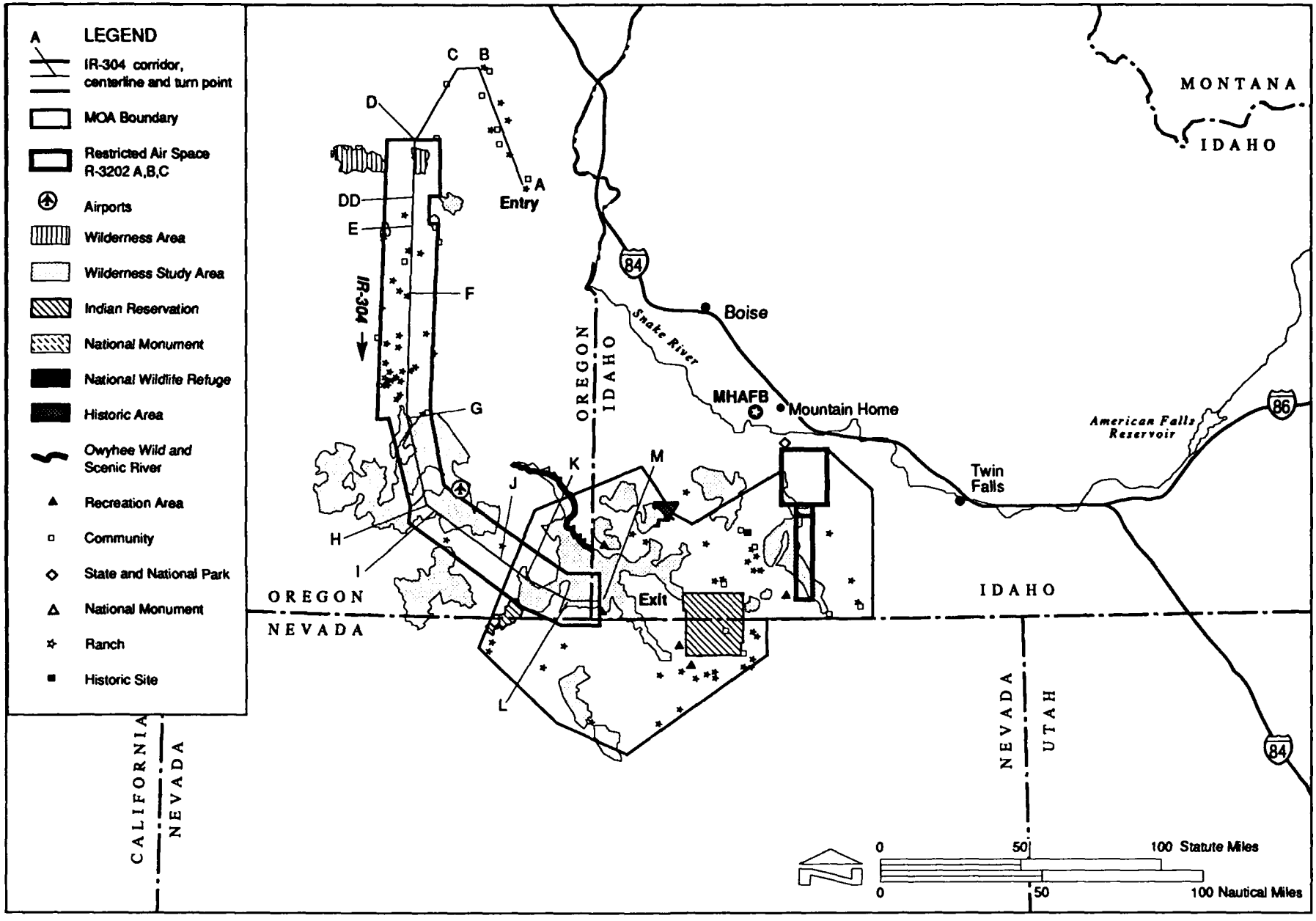


Figure S3.1-6

SENSITIVE RECEPTORS IN THE VICINITY OF MILITARY TRAINING ROUTE IR-304

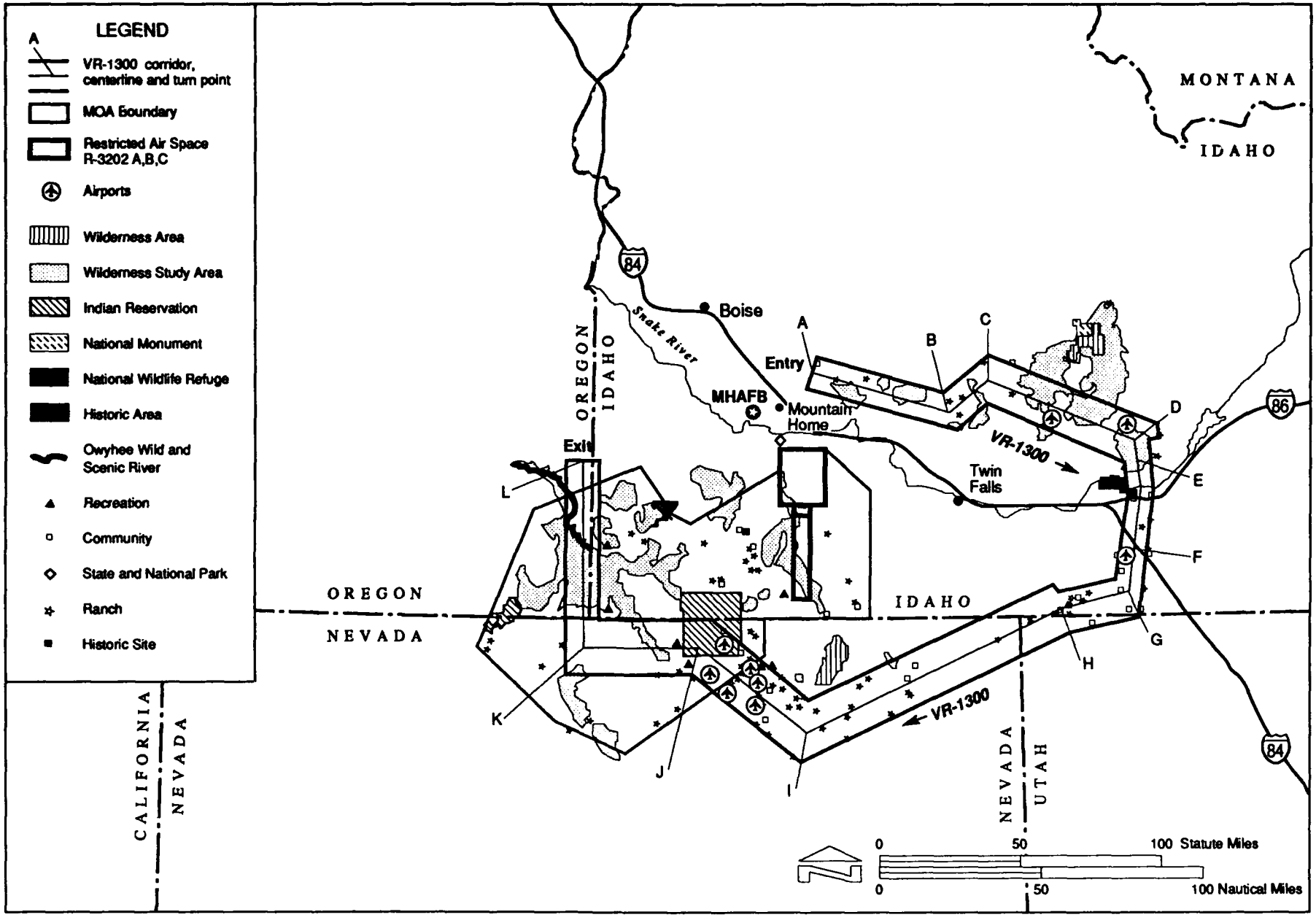


Figure S3.1-7

SENSITIVE RECEPTORS IN THE VICINITY OF MILITARY TRAINING ROUTE VR-1300

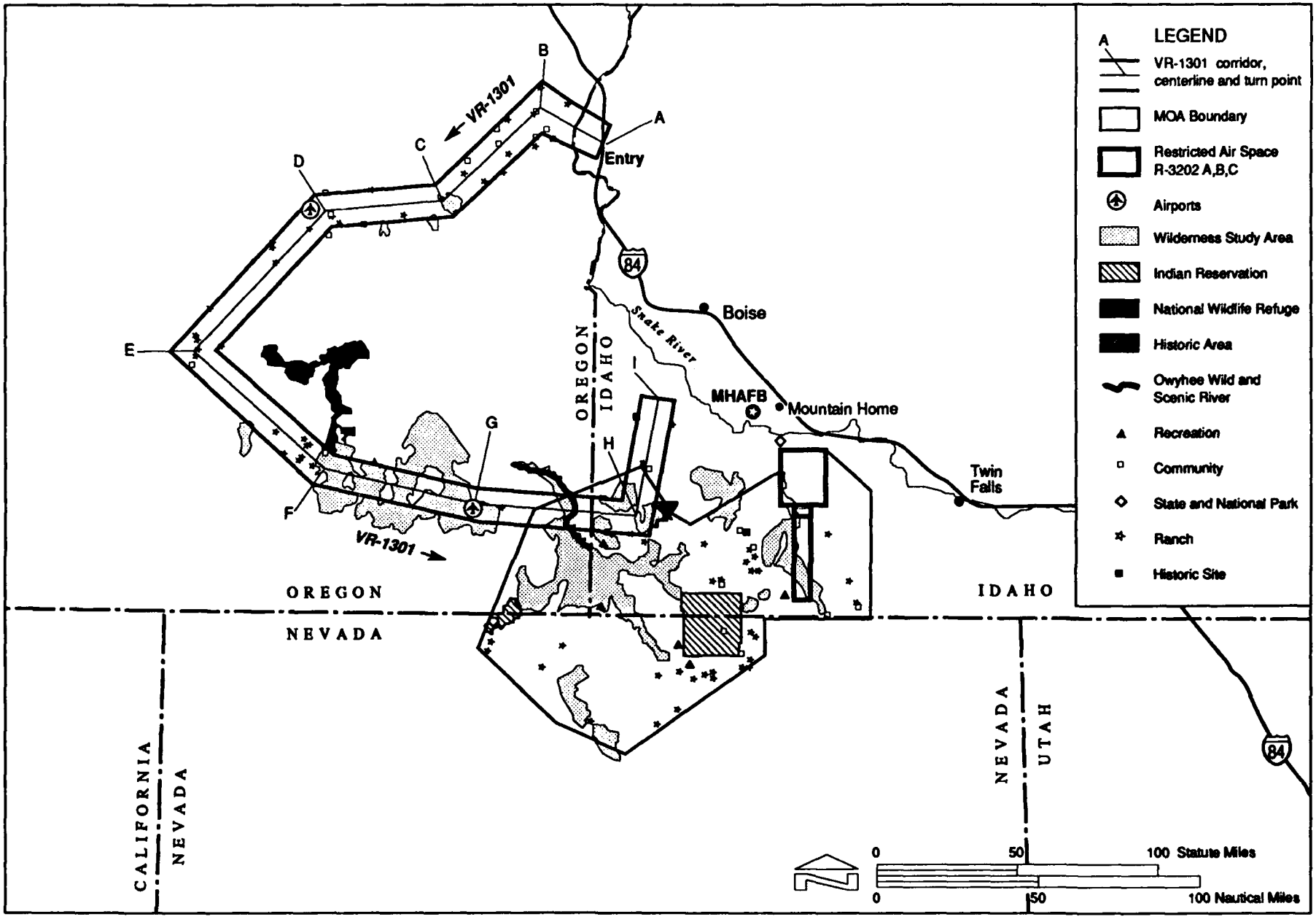


Figure S3.1-8

SENSITIVE RECEPTORS IN THE VICINITY OF MILITARY TRAINING ROUTE VR-1301

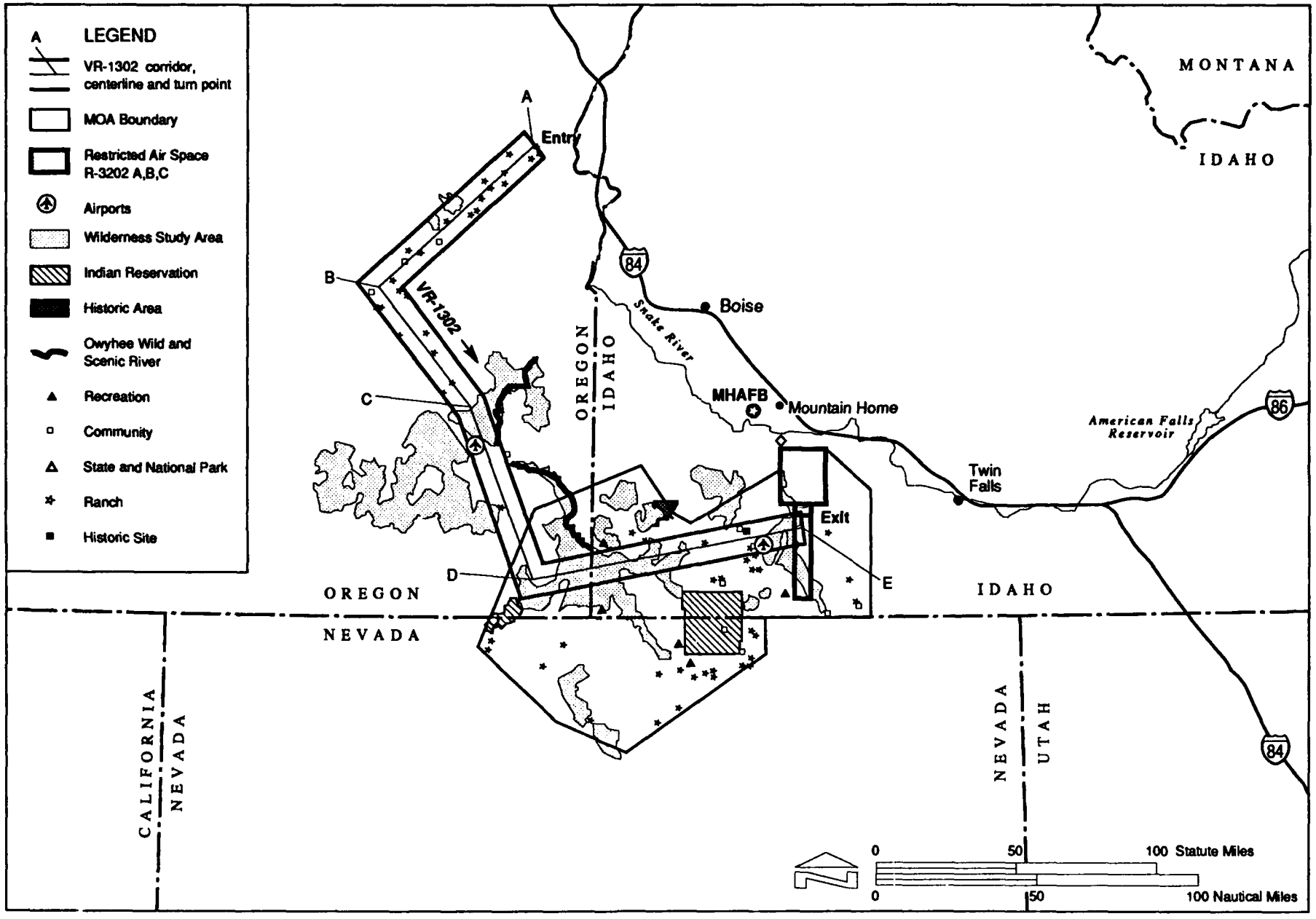


Figure S3.1-9

SENSITIVE RECEPTORS IN THE VICINITY OF MILITARY TRAINING ROUTE VR-1302

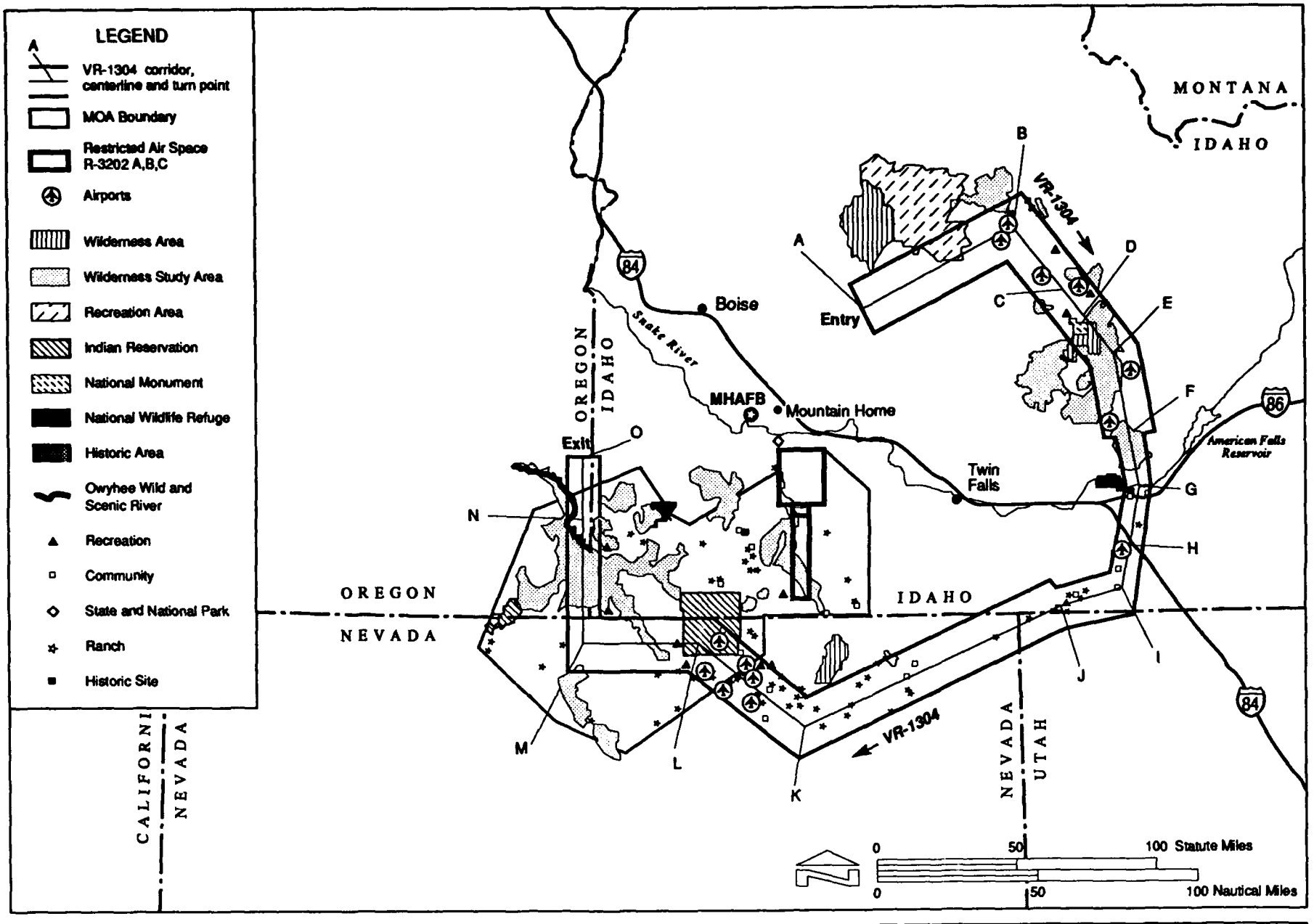


Figure S3.1-10

SENSITIVE RECEPTORS IN THE VICINITY OF MILITARY TRAINING ROUTE VR-1304

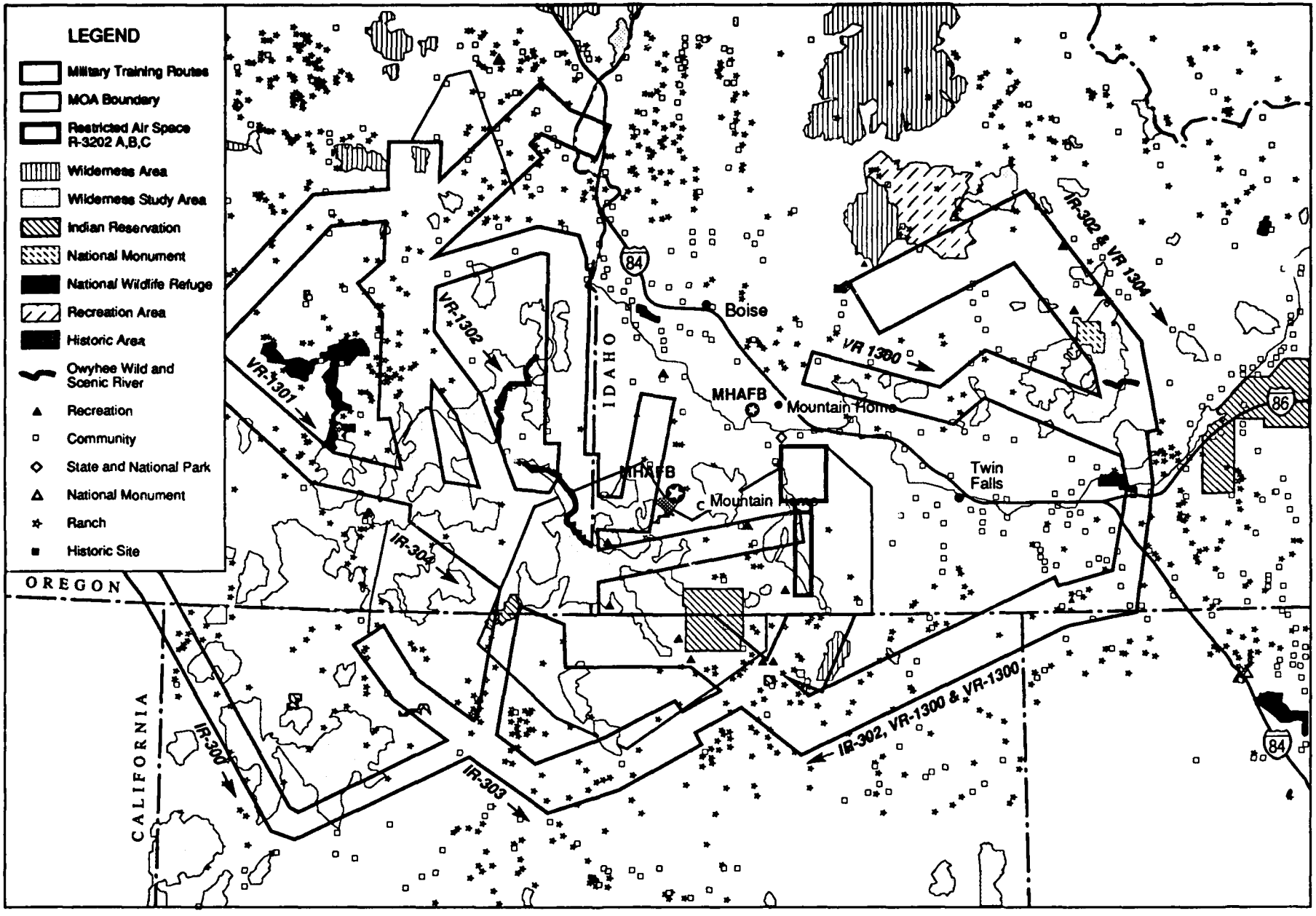


Figure S3.1-11

REGIONAL SENSITIVE RECEPTORS IN THE VICINITY OF SAYLOR CREEK RANGE AND THE MTRs

Table S3.1-5

MTR USE JULY 1988 - JUNE 1989
Sorties per Month - All Users [4]

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
IR-300	260	260	260	260	260	260	260	260	260	260	260	260	3,120[1]
IR-302	62	84	76	57	95	144	137	142	102	52	136	136	1,223[3]
IR-303	164	139	150	143	222	200	176	176	243	176	209	183	2,181[2]
IR-304	100	125	101	99	206	124	142	138	136	130	94	94	1,489[2]
VR-1300	144	127	63	89	57	66	62	85	99	105	132	73	1,102[3]
VR-1301	61	107	89	51	39	32	48	56	55	101	76	93	808[3]
VR-1302	72	121	86	69	36	50	69	60	72	95	138	81	949[3]
VR-1304	15	20	20	22	7	6	1	9	2	5	18	24	149[3]
Total	878	983	845	790	922	882	895	926	969	924	1,063	944	11,021

Notes:
1. Average monthly data provided by USAF, HQ SAC.
2. Actual monthly data provided by USAF, 366 TFW, TAC.
3. Actual monthly data provided by 124 TRG, IANG.
4. Does not include recently authorized increase in SAC sorties on the SCR.

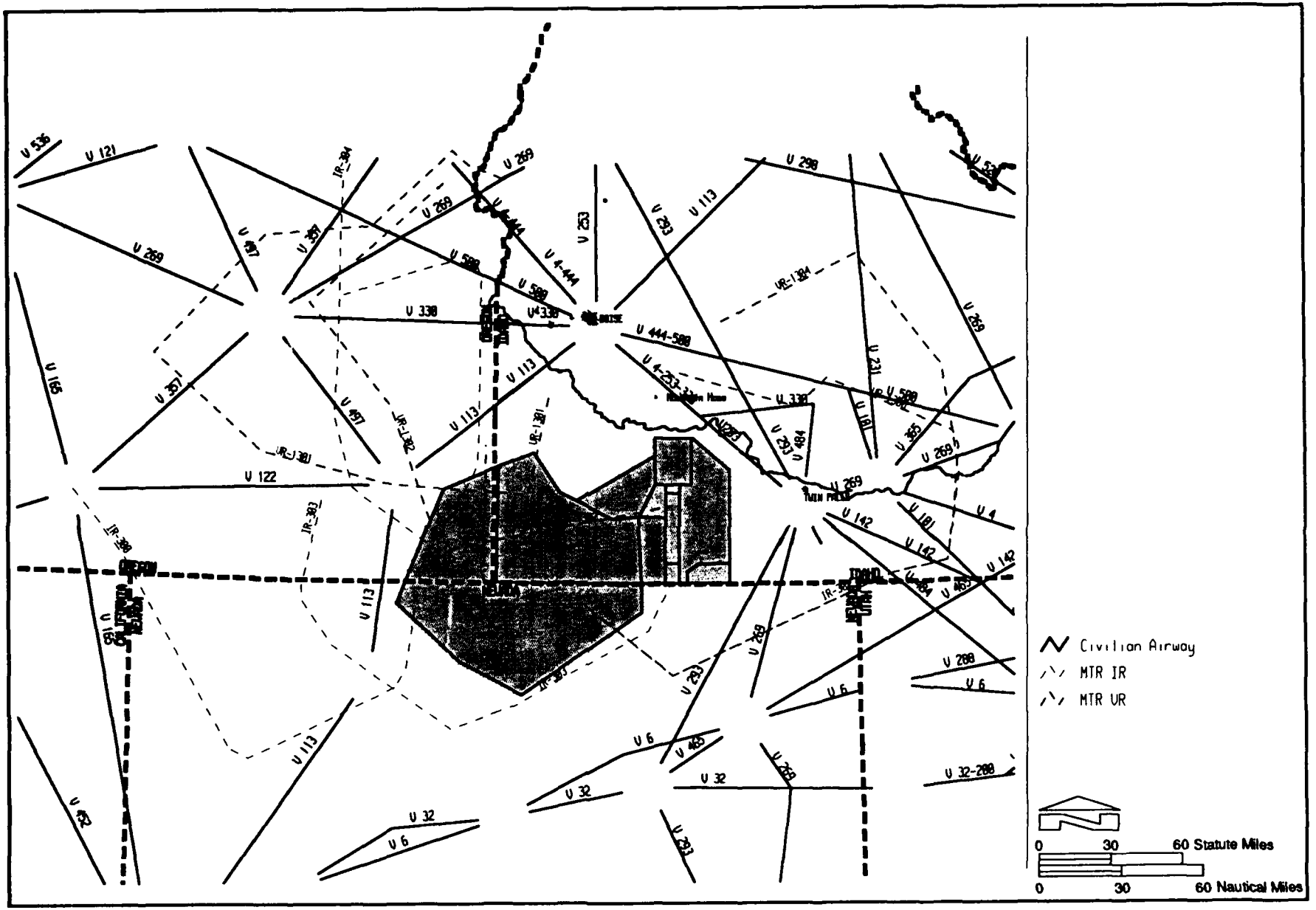


Figure S3.1-12

AIRWAYS INTERSECTED BY MTRs

use airports can also be owned by public or private entities; however, the vast majority of private-use (restricted) airports are privately owned.

With respect to the SCR and associated airspace, there are no commercial airports within any of the restricted or military operations areas nor are there any commercial airports underlying any of the MTRs.

General aviation airports underlying the MOAs associated with the SCR are listed in Table S3.1-6. General aviation airports underlying the various MTRs are listed in Table S3.1-7 and are shown by individual MTR in figures S3.1-3 through S3.1-10.

Table S3.1-6

AIRPORTS UNDERLYING MILITARY OPERATIONS AREAS

Airport [1]	*MOA*
Riddle (PR)	Owyhee MOA
Grasmere (PU)	Owyhee MOA
Unverified [2]	Owyhee MOA
Owyhee (PU)	Paradise MOA
Byington (PR)	Paradise MOA
Petan (PR)	Paradise MOA
I-L (PR)	Paradise MOA
Grindstone AG (PU)	Bruneau 1 MOA
Murphy Hot Springs (PU)	Bruneau 2 MOA

Notes:
1. PR = private-use airport; PU = public-use airport.
2. A landing area available for emergencies but that requires extra precaution due to a lack of information on field conditions or because of information that indicates peculiar operating constraints.

Table S3.1-7

AIRPORTS UNDERLYING MILITARY TRAINING ROUTES

Airport[1]	*MTR*
Juntura (PR)	IR-300
Skinner Ranch (PR)	IR-300
Owyhee Reservoir State (PU)	IR-300
Pinnacle Ranch (PR)	IR-300
Miller Memorial (PU)	IR-300
Twin Bridges (PU)	IR-302/VR-1304
Stars Ranch (PR)	IR-302/VR-1304
Copper Basin (PU)	IR-302/VR-1304
Antelope Valley (PU)	IR-302/VR-1304
Coxs Well (PU)	IR-302/VR-1304
Bear Trap (PU)	IR-302/VR-1304
Interstate (PR)	IR-302/VR-1304
Stevens-Crosby (PU)	IR-302/VR-1304
Wild Horse (PR)	IR-302/VR-1304
Byington (PR)	IR-302/VR-1304
Petan (PR)	IR-302/VR-1304
Unverified[2]	IR-302/VR-1304
Owyee (PU)	IR-302/VR-1304
Unverified[2]	IR-303
Wild Horse (PR)	IR-303
Unverified[2]	IR-303
Rome State (PU)	IR-304
Laidlaw Corral (PU)	VR-1300
Bear Trap (PU)	VR-1300
Interstate (PR)	VR-1300
Stevens-Crosby (PU)	VR-1300
Wild Horse (PR)	VR-1300
Byington (PR)	VR-1300
Petan (PR)	VR-1300
Owhyee (PU)	VR-1300
Wagontire (PR)	VR-1301
Rome State (PU)	VR-1301
Unverified[2]	VR-1302
Grasmere (PU)	VR-1302

Notes:

1. PR = private-use airport; PU = public-use airport
2. A landing area available for emergencies but which requires extra precaution due to a lack of information on field conditions or because of information that indicates peculiar operating constraints.

S3.2 AIR RESOURCES

S3.2.1 Definition of Resource

Air quality in a given location is described by the concentrations of various pollutants in the atmosphere, expressed in units of ppm or ug/m^3. Air quality is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the meteorological conditions related to the prevailing climate. The significance of a pollutant concentration is determined by comparison with federal and/or state air quality standards. These standards represent the maximum allowable concentrations of various pollutants necessary to protect public health and welfare with a reasonable margin of safety. Federal standards are established by the EPA and termed the National Ambient Air Quality Standards (NAAQS). The NAAQS are defined as maximum pollutant concentrations that may not be exceeded more than once a year, except annual standards, which may never be exceeded. These standards include concentrations for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 10 microns in diameter (PM_{10}), and lead (Pb). Within the study area, the Idaho Air Quality Bureau (IAQB) and Utah Bureau of Air Quality (UBAQ) have adopted the NAAQS to regulate pollutant levels. The Nevada Division of Environmental Protection (NDEP) and Oregon Department of Environmental Quality (ODEQ) have adopted the NAAQS and promulgated additional ambient air quality standards to regulate pollutant levels. The federal and state ambient air quality standards are shown in Table S3.2-1.

S3.2.2 Region of Influence

Construction and operation of the proposed expanded range capability would affect Owyhee County in southwest Idaho. Increased use of MTRs and MOAs connected with the range would also affect areas in southwestern Idaho, Oregon, Nevada, and Utah. Specifically identifying the ROI for air quality requires knowing the pollutant type, emission rates and release parameters (e.g., stack height) of a pollutant source, source proximity to other pollutant sources, and local and regional meteorology. For inert pollutants (all pollutants other than O_3 and its precursors), the ROI is generally limited to a few miles downwind from a source.

The ROI for O_3 extends much farther downwind than for inert pollutants. Ozone is a secondary pollutant formed in the atmosphere by photochemical reactions of previously emitted pollutants, or precursors. Ozone precursors are mainly reactive hydrocarbons (RHC) and nitrogen oxides (NO_x). In the presence of solar radiation, the maximum effect of precursor emissions on O_3 levels usually occurs several hours after they are emitted, and therefore many miles from the source.

Table S3.2-1

NATIONAL, NEVADA, AND OREGON AMBIENT AIR QUALITY STANDARDS

Pollutant	*Averaging Time*	NATIONAL STANDARDS[a] *Primary*[b]	*Secondary*[c]	STATE STANDARDS *Nevada*	*Oregon*
Oxidant (ozone)	1-hour	0.12 ppm (240 ug/m^3)	Same		
Carbon monoxide	8-hour	9 ppm (10 mg/m^3)	Same		
	1-hour	35 ppm (40 ug/m^3)	Same		
Nitrogen dioxide	Annual	100 ug/m^3 (0.05 ppm)	Same		
Sulfur dioxide	Annual	80 ug/m^3 (0.03 ppm)	Same	60 ug/m^3 (0.02 ppm)	
	24-hour	365 ug/m^3 (0.14 ppm)	Same	260 ug/m^3 (0.10 ppm)	
	3-hour	none	1,300 ug/m^3 (0.5 ppm)		
TSP	24-hour			150[d] ug/m^3	150 ug/m^3
PM_{10}	Annual	50 ug/m^3	Same		
	24-hour	150 ug/m^3	Same		
Lead	Quarter	1.5 ug/m^3	Same		
Nonmethane hydrocarbons	3-hour				160 ug/m^3

Notes:

a. National standards, other than those based on annual averages or annual geometric means, are not to be exceeded more than once per year. The Idaho Air Quality Bureau and the Utah Bureau of Air Quality have adopted the NAAQS to regulate pollutant levels.

b. National Primary Standards express the level of air quality necessary to protect the public health from any known or anticipated adverse effects of a pollutant, allowing for a margin of safety to protect sensitive members of the population.

c. National Secondary Standards express the level of air quality necessary to protect the public welfare by preventing injury to agricultural crops and livestock, deterioration of materials and property, and adverse impacts on the environment.

d. The 24-hour TSP standard for Nevada is 150 ug/m^3, except in the las Vegas metropolitan area, where it is 260 ug/m^3.

S3.2.3 Climate

The study area is located in the southern portion of the Columbia Intermountain Province. This area has a continental climate which is characterized by low to moderate precipitation, large variations in annual and diurnal temperatures, and low relative humidity. Due to the prevailing westerly winds, the study area is often influenced by Pacific air masses. As these air masses pass over the Cascade Mountain Range to the west, they often lose much of their moisture by precipitation. This produces a rain shadow effect and resulting semi-arid climate within the study area. The Rocky Mountains also protect the study area from many of the extreme continental Arctic air masses that traverse the Great Plains to the east. During the summer months, the study area is usually under the influence of warm, dry, continental air masses.

Meteorological data collected at locations throughout southwestern Idaho (shown in Figure S3.2-1) are used to describe the climate of the study area. As elevation generally increases towards the southern reaches of the study area, temperatures are cooler and precipitation increases.

S3.2.3.1 Temperature

Temperature data collected at locations in and around the study area are presented in Table S3.2-2. These data show a wide range of diurnal and annual temperature variations experienced in the study area and are a result of low relative humidities. The Three Creek location experiences the lowest temperatures due to its higher elevation in the foothills of the Jarbidge Mountains. Extreme temperatures that occurred at MHAFB from 1943 through 1986 ranged from a high of 111 °F to a low of -22 °F (USAF 1987).

S3.2.3.2 Precipitation

Most of the precipitation in the study area is produced from storm systems that originate in the polar regions during the colder months of the year. Summer rainfall is infrequent and usually occurs from afternoon and evening thunderstorms. Precipitation data within the study area are summarized in Table S3.2-3. Precipitation is generally greatest during the springtime. Snow occurs throughout the study area during the colder months of the year, although heavy snowfalls are usually limited to higher elevations.

S3.2.3.3 Winds

There are three regional influences on wind conditions within the study area: (1) during the cooler months of the year, cold air often drains down the Snake River Valley and winds prevail from the east-southeast direction, (2) the relatively cold Pacific Ocean and warm continent during the summer

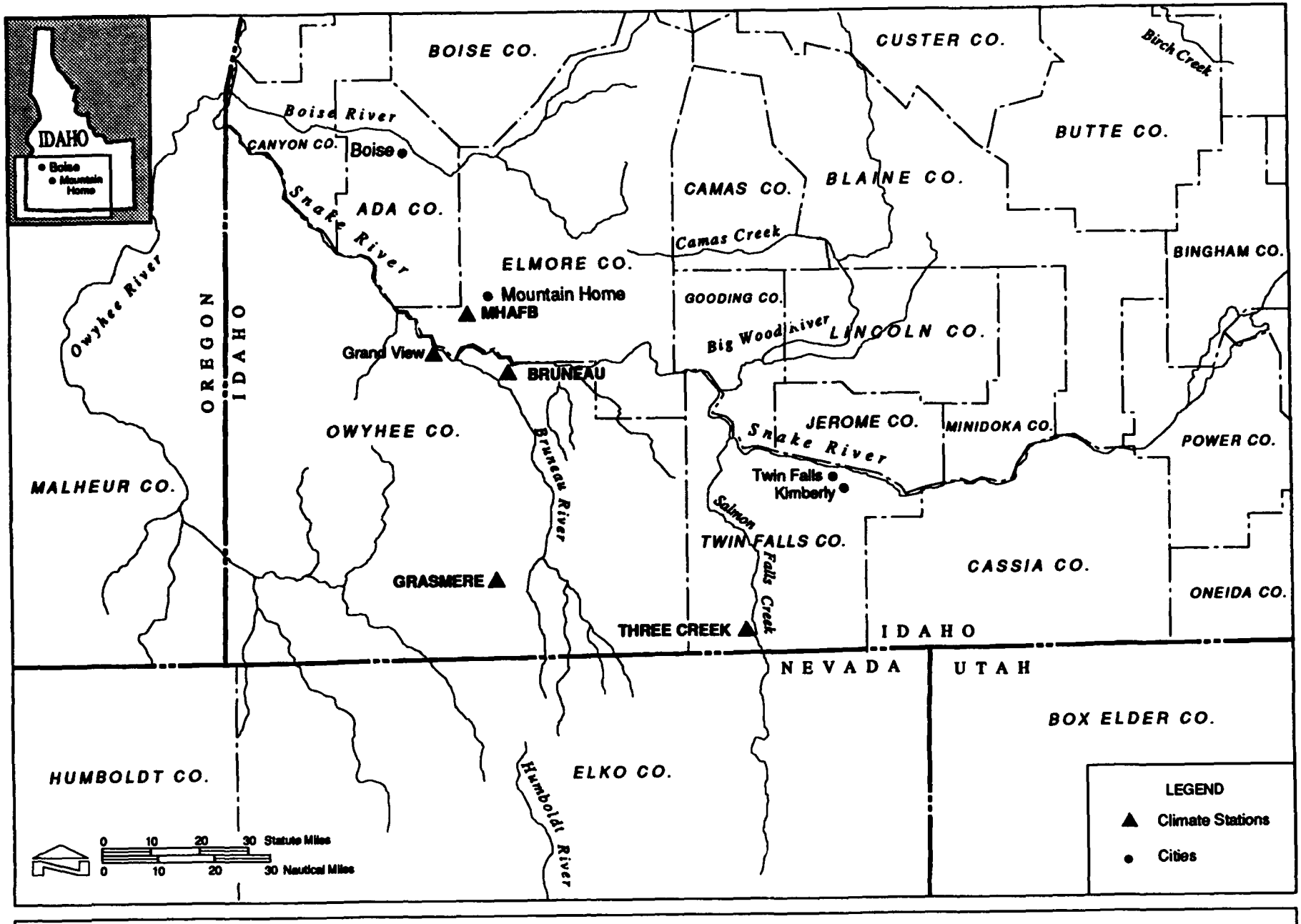


Figure S3.2-1

REPRESENTATIVE CLIMATE STATIONS FOR THE STUDY AREA

Table S3.2-2

AVERAGE MAXIMUM AND MINIMUM TEMPERATURES FOR THE STUDY AREA
(^{o}F)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
MHAFB[1]	36	44	52	61	71	80	92	89	78	65	49	38	63
	22	27	30	36	44	52	59	58	48	38	30	23	39
Bruneau[2]	41	49	56	66	76	86	94	90	82	70	52	42	66
	23	26	29	36	43	52	57	54	45	38	30	24	38
Three Creek[2]	39	43	47	56	65	74	87	86	75	63	49	41	61
	12	17	20	26	33	38	42	40	33	26	21	15	27

Sources: 1. USAF 1987; AWS Climatic Briefs for MHAFB
2. Gehr et al. 1982

Table S3.2-3

PRECIPITATION DATA SUMMARY FOR THE STUDY AREA
(Inches)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
MHAFB[1]													
Precipitation	1.00	0.70	0.080	0.70	0.80	0.90	0.30	0.30	0.50	0.50	1.00	0.90	8.40
Snowfall	4.0	2.0	1.0	Tr.	Tr.	Tr.	0.0	0.0	Tr.	Tr.	2.0	4.0	13.0
Bruneau[2]													
Precipitation	0.52	0.36	0.20	1.52	0.86	0.83	0.17	0.00	0.19	0.27	1.00	0.52	6.44
Snowfall													
Three Creek[2]													
Precipitation	0.99	0.91	1.05	1.40	2.07	1.35	0.35	0.20	0.50	0.71	1.07	0.84	11.44
Snowfall	15.3	12.3	13.5	5.9	2.5	0.1	0.0	0.0	0.1	2.0	7.0	13.8	72.5
Grand View[3]													
Precipitation	0.71	0.58	0.91	0.70	1.09	0.83	0.16	0.11	0.33	0.47	0.68	0.69	7.26
Snowfall													
Grasmere[2]													
Precipitation	0.39	0.47	0.68	0.50	1.57	1.12	0.05	0.27	0.22	0.19	0.62	0.63	6.71
Snowfall													

Sources: 1. USAF 1987; AWS Climatic Briefs for MHAFB.
2. Gehr et al. 1982.
3. BLM 1979.

produces a pressure gradient where northwest winds prevail, and (3) the passage of polar storm systems throughout much of the year produces shifting winds from the southeast to northwest directions. Topography also plays an important role in producing localized wind conditions within the study area.

Meteorological data recorded at MHAFB determine that winds prevail from the east-southeast direction from October through March. Winds for the remainder of the year prevail from the northwest direction. The average wind speed ranges from five to seven knots on a monthly basis, with the highest average wind speeds occurring in February through May. Calm wind conditions are most frequent during the winter months.

S3.2.3.4 Adverse Air Quality Conditions

Increased degradation of air quality can occur when the dispersion of locally emitted air pollutants is restricted by temperature inversions or low wind speeds. These conditions usually occur during the late night and early morning hours in the colder months of the year. High particulate matter concentrations can also occur when strong winds increase fugitive dust emissions from the desert floor or from anthropogenic sources such as agricultural activities or dirt roads.

S3.2.4 Air Quality

According to EPA guidelines, an area with air quality better than the NAAQS is designated as being "in attainment," while an area with air quality worse than the NAAQS is classified as a nonattainment area. A nonattainment designation means that a primary NAAQS has been exceeded more than three discontinuous times in three years in a given area. The study area within Idaho, Oregon, Nevada, and Utah is presently designated as in attainment for all criteria pollutants by the EPA (personal communications, D. Gudgell, R. Dalley, L. Shifley, and M. Wolgamott 1989). The nearest nonattainment area is the Boise metropolitan area, which currently exceeds the NAAQS for CO. The attainment status for particulates is being revised by the IAQB and EPA, since the NAAQS for PM_{10} has recently superseded the NAAQS for total suspended particulates (TSP). However, the northern half of Ada County is presently designated as a Group I area for PM_{10}, meaning that there is a 95 percent or greater probability of exceeding the primary NAAQS for PM_{10}.

Due to the low population density and lack of numerous large emission sources, air quality in the study area is generally very good. As a result, ambient pollutant concentrations have rarely been monitored within Owyhee County. The two closest monitoring stations to the study area are located in Boise, 50 miles north-northwest of MHAFB, and Kimberly, approximately 35 miles east of the SCR and 5 miles southeast of Twin Falls. Ambient pollutant concentrations monitored at these locations from 1983 through 1987 are presented in Table S3.2-4 (IAQB 1988). These data show that the eight-hour

Table S3.2-4

AMBIENT AIR POLLUTANT LEVELS MONITORED IN PROXIMITY TO THE STUDY AREA FROM 1983-1987[1]

Pollutant/ Monitoring Station	*Averaging Time*	*Unit of Measure*	--MAXIMUM CONCENTRATION BY YEAR-- *1983*	*1984*	*1985*	*1986*	*1987*
Carbon monoxide							
Boise[2]	1-hr	ppm	31.8	19.0	18.3	19.5	19.5
	8-hr	ppm	15.6*	10.2*	9.9*	11.6*	13.8*
Total suspended particulates							
Boise[2]	24-hr	ug/m^3	415	330	397	410	205
Kimberly			--	--	--	239	479
Boise[2]	Annual	ug/m^3	70	73	86	100	88
Kimberly			--	--	--	46	48
PM_{10}							
Boise[2]	24-hr	ug/m^3	--	--	--	325	107
Kimberly			--	--	--	--	157*
Boise[2]	Annual	ug/m^3	--	--	--	--	48
Lead							
Boise[2]	Calendar quarter	ug/m^3	0.69	0.93	1.00	0.40	0.16

Notes: * Exceeds the NAAQS

1. Ozone and nitrogen dioxide are no longer monitored in Idaho, due to low ambient levels.
2. There are up to five monitoring stations in the Boise metropolitan area. The highest pollutant level monitored at these stations on an annual basis is included in this table.

Source: IAQB 1988

NAAQS for CO continues to be exceeded in the Boise area. This is due to traffic congestion and residential wood burning. The 24-hour PM_{10} was exceeded at Kimberly because of the proximity of agricultural emissions (fugitive dust and crop burning).

Ambient pollutant concentrations at these two monitoring stations are expected to be higher than concentrations within the study area because (1) Boise is a more urban site and correspondingly has a higher density of emissions sources and (2) the Kimberly monitor is located adjacent to agricultural activities. Ambient pollutant concentrations within the proposed expanded range study area are expected to be lower than at the MHAFB study area, due to the higher number of emission sources concentrated around the base.

S3.2.5 Emission Inventories

Emissions that occurred within the study area and adjoining MOAs and MTRs for fiscal 1988 (October 1987 through September 1988) are presented in Table S3.2-5 (USAF 1989). Factors used to estimate aircraft emissions were obtained from *Aircraft Engine Emissions Estimator* (Seitchek 1985). Emission factors for stationary sources and diesel vehicles were obtained from AP-42, Compilation of Air Pollutant Emission Factors, Volumes I and II (EPA 1985a), respectively. Emission factors for general purpose and personal vehicles and aerospace ground equipment were obtained from Air Pollution Emission Inventories (USAF 1979).

Emissions from military aircraft operating within the range and adjoining MOAs and MTRs are presented in Table S3.2-5. Emissions were calculated for both transient aircraft and aircraft based at MHAFB by determining aircraft flight time within each airspace. Range flight time was assumed to be 20 minutes for all aircraft. Flight time within the MOAs was assumed to be 45 minutes for all aircraft. Aircraft flight times within each MTR were determined by typical aircraft speeds and percentage of route lengths flown. Total emissions within the range, MOAs and MTRs for fiscal 1988 amounted to 360.0 tons of CO, 77.8 tons of THC, 1,935.9 tons of NO_x, 192.5 tons of SO_2, and 281.8 tons of PM.

Table S3.2-5

EMISSION INVENTORY FOR THE STUDY AREA FOR FISCAL 1988 (tons/year)

	CO	*THC*	NO_x	SO_2	*PM*
Range aircraft operations	58.9	8.6	260.4	26.3	29.6
MOA aircraft operations	40.4	3.1	290.8	27.6	34.6
MTR aircraft operations	260.7	66.1	1,384.7	138.6	217.6
TOTAL EMISSIONS	360.0	77.8	1,935.9	192.5	281.8

S3.3 NOISE

S3.3.1 Definition of Resource

Noise is defined as "unwelcome or unwanted" sound that is usually caused by human activity and added to the natural acoustic setting of a locale. It is further defined as sound that disrupts normal activities or that diminishes the quality of the environment. There are two types of noise sources: stationary and transient. Stationary sources are typically related to specific land uses, e.g., housing tracts and industrial plants. Transient noise sources move through the environment either along established paths (railroads, roads, and flight tracks) or randomly. The total acoustical environment of a locale is the blend of the background or ambient acoustics with the "unwanted" noise. The human response to noise is diverse and varies with the type of noise, the time of day, and the sensitivity of the receptor.

The measurement of noise is usually performed using the A-weighted sound level scale expressed in dB(A) units. This scale approximates the characteristics of normal human hearing over a wide frequency range. Impulsive noise measurements, such as from a small arms range, are expressed using the C-weighted sound level scale, dB(C) units.

The EPA examined noise evaluation methods that could be employed for the protection of public health and welfare with a reasonable margin of safety (EPA 1974), and recommended use of the Day-Night Average Sound Level, L_{dn}, as a descriptor of the 24-hour daily noise environment. The L_{dn} is the energy-equivalent average A-weighted sound level over an average busy 24-hour day. In order to compute an L_{dn}, a single noise event is measured and corrections are added for the number of events and the time of day. An L_{dn} includes a 10-dB penalty to noise that is generated during nighttime hours, i.e., 10 P.M. to 7 A.M. local time. The L_{dn} metric is used extensively to assess non-impulsive noise environments. It has been adopted by federal agencies, including the EPA, DOT, HUD, and DOD, for establishing guidelines for land use compatibility.

The L_{dn} metric is used extensively to assess the noise environment caused by aircraft operations around civilian and military air installations. The frequency, magnitude, and duration of each noise event varies according to the airframe type, engine type, power setting, and aircraft altitude. Therefore, individual aircraft noise data are collected for the aircraft being assessed at different power settings and phases of flight.

Noise generated by low-level, high-speed aircraft flying on MTRs is addressed by means of the noise onset-rate, adjusted for monthly day-night average sound level or L_{dnmr}. The L_{dnmr} is identical to L_{dn} measurements, except that a penalty of up to 5 dBA is applied to events with a startle effect (i.e., fast onset rate). The more sudden the rate of noise onset, the greater the penalty applied. The average

daily noise is evaluated for the calendar month with the highest number of low-level overflights (Plotkin 1987). This produces a noise value for the worst-case number of low-level operations on the particular segment being assessed. A diagrammatic illustration of the noise impacts associated with operations on MTRs in shown in Figure S3.3-1.

The noise environment in the study area that is affected by current aircraft operations or that would be affected by a proposed expanded range capability are modeled using the following L_{dn}-type metrics:

- L_{dnmr} is the metric used to assess noise impacts to areas underlying low-level, high-speed overflights on MTRs and ranges. The Air Force ROUTEMAP noise prediction methodology is used for assessing these operational environments. This method uses a reference file of noise data for low-level, high-speed military aircraft. Noise is measured for L_{dnmr} in dBA levels.

A further discussion of the potential effects on people, wildlife, and structures from noise and sonic booms is contained in Appendix F.

S3.3.2 Region of Influence

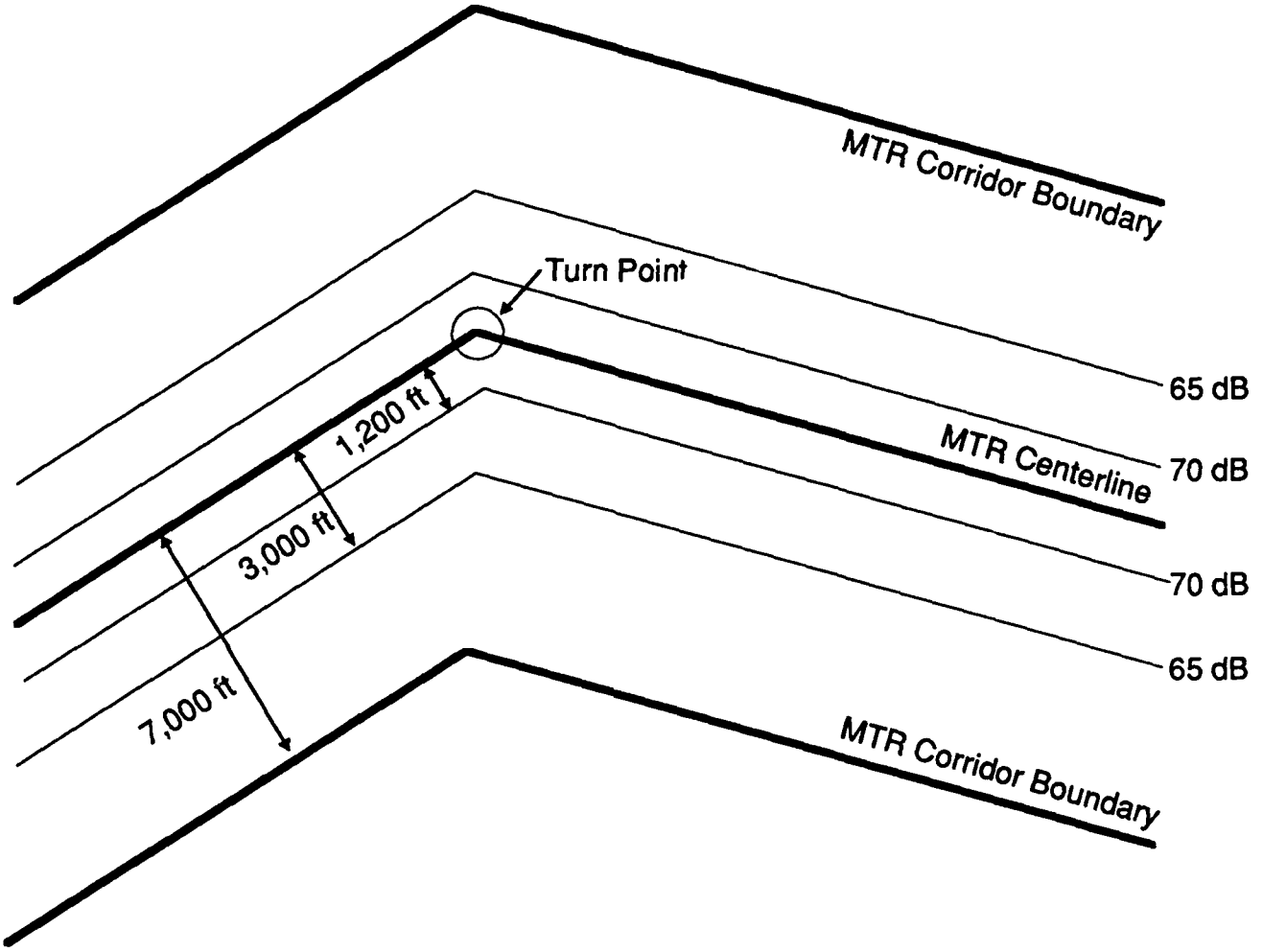
The ROI for the analysis of noise impacts is delineated by the airspace boundaries shown in Figure S3.1-1. The ROI is limited to the following airspace areas:

- The current SCR restricted areas: R-3202A, B, and C.
- The current MOA airspace: Bruneau 1 and 2, Paradise, Owyhee, Saylor, Sheep Creek 1, 2, and 3 MOAs.
- The airspace associated with the current MTR structure, which can be used to access the SCR and MOA airspace: IR-300, IR-302, IR-303, IR-304, VR-1300, VR-1301, VR-1302, and VR-1304 (see Figure S3.1-11).

This ROI includes much of southwestern Idaho, northcentral Nevada, and southeastern Oregon.

S3.3.3 Analysis of Current Noise Environment

The analysis of the current noise impacts at the SCR was performed utilizing data provided by the range operator: the 366 TFW, MHAFB (USAF 1989). Data essential for the implementation of the noise analysis process and for the generation of noise contours are:



Note: The width of an MTR can vary from 3,000 feet up to 10 NM wide.

Figure S3.3-1

TYPICAL AVERAGE NOISE LEVELS (L_{dnmr}) GENERATED BY LOW-LEVEL AIRCRAFT OPERATIONS ON AN MTR

- o *Aircraft flight tracks* around the range.
- o *Aircraft types* identified for each flight track.
- o *Altitude* of each aircraft type for each flight track segment.
- o *Airspeed* of each aircraft type for each flight track segment.
- o *Power setting* of each aircraft type for each flight track segment.
- o *Annual sorties and passes* made by each aircraft type on each flight track.
- o *Length of time* each aircraft operated on the range for a given flight track.

The primary aircraft using the SCR and MTRs are the following: EF-111A and F-111A (366 TFW/TAC); RF-4C (124 TRG/IANG); and B-1B, FB-111, and B-52 (various wings of SAC). A computer model was employed to calculate the current noise contours around the SCR for the primary users. No data were available for units and aircraft other than those stated above.

S3.3.3.1 Current Operations on the Saylor Creek Range

The SCR is a day/night multi-use Class A air-to-ground and electronic combat range where only practice/inert ordnance is used (live ordnance is not authorized for use). Class A ranges have a Range Control Officer (RCO) present on the ground who controls all aircraft operating on the range. The SCR is oriented north to south. The northern two-thirds of the SCR impact area is a tactical range, while the southern third is a conventional range. Air-to-ground targets located within the impact area include the following: east and west conventional targets (aircraft), two primary strafe targets, helicopter strafe target, high angle strafe target, west tactical target (armored personnel carriers), airfield tactical targets, north antiaircraft artillery (AAA) site, surface-to-air missile (SAM) site, and a bridge.

Entry into the SCR airspace is strictly controlled. All aircraft must receive clearance from the RCO before entering the restricted airspace. All airspeeds must be less than Mach 0.95. A maximum of four aircraft is allowed on the range during a daylight range period, and two aircraft are permitted on the range during a nighttime range period. When flying on the SCR, the Saylor, Sheep Creek 1 and 2, and Bruneau 1 and 2 MOAs are automatically scheduled in addition to the restricted airspace overlying the impact area. Access to the SCR is either by direct routing through the air traffic control system or along two low-level military training routes (Refer to section S3.1, Airspace Management, for an analysis of the current airspace configurations and limitations.)

Conventional delivery profiles that are authorized on the range include the following: low-angle low drag, dive bomb, high-altitude dive bomb, low-angle bomb, strafe, dive toss, toss/loft, and pop-up deliveries. These profiles are typically practiced by F-111As and F-4s. Simulated nuclear deliveries that are authorized are laydown, low-altitude drogue delivery (LADD), and toss/loft deliveries. These profiles are practiced most frequently by TAC and SAC aircraft.

The electronic combat range provides a simulated hostile electronic threat environment. The purpose of the threats is to support aircrew electronic combat training requirements and tactics development. Aircrews can practice radar weapons releases, electronic combat maneuvers, and chaff systems in conjunction with the bombing and gunnery targets on the tactical range.

The range is currently used 5 days per week for low-level bombing practice by F-111A, B-52, FB-111, and B-1B aircraft. Occasionally, F-16, A-6, and A-7 aircraft use the range. Strafing practice is conducted by F-16s and A-7s. Low-level photo reconnaissance runs on tactical range targets are practiced by RF-4C aircraft. Threat reaction training profiles are conducted against the electronic warfare threat emitters by EF-111A aircraft.

S3.3.3.2 Calculation of Current Noise Environment

The current noise environment in the vicinity of the SCR was estimated using the ROUTEMAP noise model. ROUTEMAP utilizes a database of aircraft operational information similar to that of NOISEMAP, which is the principal modeling program used for detailed noise analysis at Air Force installations. The ROUTEMAP database is composed of aircraft operational information, including the following parameters for different types of military aircraft: airspeeds, engine or power settings, engine types, and altitudes above ground level. ROUTEMAP is a "line model" that calculates noise contours at distances perpendicular to the flight track flown by the aircraft being assessed. The model is flexible in that it can calculate the noise along a flight track based on the distribution of aircraft flown to the sides of the track's centerline. ROUTEMAP calculates both L_{dn} and L_{dnmr} noise metrics.

The process by which noise contours are generated is illustrated in the flow chart of Figure S3.3-2. The analysis may be performed in two ways: using specific flight tracks for each aircraft and mission profile or by designating "operating" areas where aircraft fly many unassigned flight tracks. The analysis of the current operations on the SCR involve using specific flight tracks that are flown around the impact area (see Figure S3.3-3). Each flight track was separated into segments to accommodate changes in altitude, airspeed, and engine setting. The number of passes made along each specific segment and by each aircraft type were entered into the model. Noise levels were then computed for each segment. The segments for each flight track were then combined after the calculations were completed. Each noise data point was then contoured to form the resulting noise contour map of the SCR (Figure S3.3-4).

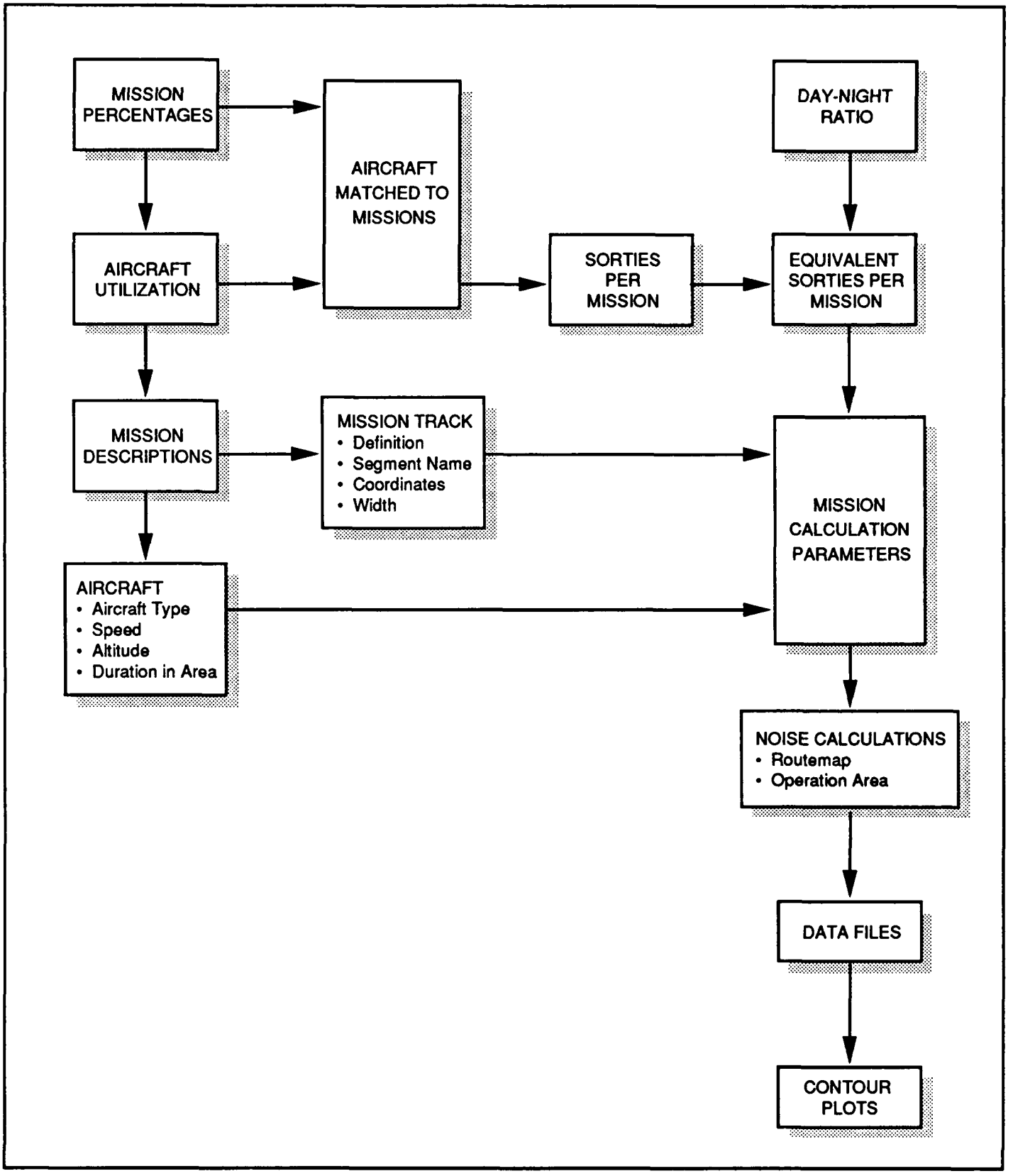


Figure S3.3-2

FLOWCHART FOR NOISE ANALYSIS PROCEDURE

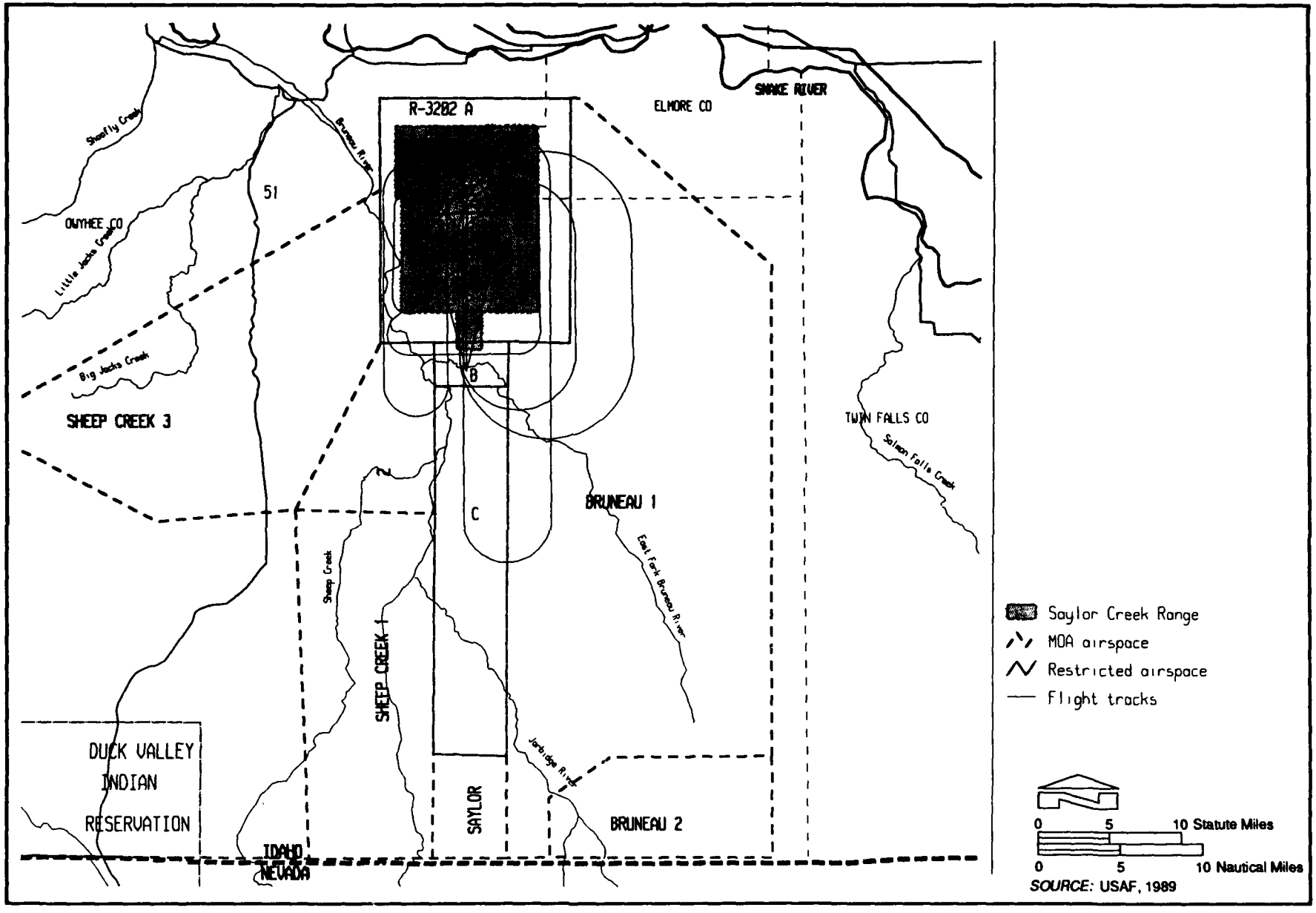


Figure S3.3-3

CURRENT SAYLOR CREEK RANGE FLIGHT TRACKS

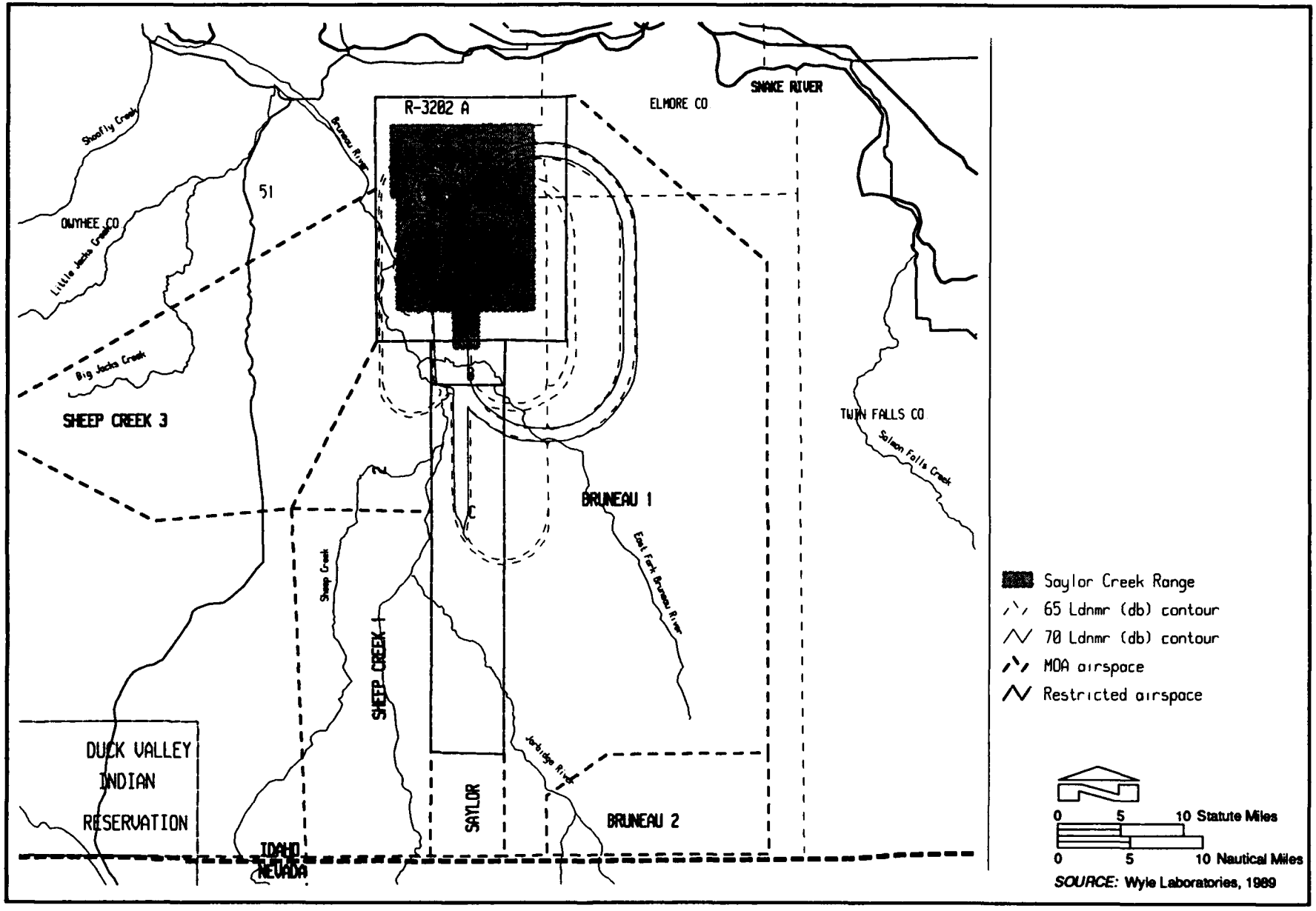


Figure S3.3-4

CURRENT SCR NOISE (L_{dnmr}) ENVIRONMENT

Analysis of the present aircraft activity on the SCR was completed using the following assumptions:

- Current annual SCR sorties are as listed in Table S3.3-1.
- All operations occur during the day between the hours of 0700 and 2200 local.
- Aircraft fly on the SCR Monday through Friday, except on holidays and poor weather days.
- Average day weather conditions over a typical year are 51°F (11°C) and 54 percent relative humidity.
- Flight tracks, passes, operations, and mission profiles while operating on the current SCR are as provided by the current Air Force users (USAF 1989).
- There is no current supersonic activity on the SCR.
- Flight track widths are 1.5 NM.
- All aircraft enter the range from the south at 3,000 feet AGL or at low-level if operating on an MTR.
- F-111A and EF-111A aircraft operate on five general flight tracks around the SCR. Altitudes range from 100 feet up to 5,500 feet AGL. Engine power settings vary from 90-percent RPM to afterburner.
- B-1B, FB-111, and B-52G aircraft operate on three general flight tracks around the SCR. The primary operational altitude is 400 feet AGL. Airspeeds vary from 340 KTAS (knots true airspeed) for the B-52G, to 450 KTAS for the FB-111, to 550 KTAS for the B-1B.
- Seventy percent of the aircraft exit the SCR toward the north at 5,500 feet MSL (approximately 2,500 feet AGL), 30 percent exit toward the southwest at 11,000 feet MSL; and all RF-4C aircraft exit to the south.

S3.3.3.3 Current Noise Conditions on Affected Military Training Routes

Eight MTRs are currently used to access the SCR and its special use airspace: IR-300, IR-302, IR-303, IR-304, VR-1300, VR-1301, VR-1302, and VR-1304. Only IR-303 and VR-1302 provide direct access

Table S3.3-1

CURRENT SPECIAL USE AIRSPACE ANNUAL SORTIES

Current Operations	F-111 & EF-111A TAC[1]	B-1B SAC[3]	FB-111 SAC[3]	B-52 SAC[3]	RF-4C IANG[2]	Other Users	Total Existing
Total SCR Range Sorties	3,757	520	520	1,040	646	650	7,153
Total SCR Range Hours	1,083	151	140	374	199	132	2,079
MOA Sorties							
Owyhee MOA	1,874	0	0	0	967	165	3,006
Paradise MOA	1,270	0	0	0	718	108	2,096
Total	3,144	0	0	0	1,685	273	5,102
MOA Hours							
Owyhee MOA	462	0	0	0	500	51	1,013
Paradise MOA	490	0	0	0	364	38	893
Total	952	0	0	0	864	89	1,906

Notes:
1. Data provided by HQ 366 TFW (TAC) dated September 20, 1989. F-111 numbers include FB-111A, F-111A, and F-111D sorties.
2. Data provided by 124 TRW (IDAHO ANG) dated September 18, 1989.
3. Existing SAC usage of SCR and IR-302 and IR-303 based on proposed 1989 increased SAC sorties addressed in SAC Low-Altitude Flight Operations at Saylor Creek Range, Idaho, Final Environmental Assessment, February 1989; actual July 1988 to June 1989 sortie counts do not reflect the existing increase in SAC sorties; therefore, projections are used here to represent the maximum possible utilization. These projections account for the differences in SCR sorties reported in section S3.1, Airspace Management, and this table.

Table S3.3-2

CURRENT MILITARY TRAINING ROUTE ANNUAL SORTIES

Current MTR Usage	F-111A & EF-111A TAC[1]	B-1B SAC[4]	FB-111 SAC[4]	B-52 SAC[4]	RF-4C IANG[2]	Other Users	Total Existing
Total Sorties	3,863	554	698	2,653	2,164	1,360	11,292
IR-300[3]	0	34	178	1,613	24	0	1,849
IR-302[4,5]	272	130	130	260	276	155	1,223
IR-303[4]	1,633	390	390	780	473	53	3,719
IR-304	1,059	0	0	0	428	6	1,493
VR-1300[5]	457	0	0	0	204	441	1,102
VR-1301[5]	217	0	0	0	240	351	808
VR-1302[5]	223	0	0	0	372	354	949
VR-1304[6]	2	0	0	0	147	0	149

Notes:
1. Data provided by HQ 366 TFW (TAC) dated September 20, 1989.
2. Data provided by 124 TRW (IDAHO ANG) dated September 18, 1989.
3. IR-300 data provided by Scheduling Office, HQ SAC September 21, 1989.
4. Existing SAC usage of SCR and IR-302 and IR-303 based on proposed 1989 increased SAC sorties addressed in SAC Low-Altitude Flight Operations at Saylor Creek Range, Idaho, Final Environmental Assessment, February 1989; actual July 1988 to June 1989 sortie counts do not reflect the existing increase in SAC sorties; therefore, projections are used here to represent the maximum possible utilization.
5. IR-302 and VR-1300 VR-1301, VR-1302, and VR-1304 scheduled by 124 TRG (Idaho ANG); no specific sortie information is available other than that presented in this table; this accounts for the discrepancy between sortie totals for the aircraft listed here and the total MTR usage in the far right column.
6. VR-1304 overlaps IR-302 entirely and portions of VR-1300.

into the SCR. The other low-level routes circumvent the Saylor Creek special use airspace to the east, south, and west. Table S3.3-2 lists the current MTR utilization rates. The subsequent sections discuss the current noise conditions beneath each MTR.

IR-300 has a minimum authorized altitude of 100 feet AGL. The maximum L_{dnmr} noise level for the route is 70 dB directly beneath the centerline. The 65-dB contour is 4,000 feet to either side of the centerline.

IR-303 has a minimum authorized altitude of 100 feet AGL. The maximum L_{dnmr} noise level for the route is 74 dB directly beneath the centerline. The 70-dB contour is 4,000 feet and the 65-dB contour is 6,000 feet to either side of the centerline.

IR-304 has a minimum authorized altitude of 100 feet AGL. The maximum L_{dnmr} noise level for the route is 71 dB directly beneath the centerline. The 70-dB contour is 2,000 feet and the 65-dB contour is 4,000 feet to either side of the centerline.

VR-1300 has a minimum authorized altitude of 100 feet AGL. The maximum L_{dnmr} noise level is less than 65 dB directly beneath the centerline.

VR-1301 has a minimum authorized altitude of 100 feet AGL. The maximum L_{dnmr} noise level is less than 65 dB directly beneath the centerline.

VR-1302 has a minimum authorized altitude of 100 feet AGL. The maximum L_{dnmr} noise level is less than 65 dB directly beneath the centerline.

IR-302 and *VR-1304* overlap each other for their entire lengths. The minimum authorized altitude on these routes is 100 feet AGL. The maximum L_{dnmr} noise level generated by aircraft operating on these two routes in 69 dB directly beneath the centerlines. The 65-dB contour is 5,000 feet to either side of the centerlines.

Where *VR-1300* overlaps *IR-302* and *VR-1304* the maximum L_{dnmr} noise level is 69 dB directly beneath the centerlines and the 65-dB contour is 7,000 feet to either side of the centerlines.

S3.3.3.4 Current Noise Conditions at the Saylor Creek Range

The ROUTEMAP model results indicate that L_{dnmr} noise levels at most sensitive land uses in the vicinity of the SCR are less than 65 dB. This area includes the town of Bruneau, Bruneau Dunes State Park, and the scenic overlook on the Bruneau River. Analyses of the resource disciplines that are

affected by the current noise environment at the SCR are addressed in the following sections: S3.4 (Biological Resources), S3.6 (Visual Resources), S3.8 (Land Use), and S3.10 (Socioeconomics).

The highest L_{dnmr} noise contour calculated for the current SCR operations is 70 dB (see Figure S3.3-3). It is confined principally to the impact area and to the south of the impact area. The 70-dB contour extends approximately 21 statute miles to the south, exposing the area at the intersection of Sheep Creek and the Bruneau River, which is also known as Snoopy's Head. An area that extends approximately 13 miles east of the range is exposed to noise levels around 70 dB. This is along the racetrack that B-1B aircraft currently fly.

Noise levels between 65 dB and 70 dB affect the same general area as those levels greater than 70 dB. The exception is that noise levels between 65 and 70 dB occur up to 4 miles west of the current impact area. However, none of this noise extends beyond the restricted area that encompasses the SCR. The 65 dB noise level extends 24 miles south of the impact area. The area around the intersection of the Bruneau River with Sheep Creek is currently exposed to noise (L_{dnmr}) between 65 and 70 dB.

Noise levels of 65 dB and less cover almost all of the SCR area. This noise level extends to the south 25 miles, to the east 13 miles, and to 5 miles west of the SCR impact area.

S3.3.3.5 Current Noise Conditions Beneath Owyhee and Paradise MOAs

The current level of aircraft operations outside of the SCR airspace in Owyhee and Paradise MOAs is 5,102 annual sorties. These sorties are primarily flown at altitudes above 5,000 feet AGL. RF-4C aircraft operated by the IANG are the exception, operating at altitudes in Owyhee MOA down to 100 feet AGL. The relatively low number of sorties flown in Paradise and Owyhee MOAs and the typically high operating altitudes preclude the use and value of computer noise models. The overall level of noise generated by the current MOA sorties is considered to be less than 65 dBA.

S3.3.4 Historic Supersonic Operations

Supersonic flight operations were authorized and occurred periodically in the early 1980s during special training exercises in the Owyhee and Paradise MOAs (USAF 1989c). After an environmental review, a supersonic waiver was issued for a composite force training[1] exercise: the Owyhee Roundup. The Owyhee Roundup is a training exercise hosted annually by the 366 TFW, MHAFB. Owyhee MOA, located west of the SCR, is special use airspace assigned from 100 feet AGL to 14,500 feet MSL. Paradise MOA overlies a portion of the Owyhee MOA, extending from 14,500 feet MSL to 18,000 feet MSL. Supersonic airspeeds during the authorized years were no higher than Mach 1.15. Supersonic

1. Composite force training exercises involve a large formation of multiple types of aircraft.

operations occurred during the following exercises, at altitudes between 10,000 feet AGL to 35,000 feet MSL:

- 18 - 22 May 1981: 38 sorties per day went greater than Mach 1.0 (190 supersonic sorties during a five-day period); no noise complaints were filed by the public.

- 19 - 23 July 1982: 55 sorties per day went supersonic (275 supersonic sorties during a five-day period); one noise complaint was filed by the public.

- 24 - 30 July 1983: 55 sorties per day went supersonic (275 supersonic sorties during a five-day period); no noise complaints were filed by the public.

The 1984 exercise was cancelled. There have been no additional requests in subsequent years for supersonic operations during the Owyhee Roundup.

S3.4 BIOLOGICAL RESOURCES

S3.4.1 Definition of Resource

Biological resources include terrestrial and aquatic vegetation (including wetlands and riparian areas), terrestrial wildlife (excluding livestock), aquatic biota, and threatened and endangered species.

S3.4.2 Region of Influence

The ROI for biological resources is defined by the horizontal boundaries of the airspace that would be used to train the aircrews stationed at MHAFB. It includes lands that could be used for the proposed expanded range capability, land under the MOAs associated with the range that could be affected by overflights, and the MTRs that would be used to access the range and MOAs. This ROI includes most of Owyhee County in Idaho, southern Malheur County in Oregon, portions of Humboldt and Elko counties in Nevada, and linear corridors in Idaho, Oregon, Nevada, and Utah associated with the MTRs.

In the following descriptions of biological resources, the greatest detail is provided for areas in southwestern Idaho where expansion of range capability could occur, since development of a range with expanded capability would result in both ground disturbance and intense aircraft overflight activity. For the lands under the MOAs in Oregon and Nevada, descriptions are limited to those resources that would be sensitive to aircraft overflights since no ground disturbance would occur. Biological resources under the MTRs are only briefly addressed in this document, since the configuration of MTRs to access a range with expanded capability will not be determined until Tier 2.

S3.4.3 Vegetation

The ROI lies within what is generally referred to as the Columbia Plateau physiographic province (Fenneman 1931), although it is also considered to be within the Great Basin Desert, or Intermountain Region, by others (Shreve 1942; Cronquist et al. 1972). The Columbia Plateau is an elevated plateau with mountains that are dissected by canyons draining ultimately to the Pacific Ocean via the Columbia River. It is thus not within the hydrographic Great Basin, which has no drainage to the sea. Situated almost entirely within the Owyhee Desert floristic section of Cronquist (1972), yet also encompassing a portion of the Snake River Plains section, the area contains at least four major rivers (Owyhee, Snake, Bruneau, and Jarbidge). It includes the southern portion of the Owyhee Mountains in Idaho and abuts the Santa Rosa Range, Bull Run Mountains, Jarbidge Mountains, and Independence Mountains in Nevada. The proposed expanded range capability study area includes smaller, regionally named areas

such as the Bruneau, Blackstone, Diamond A, J-P, and Inside deserts, which typically occupy the plateaus above the river canyons.

The major vegetation types occurring within the region of influence are sagebrush shrub-steppe (including both big and low sage communities), shadscale (also called salt desert shrub), western juniper woodland, riparian, wetland (including playas), native grasslands (including lowland, valley, and canyon grasslands), mountain mahogany chaparral, forest (including aspen and conifers in the mountains), and burned or seeded areas. Sagebrush-grass is by far the most prevalent.

Because the only disturbance to vegetation would be in the Owyhee County portion of the ROI (where targets, roads, and other facilities would be built if the expansion of range capability occurs), this discussion focuses on the vegetation in that area. Descriptions of communities present outside this area under the MOAs are provided only from the standpoint of their importance as wildlife habitat.

Sagebrush shrub-steppe is typically divided into big and low sagebrush plant communities, depending on the height of the dominant sagebrush present. Big sagebrushes include Wyoming big sage (*Artemisia tridentata* ssp. *wyomingensis*), basin big sage (*A. tridentata* ssp. *tridentata*), and mountain big sage (*A. tridentata* ssp. *vaseyana*). Low sagebrushes include low sage (*A. arbuscula*) and early sage (*A. longiloba*), among others.

Big sagebrush-grass. Big sagebrush-grass communities within the ROI are dominated by Wyoming big sage and grasses such as bluebunch wheatgrass (*Agropyron spicatum*), Great Basin wildrye (*Elymus cinereus*), Idaho fescue (*Festuca idahoensis*), squirreltail (*Sitanion hystrix*), and Sandberg's bluegrass (*Poa sandbergii*). Basin big sage, another tall sage, occurs on the deeper, richer soils with many of the same grasses. Both Wyoming and basin big sage occur on well-drained soils. At higher elevations, where increased moisture is available from rain and snow, mountain big sage predominates. This community has greater species diversity and is generally in better ecological condition than the lower, drier Wyoming and basin big sage communities (Winward 1983). Hironaka et al. (1983) have identified at least 22 big sagebrush habitat types in southern Idaho; some of these have been greatly altered by fire and grazing and are in poor ecological condition.

Low sagebrush-grass. Low sagebrush communities are dominated by low sage or early sage, and grasses such as bluebunch wheatgrass, Idaho fescue, and Sandberg's bluegrass. These communities generally occur on shallow soils, typically those with a subsurface clay layer (Hironaka et al. 1983). Low sagebrush-grass communities within the ROI are not as prevalent as tall sagebrush grass communities.

Shadscale. This vegetation is usually dominated by shadscale (*Atriplex confertifolia*) and four-wing saltbush (*Atriplex canescens*), although monotypic stands of other species such as winterfat (*Eurotia*

lanata) and greasewood (*Sarcobatus vermiculatus*) are also common. These communities occur in valley bottoms, usually in highly alkaline soils.

Western juniper woodland. Western juniper (*Juniperus occidentalis*) dominates the aspect of this vegetation. Associated species include Idaho fescue, bluebunch wheatgrass, mountain big sage, low sage, and mountain mahogany (*Cercocarpus ledifolius*). This vegetation occurs primarily in canyons and rocky areas in the Owyhee Mountains and along the north fork of the Owyhee River (BLM 1986), and has been expanding into sagebrush areas since the advent of fire control (Burkhardt and Tisdale 1976). This vegetation provides forage and cover for many birds and mammals, including mule deer (Dealy et al. 1981).

Riparian, wetland. Riparian and wetland vegetation occurs in the canyon bottoms along most of the rivers and streams in the area, and adjacent to springs and water bodies such as the Blackstone and Grasmere reservoirs. These communities are considered by the BLM to be the most sensitive to disturbance, and some are in poor condition (BLM 1985a). Riparian areas are typically dominated by willows (*Salix* spp.), dogwoods (*Cornus stolonifera*), and other shrubs; in some areas western junipers line stream channels. Permanently or seasonally wet meadows are found where rivers or streams flatten out; these areas are dominated by bluegrasses (*Poa* spp.), sedges (*Carex* spp.), and rushes (*Eleocharis* spp.). The USFWS has mapped wetlands in the area; in many instances these areas correspond to riparian areas along rivers and streams. Some seasonally or temporarily flooded playas occurring in shadscale vegetation on the plateaus (e.g., the Blackstone Desert area) provide habitat for Davis' peppergrass (*Lepidium davisii*), a category 2 candidate for federal listing as an endangered species (see section S3.4.6 below). Riparian communities are the most important habitats found on public lands in the ROI, and they harbor many wildlife species.

Native grasslands. Native grasslands include lowland, valley and canyon grasslands. Lowland grasslands occur in sandy areas in the Snake River basin. Common species include bluebunch wheatgrass, Indian ricegrass (*Oryzopsis hymenoides*), squirreltail, Sandberg's bluegrass, and needle and thread (*Stipa comata*). Valley grasslands occur on valley bottomland soils that are moist and often alkaline. Common species include Great Basin wildrye, inland saltgrass (*Distichlis stricta*), and alkali cordgrass (*Spartina gracilis*). Canyon grasslands occur on steep canyon walls in the Owyhee River drainage. Bluebunch wheatgrass and Sandberg's bluegrass occur on south-facing rocky slopes; Idaho fescue and bluebunch wheatgrass occur on north-facing slopes.

Mountain mahogany chaparral. This vegetation occurs on rhyolite in the Owyhee Uplands and in the Santa Rosa Range and Jarbidge Mountains in Nevada. It is dominated by mountain mahogany; other common species include mountain big sagebrush, low sage, quaking aspen (*Populus tremuloides*), and grasses such as Columbia needlegrass (*Stipa columbiana*) and big bluegrass (*Poa ampla*).

Forest. Forest vegetation includes aspen and coniferous forest communities that are found at high elevations in the Santa Rosa, Jarbidge, Independence, and Bull Run mountains. Aspen communities are sometimes considered riparian, as they often occur in moist areas. Conifers such as subalpine fir (*Abies lasiocarpa*), limber pine (*Pinus flexilis*), and whitebark pine (*P. albicaulis*) often form large stands in the Jarbidge, Independence, and Bull Run mountains.

Burned or seeded areas. The ROI contains many areas that have burned and have been reseeded with crested wheatgrass (*Agropyron desertorum* and *A. cristatum*), Russian wildrye (*Elymus junceus*), or intermediate wheatgrass (*Agropyron intermedium*), and a variety of other species, including forbs and shrubs. These areas are predominant in the eastern portion of the study area. Other areas have burned and have been overtaken by cheatgrass (*Bromus tectorum*), an annual that has invaded as a result of overgrazing and recurring wildfires.

Several plant species are candidates for protection under federal legislation. These are discussed in section S3.4.6. Other plant species that are considered to be sensitive by the Idaho Native Plant Society and that BLM is required to protect occur within the ROI. These species are: cowpie buckwheat (*Eriogonum shockleyi*), giant helleborine (*Epipactis gigantea*), Torrey's blazing star (*Mentzelia torreyi* var. *acerosa*), Owyhee mourning milk-vetch (*Astragalus atratus* var. *owyheensis*), and thistle milk-vetch (*Astragalus kentrophyta* var. *jessiae*). A rare lichen (Texosporium sancti jacobii) is also reported from within the ROI (personal communication, R. Rosentreter 1989).

S3.4.4 Wildlife

Wildlife is defined here as all non-domesticated terrestrial animals, including those that spend much of their life associated with water. The major categories of wildlife discussed below are mammals, birds, reptiles and amphibians, and terrestrial invertebrates (primarily insects). This section focuses on those species most likely to be adversely affected by a proposed expanded range capability and those species of greatest concern to resource managers and the public due to their economic, recreational, and ecological importance. These include birds of prey (e.g., hawks, eagles, falcons, and owls); shorebirds; and game animals such as deer, bighorn sheep, pronghorn, chukar, sage grouse, quail, dove, and waterfowl.

The varied topography (i.e., rolling plains, steep canyons, and mountains) in the study area provides habitat for many different wildlife species. The plains are semi-arid while the mountains and river canyons provide moister habitats. Some species have specific habitat requirements and are found only where these conditions occur while other species use a variety of habitats at different times of the year. Information on the distribution and abundance of many wildlife species is limited for the study area. This is due, in part, to the remoteness of the area and lack of human developments that require

environmental review. Some data are available for game species and for specific areas such as the Snake River Birds of Prey Area.

Several wildlife species are protected under federal and state legislation or are candidates for such protection. These are discussed below in section S3.4.6. Some of the candidate species as well as a number of other species are of special concern to state wildlife management agencies. They are classified as fully protected or species of special concern within the state. Table S3.4-1 lists those species known to occur within the study area. Data for many of these species have not been compiled at this time.

S3.4.4.1 Mammals

A variety of mammals inhabit the study area, ranging from large ungulates such as deer to carnivores, rabbits, and rodents.

Mule deer (*Odocoileus hemionus*) inhabit areas of broken topography, open plains, brush, and woodlands. They are browsers, feeding primarily on shrubs and the twigs of trees, but grasses and herbs are also eaten (Hall and Kelson 1959; Burt and Grossenheider 1976). The rutting (breeding) season occurs from October through December with the fawns, usually two, being born in May and June. Deer are generally solitary but aggregate during migrations and on winter ranges. Prior to settlement by European man, mule deer were not abundant in most of Idaho (Trent et al. 1985). This is presumably also true of the adjacent portions of Oregon and Nevada which are within the study area. Peak abundances occurred in the 1950s and 1960s as a result of domestic livestock grazing practices that promoted the spread of brush. Modern range management, which favors grasses over brush, and urban and industrial developments in historic mule deer winter range have caused a decline in deer abundance. Hunting is an important factor influencing deer population structure, growth rate, and size.

Mule deer are found throughout the study area, but most occur in association with river canyons or mountains. Crucial winter range in Idaho (Figure S3.4-1) is found in the headwaters of Shoofly and Little Jacks creeks, along the Owyhee River (including near the mouth of the south fork), along the eastern side of the Diamond A Desert adjacent to the Jarbidge River from its confluence with the Bruneau to the Nevada border, along both sides of the West Fork of the Bruneau River near the Nevada border, on Big Island, and from the eastern rim of the Jarbidge River near Poison Butte eastward to near the Owyhee-Twin Falls county line. Approximately 1,500 deer from Nevada winter just west of the Jarbidge River from near Poison Butte to the town of Three Creek (personal communication, J. Williams 1989). At least 1,500 winter in the Diamond A Desert area and on Big Island. In Nevada, crucial winter range occurs along the west side of the Bull Run Mountains and across the northern end of the Tuscarora Mountains (BLM 1985b).

Table S3.4-1

WILDLIFE SPECIES OF SPECIAL CONCERN OCCURRING IN THE STUDY AREA

Species	*ID*	*OR*	*NV*
Western big-eared bat		SSC	
Pacific pallid bat		SSC	
Least chipmunk	P		
Golden-mantled ground squirrel	P		
Kit fox	SSC,P		
American white pelican	SSC[2]	SSC	P
Swainson's hawk	P	SSC	P
Bufflehead	P	SSC	
Greater sandhill crane	P	SSC	
Barn owl	P	SSC	P
Burrowing owl	P	SSC	P
Flammulated owl	P	SSC	
Bank swallow	P	SSC	
Western bluebird	P	SSC	
Mountain bluebird	P	SSC	
Western meadowlark	P	SSC	
Mountain quail	SSC[2]		
Desert horned lizard		SSC	
Short-horned lizard		SSC	
Western ground snake	SSC	SSC	
Western long-nosed lizard	SSC		

Notes:

1. SSC = species of special concern; P = protected nongame species (Idaho). Wildlife classification and terminology varies in each state; this table indicates the primary sensitive or protected species occurring in the study area.
2. Proposed addition to the Idaho list (Melquist 1988).

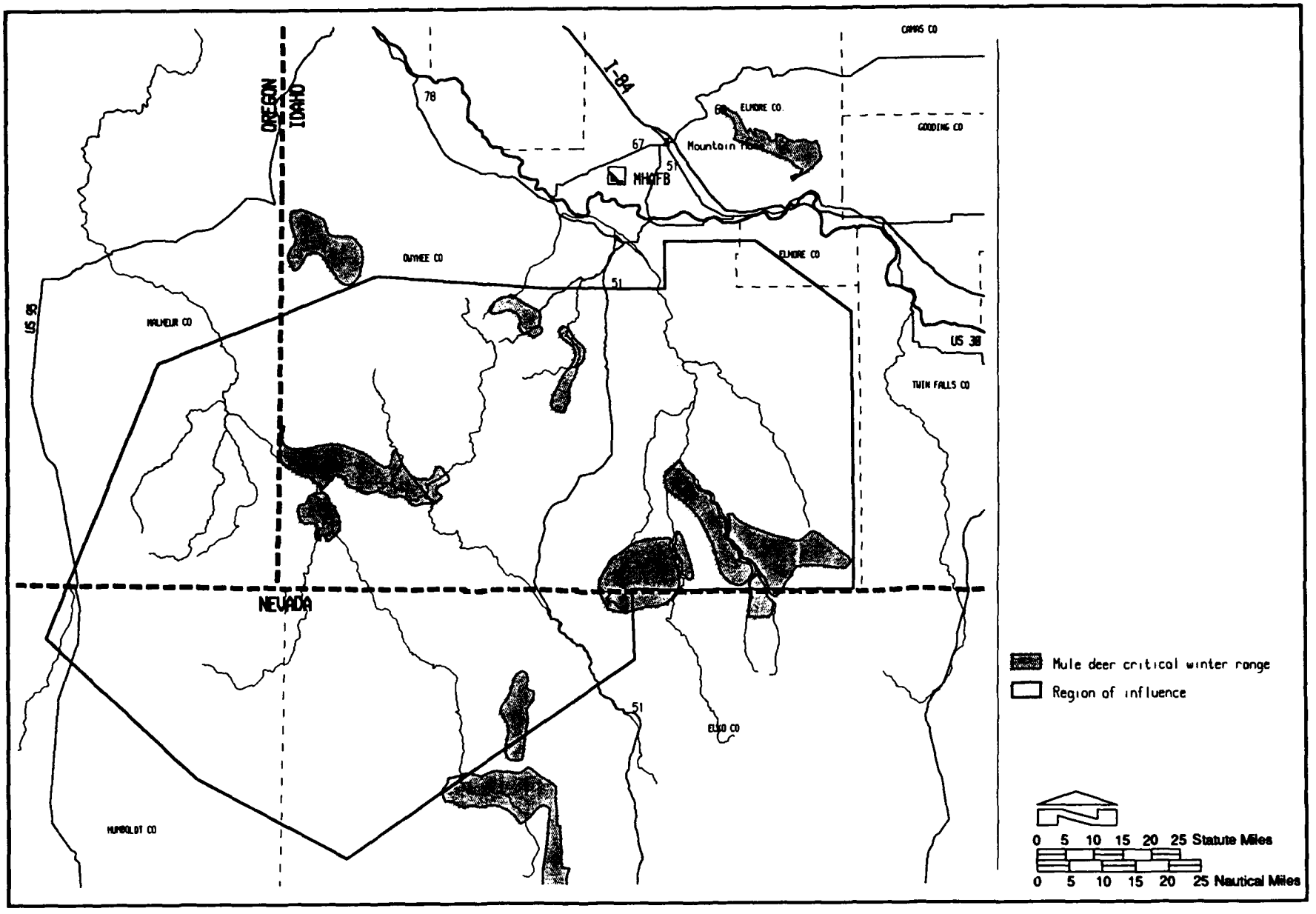


Figure S3.4-1

MULE DEER CRUCIAL WINTER RANGE

Pronghorn (*Antilocapra americana*) prefer flat or rolling prairies and sagebrush plains with unobstructed views, where they feed primarily on shrubs and forbs (herbs) (Burt and Grossenheider 1976; Martin et al. 1961; Yoakum 1978). Sagebrush is important for year-round food and cover (Autenrieth and Connelly 1985). Pronghorn form small herds and are highly mobile. They are generally found within 2 to 3 miles of water in summer (personal communication, J. Williams 1989). Males defend territories from March to October (Yoakum 1978). Pronghorn also migrate between summer and winter ranges. Seasonal ranges in Idaho are shown in Figure S3.4-2. Their movements are often restricted by agriculture, fences (pronghorn tend to crawl under fences rather than jump them like deer), and transportation corridors (e.g., highways and railroads). Breeding occurs in August to October, and one to two young are born in May or June (Burt and Grossenheider 1976).

Population densities are generally low in southwestern Idaho (Autenrieth and Connelly 1985). Herd size is limited by range fires, livestock grazing and its associated vegetation manipulation (i.e., brush removal), and low precipitation. Severe winters also cause mortality. The pronghorn population in southwestern Idaho (south of the Snake River and west of Highway 93) was estimated to be 1,700 animals in the fall of 1985 (Autenrieth and Connelly 1985). Few pronghorn occur south of the Owyhee River, and no hunting is permitted there. North of the river, population numbers appear to be increasing, but total numbers are still low (personal communication, C. Harris 1989). Few surveys have been flown in Owyhee County by the Idaho DFG or BLM in recent years. Data from 1983 indicate that at least 400 pronghorn winter in the Shoofly Creek to Duncan Creek area (northwest of Grasmere), and that more than 200 winter in the Squaw Meadows to Dickshooter Ridge area (BLM unpublished data). Animals from these two wintering areas disperse to the area between them and eastward to the Bruneau River in summer.

About 2,000 pronghorn also winter east of the Bruneau and Jarbidge rivers. The Poison Butte area in the Inside Desert north of Murphy Hot Springs provides crucial winter range during hard winters (personal communication, J. Williams 1989). The Idaho DFG has identified three crucial wintering areas in eastern Owyhee County (Figure S3.4-2). Many of the pronghorn wintering in this area migrate north from higher elevation summer ranges in Nevada. The pronghorn herd east of the Bruneau River is increasing rapidly. According to the Boise district BLM, the increase may be associated with type conversions of sagebrush to grassland range and increased water availability.

Bighorn sheep (*Ovis canadensis*) were once common throughout the study area. In southwestern Idaho, they were one of the most abundant game animals at the beginning of the 19th century, but hunting by miners and settlers, range exploitation by domestic livestock, and possibly diseases transmitted by livestock led to a precipitous population decline (Toweill 1985). Bighorn sheep were extirpated from Owyhee County, Idaho by 1910 (Trout and Theissen 1973) and from Oregon by 1916 (Olterman and Verts 1972). The Idaho DFG began a reintroduction program to reestablish bighorn

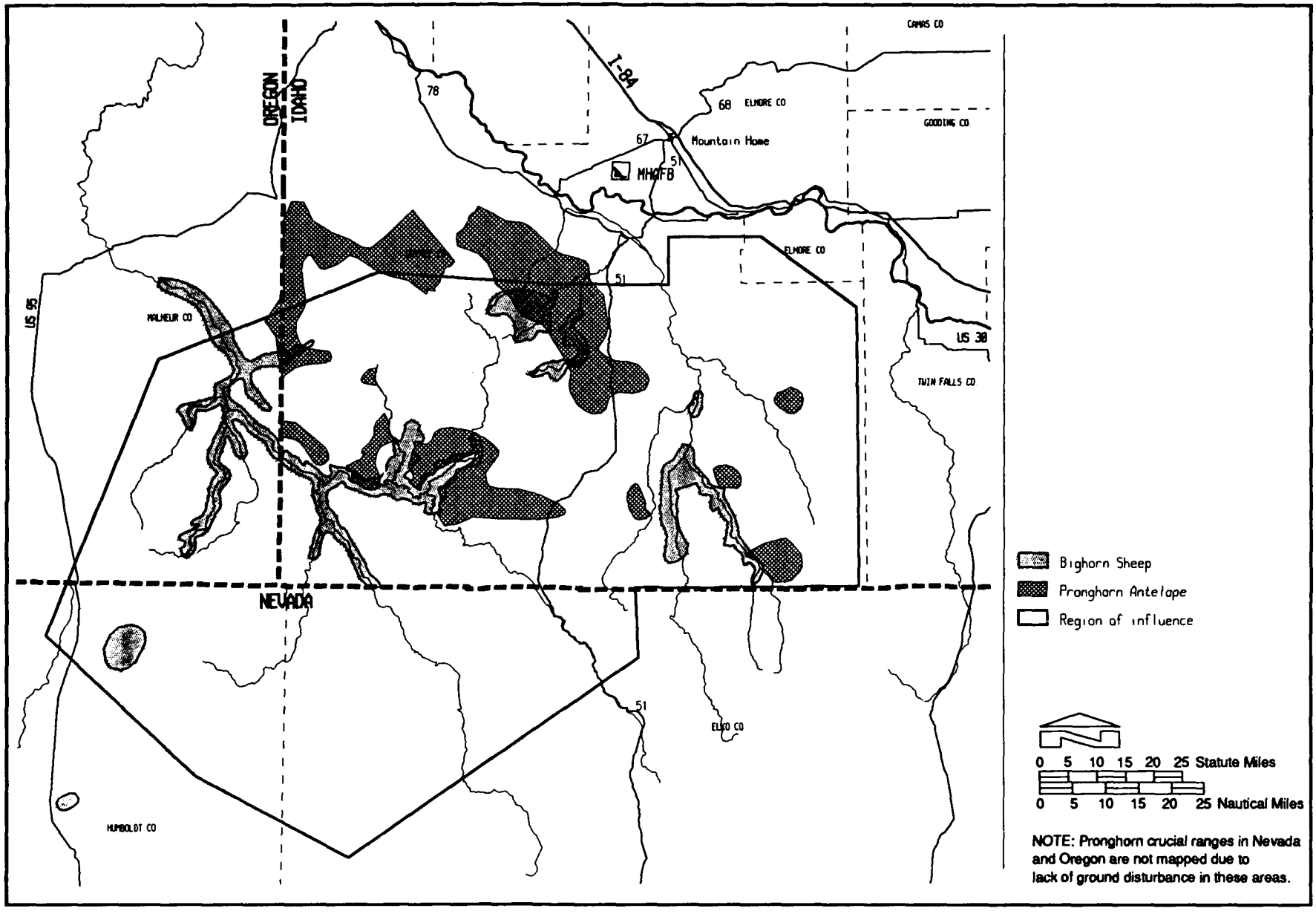


Figure S3.4-2

BIGHORN SHEEP DISTRIBUTION AND PRONGHORN CRUCIAL RANGES

sheep in their former habitats within the state with the release of 19 animals in the east fork area of the Owyhee River in 1963. Additional transplants were made in 1965 and 1966 (Toweill 1985).

Bighorns were released in the Little Jacks Creek drainage in 1967 and have expanded into the adjacent Shoofly drainage (Toweill 1987). By 1969 the Owyhee herd had expanded enough to allow a limited trophy hunt. In 1978, bighorn sheep were also released in Eightmile Canyon within the Santa Rosa Range in Nevada. Beginning in the 1980s, transplants were made into the Bruneau and Jarbidge river drainages in Idaho, to the South Fork of the Owyhee River in Idaho, and in the Jarbidge River canyon near Slide Creek and Granite Mountains (east of the study area) in Nevada (Toweill 1985; USDA 1985). Recent transplant sites include Cottonwood Canyon (east of the study area in Idaho) in 1986 and 1987, the Big Jacks Creek drainage (Idaho) in 1988, and the Snowcloud Mountains (Nevada) in 1986 (Toweill et al. 1988). These, plus population growth at the other sites, brings the population to about 700 in Idaho. In 1983 the Oregon Department of Fish and Wildlife transplanted California bighorn sheep into former habitat in the Owyhee River Canyon, and the population now exceeds 100 animals (personal communication, W. Olson 1989; Meyer undated). Population data for Nevada are not available.

Bighorn sheep inhabit rugged terrain consisting of mountains and river canyons in the study area, usually within 3 miles of water (Figure S3.4-2). In the canyon areas they range up to 2 or 3 miles onto adjacent plateaus to forage (personal communication, Oldenberg 1989). Their principal food is grass along with some herbaceous and woody browse species (Martin et al. 1961). Bighorn sheep are gregarious, but rams and ewes usually remain in separate groups except during the rut and in spring when new vegetation sprouts (Wishart 1978). The rut is in November and December, and the lambs (seldom more than one per ewe) are born in May and June (Burt and Grossenheider 1976).

Elk (*Cervus elaphus nelsoni*) apparently did not occur in Owyhee County, Idaho until released in 1946 (Trout and Theissen 1973) and are not present in the Oregon portion of the study area (personal communication, W. Olson 1989). A few elk are present in the Jarbidge Mountains, on Big Island, at Merritt Mountain (near the northeastern corner of the Paradise MOA), and in the Columbia Basin at the south end of the Bull Run Mountains. The Nevada Department of Wildlife is considering transplanting more elk into the Jarbidge Mountains (personal communication, J. Williams 1989). The herd on Merritt Mountain contains about 20 animals. Elk are gregarious, forming herds. They use a variety of habitats ranging from mountain forests and meadows to lower elevation plains and feed on browse, grass, and forbs (Boyd 1978). Breeding takes place from September to October, and a single calf is born in June.

Wild horses occur in the northeastern corner of the proposed expanded range capability area. BLM manages this area for 50 head (BLM 1987). Wild horses are also present in Oregon just west of the Owyhee River at the northern edge of the Paradise MOA and extending north (personal

communication, Kindschy 1989). In Nevada, wild horses occur in the Owyhee Desert area west of the South Fork of the Owyhee River and south of the Idaho border to the Snowstorm Mountains and Little Humboldt River on the south. Approximately 1,500 animals are present in this area which is more than the BLM Resource Management Plans designate the area should be managed for (BLM 1985b; personal communication, B. Portwood 1989).

Carnivores in the study area include mountain lion, bobcat, coyote, badger, raccoon, river otter, skunks, and longtail weasel. Data for these species as well as for the other mammals discussed below are very limited for most of the study area, with the notable exception of the Snake River BOPA.

Mountain lions (*Felis concolor*) prefer habitat with dense cover or rugged, rocky terrain and maintain fairly large home ranges. They are solitary except during courtship, territorial fights among males, and rearing of young (by the females). Maximum abundance in an area is limited by social interactions and territory size. Litters of one to six (usually two or three) are generally born in summer. Mountain lions prey upon other animals and deer are the most common food (Russell 1978). In the study area, mountain lions inhabit the river canyons and mountains (BLM 1982, 1984, 1985a). At least 2 or 3 mature individuals and many juveniles occur in the Murphy Hot Springs area during winter when deer are abundant (personal communication, J. Williams 1989).

Bobcat (*Lynx rufus*) inhabit rimrock areas along the river canyons and are generally nocturnal. They feed on small mammals, birds, and occasionally deer (Martin et al. 1961). River canyons and other locations near water (e.g., adjacent to reservoirs and irrigated agriculture) provide habitat for raccoon (*Procyon lotor*), longtail weasel (*Mustela frenata*), spotted skunk (*Spilogale putorius*), and striped skunk (*Mephitis mephitis*). These species are more active at night than during the day (Burt and Grossenheider 1976; BLM 1979). They prey on small mammals, birds, reptiles, and amphibians. Invertebrates such as crayfish, insects, and spiders are also eaten by all but the weasel (Martin et al. 1961). The river otter (*Lutra canadensis*) occurs in most perennial streams of the study area in Idaho and Oregon (BLM unpublished data). Badgers (*Taxidea taxus*) live in grassland and desert habitats where soils are suitable for burrowing. Many are present in the Snake River BOPA just north of the river (Burt and Grossenheider 1976; BLM 1979). The coyote (*Canis latrans*) uses a wide variety of habitat types, and is found throughout the study area.

Several species of rabbits, rodents, and bats are present in the study area. The following discussion is taken primarily from studies performed in the Snake River BOPA (BLM 1979) and from field guides (Burt and Grossenheider 1976) since little site-specific information is available for the study area. Rabbits and rodents are of particular ecological importance since they provide forage for birds of prey. Blacktail jackrabbits (*Lepus californicus*) and mountain cottontail (*Sylvilagus nuttallii*) are the most common rabbits in the study area (BLM 1979). The jackrabbit prefers open desert and grassland habitats while the cottontail is most abundant along river canyons.

Rodents are quite abundant in the BOPA, particularly north of the Snake River. Common species include yellowbellied marmots (*Marmota flaviventris*) in rocky areas such as canyon outcrops; Townsend and Belding ground squirrels (*Spermophilus townsendi* and *S. beldingi*) where soils are deep enough for burrowing; whitetail antelope squirrels (*Ammospermophilus leucurus*); least chipmunks (*Eutamias minimus*); pocket gophers (*Thomomys talpoides* and *T. townsendi*); Ord kangaroo rats (*Dipodomys ordi*) in areas of sandy soil; western harvest mice (*Reithrodontomys megalotis*) near water; deer mice (*Peromyscus maniculatus*); northern grasshopper mice (*Onychomys leucogaster*); bushy tail woodrats (*Neotoma cinerea*) along canyon walls; several species of vole (*Microtus longicaudus, M. pennsylvanicus,* and *Lagurus curtatus*); and Merriam shrews (*Sorex merriami*). Muskrats (*Ondatra zibethica*) and beaver (*Castor canadensis*) are found in the Snake River (BLM 1982) and in the Owyhee River (Meyer undated), it is probable that they occur in other perennial waters of the study area as well. At least nine species of bat are known summer visitors to the BOPA (BLM 1979).

Most bats occupy caves, which may be present throughout the study area, especially along river canyons and other areas of high topographic relief. Caves provide unique habitats for wildlife and microscopic plants, and could support sensitive species such as Townsend's big-eared bat.

S3.4.4.2 Birds

Birds present in the study area can be divided into four major categories: (1) birds of prey, (2) water-associated birds such as waterfowl and shorebirds, (3) gallinaceous birds (primarily upland game species), and (4) passerine and other birds (songbirds).

Birds of prey (raptors) include hawks, eagles, falcons, vultures, osprey, and owls. The study area provides excellent habitat for these birds, particularly along the Snake River. Steep canyon walls with many fractures and holes are prime raptor nesting habitat while an abundant prey base is present in areas adjacent to the Snake River (BLM 1979). At least 14 species of raptors breed along the Snake River in the highest density known anywhere in the world (Kochert and Pellant 1986). A number of these plus some of the other raptors frequenting the study area are migratory and are only present for part of the year.

The prairie falcon is the most abundant nesting species in the BOPA. They prey heavily on Townsend ground squirrels, foraging up to 15 miles from their nests (BLM 19[illegible]). They also nest in other river canyons, including smaller tributaries to the Owyhee River (BLM 1984). Golden eagles are also a common cliff nesting species in the area with densities about equal along the Snake River and the Bruneau/Jarbidge rivers (personal communication, M. Kochert 1989). Many nest along the Owyhee River as well (Meyer undated; BLM 1984). This species defends a territory around the nest, and nests are a minimum of 2.5 miles apart. The adults forage within 3.5 miles (5.6 km) of the nest. Jackrabbits

are a preferred food along with pheasant in agricultural areas. Ground squirrels, cottontail rabbits, and other small mammals are consumed as well (BLM 1979).

Red-tailed hawks nest along canyons, defending territories. Nests may be as close together as 1.5 miles, and the adults forage within 3 miles of the nest. In the Owyhee River drainage, they nest at 2- to 3-mile intervals in the main river canyons. Prey include ground squirrels, jackrabbits, cottontail rabbits, reptiles, rodents, and birds (BLM 1979, 1984). Ferruginous hawks nest in a variety of habitats ranging from cliffs to open ground. They prey on gophers, ground squirrels, cottontail rabbits, and reptiles (BLM 1979).

Other common birds of prey in the study area include the American kestrel, northern harrier, rough-legged hawk (in winter only), great horned owl, barn owl, western screech owl, and long-eared owl. Less abundant species include the Swainson's hawk, short-eared owl, burrowing owl, and turkey vulture (Kochert and Pellant 1986). All but the rough-legged hawk also breed in the study area (Bammann and Doremus 1982; BLM 1979, 1984).

The study area is an important breeding, migration, and wintering area for waterfowl. Many species of waterfowl are known to breed in the study area, although the number of individuals involved is not known. Common breeders include the mallard, northern pintail, green-winged teal, and cinnamon teal. Canada geese breed at approximately 1-mile intervals along the Owyhee River shoreline in Oregon and Idaho (Meyer undated; BLM 1984). Breeding also occurs on the Snake River and along the Bruneau River (BLM 1982). Tundra swans have been observed nesting on Indian Lake, located just north of the confluence of Battle Creek and Pole Creek (BLM unpublished data). In addition, reservoirs, stock ponds, and streams are used by breeding ducks, primarily mallards and teal. Although only a few individuals use any one of these small habitats, many such locations occur in the study area resulting in considerable production (BLM 1982). During migration, waterfowl commonly use potholes, rivers, lakes, and other bodies of water for resting and feeding. During the winter, large concentrations of waterfowl, especially Canada geese and mallards, can be found in the area. Although little is known at present regarding the size of these concentrations within the study area, based on concentrations in neighboring areas, numbers may be very large. At nearby Malheur NWR, winter concentrations of Canada geese commonly number in the thousands, and as many as 3,000 to 4,000 mallards have also been seen there (*American Birds* 1980). Hagerman Valley, Idaho, along the Snake River, has hosted winter populations of several thousand Canada geese and over 100,000 mallards. Nampa, Idaho regularly records the highest concentrations of mallards in the United States, commonly over 300,000 individuals (*American Birds* 1979-80). Other species at least seasonally present include American white pelican, great blue heron, western grebe, pied-billed grebe, Caspian tern, American avocet, spotted sandpiper, and common snipe.

Gallinaceous birds in the study area include sage grouse, chukar, wild turkey, quail (three species), ring-necked pheasant, and gray (Hungarian) partridge. Of these, only the sage grouse and mountain quail are native to this area. The chukar, pheasant, and gray partridge have been introduced from Asia for hunting. California and bobwhite quail and wild turkey are native to other parts of North America but have been introduced to the study area.

Sage grouse are common in the sagebrush plains of the study area. They use a variety of habitats in summer, feeding on insects and forbs. During the remainder of the year, however, they are dependent on sagebrush for food and cover (Rybarczyk and Connelly 1985). Many populations are migratory and may move 50 miles or more to seasonal ranges. A major wintering area is present just north of the Murphy Hot Springs airstrip. In 1979, 1,000 to 1,500 birds were observed there (personal communication, J. Williams 1989). A second major wintering area is in the Horse Basin/Little Jacks Creek Plateau area. Male sage grouse perform courtship rituals in the spring on traditional sites known as leks. Owyhee County is one of the major areas of sage grouse production in the state. Numerous leks and nesting areas are present on the rolling plains south of the Snake River in Idaho. Abundance on an annual basis is influenced by spring weather, which affects reproductive success. Agricultural development and sagebrush eradication to promote grasses for livestock grazing have reduced sage grouse habitat.

Chukar prefer steep, rocky canyons with annual and perennial grasses and scattered brush. They eat a variety of plant material, including the seeds and leaves of introduced species such as cheatgrass and Russian thistle. Insects are also eaten, particularly by the young. Availability of water determines their distribution in summer and fall (Rybarczyk and Connelly 1985).

Ring-necked pheasants and gray partridge occur in association with irrigated agriculture, but they require riparian/wetland or brush habitat nearby for cover (Rybarczyk and Connelly 1985). Gray partridge feed primarily on seeds. They also eat insects and other invertebrates. Pheasants consume grains, a variety of insects, and other animals such as earthworms, toads, snails, spiders, and millipedes (Martin et al. 1961).

Quail are dependent on riparian habitats for water and cover although they can also be found in nearby brush habitats. California quail are the most common of the three species in the study area. A few mountain quail and bobwhite quail may be present (Rybarczyk and Connelly 1985). For example, mountain quail occur in the South Fork of the Owyhee River canyon and portions of the Big Jacks Creek drainage (BLM 1984a).

A variety of passerine and other types of birds are present within the study area, some as year-long residents and others as seasonal visitors. Some of the most common species include the horned lark, common nighthawk, American crow, common raven, mourning dove, black-billed magpie (near

agriculture), western meadowlark, Brewer's blackbird, barn and bank swallows, rock and canyon wrens, sparrows (lark, sage, song, and white-crowned), and American goldfinch (Bammann and Doremus 1982; field observations).

S3.4.4.3 Reptiles and Amphibians

A number of reptile and amphibian species occur in the study area (BLM 1979; Stebbins 1966; West 1983; personal communication, P. Olmstead 1989), but reptiles are less diverse than in southern deserts (West 1983). Common amphibians in the Snake River BOPA are the boreal toad (*Bufo boreas boreas*), Rocky Mountain toad (*B. woodhousei woodhousei*), and leopard frog (*Rana pipiens*). Other species present include the long-toed salamander (*Ambystoma macrodactylum*), Great Basin spadefoot toad (*Scaphiopus intermontanus*), Pacific tree frog (*Hyla regilla*), and boreal chorus frog (*Pseudacris triseriata maculata*). All are found in or near water and could occur in the river canyons or at reservoirs of the study area.

At least eight species of lizard inhabit the study area. They do not require water and can be found wherever open vegetation occurs with rocks for cover or soils suitable for burrowing. Species that are common in the BOPA include the long-nosed leopard lizard (*Crotaphytus wislizenii wislizenii*), Great Basin fence lizard (*Sceloporus occidentalis biseriatus*), northern side-blotched lizard (*Uta stansburiana stansburiana*), northern desert horned lizard (*Phrynosoma platyrhinos platyrhinos*), and Great Basin whiptail (*Cnemidophorus tigris tigris*). Less abundant species are the collared lizard (*Crotaphytus collaris*), northern sagebrush lizard (*Sceloporus graciosus graciosus*), and pigmy horned lizard (*Phrynosoma douglassi douglassi*). The latter was observed in the western part of the Inside Desert on 27 August 1989.

Snakes occur in both plains and canyon habitats of the study area. Eight species were reported for the BOPA. The most abundant were the Great Basin gopher snake (*Pituophis melanoleucus deserticola*), striped whipsnake (*Masticophis taeniatus*), and Great Basin rattlesnake (*Crotalus viridis lutosus*). Other species present include the western yellow-bellied racer (*Coluber constrictor mormon*), western long-nosed snake (*Rhinocheilus lecontei lecontei*), wandering garter snake (*Thamnophis elegans vagrans*), and western ground snake (*Sonora semiannulata*). The Rocky Mountain rubber boa (*Charina bottae utahensis*) has been reported at Black Leg Creek (personal communication, P. Olmstead 1989), and the valley garter snake (*Thamnophis sirtalis fitchi*) could occur near water (Stebbins 1966).

S3.4.4.4 Invertebrates

Invertebrates such as insects, spiders, and mites are common throughout the study area, but data on species composition, abundance, and habitat preferences are limited due to lack of studies. Over 1,000 insect species were identified from a sagebrush-grass site at the Idaho National Engineering

Laboratory (West 1983). Grasshoppers, flies, harvester ants, and butterflies are abundant. Other invertebrates present include beetles, wasps, cicadas, aphids, spiders, ticks, and nematodes (in the soil).

S3.4.5 Aquatic Biota

For this analysis, aquatic biota are defined as the wholly aquatic plants and animals that live in permanent and temporary surface waters such as rivers, streams, reservoirs, and playa lakes. These biota include algae, fish, aquatic insects, and snails. Emergent plants (e.g., cattails and sedges) are discussed under wetland vegetation above. Animals that use water for only part of their life cycle (e.g., toads) or that primarily use the water surface (e.g., waterfowl) are discussed under wildlife.

Aquatic habitats have a limited distribution in the ROI. The Snake River flows westward between MHAFB and the area being considered for a proposed expanded range capability. Numerous dams have been constructed on this river to impound water for power production, recreation, irrigation, and municipal uses, such as the C. J. Strike Reservoir, adjacent to the study area. The study area is traversed by the Bruneau River and several of its tributaries: the Jarbidge River, East Fork of the Bruneau (Clover Creek), and Sheep Creek. These perennial streams flow through deep, narrow canyons that are hundreds of feet below the surface of the rolling plains. The Owyhee River and its tributaries drain the western part of the study area. Steep canyons characterize this drainage also. The Humboldt and Quinn rivers drain the south and west margins of the ROI in Nevada. Numerous smaller drainages that contain water seasonally (intermittent) or only after storms (ephemeral) are also present. Small impoundments have been constructed on many of these drainages to store water for livestock, but most are dry for much of the year. Natural playa lakes are also present in low areas throughout the study area in Idaho. They are seasonally wet, and most are quite small (tens of feet across).

Perennial waters are inhabited by a variety of aquatic organisms. The Snake River contains white sturgeon (*Acipenser transmontanus*) in free flowing sections. The reach from Bliss Dam to Hammett is the best reproductive area in the state for this species (personal communication, P. Olmstead 1989). It is designated a species of special concern by the Idaho DFG. Northern squawfish (*Ptychocheilus oregonensis*), peamouth (*Mylocheilus caurinus*), channel catfish (*Ictalurus punctatus*), and smallmouth bass (*Micropterus dolomieui*) are abundant. Other species present include brown bullhead (*Ictalurus nebulosus*), mountain whitefish (*Prosopium williamsoni*), bluegill (*Lepomis macrochirus*), black crappie (*Pomoxis nigromaculatus*), three species of sucker (*Catostomus columbianus, C. macrocheilus,* and *C. platyrhynchus*), carp (*Cyprinus carpio*), chiselmouth (*Acrocheilus alutaceus*), and redside shiner (*Richardsonius balteatus*). Dominant species in C. J. Strike Reservoir are largemouth bass (*Micropterus salmoides*), smallmouth bass, bluegill, black crappie, yellow perch (*Perca flavescens*), and channel catfish (BLM 1979).

Redband trout (*Oncorhynchus mykiss* ssp.) are found in most perennial streams in the Bruneau and Jarbidge river drainages, as are suckers (*Catostomus* spp.), dace (*Rhinichthys* spp.), and sculpins (*Cottus* spp.) (personal commumication, P. Olmstead 1989). Brook trout (*Salevlinus fontinalis*) have been planted in several streams and have become established in Big Flat Creek. Hatchery-reared rainbow trout (*Oncorhynchus mykiss*) are also stocked annually in the Murphy Hot Springs area. A nonpure strain of Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) and bull trout (*Salvelinus confluentus*) have been stocked in several reservoirs by the Idaho DFG. Bull trout are discussed in section S3.4.6, Threatened and Endangered Species.

The Owyhee River drainage contains northern squawfish, chiselmouth, redside shiners (*Richardsonius balteatus*), speckled dace (*Rhinichthys osculus*), sculpins (*Cottus* spp.) bridgelip sucker (*Catostomus columbianus*), and largescale sucker (*C. macrocheilus*), as well as several introduced game species (e.g., smallmouth bass and channel catfish) (Meyer undated; BLM 1984). Redband trout are present in the Nevada and Idaho portions of the drainage (BLM 1984). The presence of redband trout in Oregon is suspected but has not been confirmed (Meyer undated).

Rivers of the study area have little high quality invertebrate habitat due to the sediment load they carry. Stream beds are predominantly composed of fine sediment with some areas of basalt talus. Spawning habitat for trout is limited in many streams (personal communication, P. Olmstead 1989). Invertebrates present include dragonflies, mayflies, riffle beetles, some stoneflies, and snails. The Bruneau Hot Springs snail is discussed under threatened and endangered species.

S3.4.6 Threatened and Endangered Species

Federally listed endangered, threatened, or candidate species that occur in the ROI are listed in Table S3.4-2. Under the Endangered Species Act (ESA), an endangered species is one in danger of extinction throughout all or a significant portion of its range; a threatened species is one likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. According to the ESA, the term "species" includes any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife that interbreeds when mature. Candidate and proposed species are those being considered for listing as threatened or endangered. Candidate species fall into three categories. Category 1 comprises species for which the USFWS currently has substantial information on hand to support the biological appropriateness of listing the species as endangered or threatened. Category 2 comprises species for which information now in possession of the USFWS indicates that listing is possibly appropriate, but for which conclusive data on biological vulnerability and threat are currently not available to support proposed inclusion. Category 3 comprises species that were once being considered for listing, but are not currently receiving such consideration. These species may be believed to be extinct, no longer taxonomically recognized, or are more widespread and abundant than previously thought. Listed and proposed

Table S3.4-2

USFWS LISTED, PROPOSED, AND CANDIDATE SPECIES KNOWN OR SUSPECTED TO OCCUR IN THE STUDY AREA[1]
(page 1 of 2)

Species	STATUS		Occurrence in Study Area[5]
	USFWS[2]	State[3]	
Animals			
Bald eagle	E[4]	IE,OT,NE	Winters along Snake River in Idaho and the Owyhee River in Oregon; C.J.Strike Reservoir.
Peregrine falcon	E	IE,OE,NE	Occasional migrant; potential habitat along canyons and watercourses; historic aerie near C.J. Strike Reservoir.
Gray wolf	E	IE	Recent sighting near Grasmere.
Lahontan cutthroat trout	T	OS	Potential in streams of the Humboldt River drainage in Nevada but may be different subspecies of cutthroat trout. Nonpure strains introduced into reservoirs of southern Idaho.
Bruneau Hot Springs snail	PE		Bruneau Hot Springs (Indian Bathtub); Hot Creek and adjacent Bruneau River.
North American lynx	C2	IS[6]	No known sightings in the project area in recent years.
North American wolverine	C2	IPN,OT,IS	No records for project area; prefers mountainous wilderness.
Preble's shrew	C2		No records for project area.
Townsend's big-eared bat	C2	OS	3 miles south of Foreman's Reservoir, near Oreana (north of MOA); occasional sightings in BOPA.
Ferruginous hawk	C2	IS[7],OS,NP	Multiple sightings in BOPA; potential habitat throughout study area; known nests along Snake River, Bruneau River, and other parts of the study area.
Long-billed curlew	C2	IS[7],OS	Sightings near C.J. Strike Reservoir; south of Glenns Ferry; Brown's Gulch east of C.J. Strike Reservoir; and near Mountain Home, Idaho; west of Fort McDermitt Indian Reservation, Oregon. Nests along Snake River south of Hammett and Glenns Ferry.
Snowy plover	C2	OE	Occasional sightings in northeastern Nevada; no known nesting in study area.
Whitefaced ibis	C2	OS,NP	Hansen Canyon Reservoir, Oregon; known nesting area on Pig Creek east of Riddle and north of Duck Valley Indian Reservation.
Western sage grouse	C2	OS	Numerous leks in southeastern Oregon.
Redband trout	C2	IS,OS,NS	Most perennial streams in the project area.

Table S3.4-2

USFWS LISTED, PROPOSED, AND CANDIDATE SPECIES KNOWN OR SUSPECTED TO OCCUR IN THE STUDY AREA[1]

(page 2 of 2)

Species	STATUS		Occurrence in Study Area[5]
	USFWS[2]	State[3]	
Bull trout	C2	IS,OS	In the Jarbidge River and possibly in the West Fork of the Bruneau and Jarbidge rivers.
Mattoni's blue butterfly	C2		No records for project area.
St. Anthony sand dunes tiger beetle	C2		Bruneau Sand Dunes State Park.
Plants			
Astragalus camptopus	C2		Little Valley near Bruneau; Hot Creek, west of Blackstone-Grasmere Road.
Astragalus mulfordiae	C1		Little Valley near Bruneau; northwest edge of range expansion area.
Astragalus yoder-williamsii	C2		Along Hurry Back Creek Road in the Owyhee Mountains.
Erigeron latus	C2		Three Creek area; Dickshooter Creek; along Hurry Back Creek Road; bluffs above Owyhee River; the Badlands.
Lepidium davisii	C2		Hard-bottom playas in Blackstone and J-P deserts and in the vicinity of MHAFB.
Leptodactylon glabrum	PC		Canyon walls and cliffs along the Bruneau River; also reported to occur along the Jarbidge River.
Lepidium montanum var. papilliferum	PC		Historic (1940s) records near Mountain Home; most recent documented record is 15 miles northwest of Mountain Home.
Trifolium owyheensis	C2		Sagebrush and juniper areas along Succor Creek, near the Oregon-Idaho border.

Notes:

1. This list is based on informal consultation with USFWS Portland, Reno, and Boise offices, August 1989; it does not include plant species occurring under the MOAs, as no ground disturbance is proposed for those areas.
2. E = endangered; T = threatened; PE = proposed endangered; C = candidate; C1 = data sufficient to support listing; C2 = data insufficient to support listing; PC = proposed candidate
3. State status: IE = Idaho Endangered
   IT = Idaho Threatened
   IS = Idaho Fish & Game Species of Special Concern
   IPN = Idaho Protected Nongame
   OE = Oregon Endangered
   OT = Oregon Threatened
   OS = Oregon DFW Sensitive Species
   NE = Nevada Endangered
   NP = Nevada Protected
   NS = Nevada Sensitive
4. This species is threatened in Oregon and Washington.
5. Sources: 1989 Idaho NHP data; BLM data; 1979 BLM Agricultural Development EIS; Sigler and Sigler 1987; Melquist 1988.
6. Proposed to be downlisted to category B (peripheral).
7. Proposed deletion from list.

threatened and endangered species are provided statutory protection; candidate species are not. The BLM's policy, however, is to carry out management, consistent with the principles of multiple use, for the conservation of candidate species and their habitats and to ensure that actions authorized or carried out do not contribute to the need to list any species as threatened or endangered.

In Idaho, federally listed species are also considered threatened or endangered by Idaho DFG (see Table S3.4-2). In addition, all birds except exotic species, such as house sparrows and starlings, and upland and migratory game birds are considered protected nongame, along with several mammals. Only one protected nongame mammal, the least chipmunk, is known to occur within the ROI, although the kit fox and golden-mantled ground squirrel could be present as well. These species are discussed in the wildlife section. Idaho DFG's species of special concern are species with restricted ranges, specific habitat requirements, and/or low numbers which make them vulnerable to elimination from the state. They are not provided any statutory protection. These species are also discussed in the wildlife section.

The Oregon Department of Fish and Wildlife (DFW) maintains a list of threatened or endangered animal species; those occurring within the ROI are indicated in Table S3.4-2. Oregon DFW also maintains a list of sensitive species. Those occurring within the ROI that are not already included in Table S3.4-2 (because they are not federal candidates) are discussed in the wildlife section.

The Nevada Department of Wildlife administers laws that protect wildlife in the state. Currently, they recognize endangered, protected, and sensitive species (Nevada Revised Statutes 501-503; Nevada Administrative Code 503). Those occurring within the study area are indicated in Table S3.4-2 or Table S3.4-1.

For plants, only the candidates that are known to occur in the Idaho portion of the ROI are included in Table S3.4-2, since this is the only area where ground disturbance is expected. Data regarding the specific occurrences of many of the candidate species within the ROI are lacking, because for many species no inventories or surveys have been completed in this region. The following sections briefly summarize the available information for species that are federally listed as endangered or are candidates for such listing.

S3.4.6.1 Federally Listed or Proposed Species

BALD EAGLE *(Haliaeetus leucocephalus)*. The bald eagle has been a protected species in the United States since the establishment of the Bald Eagle Protection Act in 1940. It was listed as endangered by the USFWS in 1973; it is now listed as endangered in 43 states and threatened in five other states (USFWS 1987a; Havera and Kruse 1988). Two populations have been described in North America; however, for the purposes of management and protection, these two populations are now treated as one. In the northern United States, the centers of abundance for this species are in Maine, the

Chesapeake Bay area, Michigan, northern Wisconsin, Minnesota, Idaho, Oregon, and Washington. In the southern United States, the center of abundance is primarily Florida, with a few nesting pairs in California, Louisiana, and Texas (Evans 1982). Bald eagle habitat is usually associated with large bodies of water that provide an abundant source of food, primarily fish. In Cedar and Rush valleys in Utah, however, bald eagles are known to feed on jackrabbits (Ryser 1985).

Bald eagles migrate throughout North America in both the spring and fall, usually during daylight hours, at an altitude of about 1,300 feet (Heintzelman 1986). In Idaho, bald eagles nest in the northern, eastern, and western portions of the state (Melquist 1989). The nearest known nesting localities to the ROI are along the north fork of the Payette River, and the south fork of the Boise River (Melquist 1989). A recent record of a bald eagle nest has been reported near Jackpot, about 20 miles east of the study area (Nevada NHP 1989) but it is believed that nesting attempts have since been abandoned due to recreational activities in the area. Bald eagles winter within the study area, but they are not known to nest there. They are known to concentrate in winter primarily along the upper Owyhee River in Oregon (near Three Forks) and along the Snake River in Idaho, especially within the Snake River BOPA (C. J. Strike Reservoir) (personal communication, R. Kindschy 1989; Idaho NHP 1989). In Nevada, wintering eagles have been reported at Wilson Reservoir. They may use the Little Humboldt River as well, but no surveys have been conducted in the Owyhee Desert area due to lack of road access in winter (personal communication, R. Price 1989). Numerous sightings are recorded for the area just east and south of the ROI in Nevada.

PEREGRINE FALCON *(Falco peregrinus)*. The American peregrine falcon is listed as endangered by the USFWS, and the Arctic peregrine falcon, which occurs to the north, is listed as threatened (USFWS 1987a). The American peregrine falcon was extirpated in the eastern and middle United States and southern Canada, but scattered areas of breeding remain in the west, primarily in Colorado and Arizona (Evans 1982). Peregrine falcons migrate during daylight hours, usually between 2,100 and 3,500 feet (Heintzelman 1986). Peregrine falcon habitat is usually associated with tall cliffs containing ledges, potholes, and small caves that are located near water sources. Nests are typically in these same areas. Their diet consists primarily of waterfowl, shorebirds, and passerine species commonly found in and around lakes and rivers.

Formerly a resident species, the peregrine falcon is now an occasional migrant in the study area. Historically, the peregrine falcon bred throughout Idaho from the northern panhandle through the mountainous central region to the southern portion of the state; the densest populations were in the southeast. Although they have not been occupied since the mid-1970s, two historic nest sites occur in the study area (Bechard and Howard 1988). One is located on the north side of C. J. Strike Reservoir; the other is located on the Duck Valley Indian Reservation. These sites are not currently used by peregrines, and USFWS has no plans to reintroduce birds at these locations (personal communication, R. Howard 1989). In general, potential habitat exists along canyons and watercourses.

GRAY WOLF *(Canis lupus).* This species is found primarily in Alaska, Canada, and Mexico, but it is also known from central Idaho and northern Montana, where occasional sightings are recorded. Wolves were present in most timbered areas of Oregon in the 1800s, but they were extirpated from the state by 1946 (Olterman and Verts 1972). Within the study area, one 1988 sighting has been recorded at the mouth of Louse Creek near Grasmere Reservoir (Idaho NHP 1989). One was also seen near Silver City that same year.

LAHONTAN CUTTHROAT TROUT *(Oncorhynchus clarki henshawi).* The Lahontan cutthroat trout originated during the Pleistocene in Lake Lahontan, becoming isolated in the Truckee River-Pyramid Lake ecosystem about 8,000 years B.P. as lake levels receded. At the same time, a stream form of cutthroat trout developed in the Humboldt River drainage. The latter may be an undescribed subspecies (Behnke 1981) or a mixture of Yellowstone Lake cutthroat and Summit Lake-Heenan Lake strains of Lahontan cutthroat that have been introduced into this drainage (Sigler and Sigler 1987). Lahontan cutthroat trout were once widespread in streams and lakes of the Lahontan Basin, but abundance and distribution have been reduced through fishing pressure, competition with introduced trout species, and habitat loss due to human activities. Hybridization with introduced rainbow trout has also reduced the abundance of pure strain populations. Although a lacustrine species, it spawns on shallow riffles in the spring in clear, cold streams (Sigler and Sigler 1987).

Only the southern part of the study area in Nevada is within the Humboldt River drainage. Considering the uncertainty in the taxonomy of cutthroat trout in this drainage, it is unknown whether any pure strain Lahontan cutthroat trout are present in the study area. Cutthroat trout present in the Quinn River drainage (southwestern edge of the ROI) may be a different subspecies (personal communication, G. Weller 1989).

BRUNEAU HOT SPRINGS SNAIL (unnamed). This species is proposed for listing as endangered. Two separate colonies occur in Indian Bathtub Hot Spring and Lower Indian Bathtub Hot Spring, near Bruneau (Idaho NHP 1989).

S3.4.6.2 Candidate and Proposed Candidate Species

FERRUGINOUS HAWK *(Buteo regalis).* The ferruginous hawk breeds in the semi-arid plains of the northwestern United States and the Canadian prairie provinces. It is a common breeding species in the Great Basin, but has experienced declines, principally as a result of habitat alteration that may be related to overgrazing (Evans 1982). It nests most frequently in trees, especially junipers, but has also been seen utilizing shrubs, poles, transmission towers, and even the ground for nest sites in some instances (Ryser 1985). The primarily food is blacktail jackrabbits.

There are multiple sightings of this species in the BOPA, where it is a year-round resident, and there is potential breeding habitat throughout the study area. Several nest sites are located along the Snake River, in the vicinity of C. J. Strike Reservoir, and just west of the SCR. Nesting undoubtedly occurs in other parts of the study area, but systematic surveys to locate nests have not been conducted.

LONG-BILLED CURLEW *(Numenius americanus)*. The long-billed curlew was once found throughout the United States, but is now limited mostly to western states. It breeds in interior areas from Washington to Colorado (Johnsgard 1981), and is a migrant and a breeding species in the Great Basin (Ryser 1985). A colonial nester, the curlew often builds its nest in grassy areas near marshes or lakes, as well as in upland areas, where it is also known to forage. In the Columbia and Great basins, curlews breed in meadows, annual grasslands dominated by cheatgrass, some shadscale areas, and occasionally in crested wheatgrass and agricultural habitats (Pampush 1980). In Idaho, it is known to breed at Deer Flat and Minidoka NWRs (Allen 1980), in addition to the specific sites within the ROI discussed below.

Although long-billed curlews breed within the ROI, they do not reside there all year. Several nesting sites are present along the Snake River, in the area south of Hammett and Glenns Ferry, just north of the SCR. Multiple sightings have been recorded near C. J. Strike Reservoir, south of Glenns Ferry, in the vicinity of Brown's Gulch (east of C. J. Strike Reservoir), and near the city of Mountain Home. At the Saylor Creek Farms cheatgrass study area (BLM) southwest of Glenns Ferry, the nesting population has averaged over 60 birds over the past six years (personal communication, J. Clark 1989). In Oregon, it has been known to occur in grasslands west of Fort McDermitt Indian Reservation (personal communication, W. Olson 1989).

SNOWY PLOVER *(Charadrius alexandrinus nivosus)*. The snowy plover breeds in coastal and interior areas in the United States from Washington and northern Utah south to California. Breeding localities near the study area include Malheur National Wildlife Refuge in the Harney Basin of southeastern Oregon, northeastern Nevada, and northern Utah (Ryser 1985). It is a fairly common resident and migrant in the Great Basin, commonly occurring in the Lahontan Valley near Fallon, Nevada, and Walker Lake (Marshall 1989). The snowy plover is a loosely colonial nesting bird, inhabiting alkali and salt flats. Nests are typically located in barren unprotected areas, often near a grass clump or low shrub (Johnsgard 1981). In southeastern Oregon, they are consistently associated with alkaline substrates holding some water; they do not favor freshwater lakes or dry alkali flats (Marshall 1989). Although no data concerning nesting localities within the study area are available, birds are reported to be present in northeastern Nevada (Ryser 1985). Surveys for this species have not been conducted in this area, but the species would not be expected to occur in great numbers.

WHITE-FACED IBIS *(Plegadis chihi)*. This species breeds at Malheur NWR in Oregon, and in other wetland areas in the Great Basin (e.g., Ruby and Carson lakes in Nevada, Great Salt Lake in Utah), in addition to other areas in California and Colorado (Voecks and English 1981). It is a colonial nesting

bird, often mixing with herons and egrets, and it typically occupies emergent marsh vegetation such as tules (*Scirpus* spp.) (Ryser 1985). This species winters and nests within the ROI. It has been seen near Hansen Canyon Reservoir in Oregon, and there is a known nesting area in Idaho on Pig Creek, which is east of Riddle and north of Duck Valley Indian Reservation (Idaho NHP 1989).

WESTERN SAGE GROUSE *(Centrocerus urophasianus phaios).* This subspecies of sage grouse occurs from central and eastern Washington south to southeastern Oregon, where it is considered a candidate (category 2) species (personal communication, B. Sharp 1989). The more common subspecies, discussed in the wildlife section, occurs in Idaho and Nevada, and some populations in Oregon may belong to the more common subspecies (personal communication, K. Durbin 1989). Numerous western sage grouse leks are present in southeastern Oregon, north of the Fort McDermitt Indian Reservation.

NORTH AMERICAN LYNX *(Felis lynx canadensis).* The lynx inhabits forest and swamp areas in northern North America (Burt and Grossenheider 1976). Historically, the southern end of its range in the study area extended into northern Nevada along the Little Owyhee River (Hall 1981). Lynx apparently were never very abundant in Oregon, and no museum records exist for Malheur County (Olterman and Verts 1972). Nevada has no records of this species for the last 30 years (personal communication, G. Herron 1988). The lynx is primarily nocturnal and solitary. Snowshoe hares make up most of its diet along with rodents and birds. It ranges over long distances, up to 50 miles, except when breeding. Abundance fluctuates with peaks at 9 to 10-year intervals. Breeding takes place in January to February, and the young, usually two, are born in March or April (Burt and Grossenheider 1976).

NORTH AMERICAN WOLVERINE *(Gulo gulo luseus).* This species formerly occupied high mountain areas in most of the western states but now probably only occurs in Oregon, Washington, California, Idaho, Montana, and Wyoming (Groves 1987). Most records in Oregon are from the central portion of the state (Olterman and Verts 1972), and in Idaho wolverines occur mostly in the central, northern, and eastern parts of the state. There are no confirmed or probable reports within the study area in Idaho (Groves 1987). However, several unconfirmed sightings have been reported for the Jarbidge Mountains in Nevada (personal communication, J. Williams 1989).

PREBLE'S SHREW *(Sorex preblei).* Preble's shrew is found along creeks and marshes in eastern Oregon (Jordan Valley, Steens Mountain)(Olterman and Verts 1972). It has also been collected in sub-alpine dry bunchgrass habitat at elevations up to 9,200 feet on Steens Mountain. There are no records of occurrences of this species in the study area.

TOWNSEND'S BIG-EARED BAT *(Plecotus townsendii townsendii).* This species occurs in the western United States from southern Canada into Mexico and eastward into the Great Plains. It typically roosts in caves, mine tunnels, and buildings. The western big-eared bat is colonial at nurseries and

during hibernation; it may be solitary for other parts of the year (Burt and Grossenheider 1976). Occasional sightings are reported for the BOPA in Idaho during summer migrations (BLM 1979). Mating occurs from October through February, and the single young are born from April through July (Burt and Grossenheider 1979). The species is reported to be extremely sensitive to human activities (Reel et al. 1989).

REDBAND TROUT *(Oncorhynchus mykiss,* formerly *Salmo gairdneri).* This is an interior form of rainbow trout that is presently considered an undescribed subspecies (Behnke 1981). It is common in perennial waters within the Owyhee, Bruneau, and Jarbidge river drainages in Idaho. No confirmed locations are known for the study area in Oregon (Meyer undated), and only a few locations are documented in Nevada (BLM 1983). The latter include the South Fork of the Owyhee River north of Tuscarora and northeast of Midas (USFWS 1988) and the West Fork (Little Owyhee River) (personal communication, G. Weller 1989).

BULL TROUT *(Salvelinus confluentus).* Bull trout have long been confused with Dolly Varden (*S. malma*). In 1978 the latter was split into two species, the coastal Dolly Varden and the interior bull trout (Reel et al. 1989). Their ranges include coastal and montane areas of the Pacific Northwest from about 48° to 60° north latitude. The study area is at the southeastern end of this range. Preferred habitat is large, cold rivers and lakes (Lee et al. 1980). Bull trout may occur in the West Fork of the Bruneau River in Idaho, but no confirmed records are available (personal communication, P. Olmstead 1989). The species has been collected in both the east and west forks of the Jarbidge River in Nevada (personal communication, G. Weller 1989).

INVERTEBRATES. There are two candidate invertebrate species within the ROI. The St. Anthony sand dunes tiger beetle breeds at Bruneau Sand Dunes State Park and Mattoni's blue butterfly occurs in Nevada.

MURPHY MILK-VETCH *(Astragalus camptopus).* This plant is endemic to the Bruneau area, and is considered sensitive by the BLM. Known locations are reported from the Shoofly Creek, Little Valley, and Bruneau Valley areas in Owyhee county, immediately north of the study area (DeBolt and Rosentreter 1988). One location is reported from within the study area, near Hot Creek, west of the Blackstone-Grasmere Road. It is found primarily on sandy soils in shadscale and Wyoming big sage communities at the west end of the Snake River Plain. It is a federal category 2 species.

MULFORD'S MILK-VETCH *(Astragalus mulfordiae).* This plant is known primarily from Owyhee County, but has also been reported from neighboring counties, including Malheur County, Oregon (DeBolt and Rosentreter 1988). Its habitat includes coarse sandy soils of alluvial deposits at the west end of the Snake River Plain, often in the same general vicinity as Murphy milk-vetch. It typically occurs in sagebrush-grass plant communities. Although there are no known locations within the study area, it

does occur along Highway 51 on the northwestern periphery and in Little Valley immediately to the north. It is a federal category 1 species.

OSGOOD MOUNTAINS MILK-VETCH *(Astragalus yoder-williamsii)*. This plant is known to occur in Owyhee County, Idaho, and Humboldt County, Nevada (DeBolt and Rosentreter 1988). It is a dwarf, densely tufted plant that is found on gravelly soils in low sage and mountain big sage communities. It occurs primarily along the Hurry Back Creek Road in the Owyhee Mountains, and in the vicinity of Battle Creek in the western portion of the study area. Although now a federal category 2 species, this plant was temporarily emergency listed in 1980 (FR 45:53969) because of perceived risks from mining.

BROAD FLEABANE *(Erigeron latus)*. This plant is known to occur in Owyhee, Twin Falls, and Cassia counties, Idaho, and in Elko County, Nevada (DeBolt and Rosentreter 1988). A member of the sunflower family, this plant occurs on soils of volcanic origin, usually in Wyoming big sage communities. It is known to occur throughout the study area. It is concentrated near Three Creek, along Dickshooter Creek and the Hurry Back Creek Road in the Owyhee Mountains, on bluffs above the Owyhee River, and in the Badlands in the Owyhee Mountains. The broad fleabane is a federal category 2 species.

DAVIS PEPPERGRASS *(Lepidium davisii)*. This species, a member of the mustard family, grows exclusively on flat hard floors of dry lake beds, or playas, in the Blackstone and J-P Deserts south of the Snake River, and in similar habitats in the vicinity of MHAFB north of the Snake River. Most known locations are west of the west fork of the Bruneau River, but potential habitat (hard-bottom playa) is also present on the east side, where it is also expected to occur. A disjunct population is located about 4 miles south of Salmon Falls Dam, east of the study area (DeBolt 1989), and a few populations are also located in Malheur County, Oregon. When this species was originally proposed for listing (1977), only three sites were known. Since then, many additional locations have been documented as a result of inventory work; these are primarily in the Bruneau RA of the BLM. Many of the known locations of this species are located within the study area, and considerable potential habitat is present there also. It is a federal category 2 species.

BRUNEAU RIVER PRICKLY PHLOX *(Leptodactylon glabrum)*. This species, described in 1984, is known from Owyhee County, Idaho and at least three locations in Nevada (Patterson and Yoder-Williams 1984; DeBolt and Rosentreter 1988). It occurs on rhyolite canyon walls and cliffs along the Bruneau and Jarbidge rivers, within the study area. It is a newly proposed federal candidate (category 2) species.

MONTANE PEPPERGRASS *(Lepidium montanum* var. *papilliferum)*. This plant is reported from five counties in Idaho, although it is believed to have been extirpated at many of its previously known localities (DeBolt and Rosentreter 1988). One 1934 record is immediately outside the city limits of

Mountain Home (Idaho NHP 1989). All known occurrences are north of the Snake River, and there are few recent (post 1970) records. One of these is at the junction of Interstate 84 and Simco Road about 15 miles northwest of Mountain Home, another is at Sand Hollow, northwest of Boise. In 1989, a population was identified within 3 miles of the city of Mountain Home, and along the Swan Falls Road south of Kuna (personal communication, A. DeBolt 1989). Like the Davis peppergrass, the montane peppergrass occurs in playas in the Wyoming big sage community; however, the playas in which this taxon occurs are very small, existing as microhabitats within pristine or protected areas (personal communication, R. Rosentreter 1989). This species is proposed for addition to the federal candidate list.

OWYHEE CLOVER (*Trifolium owyheense*). This species, described in 1956, grows on volcanic ash beds in the vicinity of Succor Creek, near the Oregon-Idaho border. Although it has the potential to occur in the proposed expanded range capability study area, most known locations are in Oregon (DeBolt and Rosentreter 1988).

S3.5 CULTURAL RESOURCES

S3.5.1 Definition of Resource

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts and other evidence of human use. These resources can be divided into four major categories: prehistoric archaeological resources, historic resources, architectural resources, and Native American resources.

Significant cultural resources are those considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Only significant cultural resources warrant consideration with regard to adverse impacts resulting from a project. To be considered significant, cultural resources must meet one or more of the criteria for inclusion on the National Register of Historic Places (36 CFR 60.4). Section S4.5.3 outlines the relationship of specific criteria to particular resource categories. Significance of Native American resources is determined according to criteria derived from the Native American Religious Freedom Act of 1978, 36 CFR 60.4, Advisory Council on Historic Preservation (ACHP) guidelines, and consultation with affected groups.

S3.5.2 Region of Influence

Two ROIs (see Figure S3.5-1) were defined for cultural resources. The smaller "ground-disturbance" ROI, which encompasses approximately 3.5 million acres in Owyhee and Elmore counties, defines the area under consideration for potential locations of the proposed expanded range (excluding the Duck Valley Indian Reservation). In such locations, cultural resources may be subject to direct impacts from ground disturbance (e.g., ordnance delivery, target array construction, road improvement) and indirect impacts (e.g., vandalism) from increased access. Thus, the ground disturbance ROI was defined for two reasons: (1) to provide baseline cultural resource sensitivity data in support of development of a proposed expanded range capability; and (2) to assess programmatically the potential for direct and indirect impacts resulting from ground disturbances associated with a proposed expanded range capability and increased access.

In contrast, the larger airspace ROI overlaps and extends beyond the limits of the ground-disturbance ROI and comprises the Owyhee, Paradise, and Bruneau MOAs. The proposed changes in use of the airspace associated with this ROI will not involve any ground-disturbing, direct impacts to cultural resources. However, the effects on cultural resources of proposed low-level (100 feet AGL) subsonic and high-level (above 5,000 feet AGL) supersonic flights within the Idaho portion of this ROI require consideration. Such overflights might result in auditory, visual, or vibratory impacts to cultural resources, especially architectural and Native American resources. For the remainder of the ROI outside Idaho, the Air Force proposes no supersonic flights and no flights below 10,000 and 14,500 feet

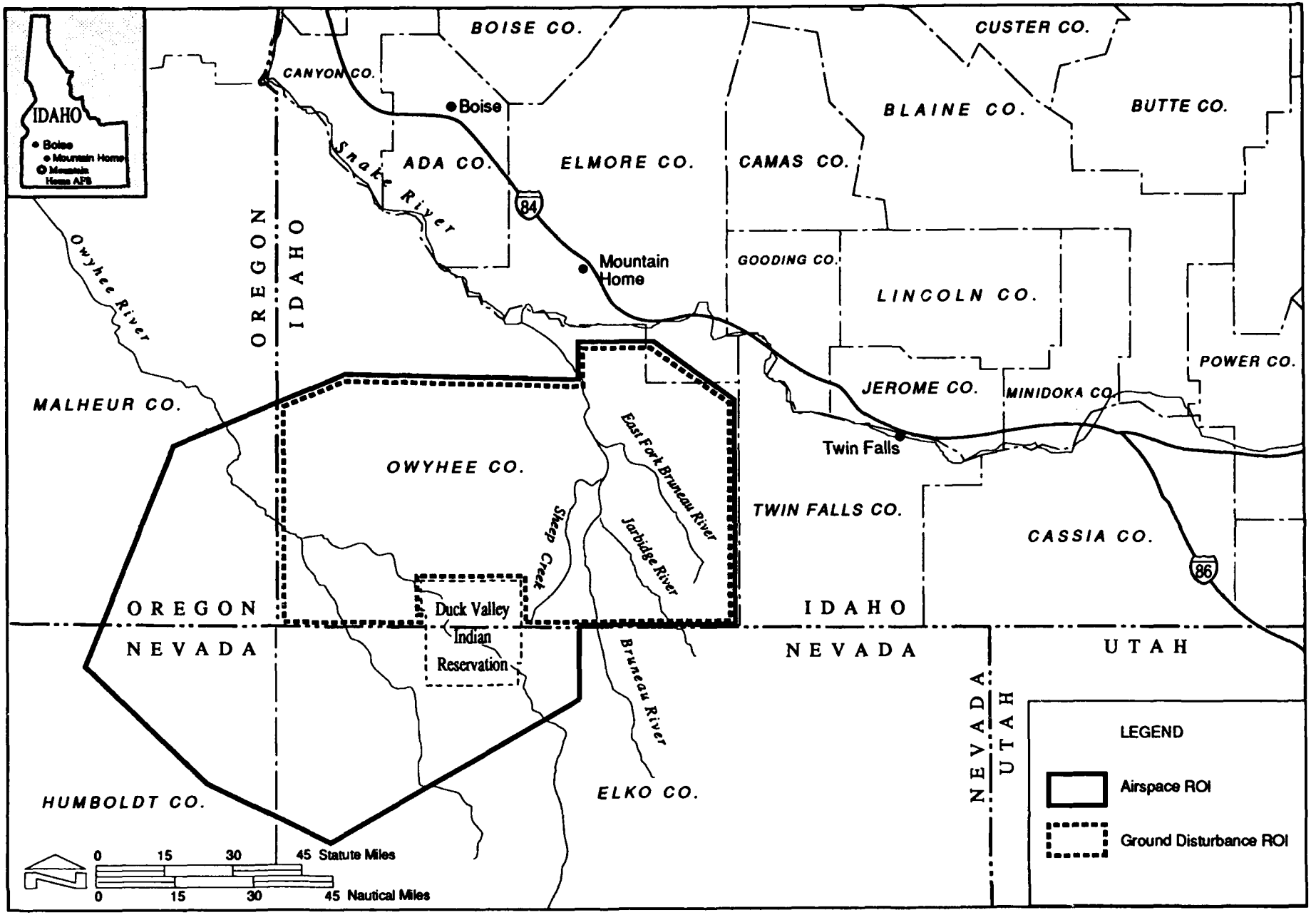


Figure S3.5-1

REGION OF INFLUENCE FOR CULTURAL RESOURCES

MSL in Oregon and Nevada, respectively. Although overflights at these altitudes will be unlikely to result in vibratory impacts to cultural resources, they may intrude audibly and visually on Native American sacred or ceremonial sites.

Additionally, cultural resources under the eight MTRs associated with the proposed range expansion capability also require consideration. Since use of these routes involves no ground disturbance, cultural resources most likely to be affected by vibration, noise, and possible visual impacts form the focus of analysis for the MTRs.

S3.5.3 Prehistoric Archaeological Resources in the Ground-Disturbance ROI

S3.5.3.1 Previous Research

Cultural Resource Surveys

Within the area defined as the ground-disturbance ROI, a total of 180 cultural resource surveys have been conducted since the late 1930s. These consist of 54 major and 126 small surveys that inspected approximately 509,000 acres (15 percent of the total study area) within the ROI. Conducted primarily as BLM cultural resource compliance efforts, the major surveys examined areas ranging from 400 to 147,000 acres (see Appendix G). Figure S3.5-2 depicts the locations of the major surveys within or extending into the ROI. The small surveys (not mapped) examined limited areas (1 to 100 acres) associated with BLM range development projects; these surveys inspected a total of only 3,623 acres.

The major surveys within the ground-disturbance ROI can be classified according to two variables: survey method and survey intensity. Survey method refers to the techniques used by archaeologists to inspect a particular area. For systematic surveys, archaeologists use standardized intervals to examine a project area; thus, all portions of the area have an equal probability of being inspected. In nonsystematic or intuitive surveys, archaeologists select the portions of the project area most likely to contain sites and inspect only those locations.

Intensity refers to the extent of coverage provided by a survey. The distance separating archaeologists as they walk transects across an area provides a measure of survey intensity. Based on data derived from recent studies conducted within the SCR (personal communication, T. Green 1989), intensive surveys are classified as those using transect intervals no greater than 30 meters; nonintensive surveys consist of those employing intervals greater than 30 meters. Appendix G provides further detail on the classification of surveys within the ROI.

Figure S3.5-3 summarizes the classification of the surveys for the ROI. Most (38 of 54) of the major surveys conducted within the proposed expanded range capability employed systematic, but

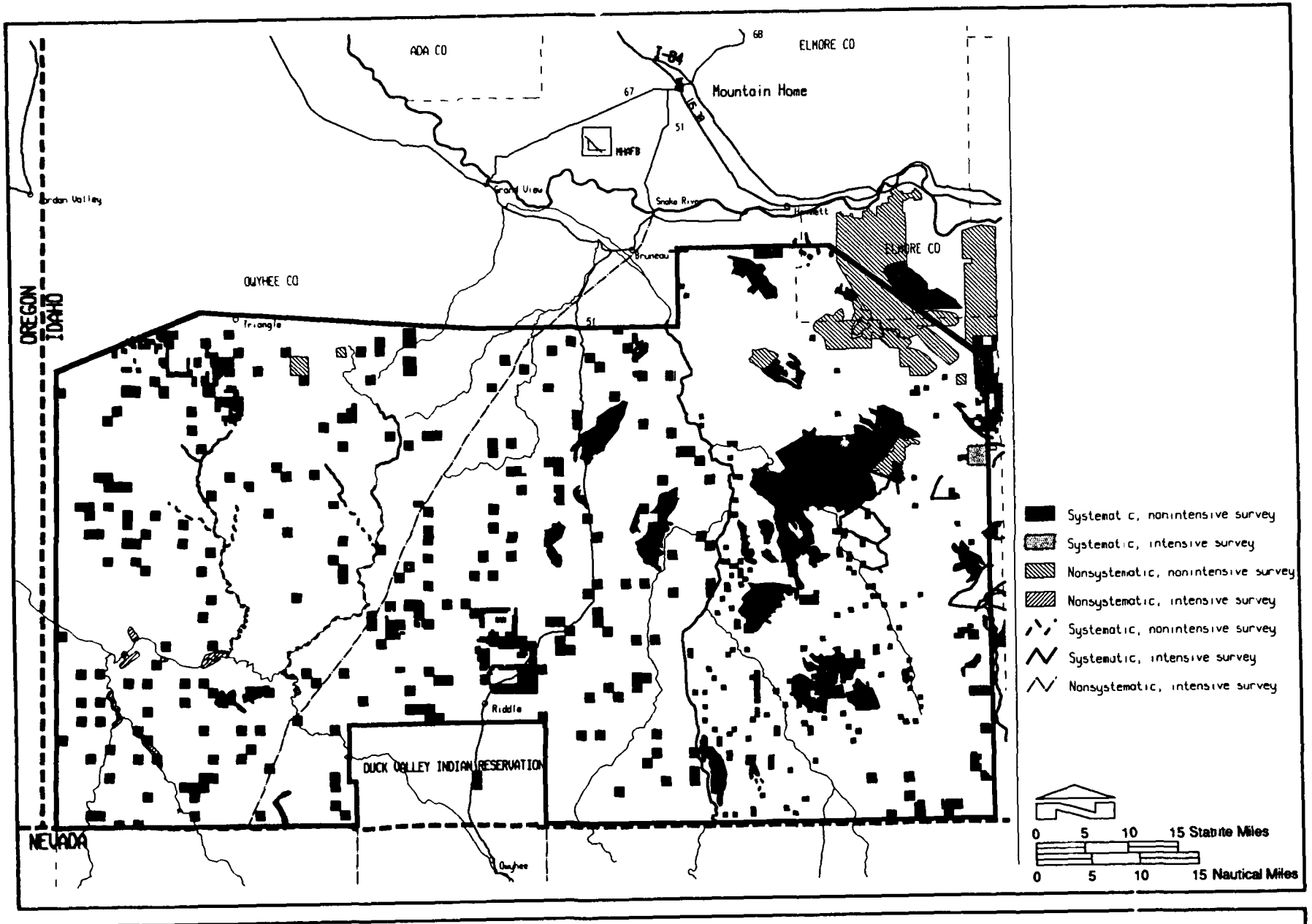


Figure S3.5-2

MAJOR SURVEYS IN THE GROUND DISTURBANCE ROI

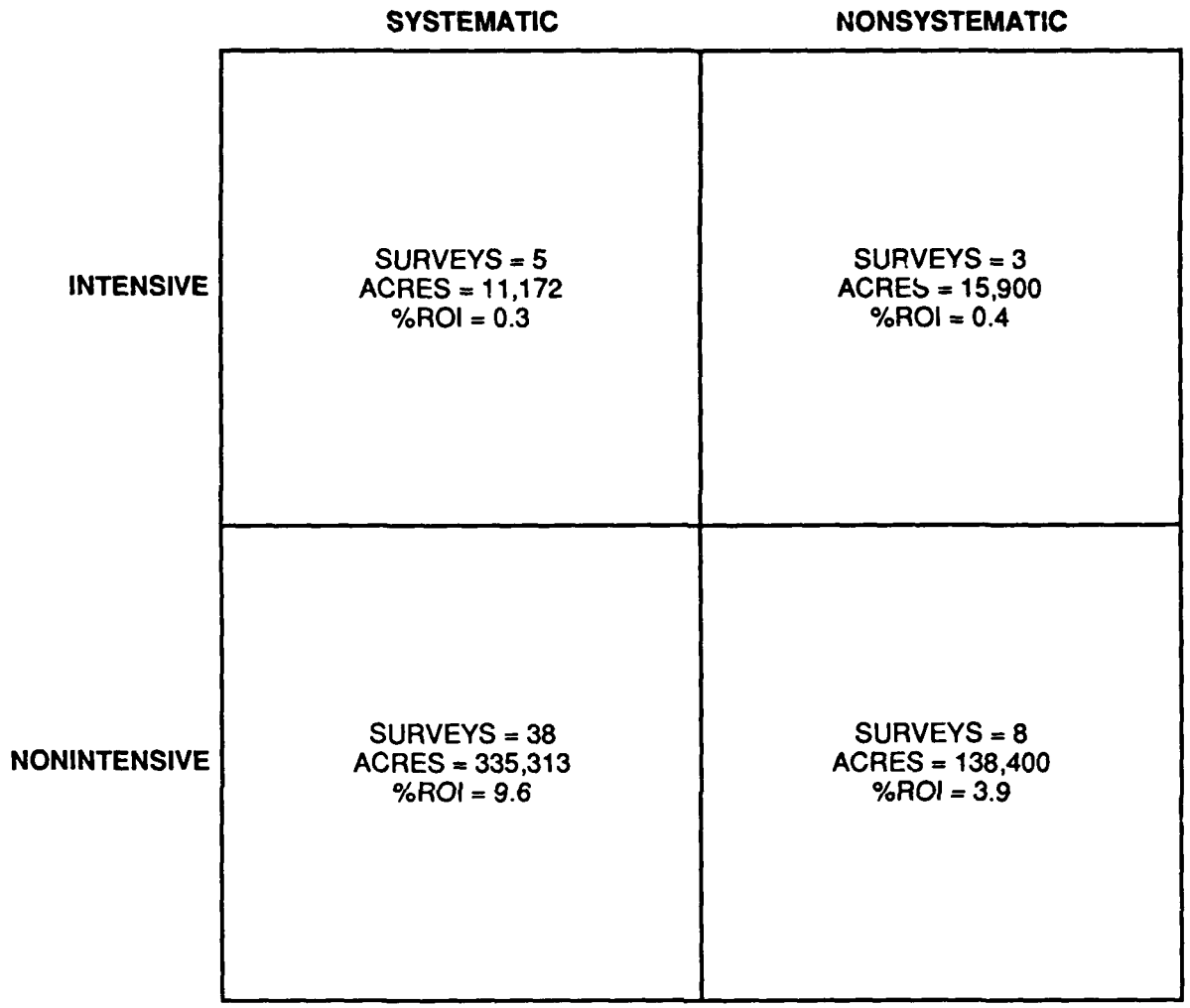


Figure S3.5-3

SURVEY CLASSIFICATIONS FOR THE GROUND-DISTURBANCE ROI

nonintensive techniques. These surveys primarily represent fire rehabilitation surveys that used generally systematic transects spaced at 200-meter intervals; the other systematic, nonintensive surveys employed up to 100- to 200-meter transect intervals. By using these wide intervals, the archaeologists probably identified most of the large sites, yet actually inspected a 33-percent sample (110,653 acres) of the total acres (338,313 acres) within the areas slated for reseeding. Although this level of intensity met the needs of the reseeding project and the standards accepted at the time (personal communication, M. Wyatt 1989), the analysis of survey methods discussed above suggests that it is insufficient to establish the density, distribution, and diversity of cultural resources within the surveyed areas (personal communication, T. Green 1989; Corbyn 1988). Nonsystematic, nonintensive surveys examined more than 138,000 acres within the ROI. Conducted mostly in the mid-1970s, these surveys relied heavily on intuitive selection of survey areas. While this approach identifies many sites, it provides neither comprehensive nor systematic coverage of the survey area or the contexts it contains.

In summary, the major surveys examining lands within the ROI have employed strategies and methods that satisfied specific research or compliance requirements. However, they suffer from two fundamental limitations with regard to predicting the density, diversity, and distribution of prehistoric archaeological resources within the ROI:

1. Use of transect intervals that are too wide to ensure a complete inventory of the cultural resources within the surveyed areas.

2. A general emphasis on surveying sampling units or judgmentally selected locations containing contexts considered "likely" to contain cultural resources; a lack of intensive, systematic examination of areas (e.g., desert plains) perceived to possess a low potential to contain cultural resources.

Despite the number of surveys performed, a relatively small percentage (i.e., 15 percent) of the ROI has been examined. Moreover, 94 percent of the area surveyed was inspected using nonintensive field methods. Only a portion of some of the major drainages have been thoroughly examined. Combined, these factors suggest that the level of knowledge about prehistoric cultural resources for much of the ROI remains limited at this time.

S3.5.3.2 Prehistoric Archaeological Resource Inventory in the Ground-Disturbance Region of Influence

Site and Isolate Types

Despite the above-mentioned limitations, previous studies have established that the ROI represents an area rich with prehistoric cultural resources. Data derived from Idaho State Historic Preservation

Office maps and records indicate that the ROI contains 2,489 documented prehistoric cultural resources consisting of 1,986 sites and 503 isolates. Although few of these resources have been radiocarbon dated, temporally diagnostic artifacts (e.g., projectile points) found at many sites imply use of the area from approximately 12,000 years B.P. to the historic period (see Appendix G).

Lithic scatters -- the residues of stone tool manufacturing and maintenance -- represent the most abundant site type. The 1,193 lithic scatters within the area vary in size and density, although sparse density characterizes most of the sites. A lack of diverse tool types, the features (e.g., hearths), and subsurface artifact deposit generally limits the level of information recoverable from lithic scatters and concomitantly limits their potential significance.

Rockshelters and caves (260) and campsites (228) are the next most abundant site types defined in the ROI. Similar to the lithic scatters, rockshelters and campsites exhibit variability in terms of size, artifact density and content. Many rockshelters and caves in the area contain stratified (i.e., layered) cultural deposits, which form an important source of information on the prehistory of the region. Campsites represent the residues of habitation ranging from brief occupations to seasonally occupied "villages." They generally contain a wide range of artifacts (e.g., stone tools, flakes, bone, pottery fragments, fire-cracked rock) indicating that the site's inhabitants performed many different activities (e.g., stone tool maintenance, plant food processing, hide preparation, etc.). Prehistoric camps include surface sites and a smaller proportion with subsurface cultural deposits. Overall, campsites tend to possess the characteristics necessary for eligibility to the National Register.

The ROI also contains 219 rock alignments and cairns. Researchers (cf. Plew 1980) consider most of the rock alignments to have been used as hunting blinds. However, the context and configuration of some alignments suggests their use as traps or drivelines for antelope or other animals. Cairns constitute a problematic resource type. Different functions, ranging from the practical to the spiritual, have been used to describe cairns. Because many occur with rock alignments, researchers often link cairns with hunting complexes.

The two sites defined as communal hunting complexes possibly represent the most unique sites in the ROI. Located near the center of the ROI, these complexes consist of large areas (ca. 200 acres) in which prehistoric hunters used a combination of rock alignments and natural features (e.g., arroyos) to gather and drive buffalo or other large game over a cliff or into a narrow defile where hunters awaited them (Agenbroad 1976; Plew 1987). Such complexes reflect very sophisticated, cooperative hunting practices and represent significant sites.

The 84 rock art localities within the ROI include pictographs and petroglyphs on exposed basalt bedrock. Some localities are isolated, whereas others are associated with caves, campsites, and lithic scatters. Although represented by relatively few sites in the ROI, the rock art localities constitute

important cultural resources both for their information and their meaning to contemporary Native Americans.

Projectile points and projectile point fragments account for more than half of the 503 isolated artifacts recorded within the ROI. The remainder consist of a variety of stone tools or tool-making debris (i.e., flakes). Isolates offer only limited information on prehistoric use of the area and very rarely constitute significant resources.

NRHP Districts and Sites

Despite the abundance of prehistoric archaeological resources documented in the ROI, relatively few have been formally evaluated for significance according to National Register criteria (see section S4.5.1). The Camas Creek and Pole Creek National Register Archaeological District (see Figure S3.5-4) contains 442 prehistoric archaeological sites. Located in the northwestern portion of the ROI, this large district formally establishes the significance of the sites it includes. Only seven other prehistoric sites within the ROI have been formally evaluated as eligible for the NRHP. Dispersed near the center of the ROI, these sites include lithic scatters, a rock art locality, and a campsite. Since hundreds of other recorded sites within the ROI possess characteristics similar to the seven eligible sites, it appears probable that they too would meet NRHP eligibility criteria.

Although none has been formally designated (personal communication, Wyatt 1989), the BLM has recognized the importance of certain cultural resources or groups of resources by proposing 12 archaeological districts and ACECs within the area encompassing the ROI (BLM 1979, 1985a). These proposed districts and ACECs include: the Dry Lakes/Bruneau River archaeological district; an ACEC encompassing Bruneau, Jarbidge, and Arch canyons; the Devil's Creek, Pot Hole Creek, Dove Springs, Juniper Ranch, Clover Creek, and Post Office complexes; and four small districts in the northwestern portion of the ROI (see Appendix G).

Prehistoric Resource Distribution and Sensitivity Assessment

The following briefly discusses the observable distribution of resources as a means to identify general zones of archaeological sensitivity within the ROI. To derive preliminary density measures and sensitivity zones, a two-stage analysis was undertaken. The first stage defined prehistoric site density for each of the 103 USGS 7.5-minute quadrangles within the ROI. Calculation of density used existing data (from the SHPO files) on the number of various prehistoric resource types relative to the extent of survey (i.e., number of acres) within a quadrangle. To gain better insight into the types of contexts likely to contain higher densities of potentially significant prehistoric resources, the second stage of analysis focused on the relationships of various site types to water sources. The analysis used four water source categories -- perennial drainage, playa, spring, and major intermittent drainage -- and

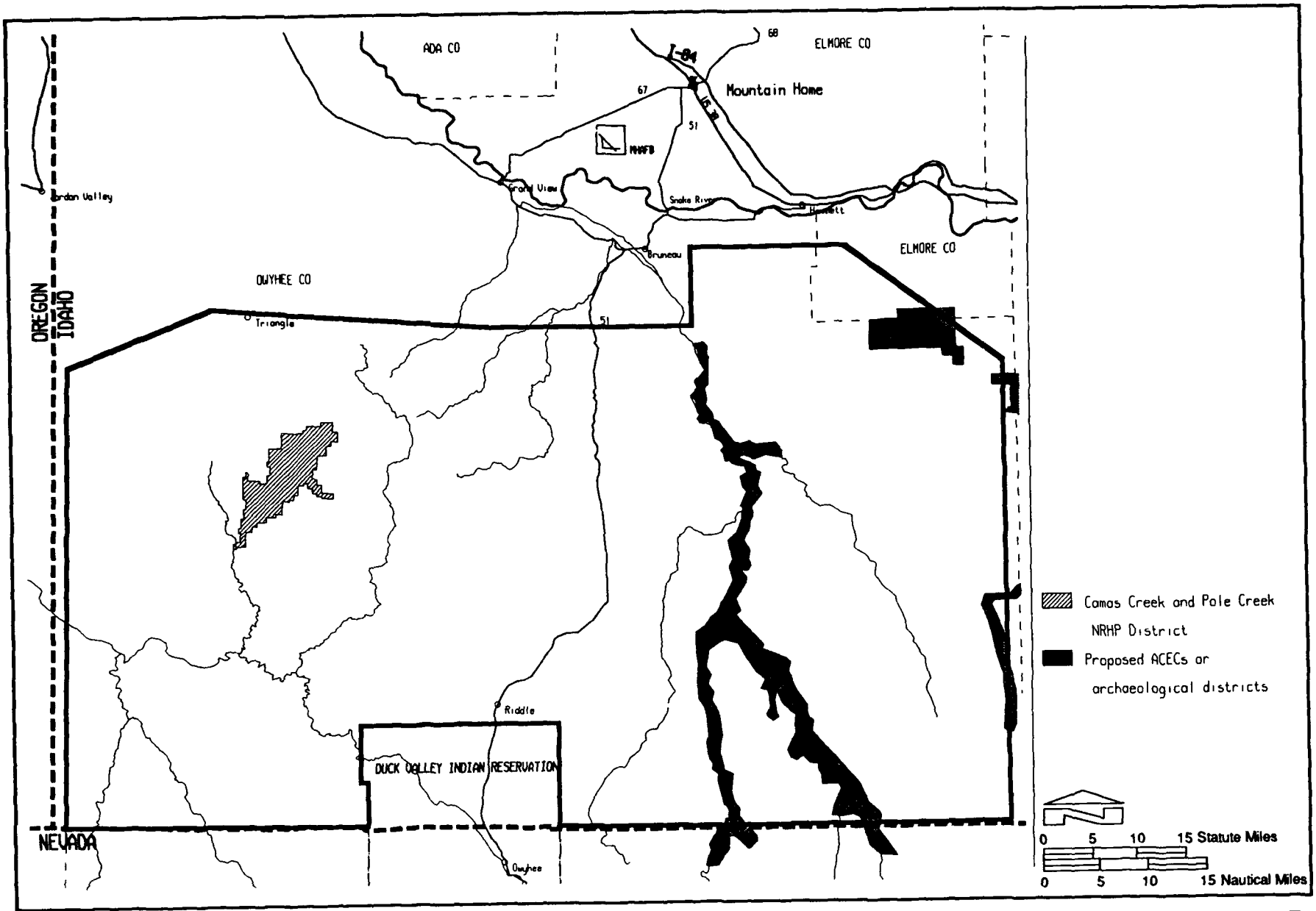


Figure S3.5-4

MAJOR DESIGNATED OR PROPOSED AREAS FOR PROTECTION OF CULTURAL RESOURCES

classified each site's relationship to the nearest water source according to one of five distance categories -- $\leq$0.25 mile, >0.25 mile to $\leq$0.5 mile, >0.5 mile to $\leq$1 mile, >1 mile to $\leq$1.5 miles, and >1.5 miles. Appendix G provides a complete description of the methods used in the analysis.

The first stage of analysis resulted in definition of four basic categories of estimated prehistoric resource density and potential sensitivity: high, moderate, low, and unknown. As depicted in Figure S3.5-5, 38 quadrangles received designation as high density areas; 30 quadrangles were assigned moderate density and sensitivity; and 33 consist of low density and sensitivity areas. Two quadrangles were classified as unknown, since no portion of either had been surveyed. The patterning of the estimated high-density quadrangles generally corresponds to the major drainages (e.g., Bruneau, Jarbidge, Devil's Creek, Camas Creek), whereas the patterning of the moderate density quadrangles reflects no obvious correlation with major physiographic or environmental features within the ROI. Quadrangles estimated to contain low densities of prehistoric resources occur throughout the ROI, although few encompass major drainages and several include expanses of broad, desert plains.

The second stage of analysis revealed that almost 70 percent of the prehistoric sites within the ROI occur within 0.25 miles of a water source. Site frequency dramatically decreases between 0.25 and 0.5 miles. The next zone, 0.5 to 1 mile from a water source, contains a similar percentage of the sites, although it encompasses more than four times the area. Beyond 1 mile, site frequency and density decrease to very low levels. Overall, 96 percent of the recorded sites lie within 1 mile of a water source, implying intensive use of this zone. Based on these data, areas that include higher densities of perennial drainages, major intermittent drainages, playas and springs possess a greater potential to contain abundant, clustered prehistoric sites. A brief examination of topographic maps of the ROI suggests that the western half includes more of these water sources (except playas) than the eastern half.

Table S3.5-1 presents the distribution of prehistoric site types relative to the defined water sources within a sample of 25 quadrangles. These data suggest that the highest frequencies of sites and isolates occur in proximity to perennial and major intermittent drainages. Areas surrounding springs also contain relatively high numbers of sites, whereas the fewest sites have been documented near playas. Evidence from an additional sample of 54 quadrangles reflects similar distributions relative to the two drainage types, but manifests a reversal of the pattern noted for playas and springs. Differential distribution of these water sources may account for the reversal; playas are more prevalent in the eastern portion of the ROI and springs predominate in the western half. However, a lack of quantitative data on the amount of acreage associated with each type of water source and the amount of acres surveyed necessitate cautious interpretation of these data. As noted above, the emphasis of many surveys on drainages potentially biases the identified distribution.

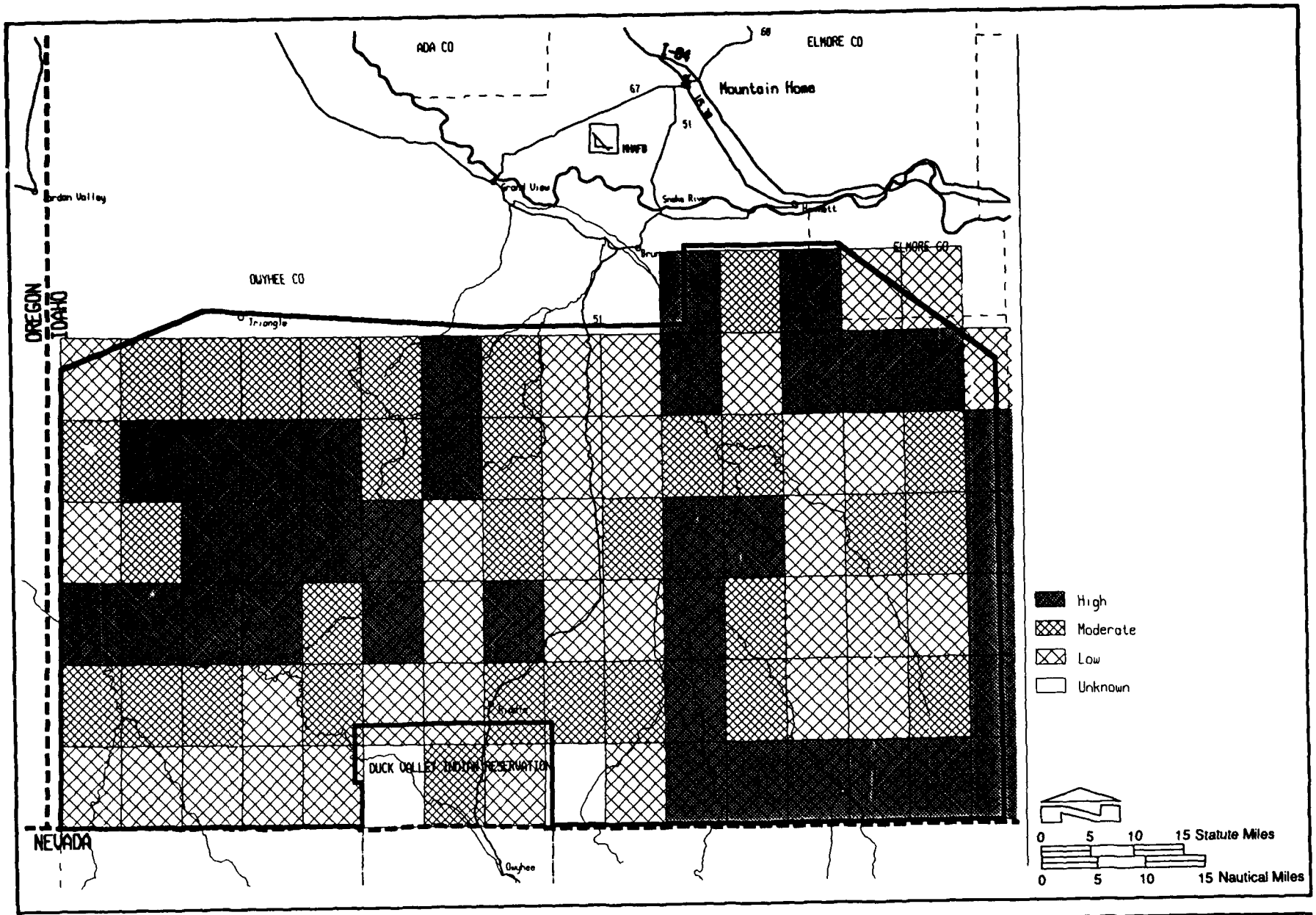


Figure S3.5-5

ESTIMATED PREHISTORIC ARCHAEOLOGICAL RESOURCE DENSITY AND SENSITIVITY

Table S3.5-1

DISTRIBUTION OF PREHISTORIC CULTURAL RESOURCES WITHIN 1.5 MILES OF A WATER SOURCE

	Perennial Drainage	*Playa*	*Spring*	*Intermittent Major Drainage*	*Beyond 1.5 Miles*
Lithic scatter	163/49%[a]	9/3%	46/14%	105/32%	7/2%
Rockshelters and caves	33/56%	0/0%	4/7%	22/37%	0/0%
Campsites	13/27%	1/2%	11/22%	22/45%	2/4%
Rock alignments and cairns	78/49%	0/0%	23/14%	54/34%	4/3%
Rock art	44/70%	1/1.5%	2/3%	15/24%	1/1.5%
Isolates	24/22%	7/6%	12/11%	54/49%	16/12%

Note: a = percentage within resource type.

The distribution of site types relative to the defined water sources provides further means to assess the sensitivity of areas within the ROI. As described above, different site types characteristically contain different artifact assemblages and cultural deposits. Thus, the types also differ in terms of their likelihood to yield significant information. For example, rockshelters and caves that often include stratified and diverse cultural deposits tend to be more significant than surface lithic scatters. Therefore, specific types of settings (e.g., perennial drainages) that contain high proportions of sites with a greater potential to be deemed significant (e.g., rockshelters) also possess greater archaeological sensitivity.

Data from a sample of 25 quadrangles (see Table S3.5-1) indicate that site types most likely to meet federal significance criteria -- rockshelters, caves and rock art localities -- predominantly occur within or near the canyons of perennial drainages. These site types also exhibit a moderate association with major intermittent drainages. In contrast, the distribution of campsites favors settings in proximity to major intermittent drainages, although moderately high proportions of campsites occur near perennial drainages and springs. Campsites generally possess the potential to yield significant information, yet this potential varies with the content and complexity of the sites. Trends for the region suggest that campsites located in perennial and major intermittent drainages tend to contain more diverse and extensive deposits. Lithic scatters, rock alignments and cairns -- sites with a generally lower potential for significance -- reflect a distributional pattern similar to that of rockshelters and caves.

The foregoing analyses reveal information, albeit preliminary, about the prehistoric archaeological sensitivity of the ROI. Available data suggest that the areas encompassed by 38 of 101 quadrangles in the ROI potentially contain high densities of prehistoric cultural resources indicative of high archaeological sensitivity. These quadrangles cluster in four portions of the ROI: the eastern edge, the northeastern corner, and the center of both the eastern and western half of the ROI. Additionally, these clusters of quadrangles characteristically encompass segments of perennial and major intermittent drainages. Whereas these data provide broad indications of sensitivity, the second stage of analysis suggests that specific settings within the quadrangles accounted for this sensitivity. These settings are located within 1 mile of water sources. Of these water sources, perennial and major intermittent drainages generally reflect a higher probability of containing significant prehistoric resources.

The patterning described above and the inferences drawn from it should, however, be considered preliminary and used cautiously for general project planning. This caveat stems from the limited nature of the existing data base for prehistoric cultural resources as well as biases in the methods used to collect the data (see Appendix G).

S3.5.4 Historic and Architectural Resources in the Ground-Disturbance Region of Influence

S3.5.4.1 Previous Research

No studies specifically focusing on historic or architectural resources have been conducted within the ROI, although the Owyhee County Historical Society identified numerous structures while conducting oral history interviews (personal communication, Morton 1989). All data on these resources derive from the general cultural resource surveys described in Section S3.5.3.1.

Corbyn (1988) suggests that, prior to 1983, most of the surveys conducted in the area did not consistently record historic resources. According to Corbyn, less prominent sites such as sheepherder camps and dumps were infrequently documented, whereas structures and similar features were recorded more commonly. Additionally, many historic resources may be located on private property (cf. Young 1984) and, as a consequence, have not been recorded. If correct, these assertions indicate that the database for historic and architectural resources dramatically underestimates the number and diversity of sites in the area.

S3.5.4.2 Historic and Architectural Resource Inventory

The 333 historic and architectural resources documented within the ROI include: 69 standing structures (e.g., houses, barns, cabins); 147 sheepherder and cowboy camps; 66 can and bottle dumps; 19 rock cairns; 15 isolated artifacts (e.g., bottles, cans); and a range of 23 other historic features (e.g., battleground, corrals, dams). These resources range in age from the late 19th century to the present (see Table S3.5-2). Historic structures are the most prominent and potentially significant type of historic and architectural resources documented within the ROI. Similarly, some of the "other" resources, such as the battleground and the historic roads, represent potentially significant sites. In contrast, most of the remaining types of historic resources possess a limited potential for significance.

Similar to the prehistoric resources, few of the historic and architectural resources within the ground-disturbance ROI have been formally evaluated for significance. Twelve sites are listed on the NRHP, including Camp Three Forks, the Wickahoney Post Office and Stage Station, and 10 historic sites within the Camas Creek and Pole Creek National Register Archaeological District. Located at the extreme northwestern margin of the ROI, Camp Three Forks consists of the remnants of an 1866 U.S. Army outpost. The Wickahoney Post Office and Stage Station, situated in a remote setting in the northcentral portion of the ROI, dates to 1895 and includes the burnt remnants of several lava rock and wood frame structures. The 10 sites within the National Register district consist of cabins, sheep camps, rock alignments, and historic petroglyphs. Although not formally evaluated, the BLM and the SHPO consider most of the other identified historic structures potentially eligible for the National Register.

Table S3.5-2

HISTORIC AND ARCHITECTURAL RESOURCES IN THE GROUND-DISTURBANCE ROI

	< 1900	*1900-1910*	*1911-1920*	*1921-1930*	*> 1930*	*Unknown*	*Total*
Structure	8	14	12	8	8	19	69
Campsite		16	24	15	24	62	141
Dump	1	2	15	4	9	35	66
Rock Cairn						19	19
Isolate		2	4	1		8	15
Other	3	3		2	6	9	23
TOTAL	12	37	55	30	47	152	333

Figure S3.5-6 presents a gross indication of the distribution of historic and architectural resources within the ROI. These resources occur throughout the ROI, but the majority of the quadrangles containing architectural resources encompass major drainages. These distributional data, however, represent only a preliminary and restricted picture of the patterning of historic and architectural resources. Inconsistent documentation (prior to ca. 1983) coupled with limited access to many sites on private lands may have resulted in an unrepresentative inventory of historic and architectural resources. No quantitative estimates are possible, but it is likely that the number of significant historic and architectural resources within the ROI is considerably higher than current information indicates.

S3.5.5 Native American Resources in the Ground-Disturbance Region of Influence

S3.5.5.1 Contemporary Native American Groups

Contemporary Native Americans with historical ties to the study area live throughout southwestern Idaho but are concentrated on and near the Duck Valley Indian Reservation, nearly 300,000 acres of land set aside for Western Shoshone and Northern Paiute groups from parts of Nevada, Idaho, Oregon, and Utah. The cultural and religious values of these Native Americans as they relate to specific cultural resources are only now beginning to be documented. Such a study has been commissioned by the Bureau of Indian Affairs (BIA) as part of an action to adjudicate water rights to the Snake River (personal communication, Pavesic 1989). Unfortunately, data collection for this large project has not yet begun in earnest, and a draft report is not expected until August 1990. However, Native American informants indicated that the general area of the ROI contains more than 100 sites important to contemporary Native Americans. The informants have yet to divulge the locations of these sites, yet it is possible to derive useful information on several types of sites important to Native Americans from a massive study of Shoshone, Paiute, and other related groups occupying areas immediately south of Duck Valley. This report (HDR 1981) focused on the culture, society, and economy of Shoshones, Paiutes, and all other Native Americans with historic and contemporary concerns in the Great Basin. Based as it is on extensive interviews with and fieldwork among these and other groups, in addition to a thorough literature review, this study is used below to provide information on the general types and significance of cultural resources likely to be important to the Shoshone-Paiute people now residing on and near the Duck Valley Reservation. These resources can be grouped roughly into ancestral/sacred areas and traditional hunting, fishing, and gathering areas.

S3.5.5.2 Ancestral/Sacred Areas

In the religions of the Shoshone, Paiute, Ute, and other related groups, the concept of sacredness is associated with supernatural power derived from the spirit-world. Sacred space is wherever spiritual energy resides. Space may be deemed sacred on a temporary as well as a permanent basis. For example, sites used for rituals in which communication with the spirit-world takes place are considered

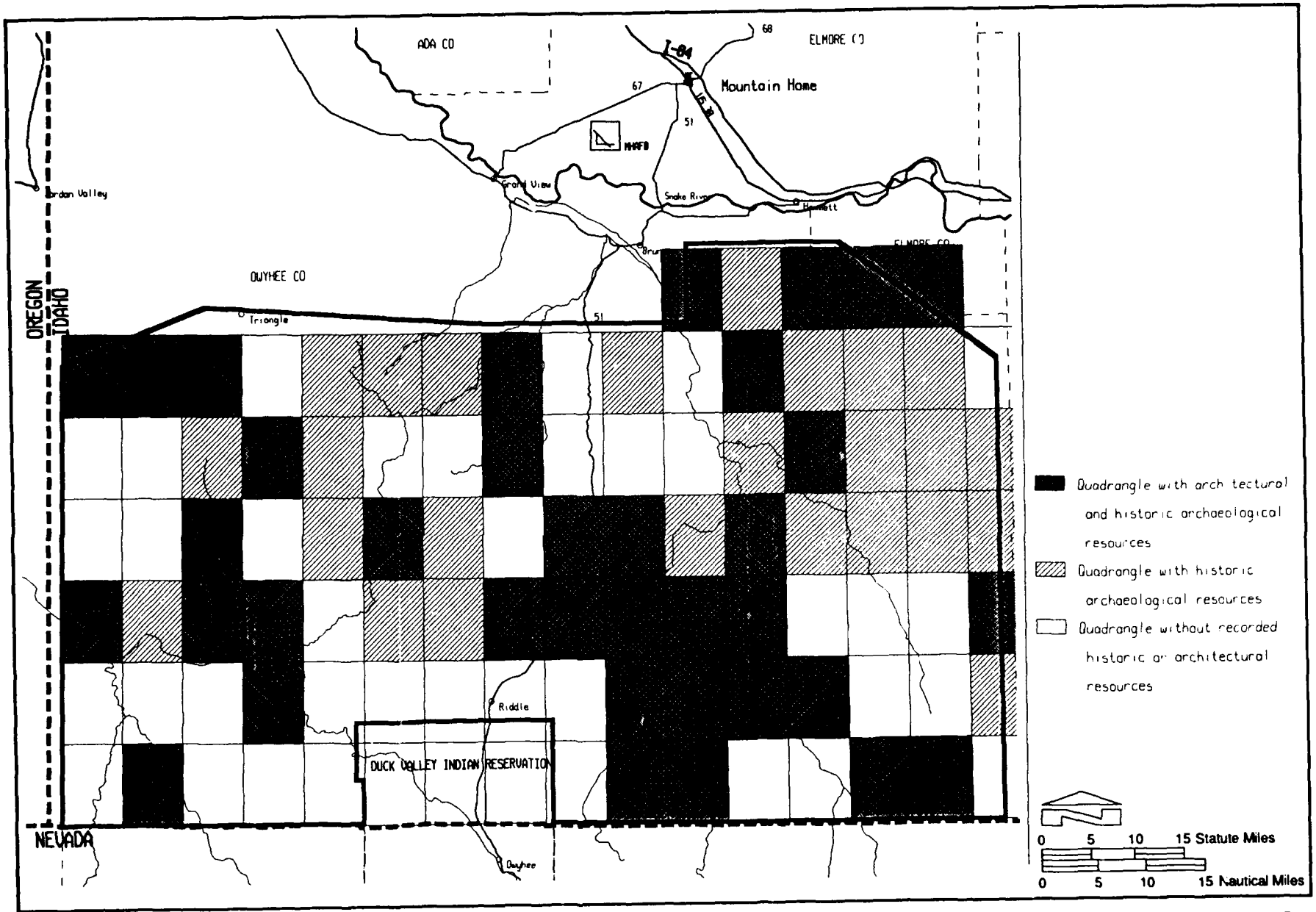


Figure S3.5-6

DISTRIBUTION OF HISTORIC ARCHAEOLOGICAL AND ARCHITECTURAL RESOURCES BY USGS QUADRANGLE

sacred only for the duration of the ceremony. Sacredness may also attach itself to the vehicles of communication with the spirit-world. Plants such as native tobacco, peyote, or Jimson weed may be so regarded. Similarly, curing wands and the entire inventory of shamanistic paraphernalia are sacred objects imbued with supernatural power due to their use in soliciting the aid of animal-spirits. In the broadest sense, the entire ancestral territory of each tribal group is sacred, since the physiographic features of the environment were created during mythical times and contain the spirits of creator figures and their descendants. Some spirits range freely within this territory and cannot be identified with particular sites. Others make their homes at specific locations, such as mountain peaks, caves, rock outcroppings, or springs. These areas, when revealed by Native Americans, can be mapped as permanent sacred sites. Resources in this group include prehistoric and historic settlement sites; burial grounds; historic event sites such as battlegrounds, massacre locations, and birth and death places of important tribal personages; rock art; ceremonial/ritual sites; trails; water sources; special caves; and selected physiographic features that are accorded significance in traditional cosmologies. Appendix G provides a more thorough discussion of these resources.

S3.5.5.3 Traditional Use Areas

Specific hunting, fishing, and gathering areas traditionally used by the residents of the Duck Valley Indian Reservation will be recorded as part of the BIA adjudication of water rights to the Snake River (personal communication, Pavesic 1989). Although these areas cannot be identified at the present time, general patterns of concern for native flora and fauna can be described.

The intimate relationship of Shoshone and Paiutes with native flora and fauna is an ancient and persistent pattern, even though farming and ranching are dominant economic activities. Plants and animals continue to be used for food, medicine, and as a source of materials for the production of ritual objects. Some plants are used by Native American artisans, an activity that provides supplemental income. In addition to these utilitarian benefits, the collection and traditional use of these plants and animals serves to affirm their cultural identity and relationship with their ancestors. Because hunting, gathering, and fishing areas were also used by ancestral groups, traditional use areas are often considered sacred.

S3.5.5.4 Summary

Native Americans living on or associated with the Duck Valley Indian Reservation are likely to be concerned about a wide variety of archaeological, historical, and environmental resources within southern Idaho. Although detailed supporting data are not yet available, the western portion of the ground-disturbance ROI probably contains the highest density of sensitive resources. This area is well-watered, contains exceptionally high densities of prehistoric sites, rock art, caves and rockshelters, and is located in immediate proximity to Native Americans residing on and near the reservation. In

addition, the eastern half of the ROI, especially the major drainages, has the potential to contain numerous resources and localities important to contemporary Native Americans.

S3.5.6 Cultural Resources under the Airspace Region of Influence

As shown in Figure S3.5-1, the airspace ROI corresponds to the restricted airspace and Owyhee, Paradise, and Bruneau MOAs. This ROI completely overlaps the ground disturbance ROI and extends into eastern Oregon and northern Nevada. Since increased overflights constitute the action proposed for the airspace ROI, only those cultural resources potentially affected by vibratory, auditory, or visual impacts are of concern. These resource types include historic structures, rock alignments and cairns, and Native American sacred and ceremonial sites.

For the area shared by both ROIs (i.e., in Idaho), previous sections have presented the available data on cultural resources and provided estimates of archaeological sensitivity. These data indicate that:

- The area contains 69 documented historic structures, two of which are listed on the National Register;
- 238 identified prehistoric and historic rock alignments and cairns occur within the area as well as potentially significant alignments associated with a bison jump or antelope trap; and
- Numerous resources important to contemporary Native Americans are present within the area, although their specific locations remain undefined.

For the Nevada and Oregon portions of the ROI, cultural resource surveys have been limited in number and much of the area remains unexamined (BLM 1983; 1984; 1985b). Available information, however, indicates that the area contains cultural resources similar to those found in the Idaho portion of the ROI. These resources include numerous historic towns, mines, homesteads, and cabins as well as an array of types of prehistoric sites (e.g., rock art localities, habitation sites) that may be important to contemporary Native Americans. In addition, the Fort McDermitt Indian Reservation lies under this portion of the ROI.

S3.5.7 Cultural Resources under the Military Training Routes

The MTRs extend throughout southern Idaho and into eastern Oregon, northern Nevada, and northwestern Utah. Five historic properties and four historic districts listed on the National Register of Historic Places have been identified in the areas under and near these routes (see Figure S3.5-7). These properties, all of which contain resources potentially affected by low level overflights, consist of

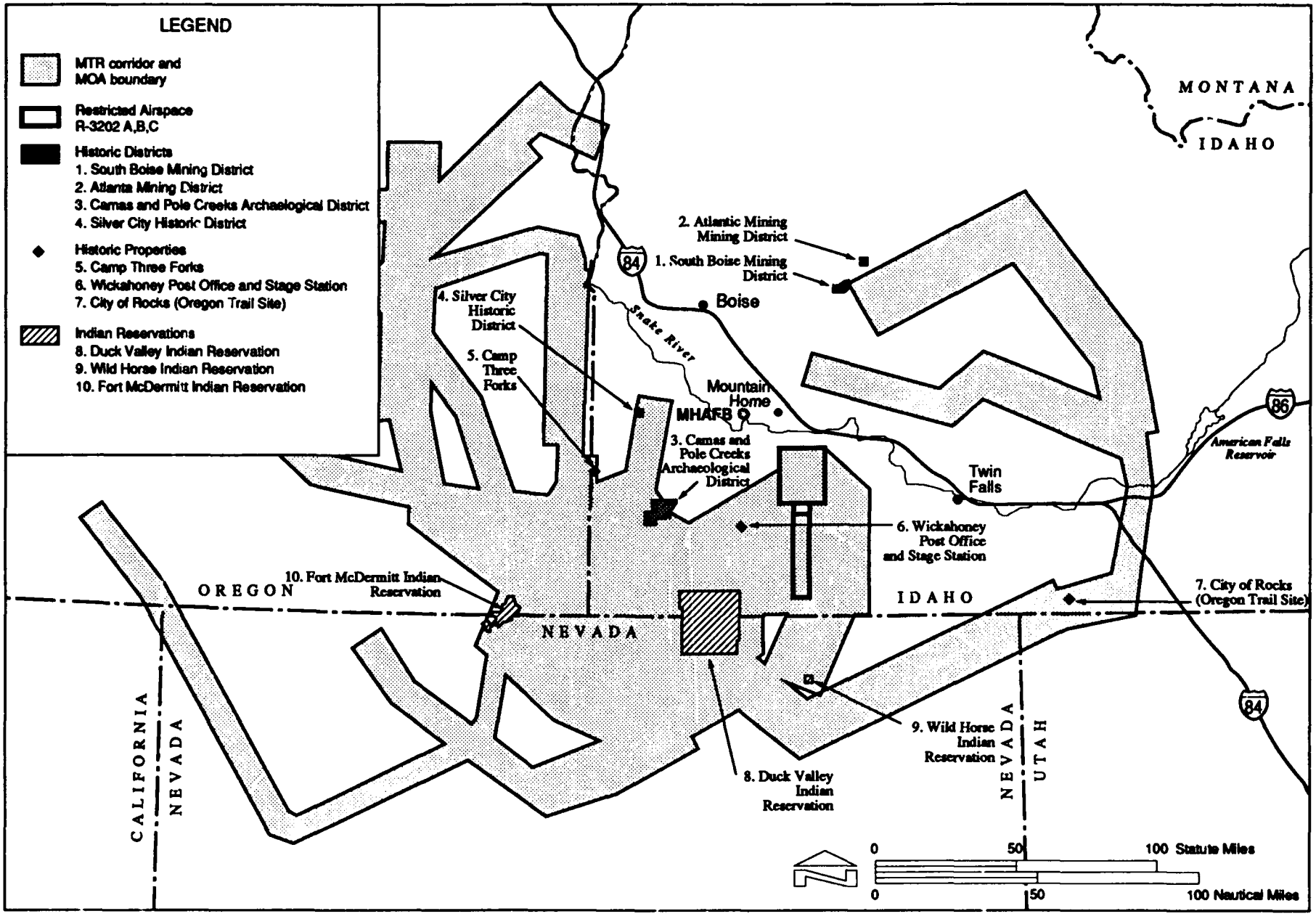


Figure S3.5-7

NRHP HISTORIC PROPERTIES AND DISTRICTS AND INDIAN RESERVATIONS UNDER THE MTRs

Camp Three Forks; Wickahoney Post Office and Stage Station; Camas and Pole Creeks Archaeological District; Silver City Historic District; South Boise Historic Mining District; Atlanta Historic District; City of Rocks (Oregon Trail site), the Oregon National Historic Trail, and the California Trail. In addition, the MTRs cross over three Indian reservations: Duck Valley, Wild Horse, and Fort McDermitt.

S3.6 VISUAL RESOURCES

S3.6.1 Definition of Resource

Visual resources are the natural and manmade features that give a particular environment its aesthetic qualities. A visual impression of an area is derived from the type, arrangement, and contrast between these features. Although each viewer's perception may be slightly different, an overall landscape character can be assigned to an area and impacts to that character can be assessed.

S3.6.2 Region of Influence

Two overlapping ROIs (see Figure S3.6-1) have been identified for the assessment of impacts on visual resources potentially resulting from the proposed expanded range capability. The land or ground disturbance ROI is contained within the southwestern portion of the state of Idaho, encompassing approximately 3.5 million acres of Owyhee and Elmore counties (excluding the Duck Valley Indian Reservation). This ROI forms the area under evaluation for possible locations of a proposed expanded range. Visual resources in this ROI could be subject to impacts from the construction, maintenance, and use of buildings, roads, and targets.

The larger airspace ROI encompasses the ground disturbance ROI and extends north to include C. J. Strike Reservoir and Bruneau Dunes State Park. To the south, the ROI extends into both Oregon and Nevada and is defined by the boundaries of the restricted airspace and the Paradise, Bruneau, and Owyhee MOAs. This ROI delineates the area in which an increase in aircraft overflights could result in impacts to visual resources. Although transitory in nature, aircraft overflights can temporarily alter the visual landscape of an area which, in turn, may affect the recreational experiences of visitors or the solitude of inhabitants.

In addition to the MOAs, the airspace ROI includes eight MTRs that provide access to the SCR and are currently in use. Of these, four MTRs (IR-303, VR-1300, VR-1302, and VR-1304) have been proposed to receive increased aircraft activity. Because the proposed increases could result in impacts to the visual resources underlying these routes, they have been included in the airspace ROI.

S3.6.3 Visual Setting

The following description of the visual setting refers to both the airspace and ground disturbance ROIs. The 15.7 million acres encompassed by these ROIs are characterized by broad rolling upland plains cut by numerous drainages and mountainous terrain. In many areas, the relatively flat landscape allows for broad views to distant mountains. However, in other areas, expansive views are screened by low

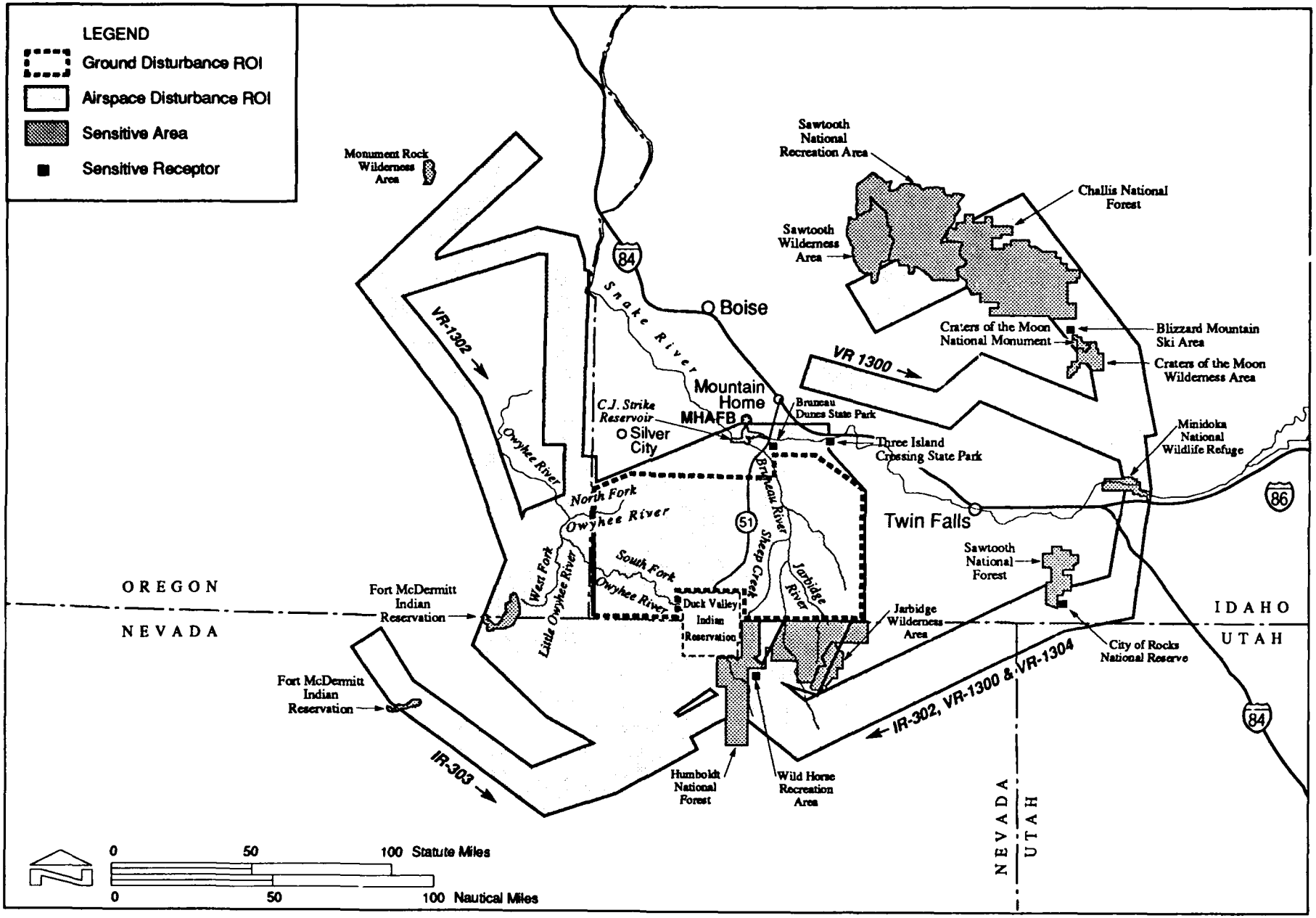


Figure S3.6-1

REGION OF INFLUENCE FOR VISUAL RESOURCES

intervening features (e.g., vegetation) and undulating terrain. Other portions of the ROIs contain mountainous forests that offer extremely limited views.

A number of visually unique and sensitive areas are located within these ROIs. Views from and of the deeply incised Bruneau, Jarbidge, and Owyhee canyons are valued because of the dramatically winding character of their respective rivers. Both the Bruneau and Jarbidge river canyons plus the tributary canyon of Sheep Creek have been recommended for Wild and Scenic River designation by the National Park Service. From within the canyons, whitewater boaters, hikers, and anglers have extraordinary views of the steep stratified volcanic cliffs. Views from the rims of these canyons reveal the impressive contrast between the vast sagebrush plains and the deep river canyons. A designated scenic overlook adjacent to the SCR offers such a view of the Bruneau River Canyon.

C. J. Strike Reservoir located northwest of the SCR is a heavily used recreation area along the Snake River. Located just east of the C. J. Strike Reservoir are the Bruneau Sand Dunes, the largest natural free-standing sand dunes in the continental United States. These 470-foot dunes rise out of the flat bunchgrass terrain to dominate the view. Northeast of the SCR and along the Snake River, Three Island Crossing State Park marks an important location on the historic Oregon Trail.

In Oregon, segments of the Owyhee, West Fork of the Little Owyhee, and the North Fork of the Owyhee are designated as Wild Rivers. The contrasting colors and unique features found in these deep river canyons provide for dramatic views. The reddish-brown canyon walls reach up to 1,000 feet above the dusty beige sagebrush slopes that define the river's edge. A variety of eroded features such as towering spires or perched rock formations can be found in the main and side canyons.

The southern part of the airspace ROI, which extends into Humboldt and Elko counties, Nevada, includes substantial portions of the Humboldt National Forest. The forest is characterized by outstanding scenery that provides hikers and campers unique visual experiences. This portion of the ROI also contains the Wild Horse Recreation Area.

In addition to the areas identified above, numerous sensitive or potentially sensitive areas are located under the MTR corridors (see Figure S3.6-1). IR-303 overflies Fort McDermitt and Wild Horse Indian reservations. Within Idaho, VR-1304 passes over the Sawtooth National Recreation Area and Wilderness Area, then joins VR-1300 to overfly Craters of the Moon Wilderness Area and National Monument as well as City of Rocks National Reserve. In Nevada, parts of Humboldt Forest and the southern part of the Jarbidge Wilderness Area underlie this route.

Hunting, fishing, climbing, boating, hiking, camping, backpacking, whitewater boating, and ORV use are the major recreational activities that attract visitors into the region. Views that evoke solitude or the ruggedness of the natural setting form an integral part of the recreation experience. For example,

one of the newest recreation areas just proposed is the Idaho State Centennial Trail. Selected for its scenic, cultural, and recreational diversity, this trail follows the rim of Bruneau Canyon to its junction with the Jarbidge River, then runs along the rim of the Jarbidge River Canyon terminating at Murphy Hot Springs. In its entirety the trail would extend from southern Idaho to the northern border of the state.

The airspace ROI is sparsely populated with no major cities within its limits. Some of the communities located in the ROI include Murphy Hot Springs, Grasmere, Bruneau, Triangle, and Riddle, Idaho; Jarbidge, Contact, Charleston, and Midas, Nevada; and Jordan Valley, Vale, Juntura, Seneca, and Rome, Oregon. The Duck Valley, Fort McDermitt, and Wild Horse Indian reservations are the home of Shoshone and Paiute Indians. The population density under the airspace ROI is extremely low, ranging from 0 to 1.2 persons per square mile. Some of these communities are adjacent to highways in areas of little visual significance (e.g., Riddle), whereas others may either provide a visual impression of an historic period (e.g., Jordan Valley) or occur in unique visual settings (e.g., Murphy Hot Springs).

Highway 51 is the major north-south route through the area. It runs from Mountain Home, Idaho, to Mountain City, Nevada, where it changes into Highway 225. Few other improved roads run through the ROIs (see section S3.9). Broken Wagon Flat Road leads from Bruneau across Highway 51 and ends at Mud Flat/Deep Creek Road. Starting from Grand View, Mud Flat/Deep Creek Road continues to Jordan Valley in Oregon after crossing the North Fork of the Owyhee River. Clover Creek/Three Creek Road runs from Bruneau along Clover Creek to end at Three Creek Road. At this junction, Three Creek Road either continues east to Three Creek, Idaho or south to Jarbidge, Nevada. A few segments of some of these roads offer views of interesting and unique scenery (such as near Murphy Hot Springs). However, expansive and consistent views of the broad plains are generally found along most of these routes. These views vary depending upon the topography and the frequency of developed features (e.g., structures) along the roads.

S3.6.3.1 Visual Characterization

Ground Disturbance ROI

Rating the visual character of an area is a complicated and involved task. The shape, form, line, and color of the landscape all play an important role in defining the visual character. The objective of BLM's VRM classification system, as described in section S4.6.4, is to identify the existing visual character of the landscape and define the allowable extent and type of modification to the landscape. Therefore, the visual classifications (VRM Classes I-IV) assigned by the BLM provide a baseline visual characterization for the ground disturbance ROI.

The visual classification map shown in Figure S3.6-2 has been compiled from maps collected from the BLM Boise District Office. Visual classes are defined solely by the quality of visual resources of an area and not influenced by classifications of neighboring areas. Consequently, the most sensitive class (VRM I) can be adjacent to the least sensitive class (VRM IV). As shown, most of the land in the ground disturbance ROI has been assigned the least sensitive class.

VRM CLASS I does not apply to any of the areas within the ground disturbance ROI. The unique resources within VRM Class I areas are highly sensitive to change; BLM standards indicate that such areas should be preserved. The complexity of a VRM Class I area, in terms of shape, form, and color, fills the visual landscape, drawing a viewer's attention.

VRM CLASS II has been assigned to over 20 percent of the ground disturbance ROI. Sections of the Bruneau (see Figure S3.6-3), Jarbidge, and Owyhee river canyons (in Idaho) have been designated VRM Class II areas. Smaller canyons such as Big and Little Jacks Creek, Battle Creek, Red Canyon, and Deep Creek have also been included in this class. All WSAs within the ROI represent VRM Class II areas. The visual resources of the areas in this class are dramatic, yet less complex (than VRM Class I areas) in terms of contrasting shapes and forms. Limited modifications to the landscape are allowed, although they should not be noticeable. Bruneau Dunes State Park, just outside of the ground disturbance ROI, is a good example of a VRM Class II area (see Figure S3.6-4) containing man-made modifications. The dunes themselves dominate the view, providing contrast to the flat bunchgrass plains in the foreground and the dark cliffs in the background. However, the shape, color, and form of the dunes is basically uniform and therefore does not warrant a VRM Class I designation. The presence of developed areas in the park (i.e., visitors center, parking lot, and access road) also influenced classification of this area as VRM Class II.

VRM CLASS III, which predominantly applies to the roads and developed areas, covers 21 percent of the ground disturbance ROI. Highway 51, Mud Flat/Deep Creek Road, Clover Creek/Three Creek Road, Three Creek Road, and Broken Wagon Flat Road as well as the communities along these roads are identified as VRM Class III areas. The Juniper Basin Reservoir and the East Fork of the Bruneau also constitute VRM Class III zones. The visual resources of areas in this class tend to be homogeneous in terms of shape, form, and color, or have been modified by development (e.g., roads). Changes in the landscape (e.g., grazing) are allowed but they should remain subordinate to the existing landscape. The area along Highway 51 exhibits the characteristics of this class (see Figure S3.6-5). In this example, the rolling terrain provides form to the landscape, altering the otherwise homogeneous view of sagebrush vegetation. The isolated road creates focal point sensitivity within the landscape by drawing the viewer's attention.

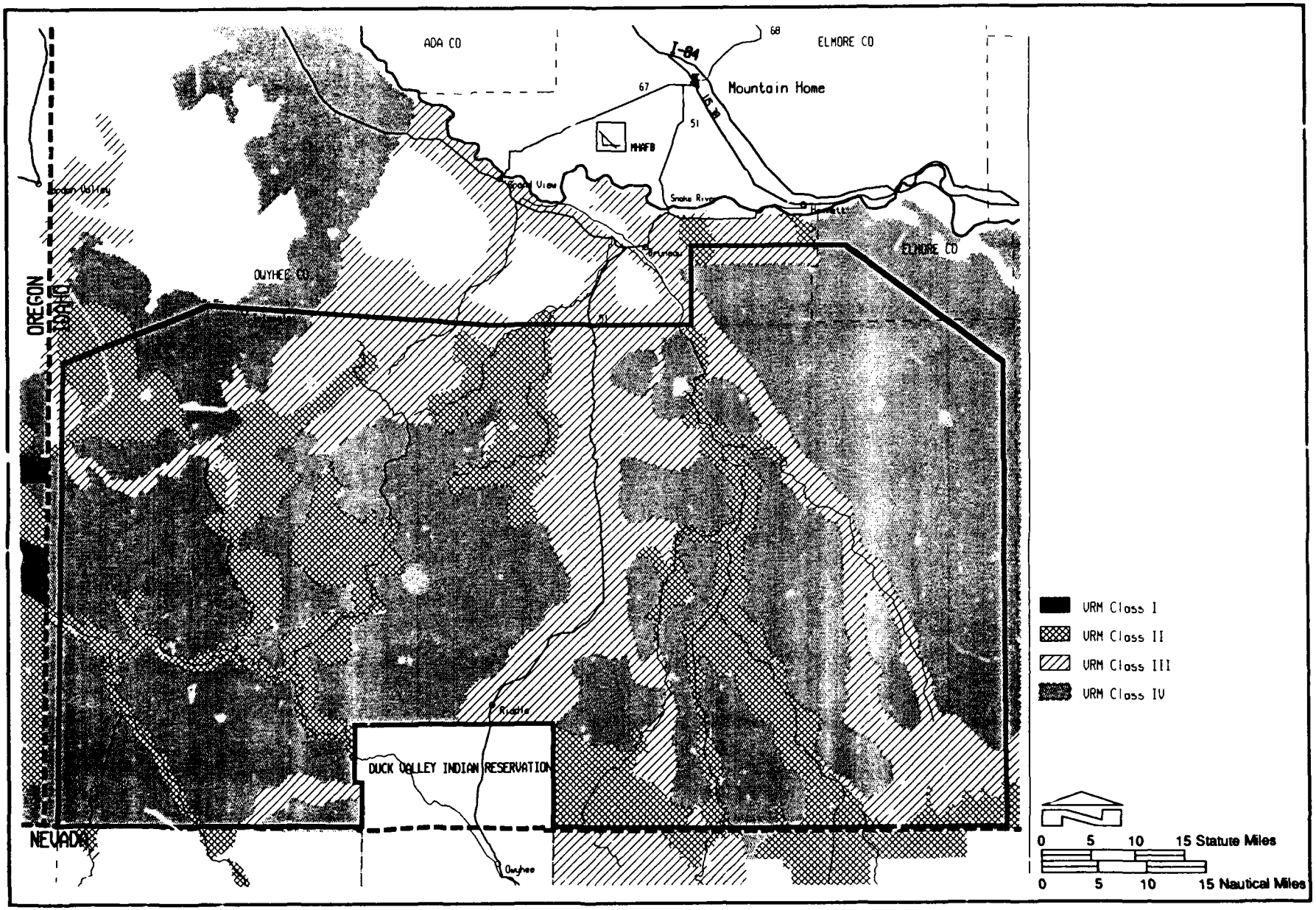


Figure S3.6-2

VISUAL CLASSIFICATION MAP FOR THE GROUND DISTURBANCE ROI



Figure S3.6-3 The winding nature of both the Bruneau (as shown) and Jarbidge Rivers is emphasized in aerial views of the area. The dark basalt canyon rim provides visual contrast with the older eroded canyon walls. Designated as VRM Class II areas, the deeply-incised river canyons represent one of the most visually sensitive portions of the ROI.



Figure S3.6-4 The expansive sand dunes found at the Bruneau Dunes State Park provide dramatic visual contrast as they rise from the bunch grass plains. Reaching heights of 470 feet, the dunes exhibit unique shape and form that draw the viewer's attention. Although located just outside the ROI, the park exemplifies a VRM Class II area.

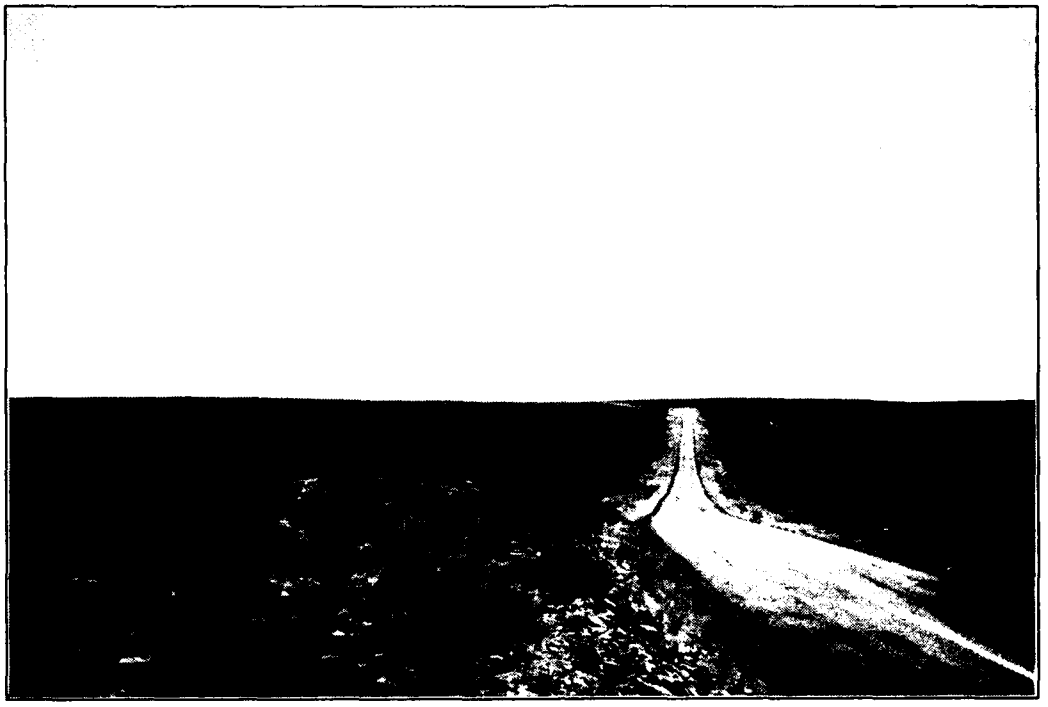


Figure S3.6-5 In this view of a VRM Class III area, the gently rolling terrain provides form to the visual landscape, but offers limited contrast. The road, which draws the viewer's attention, forms the only contrasting visual element in the landscape.

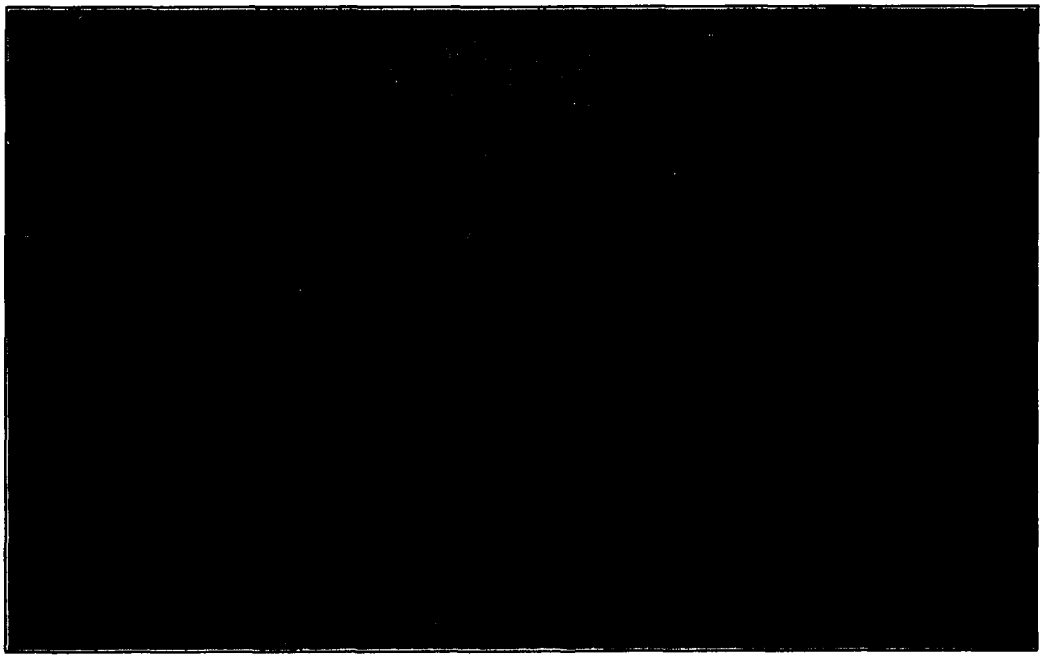


Figure S3.6-6 Tumbleweed that collect against the boundary fence of the Saylor Creek Range often screen views from the road to the expansive plains. Crested wheat grass and bunch grass blanket the area surrounding the existing range, accentuating the flat character of the terrain and allowing for distant views interrupted by dirt roads. Most of the VRM Class IV areas within the ROI exhibit the visual characteristics depicted in this

VRM CLASS IV applies to 55 percent of the ground disturbance ROI. As depicted in Figure S3.6-2, large contiguous areas have been assigned to this class. The eastern part of the ROI, including the SCR, is predominantly defined as VRM Class IV. Also, the area south of the Owyhee River and the areas around Big Blue and Little Blue creeks have been assigned to this class. In VRM Class IV areas, changes in the landscape (e.g., development of facilities) may dominate the landscape. Areas around the SCR exemplify the visual characteristics of VRM Class IV zones. In these zones, expansive views of the flat, unvaried sagebrush are often screened by intervening vegetation such as the tumbleweed (see Figure S3.6-6). Also, areas that have been developed or modified (i.e., SCR) are prevalent in this class.

The remaining 4 percent of the ground disturbance ROI lies within the Duck Valley Indian Reservation, an area that has not been analyzed by the BLM. However, the reservation is not included in the area under consideration for a proposed expanded range capability.

Airspace ROI

Since aircraft activity is transitory in nature, it is difficult to describe the baseline conditions of the visual resources, much less the impacts, for an area that experiences aircraft overflights. To date, analysis of aircraft overflight has concentrated on noise-related issues. BLM or USFS classification systems define and rank the visual resources of areas in order to assess impacts from stationary ground-disturbance activities, not from transient activities (i.e, aircraft overflight). Nevertheless, these classifications provide the only extant measures of the visual sensitivity of a portion of the remainder the airspace ROI; evaluating the sensitivity of the ROI relies on qualitative, but nonsystematic assessment of the visual resources.

The airspace ROI contains numerous sensitive visual resources. For the portion of the airspace ROI that coincides with the ground disturbance ROI, VRM Class II areas represent the most sensitive visual resources. The Duck Valley Indian Reservation and a few small communities (e.g., Murphy Hot Springs) form other areas within this portion of the airspace ROI potentially sensitive to visual impacts from overflights. However, as described above, most (55 percent) of this area received a VRM Class IV rating.

The remainder of the airspace ROI includes VRM Class I areas (i.e., Jarbidge Wilderness Area, Craters of the Moon Wilderness Area, the Sawtooth Wilderness Area, and portions of the Owyhee River in Oregon designated as Wild and Scenic), VRM Class II areas, national recreation areas, Indian reservations, and some historically significant areas (see section S3.5.6, Cultural Resources).

It is important to note that aircraft overflights are currently part of the visual landscape of the airspace ROI and some recreation areas currently experience aircraft overflights.

S3.7 EARTH RESOURCES

S3.7.1 Definition of Resource

Earth resources include topographic features, soils, mineral deposits, caves, geologic hazards, and paleontologic resources. All of these resources may have scientific, economic, or recreational value.

S3.7.2 Region of Influence

The ROI or study area for earth resources encompasses the southernmost two-thirds of Owyhee County and a small portion of southeastern Elmore County. In this area, the proposed expanded range capability may directly affect earth resources as a result of access road construction, disking soils for targets, and construction of target zones. Documented paleontological resources and sensitive formations are concentrated in the southeastern and northern portions of the study area, although they do occur in many other locales. Paleontological resources might be indirectly affected by increased non-professional access to remote portions of these areas and by restriction of professional access to important deposits.

S3.7.3 Geology

The study area is composed predominantly of basaltic lava flows and welded rhyolitic tuffs (rock material extruded from a volcanic explosion). Numerous volcanic vents and hot springs are remnants of the area's violent geologic past. Numerous streams and rivers cut these volcanics en route to the Snake River, causing channel erosion throughout the area. Modern sands and gravels are still being deposited and reworked along the area's rivers. Some small basins between mountains hold thick alluvial deposits. Some lake and river deposits, alluvial fan deposits, and terrace deposits, ranging from 5 to 1 million years in age, are found mainly on the northern margin of the study area (Bond 1978).

The lava flows and interbedded sedimentary units are predominantly composed of what is known as the Snake River Group. Rock units composing this group include the Bruneau formation, Glenns Ferry formation, Chalk Hills formation, Banbury Basalt, and Poison Creek formation in descending stratigraphic sequence (Maley 1987). These formations range from 11 to 0.7 million years in age. Together with the Snake River formation and the Columbia River Basalts, the Idaho Group forms part of the largest Cenozoic basalt field in North America.

S3.7.4 Topography

The study area is made up predominantly of broad, low-relief, uplands of volcanic rock. Most of the upland surfaces lie between 3,500 and 5,500 feet in elevation. Isolated volcanic cones reach higher, as do the Owyhee Mountains. These upland surfaces occur to the southwest and eastern portions of the study area. The southern portion of the Owyhee Mountains makes up the northwestern portion of the study area.

The upland surfaces grade northward and northeastward in the eastern portion of the area, following the bend of the Snake River Plain northwest into the Columbia Plateau. The main watercourses draining this area, ultimately flowing into the Snake River to the north, include the Jarbidge River, Bruneau River, and Sheep Creek. These northward-flowing drainages have cut gorges up to 1,200 feet deep into the volcanic rocks. Numerous parallel drainages have also eroded into the upland surface from the southern margin of the Snake River Plain (USGS 1955b and 1955c).

Drainage in the western portion of the study area is to the south. The point of highest elevation is the South Mountain peak in the mountainous region near the northwestern corner of the study area. This peak borders the northern boundary of the study area 7850 feet above mean sea level. From this high point, the mountains descend southward onto the upland plateau to approximately 5,500 feet. Rivers draining the plateau, including the Little Owyhee, South Fork of the Owyhee, and Battle Creek, flow toward the central part of the area where they join the Owyhee River. These rivers have cut canyons from 200 to 600 feet deep into the upland surface. The Owyhee River flows west-northwest into Oregon, before turning north and joining the Snake River. The lowest point in the western part of the study area is along the Owyhee River at an elevation of approximately 4,600 feet (USGS 1955a).

S3.7.5 Soils and Soil Erosion

The complex geologic setting of the proposed expanded range capability study area has generated extremely varied soils. Soils are mainly developed on volcanic rocks and weathered material from those rocks (SCS 1984). In these volcanic areas, rock outcrops are bordered by slopes of broken rock. Farther down the slopes are rocky soils with more fine-grained material. Low areas are filled with alluvial deposits and fine-grained loess (wind-deposited dust and sand). These low areas may also have deeper, better developed soils. Duripans, or silicic hardpan layers, develop within many of these soils. Dry washes contain water-laid deposits of gravels. Modern wind-laid deposits are common in some places. Some areas along the higher northwestern margin of the area have more delicate cold-temperature soils.

Thicker, usually more consistent soils have developed on the sedimentary units near the Snake River. These deposits overlap onto the volcanic rocks along the northern margin of the study area. Thick gravel deposits along the rivers also develop unique soils.

While the soils in the area vary locally, regional studies of the area (BLM 1982, 1985; SCS 1984) have ranked general erosion potential. Overall, the expansion area has a moderate erosion potential.

Expansive soils are those soils containing certain types of clay (i.e., smectites) that are prone to large volume changes with an increase or decrease in water content. These soils can pose a problem in areas where construction will be required. Clayey soils undergo some expansion with an increase in water content. However, the soils in this area generally do not contain the clay types known to cause expansion problems (Schuster 1981).

S3.7.6 Geologic Hazards

S3.7.6.1 Seismicity

Seismicity refers to the vibrations in the earth's crust caused by seismic waves generated during movement along a fault plane (an earthquake). Two major fault systems are located in Idaho. Trending northeast-southwest, the trans-Challis fault system extends over 300 miles across southern and central Idaho and into Montana. Sixty-five miles to the southeast, paralleling the Challis system, is the Dillion Lineament. Both of these fault systems appear to terminate to the southwest near the Snake River Plain. Trending northwest is a system of numerous, parallel faults, present on the north and south sides of the Snake River. It has been suggested that the western part of the Snake River Plain is a block or graben dropped between two of these faults (Alt and Hyndman 1989).

The northern margin of this basin is bordered by the Boise Fault and related faults and extends for about 50 miles from Boise to just north of Glenn's Ferry. Fault scarps associated with this fault system can be seen north of Mountain Home. However, studies of the deposits related to and overlying these scarps have determined these faults to be inactive (Gilbert and LaForge 1988). Bordering the Western Snake River Plain to the south is the Owyhee Mountain fault system which is part of the Basin and Range complex covering much of the western United States (Maley 1987). Most of the faults in this area are considered to be inactive. One exception is the Halfway Gulch fault, which lies approximately 25 miles southwest of Mountain Home. The U.S. Army Corps of Engineers (USACE) studied the Halfway Gulch Fault as part of an earthquake hazard analysis at MHAFB in 1983. In an unpublished report, the USACE concluded that a displacement episode was likely to have occurred in the last several thousand years. They also concluded, based on a fault length of 15.6 miles and a single-event surface rupture of 18 feet, that a maximum credible earthquake Richter magnitude of 6.5 to 7 is possible as a result of fault movement. Subsequent to this report, the Bureau of Reclamation did a

seismotectonic study for the Anderson Ranch Dam. In this study, the Halfway Gulch fault was investigated by studying aerial photographs and a brief field visit. It was concluded that the USACE report, in regards to the Halfway Gulch fault, contained "inconsistencies and poorly substantiated judgments" (Gilbert and LaForge 1988).

Historically, no significant seismic activity has been recorded in the study area (see Figure M3.7-1). This lack of seismic activity may be due to the thermal anomaly beneath the Snake River Plain that may prevent the brittle response necessary for faulting.

S3.7.6.2 Liquefaction

Liquefaction refers to the loss of rigidity in cohesionless soils (i.e., soils without clay) as a result of oversaturation. This condition occurs only where this type of soil is present and the groundwater level is within 50 feet of the surface. Earthquakes often provide the impetus for liquefaction to occur.

Groundwater in most of the study area is too deep for liquefaction to occur. Furthermore, since some percentage of clay is found in most soils in this area, the potential for liquefaction is reduced.

S3.7.6.3 Landslides

The term landslide generally refers to the movement of a mass of loosely consolidated soil and rock material due to the influence of gravity. Waves generated from seismic activity can provide the impetus for landslide occurrence.

Landslides are most likely to occur in the steep, river-cut canyons located throughout the study area. However, most of these canyons are composed of basaltic lavas and welded tuffs that are fairly consolidated and stable. Steeper slopes of unconsolidated or semi-consolidated sedimentary units would be the most likely areas for landslides to occur.

S3.7.7 Mineral Resources

The study area contains several realized or potential mineral resources of economic value. These include oil and gas, minerals, gemstones, geothermal fields, limestone, diatomite, gravel, and sand. Mineral resources currently being mined include gold, silver, lead, pumice, gravel, sand, Bruneau jasper, and diatomite. Several uranium and mercury prospects also exist in the study area. The main deposits of precious metals occur primarily to the northwest of the study area in the South Mountain region. Figure S3.7-1 shows a composite of the mining claims, known mineral deposits, and miscellaneous mines and prospects existing in southwestern Idaho (Strowd et al. 1981).

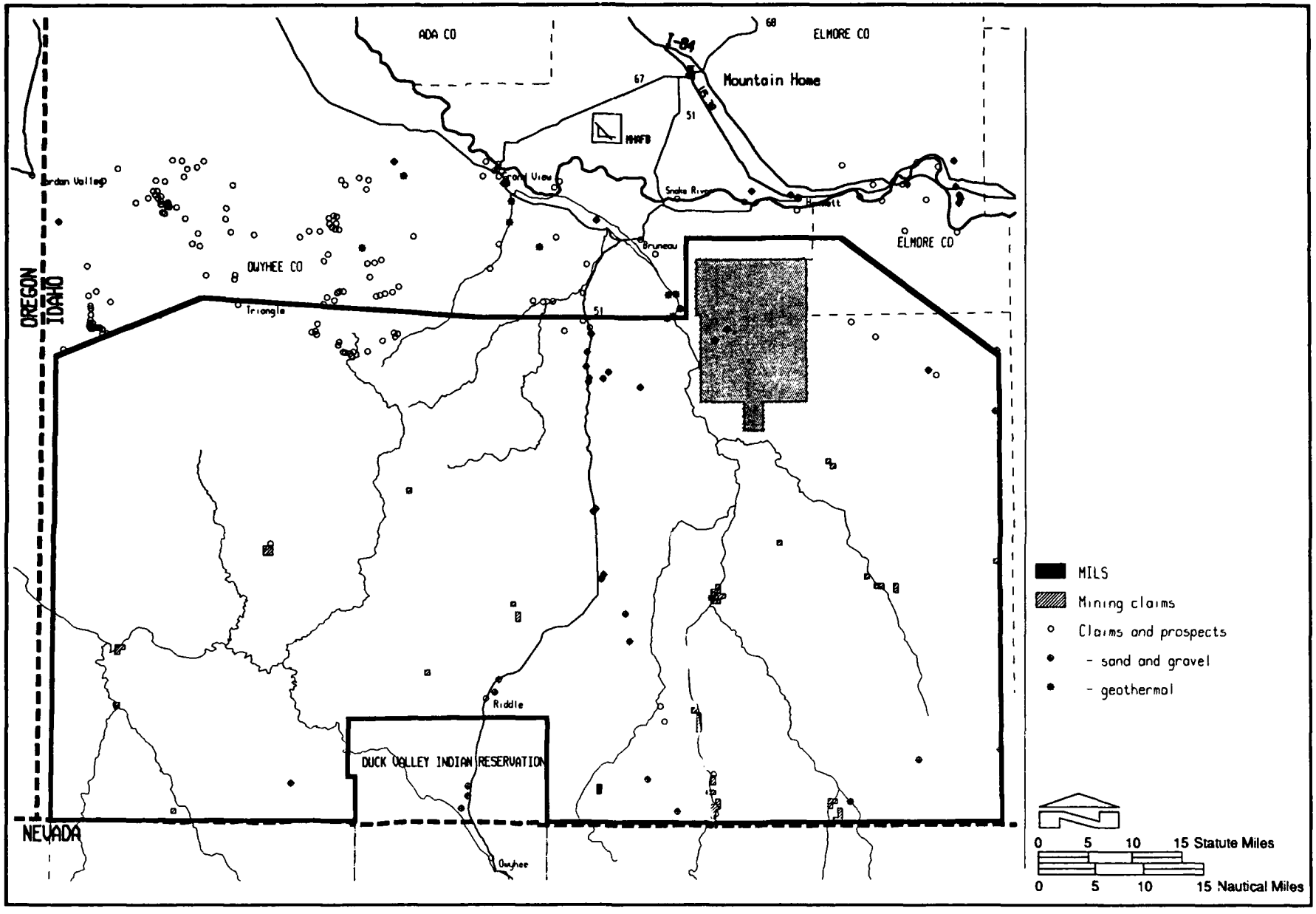


Figure S3.7-1

MINING CLAIMS, PROSPECTS, AND MINERAL DEPOSITS

One of the more well-known earth resources in this area is the Bruneau jasper, a red and green gem-quality stone. Known jasper deposits near Indian Hot Springs, located at the confluence of the Bruneau and Jarbidge rivers, currently are being mined commercially. Unpatented mining claims cover most of the Bruneau jasper deposits, however. These deposits are a zone of jasper-filled cavities. Gas cavities, fractures, and other voids in rhyolite flows are filled with secondary silica leached from the rhyolites by groundwater movement. The hot waters of the Bruneau-Jarbidge area are especially effective at this leaching. The deposits around Indian Hot Springs have been commercially mined (Maley 1987).

Geothermal resources also exist in the study area. Indian Hot Springs and Murphy Hot Springs lie within the Bruneau Known Geothermal Area designated by the U.S. Geological Survey in 1974. There has been no development of this resource, although research and leasing has proceeded (BLM 1985).

There remains some interest in oil and gas in the Snake River Plain. The Bruneau-Jarbidge Caldera and surrounding area are unlikely to have any oil or gas potential considering the great heat the crust has absorbed (BLM 1985).

Sand and gravel deposits occur along and near the Snake River and are used for construction materials.

S3.7.8 Cave Resources

Caves are of interest for recreation and for scientific research. Idaho is known particularly for its lava caves. These caves are often preserved in relatively young lava tubes, lava blisters, or fissures such as those at Craters of the Moon to the northeast of the study area (Ross 1969). Another type of cave -- shelter caves or rockshelters -- can be created by streams and wind. Both cave types have the potential to yield geological, biological, archaeological, and paleontological information. Within the study area, more than 300 caves of archaeological interest have been identified. In addition, caves within the study area potentially contain important biological and paleontological resources, although few have been evaluated. For further discussion of archaeological and biological resources in caves, see sections S3.4 and S3.5.

S3.7.9 Paleontological Resources

Southwestern Idaho is very rich in deposits containing fossil protista (single-cell organisms), plants, invertebrate and vertebrate animals, and extremely rare fossil bracket fungus. There are abundant fossil localities within or near the study area that consist of hundreds of specific collecting sites. These localities include the Hagerman Fossil Beds National Monument that contains more than 200 collecting sites. The area along the Snake River, from Hagerman, Idaho to Adrian, Oregon, includes 190 documented fossil localities (see Figure S3.7-2).

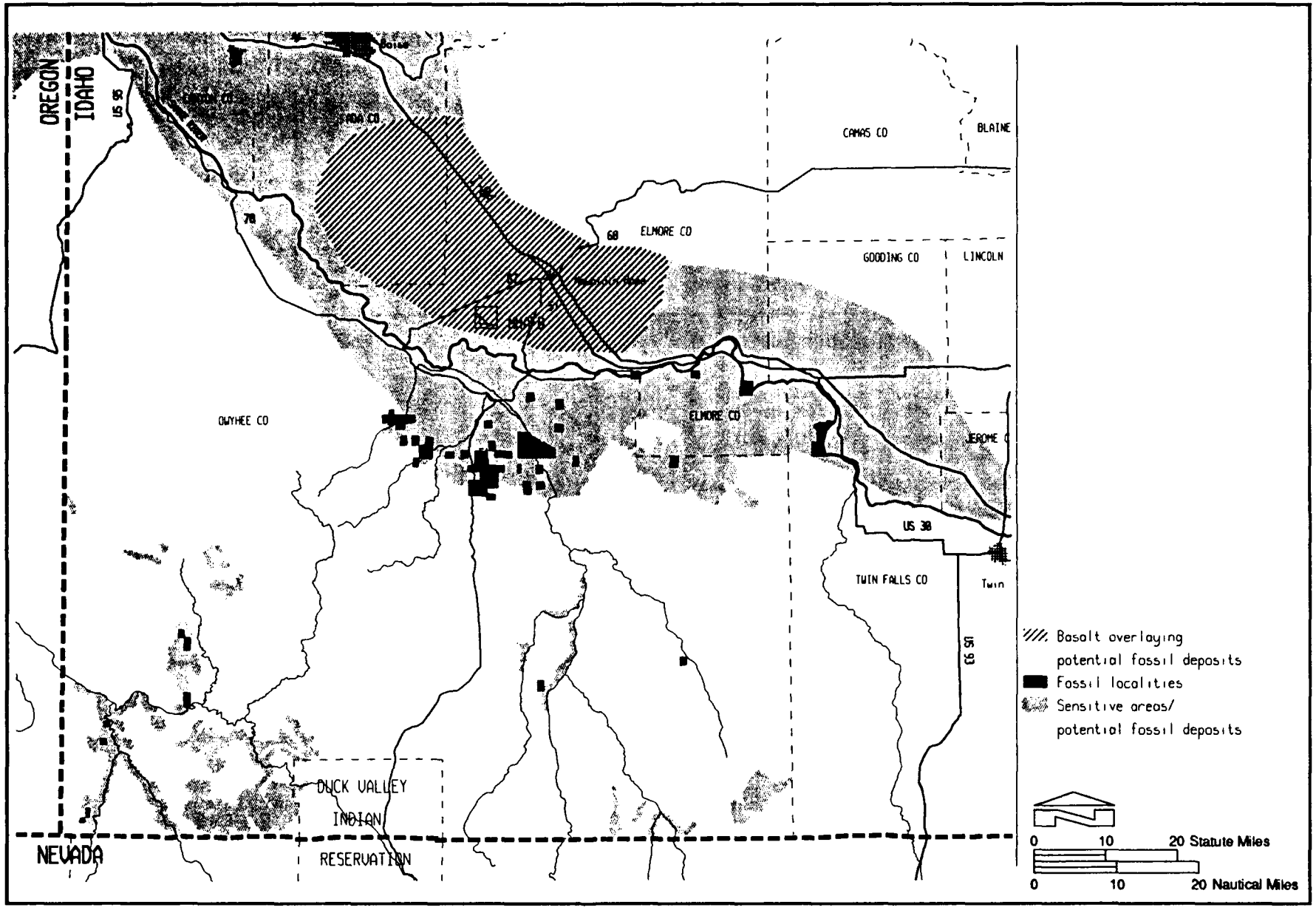


Figure S3.7-2

FOSSIL LOCALITIES AND PALEONTOLOGICAL SENSITIVITY

At least 12 fossil localities are found within the boundaries of the study area. Hundreds of specific collecting sites are known to occur within the study area. Six of these localities are in the northeastern portion of the study area within the Pliocene Glenns Ferry and Miocene Chalk Hills formations. One of these localities is within the Dove Springs Cultural Resource Site Complex, an area designated by the BLM as requiring special management because of site disturbance. Horse Hill, west of Dove Springs, is considered to be a potential National Natural Landmark because of its paleontological resources (cf. Davis 1986). Five other localities contained within the interbedded sediments of the Banbury Basalt are known along the west fork of the Bruneau River, on the Owyhee River, on the Little Owyhee River, and on the south fork of the Owyhee River. These locations also date to Miocene or Pliocene age (Ekren et al. 1981). Potential fossil localities are found along the south fork of the Owyhee River and Juniper Creek (see Figure S3.7-2) in the southern portion of the study area. Additionally, a cave on the east fork of the Bruneau River may contain late Pleistocene fossils.

Based on the locations of known fossil-bearing deposits in the Glenns Ferry Formation, Chalk Hills Formation, and the Banbury Basalt interbedded sediments in the vicinity of the study area, other areas with similar strata are considered to potentially contain fossil-bearing deposits. These areas are primarily located on the northeastern edge of the study area, but are also found adjacent to the Bruneau River. Caves along the Bruneau River may also contain late Pleistocene fossils.

Although information is not currently available to assess the importance of each fossil locality within the study area, the region as a whole does contain important deposits (e.g., Hagerman Fossil Beds National Monument, Sand Point, and Horse Hill). For this reason, fossil localities within the study area should be considered a valuable resource.

S3.8 LAND USE

S3.8.1 Definition of Resource

The attributes of land use addressed in this section include land ownership, recreation, special use areas, and livestock grazing. Land ownership, also referred to as land status, is a categorization of land according to type of owner. The major land ownership categories discussed here are federal (public), state, and private (patented) land. Federal land is further identified as BLM, USFS, Bureau of Indian Affairs (BIA), and DOD. Recreation resources include natural features and man-made facilities designated or available for public recreation use. Special use areas include designated wilderness areas; wilderness study areas (WSAs); wild, scenic, and recreational rivers; and areas of critical environmental concern (ACECs). The livestock grazing section provides a summary of past and present grazing activities in the proposed range expansion study area.

S3.8.2 Region of Influence

The ROIs for the attributes addressed under land use are variable and are described individually under each attribute. The agencies with jurisdiction over land use in the ROIs include BLM; USFS; the states of Idaho, Nevada, Oregon, and Utah; Owyhee and Elmore counties and other nearby counties; incorporated areas (cities); and the Air Force.

S3.8.3 Regional Setting

The SCR is located in southwestern Idaho approximately 430 miles south of the Canadian border, 41 miles north of the Idaho-Nevada state line, and 69 miles east of the Idaho-Oregon state line (see Figure 1.2-1). The range is situated on the Snake River Plain in eastern Owyhee County. Six miles north of the range, the Snake River forms a portion of the Owyhee-Elmore county line. On the east side of the range, almost 6 miles of the range boundary is contiguous with the Owyhee-Elmore county line. Ada County is approximately 24 miles to the northwest while Gooding, Twin Falls, and Camas counties are 20 or more miles to the east. The regional setting of the range is shown in Figure S3.8-1.

In Elmore County, the city of Mountain Home is approximately 20 miles north of the SCR, and the city of Glenns Ferry is approximately 11 miles northwest. The city of Murphy, the county seat of Owyhee County, is approximately 55 miles northwest of the range. Unincorporated communities in the vicinity of SCR include the town of Hammett in Elmore County and the towns of Grand View and Bruneau in Owyhee County. These cities and towns are shown on Figure S3.8-1.

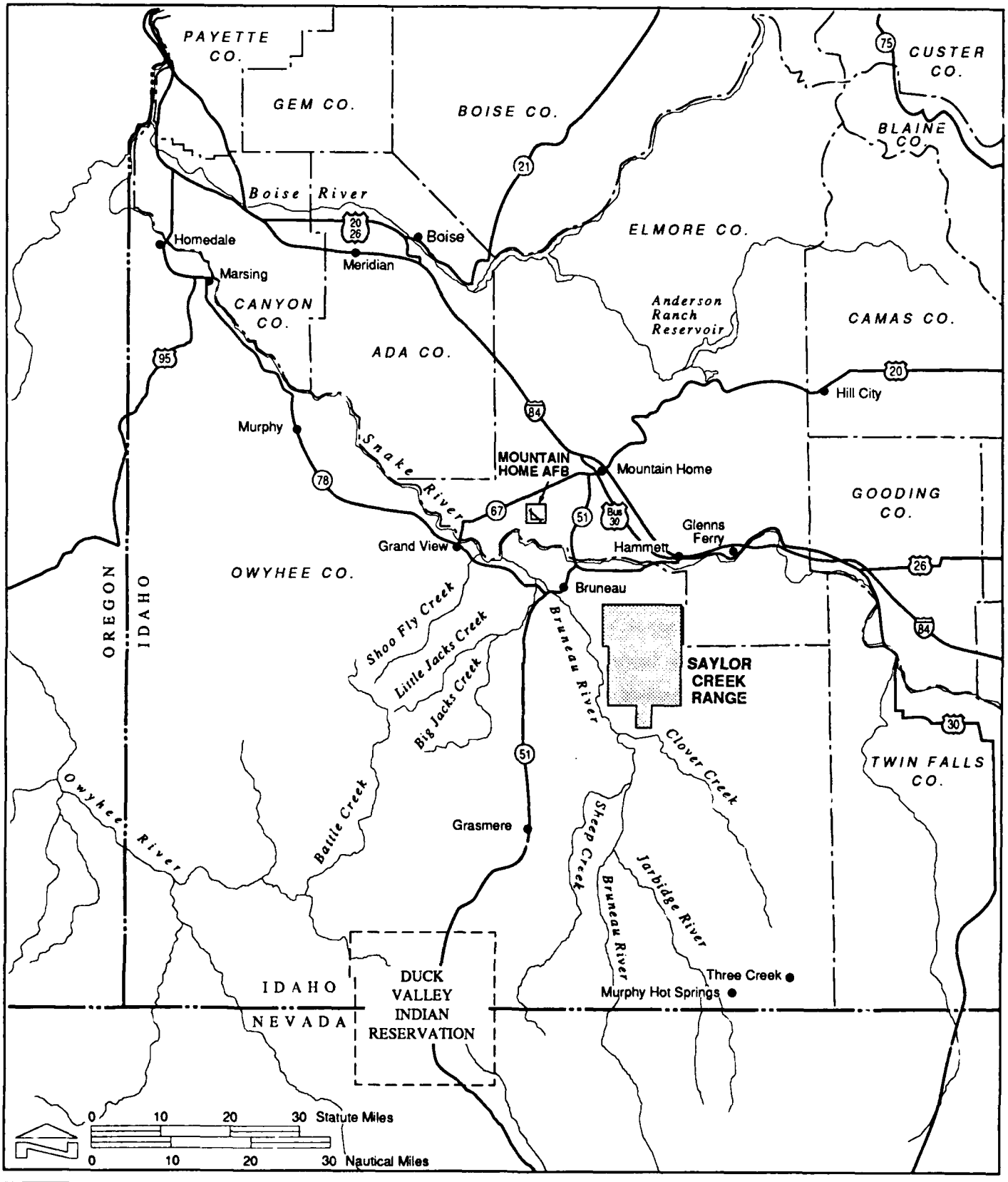


Figure S3.8-1

SAYLOR CREEK RANGE REGIONAL SETTING

S3.8.4 Land Ownership

The ROI for land ownership is the same as the study area for potential impacts due to ground disturbances described in Chapter 2. This area includes approximately 3,448,000 acres. The primary landowner is the federal government, which controls approximately 88 percent of the ROI. Most of the federal land is managed by the BLM. Approximately 81 percent of the ROI is BLM land, with 4 percent controlled by the BIA, and 3 percent by the DOD. The state of Idaho controls approximately 6 percent of the ROI; and approximately 6 percent is private land. The BIA land is the 460-square-mile Duck Valley Indian Reservation, which straddles the Idaho-Nevada state line and occupies approximately 230 square miles of Owyhee County. The land ownership pattern for the region is depicted in Figure S3.8-2.

S3.8.5 Recreation

The recreational resources ROI includes the areas of potential ground disturbance as well as the areas of increased aircraft activity under the MOAs, MTRs, and restricted areas (see figures S3.8-3 and S3.8-4). In addition to southwestern Idaho, this area includes recreation resources in southeastern Oregon, northern Nevada, and the northwestern corner of Utah.

The Idaho Department of Commerce estimates that tourism is Idaho's third largest and fastest growing industry. While the demand for outdoor recreational opportunities in general has been growing rapidly in recent years, the demand for wilderness recreation in particular has been growing even more rapidly (BLM 1984a). Since the Forest Service began compiling recreational use data, wilderness recreational demand has increased more rapidly than other outdoor recreation demands. Recreational use of Forest Service wilderness increased annually at a 9.2-percent rate during the 1970s (Walsh, Gillman, and Loomis 1981). Wilderness use in Montana and Idaho increased 15 percent between 1976 and 1978 (Norgaard 1979).

People participate in recreational activities for a variety of reasons -- a sense of refreshment, relaxation, and challenging experiences. For some, recreation provides a chance for solitude, self reliance, and adventure, while for others it provides enjoyable social interactions between family and friends.

Natural resource areas provide primitive as well as developed recreational opportunities. Primitive recreation is that which takes place in undeveloped areas where evidence of human influence is negligible and motorized vehicles are prohibited, thus presenting a high probability of solitude. Examples of primitive recreational activities include hunting, fishing, hiking, and whitewater boating. In developed recreational areas with designated camping spots, amenities such as pit toilets, running water, trash cans, and RV hook-ups may be provided. In these areas, encounters with other users are common.

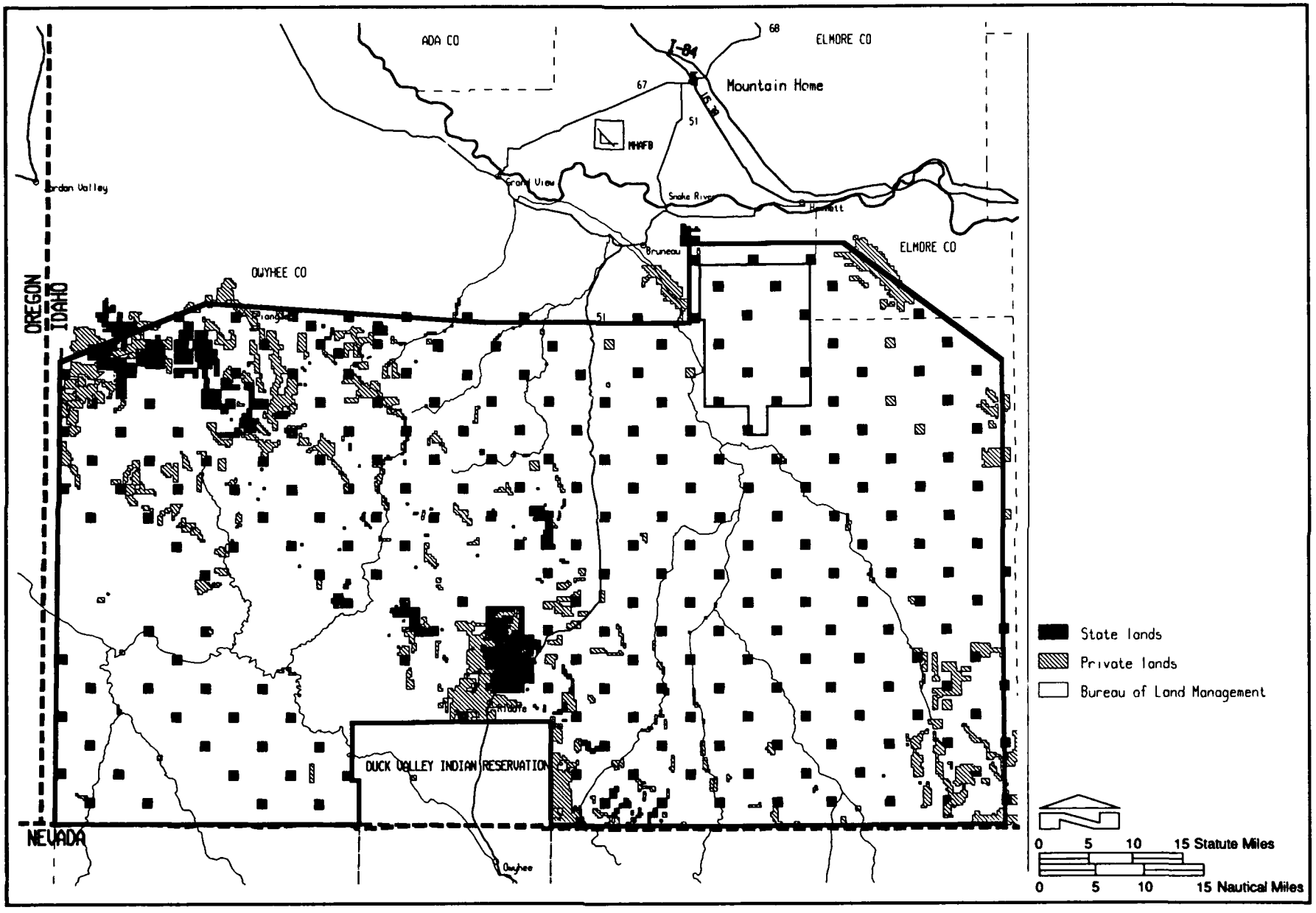


Figure S3.8-2

LAND OWNERSHIP IN THE GROUND DISTURBANCE ROI

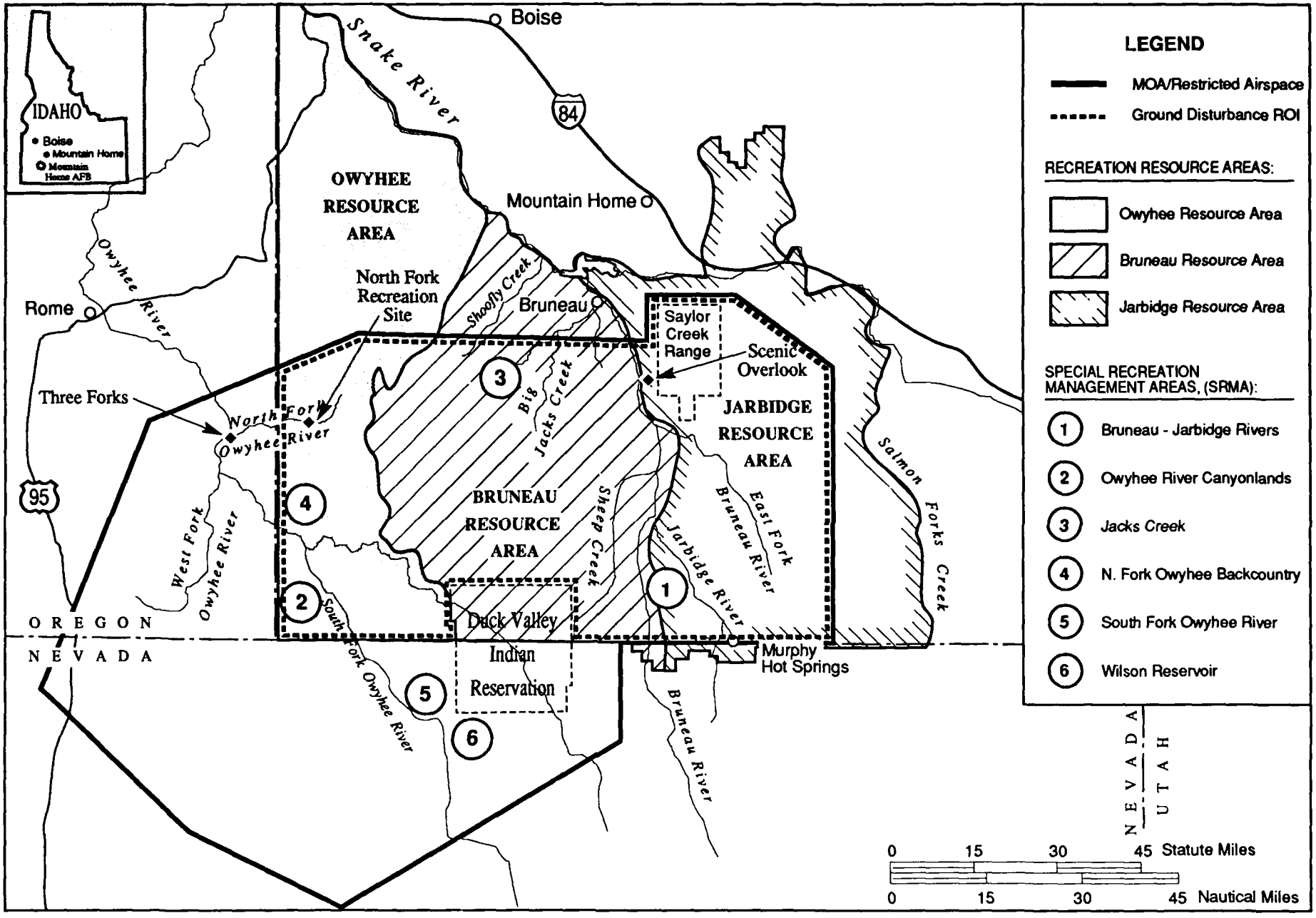


Figure S3.8-3

RECREATIONAL RESOURCES UNDER THE MOAs AND RESTRICTED AIRSPACE

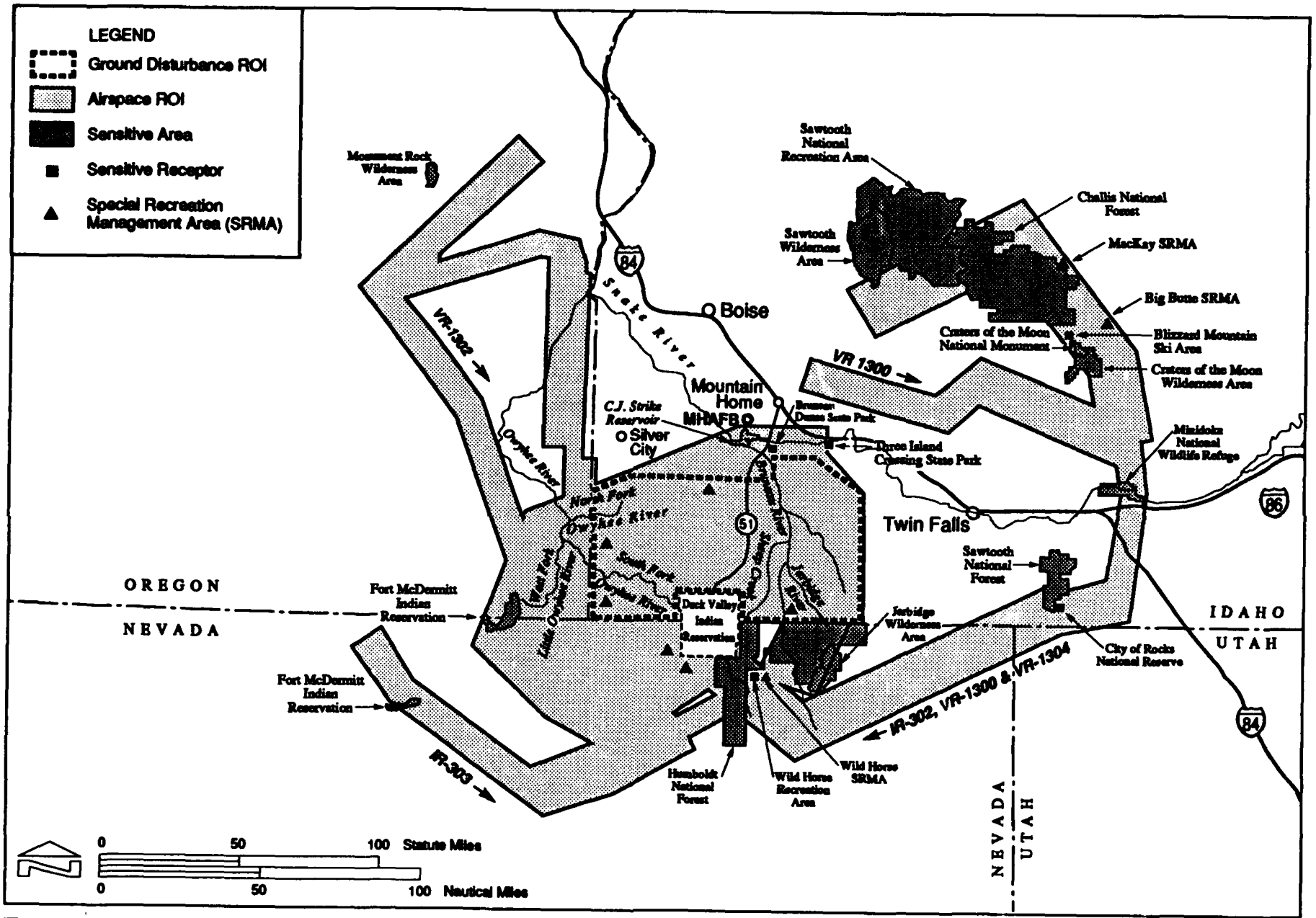


Figure S3.8-4

RECREATIONAL RESOURCES UNDER THE MTRs

Most of the land in the ROI is managed by the BLM. The BLM follows the principles of multiple-use and sustained yield management practice -- balancing resource enhancement and protection with resource use. Recreational resources are a primary consideration in the planning of multiple-use areas.

For better management, BLM land districts are subdivided into resource areas (RAs). In portions of an RA where high visitor use and its associated impacts have caused resource management problems, Special Recreation Management Areas (SRMAs) are established. Recreation is considered the principal management objective in an SRMA. The purpose of SRMAs is to encourage recreation use in a designated area and protect surrounding natural resources from recreation abuse. The remainder of the land surrounding the SRMAs in the RA are called extensive areas. In extensive areas, recreation is not a principal management objective. These areas, which constitute the bulk of the public lands, offer recreational activities with minimal regulatory constraints.

Five RAs, Owyhee, Jarbidge, Bruneau, Challis, and Big Butte, are potentially affected by the proposed expanded range capability and increased aircraft activity. A variety of recreational activities are available in the RAs and the associated SRMAs and extensive areas. These include hunting, fishing, whitewater boating, ORV use, hiking, horseback riding, camping, caving, rock climbing, rock collecting, nature study, and photography.

S3.8.5.1 Owyhee Resource Area

The Owyhee RA (see Figure S3.8-3) covers 1,351,986 acres of BLM-administered public land. In addition to providing excellent hunting and fishing opportunities, the area provides wilderness lands, historic resources, and ORV opportunities. The Owyhee River, which has been proposed as a Wild and Scenic River in the Owyhee RA, offers whitewater boating opportunities with a difficulty of Class I through Class V from February through June. In recent years, the popularity of backpacking in the area has increased, particularly in the major tributary canyons. Approximately 50 percent of the Owyhee RA is contained in the ROI.

Owyhee Extensive Area. Mountain ranges, canyonlands, and expansive flatlands create a wide range of settings from which to enjoy recreational opportunities in the Owyhee extensive area. Recreation use is widely dispersed and consists mostly of hunting, fishing, horseback riding, rock collecting, camping, sightseeing, and ORV use. Total annual recreational use of the area is estimated at 7,200 visits (BLM 1989b). Only one developed recreation site is located within the Owyhee extensive area, the North Fork Recreation Site. It is located along the Deep Creek-Mud Flat Road at the crossing of the North Fork Owyhee River. This recreation site is a six-unit campground with one picnic or day-use area.

Owyhee River Canyonlands SRMA. The area between the East Fork and South Fork of the Owyhee River composes the Owyhee River Canyonlands SRMA. These canyonlands have a national reputation for exceptionally scenic, high quality whitewater boating. During the low water periods, the river canyons provide primitive backpacking opportunities. Wildlife enthusiasts visit this primitive area to view and photograph the California bighorn sheep. The canyonlands support 7 percent of the world's population of bighorn sheep. An Area of Critical Environmental Concern (ACEC) of over 180,000 acres has been designated to protect them. The hunting of big game and upland game occurs in the fall and winter months. Rock collecting is another popular recreational activity in the canyonlands. Approximately 1,400 recreation visits occur each year with 70 percent of these for whitewater boating (BLM 1989b).

North Fork Owyhee Backcounty SRMA. This area is typified by major canyon systems with numerous tributary rock draws. It offers challenging primitive recreation opportunities in a very rugged and inaccessible setting. The National Park Service is currently recommending a National Natural Landmark (4,413 acres) in this area because of the unique riparian habitat and pristine juniper woodlands. In the southern section of the SRMA, an ACEC is being proposed to protect an area of pristine sagebrush and rock outcrops. Annual recreation use in the SRMA is estimated at 400 visits per year mainly for backpacking, sightseeing, and camping activities. However, annual recreation use is expected to increase significantly.

S3.8.5.2 Bruneau Resource Area

The Bruneau RA (see Figure S3.8-3) covers 2,055,155 acres of BLM-administered public land. A wide variety of outdoor recreation opportunities are available, such as hunting, fishing, hiking, camping, rock collecting, and boating. The majority of the RA is open to ORV recreation. Approximately 80 percent of the RA is in the ROI.

Bruneau Extensive Area. Most of this area consists of flat to rolling terrain covered with grass and sagebrush. Primitive recreational use is dispersed, consisting mostly of hunting, fishing, and ORV activities. The WSAs in the southcentral portions of the area provide wilderness recreational opportunities for hikers and campers. ORV use is restricted in these areas and in an ACEC that together constitute about 25 percent of the 1.9 million acres of the Bruneau extensive area. Total annual recreation use of the area is estimated at 180,000 visits per year (BLM 1989a). Portions of the Idaho Centennial Trail are found in this area. Currently, no developed recreational sites are located in the Bruneau extensive area.

Jacks Creek SRMA. Two major canyon systems (Jacks Creek Canyon and Shoofly Canyon) and an intervening basaltic dome are included in this SRMA. A major recreational and educational attraction in this area is the opportunity to view bighorn sheep in their natural habitat (see section S3.4, Biology).

In Idaho, bighorn sheep are second only to the grizzly bear as the animal species most sought by wildlife enthusiasts (Schoenfeld and Hendee 1978). Hunters also seek bighorn sheep and consider them the premier trophy species in North America (Idaho Department of Fish and Game 1983). Jacks Creek has also been proposed as an ACEC because of the bighorn sheep habitat. Fishing resources are good, but are mostly confined to the mouth of Little Jacks Canyon. Motorized vehicles are prohibited. Currently, permits are not required by visitors. Use of the area is estimated to be 1,600 visits per year (BLM 1989a).

S3.8.5.3 Jarbidge Resource Area

The Jarbidge RA includes 1,690,473 acres of BLM-administered public land (see Figure S3.8-3). The SCR is entirely within the Jarbidge RA. Two state parks (Bruneau Dunes and Three Island Crossing) are located just north of the SCR. Bruneau Dunes is partially within the ground disturbance ROI.

Jarbidge Extensive Area. This area consists mostly of flat to rolling plateaus covered with grass and brush. The Snake River is a major recreational attraction. Hunting, fishing, boating, and motor vehicle use are the primary recreational activities. A portion of the proposed Idaho Centennial Trail follows the Bruneau River south to the Jarbidge River Junction, continuing south along the Jarbidge River and terminating at Murphy Hot Springs. Snowmobiling in the winter is also very popular, but future use will need to be controlled to avoid adverse impacts on wintering elk, mule deer, and pronghorn. Total annual recreational use of the area is estimated at 85,000 visits (BLM 1989a).

Bruneau - Jarbidge Rivers SRMA. This area is dominated by deep spectacular canyons that dissect grass and sagebrush covered plateaus. The Bruneau River drainage system has been studied for inclusion in the National Wild and Scenic River System. It was recommended for Wild and Scenic River designation by the National Park Service in 1979. However, no action has yet been taken by Congress. These rivers have a reputation for challenging whitewater boating that includes rafting, kayaking, and canoeing in a primitive setting. In an average year, about 1,000 visitors utilize the area with 30 percent of this use for whitewater boating (BLM 1989a). Fair to excellent fishing resources are also available; however, due to a lack of roads and rough topography, accessibility to streams is limited. The limited accessibility also provides many opportunities for solitude. Hunters pursue big game animals such as deer, elk, pronghorn, black bear, and cougar. Upland game found in this area include sage grouse, pheasant, quail, chukar, dove, and rabbit. Bighorn sheep have been reintroduced successfully into the area. Also in this SRMA is the Bruneau Canyon Scenic Overlook, which provides a view of one of the deepest gorges in the continental United States. Approximately 1,000 visitors per year drive the 30-mile gravel road from the town of Bruneau to the scenic overlook (BLM 1989a). The last 7 miles of the road is on the SCR. The overlook is just outside the SCR boundary.

S3.8.5.4 Challis Resource Area

MacKay Reservoir SRMA. This SRMA is located in eastern Idaho, adjacent to U.S. Highway 83, a major north-south transportation route connecting Idaho, Montana, and Nevada. The recreation site is used as both an overnight and day-use facility. The SRMA receives about 17,000 visits in the summer with most people camping and fishing (BLM 1989b). The recreation site is also moderately used during hunting seasons (October and November) and during ice fishing season (January and February).

S3.8.5.5 Big Butte Resource Area

Big Butte SRMA. This SRMA varies from high desert plain to steep mountain slopes. The Snake River Plain encompasses the Big Butte SRMA. The SRMA provides dispersed recreation activities such as hunting, fishing, camping, picnicking, ORV activities, rock collecting, and hiking.

S3.8.5.6 Idaho Centennial Trail

A portion of a proposed hiking trail, the Idaho State Centennial Trail (scheduled for dedication in 1990), traverses the ground disturbance ROI in a north-south direction. The proposed route crosses the Snake River west of Glenns Ferry, follows the Bruneau River canyon rim south to the Jarbidge River junction, and continues south along the Jarbidge River canyon rim terminating at Murphy Hot Springs. Recreational opportunities for users of the trail will be available throughout the year.

S3.8.5.7 Oregon Recreation

The portion of the ROI under the MOAs (see Figure S3.8-3) that extends into the southeastern part of Oregon is part of a larger canyon complex called the Owyhee Canyonlands. The recreational activities available there are whitewater boating, fishing, hunting, rock collecting, ORV activities, vehicle camping, and nature study. The canyons are typically deep, narrow and very meandering. This meandering characteristic of the canyon provides excellent topographic screening between visitor groups traveling close together. River-level views up and down the canyons are limited to 0.25 to 0.5 mile (BLM 1989c). This limited viewing distance enhances a sense of isolation and solitude.

The Owyhee River in Oregon has been identified as a SRMA by the BLM and as a Wild and Scenic River by Congress. Whitewater boating is the major primitive recreational activity. The whitewater boating season, depending on climate, winter snowpack, and runoff rates, extends from February through June, with the greatest use occurring from mid-April to mid-June. This limited season combined with difficult access, rugged terrain, and state restrictions have kept boating activities low. In 1984, about 147 users (commercial and noncommercial) travelled on the river between Three Forks

and Rome, Oregon (BLM 1985b). Since no commercial access points exist west of the stateline, use of the Owyhee River from the stateline to Three Forks is dependent on access from the Idaho side. Estimated boating use above Three Forks (including the East and South forks of the Owyhee River in Nevada and Idaho) in 1989 was about 200 persons (BLM 1989c).

The Owyhee River Management Plan, completed by the BLM in 1983, established carrying capacities for boating use on the Owyhee River in Oregon, Idaho, and Nevada (see Table S3.8-1). This carrying capacity was reaffirmed by the 1986 Owyhee National Wild River Management Plan. The BLM expects that due to weather and water flow conditions, an average year would only allow about one-half of the potential starts during a consecutive 45-day "useable float period." Although total annual carrying capacity of the river should not be reached until the year 2002, use limits have already been surpassed in the section from Three Forks to Rome on weekends and during the latter part of the boating season (BLM 1989c). The carrying capacity estimate is based upon limitation of recreation visitor groups on the river system to an average of one per day on both the East Fork Owyhee River and South Fork Owyhee River in Idaho and Nevada, and four per day at Three Forks on the main stem of the Owyhee River in Oregon.

Table S3.8-1

Owyhee River Interim Use Limits

	Starts/day *Parties*	*Maximum* *Party Size*	*Parties/* *Year*	*People/* *Year*
Above Three Forks	2	15	182	2,730
Three Forks to Rome	4	15	364	5,460
TOTAL	6	--	546	8,190

S3.8.5.8 Nevada Recreation

Predominant recreational activities available in the Nevada portion of the ROI are fishing, sightseeing, hunting, boating, and ORV use. Recreational resources include two SRMAs, the Humboldt National Forest, and two WSAs.

There are three SRMAs located in the ROI in Nevada, Wilson Reservoir, South Fork of the Owyhee, and Wildhorse. Wilson Reservoir and Wildhorse are both located in the northern portion of the Elko RA. Wildhorse SRMA is located in the Wells RA. The Wilson Reservoir SRMA is used predominantly by fishermen, boaters, and campers. In 1988, an estimated 17,500 recreation visits occurred (BLM 1989d). A 15-unit campground has been proposed for the area and will contain an RV site, boat ramp, day-use area, and health and sanitation facilities. Wildhorse SRMA has four

campgrounds which provide an important campground to fishermen, hunters, and other recreationalists. The Wildhorse Reservoir is a year-long trout fishery, which includes excellent ice fishing. Annual recreation use is estimated to be 19,700 visits, the majority of which are related to fishing, camping, ORV, and other water-based recreation (BLM 1989d). The South Fork Owyhee River SRMA is more primitive and used by whitewater boaters, hunters, and fishermen. ORV use is also popular in the areas surrounding the Wilson SRMA, but due to rough topography, ORV use in the South Fork Owyhee River SRMA is restricted.

Mountain ranges in the Humboldt National Forest include the northern portion of the Santa Rosa Range and the Bull Run Mountains. One developed campground and one picnic area can be found in the Santa Rosa Range district. The Bull Run Mountains have two developed campgrounds. Most of the usage of the developed facilities occurs during the summer and fall hunting season (U.S. Forest Service 1985).

S3.8.6 Special Use Areas

Special Use Areas that occur in the ROI include established Wilderness Areas; WSAs; Wild, Scenic, and Recreational Rivers; wild horse herd areas; and ACECs. Figure S3.8-5 depicts the special use areas in the portion of the ROI encompassed by the MOAs and restricted areas.

Wilderness Areas

Wilderness status is designated by Congress to preserve areas that have minimal evidence of human activities in their primeval state. The Wilderness Act of 1964 specifies that use of motor vehicles or other motorized equipment, landing of aircraft, structures, and temporary roads are incompatible with wilderness preservation. Although not prohibited by the act, low-altitude jet aircraft flights over wilderness can reduce the solitude of wilderness. Since one of the goals of wilderness management is to preserve solitude values, low-flying jet aircraft are generally considered incompatible with wilderness.

While the demand for wilderness use is high, wilderness designation does not necessarily result in an increase in recreation use (Johst 1983 and Peterson 1981). Some wilderness areas are excessively crowded while others are seldom visited. More than 80 percent of the wilderness visitor use occurs in less than 20 percent of wilderness areas (Washburne and Cole 1983). Wilderness users seek out areas close to their homes with high quality scenery, water, and wildlife viewing opportunities (Roggenbuck 1980 and Lucas 1980).

These areas are defined, in part, as having a primeval character which is protected and managed to preserve, enhance, and restore a natural undeveloped condition and provide outstanding opportunities

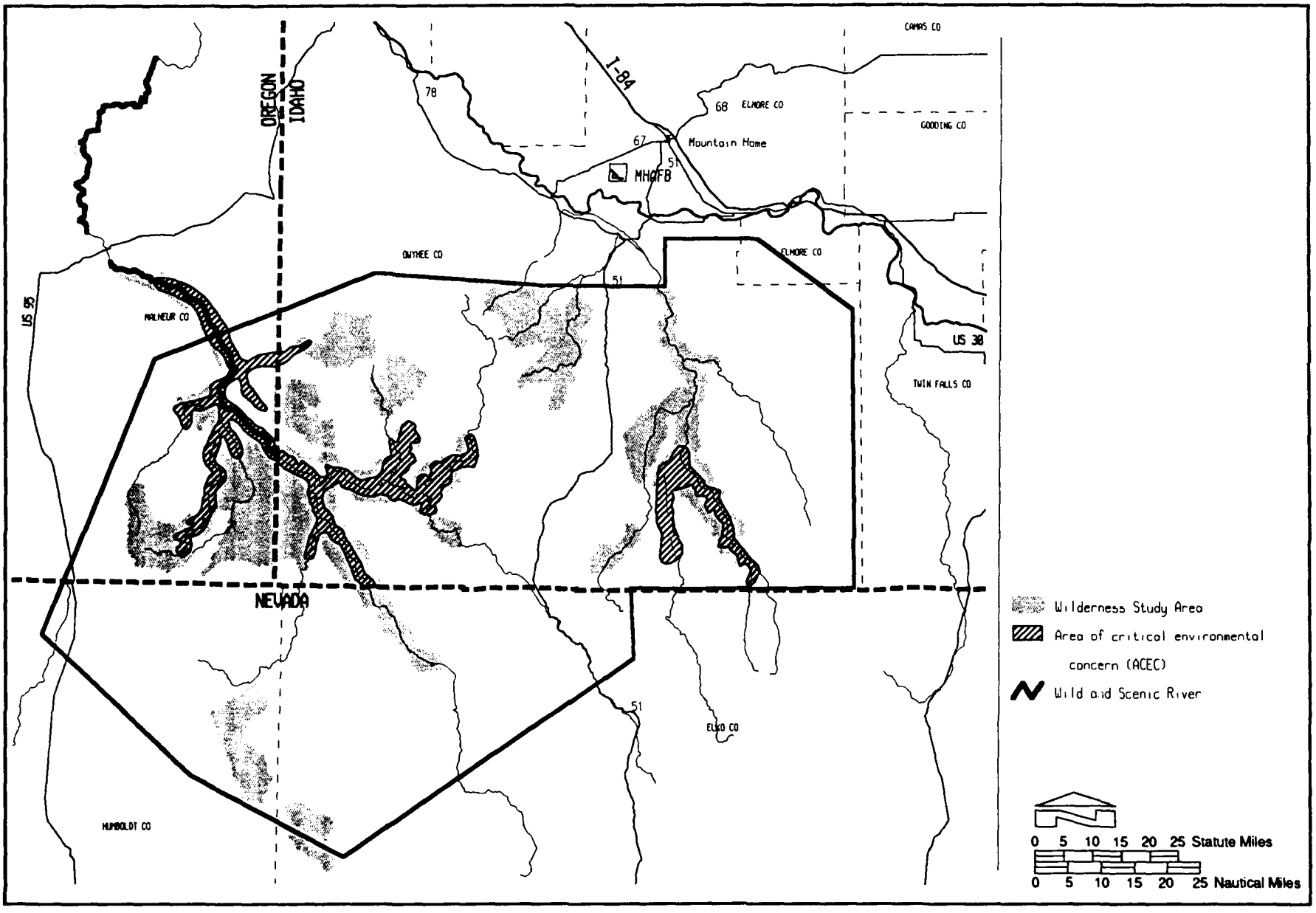


Figure S3.8-5

SPECIAL USE AREAS

for solitude or primitive recreation. The primary management guideline is to achieve and perpetuate a natural plant and animal community where human influence is not apparent. Public use of motor vehicles, motorized equipment, and aircraft is prohibited, and use by administrative personnel is restricted.

No designated Wilderness Areas are located in the potential ground disturbance ROI. Four designated Wilderness Areas are located in the airspace ROI (see Figure S3.8-4). Monument Rock Wilderness Area is located near IR-304 in eastern Oregon. The Jarbidge Wilderness Area is located under IR-303 in northern Nevada. Both Craters of the Moon and Sawtooth Wilderness areas are located in southern Idaho under IR-302 and VR-1304.

Wilderness Study Areas

WSAs are studied to determine if they are suitable for wilderness designation. WSAs should be found to be natural in character and to provide outstanding opportunities for solitude and primitive recreation. Recommendations for Wilderness designation are submitted to the Secretary of the Interior for eventual congressional action. Until the congressional review process is completed, WSAs are managed so as to not impair their suitability for Wilderness designation.

Approximately 30 WSAs (22 in Idaho, 4 in Oregon, and 4 in Nevada) are within the MOAs and restricted airspace ROI. Four of these WSAs are located along the Bruneau/Jarbidge rivers and Sheep Creek; three more between the Shoofly and Big Jacks creeks; the remaining 15 encompass the Owyhee River system (North Fork, Middle Fork, South Fork) and Deep Creek.

In the WSAs located between the Shoofly and Duncan creeks, popular recreation activities include bighorn sheep viewing, hunting, fishing, backpacking, nature study, and hiking. Although visitor days seem comparably low to other wilderness land such as the Sawtooths, this area is amongst the most heavily used WSAs in southwestern Idaho. Visitor-use restrictions have not been implemented; however, depending on human disturbance to the bighorn sheep herd and habitat, the BLM anticipates imposing restrictions in the next 5 to 10 years (BLM 1984a). Total recreation use is estimated at 3,475 annual visitor days (12-hour periods). Hunting accounts for about 70 percent of current use (BLM 1984a).

The WSAs located in southwest Idaho along the Oregon and Nevada borders are characterized by miles of canyonlands and plateaus. The opportunities for solitude, scenic natural features, and primitive recreation (nonmotorized and nondeveloped types of outdoor recreational activities) attract people interested in hunting, backpacking, river running, photography, and nature study.

Two WSAs located in the southwest part of the Jarbidge Resource Area are dissected by the Bruneau and Jarbidge rivers. Maze-like canyons and natural bridges create a distinctive landscape. The Bruneau/Jarbidge River system within the WSAs have been recommended for Wild and Scenic River designation and are considered premier non-permit whitewater rivers. During 1983, the Bruneau/Jarbidge River system received 4,720 visitor days of use (BLM 1985a).

Along the lower portion of Sheep Creek near Duck Valley Indian Reservation are two more WSAs. Current use of these WSAs is estimated at less than 50 annual visitor days and is limited to an occasional hunting party (BLM 1984a).

Wild, Scenic, and Recreational Rivers

Wild rivers are inaccessible to the general public except by water, foot or horse trail; the river area is primitive in nature and free of any man-made development, except foot bridges. Scenic rivers have limited road access and are largely primitive and undeveloped or used for dispersed human activities. Recreational rivers are readily accessible by road or railroad and may have development in the river area. Wild rivers are generally managed in accordance with the guidelines for wilderness areas in order to protect their wild character. No motorboat usage is permitted. Scenic rivers are generally managed in accordance with the guidelines for wild forest areas. Limited access by motor vehicles is permitted, and motorboat usage is not normally permitted. The natural character of the river is to be preserved. Recreational rivers are generally managed in accordance with the guidelines for wild forest areas. The natural character of the river and its immediate shoreline is to be preserved and enhanced.

Approximately 120 miles of the Owyhee River in Oregon has been designated as a Wild and Scenic River, from the Owyhee Reservoir (excluding the Rome Valley from China Gulch to Crooked Creek) to the Oregon-Idaho border. The Owyhee River from the Oregon-Idaho border to the Duck Valley Indian Reservation has been proposed as a wild and scenic river. The Owyhee River system has become nationally recognized as an early-season whitewater river (see section S3.8.5.7, Oregon Recreation). The steep secluded river-cut canyons of the Owyhee provides an excellent habitat for bighorn sheep.

Wild Horse Management Areas

A wild horse herd roams just northeast of the SCR. The wild horses are managed by the BLM in accordance with the Wild Horse and Burro Act, which recognizes the unbranded and unclaimed animals as a worthy resource. The Saylor Creek herd area is approximately 82,000 acres in size and is managed to support 50 wild horses which has been the horse population since the passage of the Wild Horse and Burro Act in 1971. There are two other horse herds in the ROI. One herd is located in

Oregon at the northern edge of the Paradise MOA and the other is in Nevada between Snowstorm Mountains and the Idaho border (see section S3.4.4.1, Biological Resources).

Areas of Critical Environmental Concern

ACECs are public lands where the BLM has determined that special management attention is required "... to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources and other natural systems or processes, or to protect life and safety from natural hazards."[1]

There are two ACECs located in the aircraft disturbance ROI, the 180,000-acre Owyhee River Bighorn Sheep Habitat ACEC located along the Owyhee River System in Idaho and the 84,111-acre Bruneau-Jarbidge River Bighorn Sheep Habitat ACEC located along the Bruneau-Jarbidge River System. These ACECs have been established to protect the bighorn sheep habitat. Bighorn sheep inhabit remote, inaccessible areas where human interference is minimal (see section S3.4, Biological Resources)

S3.8.7 Livestock Grazing

The ROI for livestock grazing is the same as the study area for potential impacts due to ground disturbances described in Chapter 2. This ROI includes significant portions of BLM's Owyhee, Bruneau, and Jarbidge resource areas.

Livestock grazing is a major source of income in the ROI. Grazing occurs on virtually all of the public land and much of the state and private land, except areas restricted for ecological, cultural, or recreational purposes.

S3.8.7.1 Origins of the Grazing Industry

The earliest recorded livestock grazing in southwestern Idaho occurred in 1834 along the route of the Oregon Trail. The Oregon Trail emigration peaked in the early 1850s when an estimated 250,000 head of livestock traversed the Snake River Plain each year (Yensen 1980).

With the local discoveries of gold and silver in the 1860s and the coming of the railroad in the early 1880s, southwestern Idaho became a destination for trail herds from Texas and Oregon. By this time, the cattle industry was firmly established, and by 1900 a booming sheep industry was competing with cattle and horses for forage on the open range.

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1. Definition from the Federal Land Policy and Management Act of 1976.

During these years, the federal government made it easy for settlers to obtain land with passage of the Homestead Act of 1862, the Timber and Stone Act of 1870, the Desert Land Act of 1877, and the Carey Act of 1894. These laws provided for private ownership of 160 to 640 acres; but sufficient grazing for a large herd of livestock under the relatively harsh conditions of Idaho's cold desert requires thousands of acres. Thus, most of the open range between the ranches was used by the ranchers as an unmanaged commons. Livestock forage was obtained by freely moving the animals to areas not yet grazed. By 1900, however, usable ranges were fully stocked and further expansion was not possible (Yensen 1980). Furthermore, all seasonal ranges had been severely damaged by overgrazing, and the range carrying capacity was reduced in many areas. However, the numbers of cattle and sheep continued to increase, and the range, especially the winter range, suffered greatly (BLM 1974).

The intense overgrazing created by competition for range resources, combined with frequent wildfire events, led to massive soil erosion, near depletion of native perennial grasses and forbs, and invasion by exotic annual grasses and weeds.

A prolonged drought in the 1920s and 1930s, compounded by the Great Depression, resulted in the failure of many ranches. During these years, the idea that rangeland could and should be managed, grew in acceptance. The Taylor Grazing Act was passed in 1934, and the era of the open range ended 100 years after the first cattle were herded down the Oregon Trail. President Roosevelt promptly withdrew millions of acres of public land in 12 western states to be administered by the Division of Grazing, which eventually became the Bureau of Land Management (BLM).

S3.8.7.2 Current Grazing Practices

Range improvement efforts, better water distribution systems, more timely grazing practices, and reduced dependence on the horse by ranchers have resulted in a steady increase in the number of Animal Unit Months (AUMs) allotted on Idaho ranges in recent years (Yensen 1980).

Although current cattle grazing practices vary among the ranches, many cattle operations use BLM land at lower elevations from mid-April to mid-June. Then the stock are trailed to higher elevations and ranged on Forest Service land or private lands through September, when they are trailed back to the lower BLM ranges for fall grazing. During late fall, winter, and early spring, the cattle graze or are fed on the private lands of the home ranch. Most of the cattle operations are now cow-calf operations, with the calves being feedlot-finished (Yensen 1980).

A typical sheep operation uses BLM land at lower elevations from early April to mid-May. The sheep are grazed on public, private, or state-owned land at intermediate elevations in the foothills through June. Then the sheep are trailed to public or private forest land at high elevations where they graze

through September. In early October, the sheep are trailed (or, less often, trucked) back to the intermediate ranges. In mid-November, they are returned to the lower ranges on BLM land or to rented pastures for about a month. From mid-November through March, they are held at winter headquarters (which is usually irrigated pasture, harvested cropland, or feedlots), but some ranchers use BLM land through the winter. Herders with dogs are used to herd the sheep on the range (Yensen 1980).

The BLM administers a grazing allotment program that allocates land and sets grazing limits. The grazing allotments in the ROI are shown in Figure S3.8-6, and the name and number of each allotment in the ROI are listed in Table S3.8-2. The number of allotments does not directly relate to the number of livestock operators. Some operators have permits to graze in more than one allotment, and some allotments are used by more than one operator.

Within each grazing allotment or group of allotments, a grazing limit is established at a level intended to ensure that adequate forage is also available for wildlife and, where present, wild horses. The limit is also intended to ensure that sufficient vegetation is reserved for purposes of maintaining plant vigor, stabilizing soil, providing wildlife cover, and other nonconsumptive uses. If a grazing limit is increased or reduced, a livestock use adjustment can be made by changing one or more of the following: the kind or class of livestock using an allotment, the season of use, the stocking rate, or the pattern of grazing (BLM 1985a).

A variety of range improvements and range management practices are used in conjunction with livestock management on individual allotments. Range improvements include fences, corrals, water pipelines, water tanks, water troughs, wells, reservoirs, and land treatment measures (e.g., brush control and seeding). These projects are usually implemented and paid for by the rancher, but the BLM also provides significant amounts of funding for specific projects. Existing range improvement projects occur throughout the ROI with a greater concentration in the northern and eastern portions of the ROI.

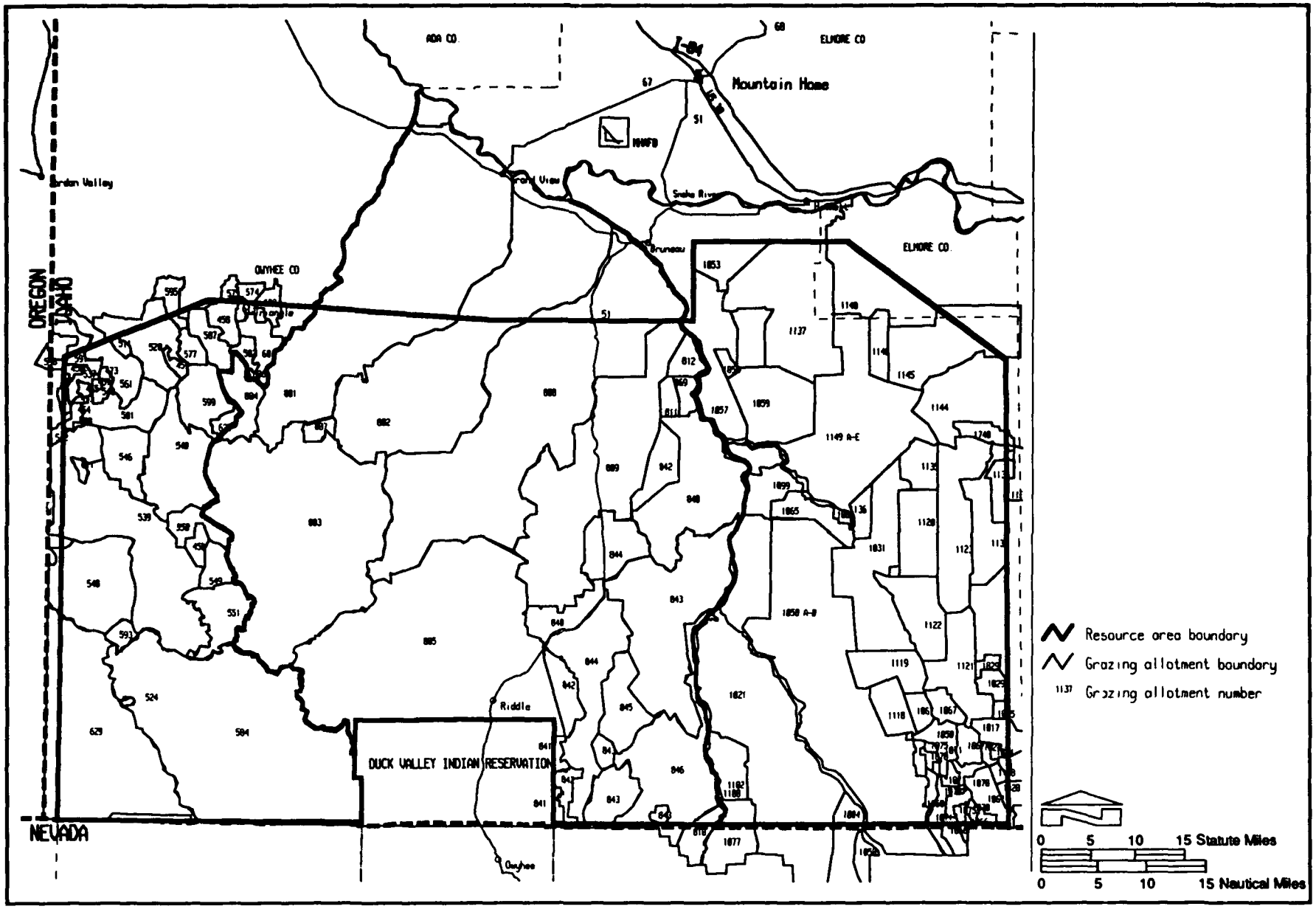


Figure S3.8-6

GRAZING ALLOTMENTS IN THE GROUND DISTURBANCE ROI

Table S3.8-2

GRAZING ALLOTMENTS IN THE GROUND DISTURBANCE ROI

(page 1 of 2)

Owyhee Resource Area

450	Swisher SP	524	Garat Individual	563	Trout Creek Individual
453	Handley FFR	536	South Dougal	573	Hardiman SP
454	Anderson FFR	537	Dougal Individual	577	Bogus Creek
455	Payne FFR	539	Trout Springs	584	Garat
456	Dougal FFR	540	Bull Basin	587	Lone Tree Individual
457	McKay FFR	541	Whitehorse-Antelope	591	South Mtn.-Graz. Coop.
458	Josephine FFR	542	Cherry Creek Field	598	Whitehorse Ore-Ida
459	Brown FFR	543	Stanford Individual	599	Burghardt Individual
470	M. Stanford FFR	546	Pleasant Valley	601	Louisa Creek
473	Lequeria FFR	548	Battleground Boni	602	W. Antelope
501	Cliffs	549	Ben Mills Flat	606	Harris Individual
502	Louisa Creek	550	Star Ranch Field	611	T. Payne FFR
511	Little Boulder FFR	551	Sheep Hills	613	Steiner FFR
520	Indian Meadows	561	South Mtn. Area	625	Burghardt FFR
				629	"45"

Bruneau Resource Area

636	Roaring Springs	808	Northwest	841	Buckhorn
801	Castle Creek	809	Center	842	M & L
802	Battle Creek	810	Scotts Table	843	Simplot
803	Big Springs	811	Canyon View Seeding	844	Tindall & Sons
804	Bennett	812	Miller Table Seeding	845	Antelope Creek
805	Riddle	840	Strickland-Hall-Yates	846	Alzola
807	Camas Creek Pocket				

Jarbidge Resource Area

1002	Cedar Butte Devil Creek	1066	Three Creek No. 8-Pvt	1121	Grassy Hills AMP
1016	Devil Creek Unit 1	1067	Three Creek No. 2	1122	Buck Flat AMP
1017	Devil Creek Patrick	1070	Three Creek No. 8	1123	Coonskin AMP
1020	E & W Deadwood Trap	1071	Three Creek Blossom	1132	East Juniper Draw
1021	Diamond A Unit	1075	Three Creek No. 8	1133	Devil Creek-Balanced Rock
1024	Deadwood	1077	Diamond A Taylor Pocket	1134	Guerry Individual
1029	Grassy Hills	1084	Wilkins Island	1135	South Crows Nest
1031	Juniper Ranch	1092	Signal Butte	1136	East Clover
1050	Poison Creek AMP	1094	Guerry-Patrick	1137	West Saylor Creek
1053	Browns Gulch	1095	Camas Slough	1138	Juniper Draw

Table S3.8-2

GRAZING ALLOTMENTS IN THE GROUND DISTURBANCE ROI

(page 2 of 2)

Jarbidge Resource Area					
1055	Lower Saylor Creek	1099	Seventy-One Desert	1140	Noh Field
1057	Bruneau Hill	1100	Diamond A Bruneau Cyn	1144	Notch Butte
1058	Echo	1102	Blackrock Pocket	1145	Twin Butte
1059	Flat Top	1118	Crawfish	1146	Dove Springs
1064	Winter Camp	1119	Juniper Butte	1148	Southside Group
1065	Three Creek-Clover	1120	Horse Butte AMP	1149	Echo Group

Sources: Owyhee RA (BLM 1980); Bruneau RA (BLM 1982); Jarbidge RA (BLM 1987 and personal communication, Carson 1989).

S3.9 TRANSPORTATION

S3.9.1 Definition of Resource

Transportation resources are defined as the infrastructure and equipment required for the movement of people, raw materials, and manufactured goods in geographic space. These resources may include highway and rail networks, airport and port facilities, and passenger and freight transport services. In the context of the proposed action, the primary transportation concerns are focused on the roadway network within the area under study for an expanded range capability.

S3.9.2 Region of Influence

The ROI contains approximately 3.5 million acres in Owyhee and Elmore counties. Figure S3.9-1 depicts the ROI. Project-related impacts will be assessed for road systems and civil airports within the ROI. There are no railroad, commercial airport, or port facilities in the ROI.

S3.9.3 Roadways

The principal roadway in the area is State Highway 51, which begins in the city of Mountain Home and traverses south through Bruneau and onto Elko, Nevada. This two-lane highway has a paved asphalt surface with varying shoulder types and widths. Vehicle volumes along this route are extremely low within the ROI, having ADTs of less than 350 vehicles. Another paved road in the ROI is 78, a county road located in the northeast corner of the ROI. A short segment of paved road crosses the southwest corner of the ROI, extending from Rogerson to Three Creek.

Numerous unpaved roads also are located within the ROI. These roads include Clover/Three Creek Road, Castleford/Balanced Rock Road, Clover Road, Blackstone/Grasmere Road, and others. Although unpaved, these roads form important elements of the roadway network within the study area. In some cases, these roads provide the only access to portions of Owyhee County for ranchers, residents, recreationists, and land managers.

Given the simplicity of this roadway network, (i.e., only three paved-surface roads) it is obvious that vehicle volume for the network is low. The principal users of the system are cattlemen, hunters, residents of the area, and land managers.

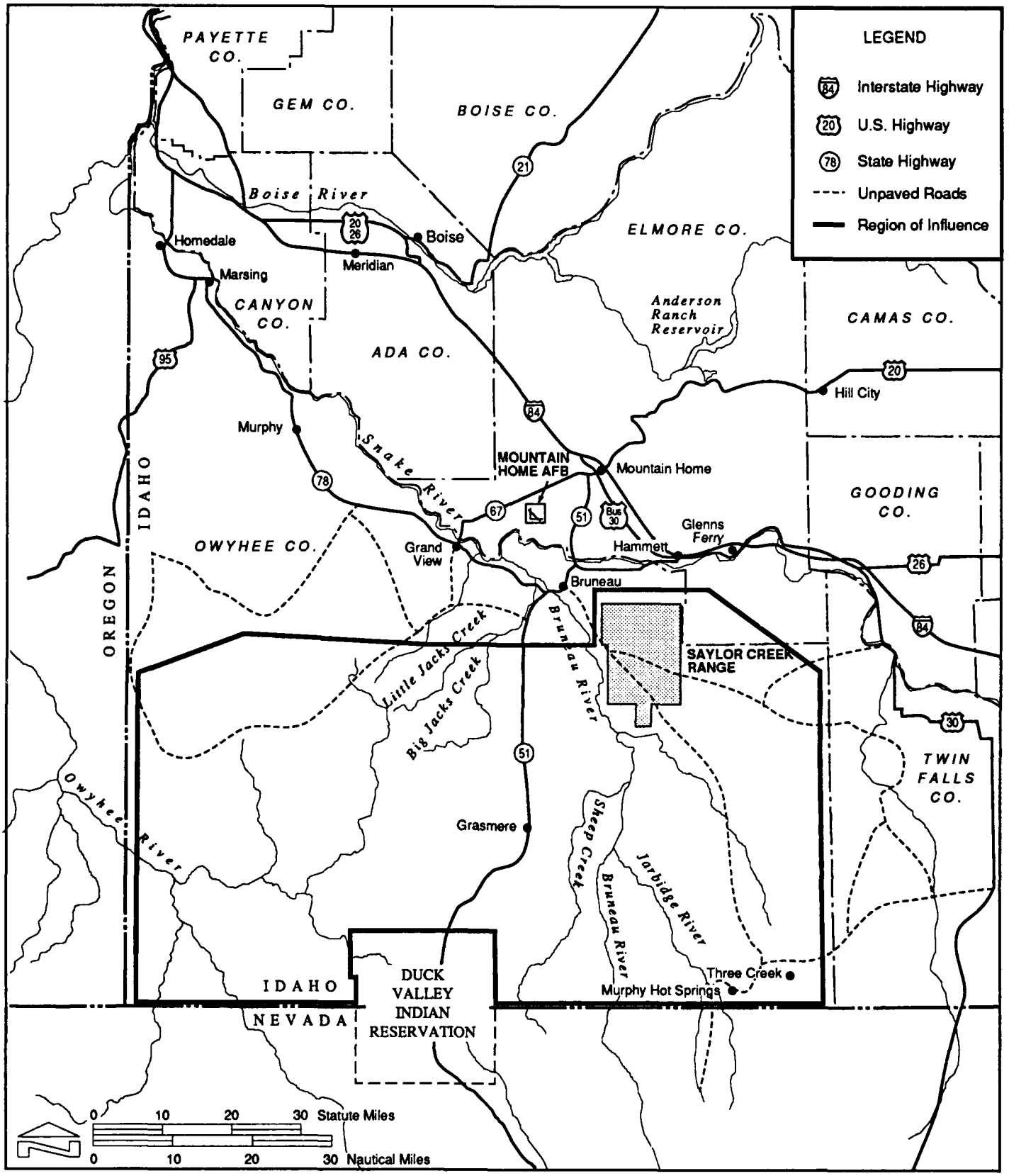


Figure S3.9-1

TRANSPORTATION RESOURCES REGION OF INFLUENCE SAYLOR CREEK

S3.9.4 Airports

The ROI contains 5 civil airports that include 3 public-use airports, 1 private-use airport, and 1 with unverified facilities (see section S3.1). The public use airports are located at Grasmere, Grindstone, and Murphy Hot Springs. The public use airport is located at Riddle. The unverified airport consists of a landing area available for emergencies only (see section S3.1). None of these airports receives intensive use and they only serve small airplanes.

S3.10 SOCIOECONOMICS

S3.10.1 Definition of Resource

Increases in military training activity and the redesignation of land uses resulting from a proposed expanded range capability would affect several elements of a region's social and economic structure. The potential exists for impacts to nearby populations, the provision of community services, and the economic health of important industries, with associated effects on employment and income distribution.

S3.10.2 Region of Influence

The ROI for assessing socioeconomic impacts of a proposed expanded range capability includes jurisdictions subject to federal land withdrawal and communities that would be potentially affected by increased flight activity along MTRs or in MOAs and restricted airspace. Owyhee County is the region that would be most affected by land withdrawal resulting from a proposed expanded range capability. Counties that would be subject to increased activity in the MOAs include portions of Elmore and Owyhee counties in Idaho and Elko County in Nevada. The MTRs that would be affected by a proposed expanded range capability traverse portions of counties in Idaho, Oregon, Nevada and Utah.

S3.10.3 Population

The population of Owyhee County was estimated to be 8,600 in 1986 and 8,400 in 1987 (BEA 1989). With a total area of 7,643 square miles, population density is approximately one person per square mile. The county's population has increased very little over the last ten years, up just 6 percent from 8,100 in both 1976 and 1977 (BEA 1989). Bureau of the Census projections indicate an expected 1990 population of 8,700. Less than 10 percent of the population resides more than a few miles south of the Snake River, which runs along Owyhee County's northern border (*The Idaho Statesman* 1989). Most of those living to the south reside in the Idaho portion of the Duck Valley Indian Reservation or in the ranching community of Three Creek.

The area directly beneath the MOAs and MTRs is sparsely populated, in most cases well below a density of one person per square mile. Several small communities are scattered within the flight corridors of the eight MTRs and are identified in Table S3.10-1. As indicated, the majority of these communities are situated at least two miles from the centerline of the nearest MTR. Maps of each of the MTRs are provided in section S3.1, Airspace Management.

Table S3.10-1

COMMUNITIES LOCATED WITHIN MTR CORRIDORS

Town	*MTR*	*County*	*Distance from Centerline* [1]
Almo, Idaho	IR-302,	Cassia	2
	VR-1300,		1.75
	VR-1304		1.5
Silver City, Idaho	VR-1301	Owyhee	6
Danner, Oregon	IR-300	Malheur	9
Adrian, Oregon	IR-300	Malheur	4
Vale, Oregon	IR-300	Malheur	4
Harper, Oregon	IR-300	Malheur	3
Juntura, Oregon	IR-300	Malheur	3
Brogan, Oregon	IR-304	Malheur	5.5
Drewsey, Oregon	IR-304,	Harney	1.5
	VR-1302		1.25
Venator, Oregon	IR-304,	Harney	2.25
	VR-1302		3.5
Durkee, Oregon	VR-1301	Baker	0
Ironside, Oregon	VR-1301	Malheur	3.5
Seneca, Oregon	VR-1301	Grant	3.5
Riley, Oregon	VR-1301	Harney	5.5
Frenchglen, Oregon	VR-1301	Harney	4.75
Beulah, Oregon	VR-1302	Malheur	4
Buchanan, Oregon	VR-1302	Harney	3
Denio, Nevada	IR-303	Elko	2.5
Midas, Nevada	IR-303	Elko	2
Jarbidge, Nevada	IR-303	Elko	10

Note: 1. All distances are in statute miles and are approximated. MTRs are illustrated in section S3.1, Airspace Management.

Source: ORNL 1988 data.

S3.10.4 Community Services

Community services provided at the county level include solid waste disposal, noxious weed control, maintenance of county roads, district court proceedings and the operation of the county Historical Society. These and other services are made possible primarily by means of property taxes. Table S3.10-2 provides 1989 tax assessment information for selected real property categories.

Table S3.10-2

1989 Owyhee County Property Tax Appraisal

Category	*Taxable Value*	*Tax*[1]
Irrigated agricultural land	$56,705,817	$184,124
Dry grazing land	$11,758,873	$38,181
Meadow land	$6,170,666	$20,036
Non-irrigated agricultural land	$1,024,783	$3,327
Mineral lands	$90,361	$293
Irrigated pasture	$63,793	$207

Note: 1. Based on a county tax levy of 0.003247.

Source: Owyhee County Clerk/Recorder and Assessor, 1989; Annual Financial Report, Owyhee County, Idaho 1988.

In 1988, Owyhee County received $342,000 in federal payments in lieu of taxes (PILT) from BLM. The county also receives a percentage of federal mineral leasing monies ($1,455 in 1988), which go directly into the maintenance of roads and bridges, and Taylor Grazing Fees ($62,490 in 1988), which are earmarked for the improvement of range lands in the county (Idaho Counties Natural Resource Payments Impact Statement 1989).

S3.10.5 Employment and Income

The economy of Owyhee County is based primarily on agriculture. Livestock grazing (primarily cattle) is the predominant economic activity and source of income in the county, followed by mining and irrigated agriculture. According to a 1986 profile of county business patterns, 1,086 out of 2,623 employees were farm workers. Employment in other industries in the county is shown in Table S3.10-3. Further information on employment in the county is provided in Table S3.10-4.

Table S3.10-3

1986 Employment by Industry in Owyhee County

Industry	*Employment*
Farm workers	1,086
Agricultural services, forestry, fishing, and other	45
Mining	193
Contract construction	132
Manufacturing	185
Transportation and other public utilities	58
Wholesale trade	82
Retail trade	170
Finance, insurance, and real estate	38
Services	122
Government	512
TOTAL	2,623

Source: National Planning Data Corporation, Enhanced County Business Patterns, 1985. Derived from Bureau of the Census, County Business Patterns, 1986, Bureau of Economic Analysis (Agriculture and Government).

Table S3.10-4

Labor Force Profile for Owyhee County

Date	*Civilian Labor Force*	EMPLOYMENT *Number*	EMPLOYMENT *Rate*	UNEMPLOYMENT *Number*	UNEMPLOYMENT *Rate*
Jan 1987	3,371	3,031	89.9%	340	10.1%
Jan 1988	3,277	2,984	91.1%	293	8.9%
Jan 1989	3,324	3,081	92.7%	243	7.3%

Source: Bureau of Labor Statistics, 1989.

The per capita income for Owyhee County in 1986 was $8,326, the third lowest level in the state and 26 percent lower than the statewide average of $11,216 (BEA n.d.).

S3.10.6 Important Economic Sectors

S3.10.6.1 Agriculture and Ranching

Ownership of land within Owyhee County can be categorized into three basic groups: private, state, and federal. The private land, which comprises approximately 10 percent of the total, is used almost

exclusively for agriculture. In 1987, a total of 573 farms were in operation on 716,637 acres of private and public land, an average of 1,252 acres per farm (1987 Census of Agriculture). The market value of agricultural products produced at these farms exceeded $75 million in 1987. Much of this farm land is located in the northern part of the county along the Snake River and would not be directly affected by the proposed action. Land uses on county lands are described more thoroughly in Section S3.8, Land Use.

Approximately 80 percent of the land in Owyhee County is owned by the federal government. Almost 95 percent of this public land is administered by the BLM for multiple uses, the most important of which is livestock grazing. In 1987, the value of cattle and calves produced and sold in Owyhee County was over $41 million, approximately 55 percent of the total value of all agricultural products sold (1987 Census of Agriculture). In the same year, the value of sheep, lambs, and wool sold was $399,000. Grazing permits issued by the BLM for the use of public grazing lands have become increasingly valuable to these livestock operations.

BLM does not recognize a monetary value for grazing permits. However, due to economies of scale, costs of production, the natural variability in rangeland productivity, and other economic considerations inherent in cow-calf and other livestock operations, federal grazing permits have taken on value in the open market. The value of grazing permits changing hands over the last few years in Idaho has varied. The market value of a particular permit and the amount an operator would be willing to pay depends on the location of the allotment and how such an allotment would fit into a particular operation. The value of grazing permits is measured using the animal unit month (AUM), the amount of forage required by a single mature cow for a month (Rimbey 1989). It is estimated that in the Saylor Creek area, only three to seven acres are required to produce a single AUM, as opposed to 13 to 25 acres in other parts of the county (personal communications, Boltz 1989). Grazing lands are particularly productive east of the SCR impact areas. The Internal Revenue Service also recognizes the value of grazing permits and taxes them as part of estate settlements and other related tax cases. In addition, lending institutions have allowed permits to be used as collateral for securing loans (Rimbey 1989).

The limited supply of both private land and grazing allotments in the county also adds to the value of grazing permits. While most cow-calf outfits maintain base operations on deeded ground, where hay and grains are grown as supplemental feed and feedlots are maintained, the ability to graze cattle on larger tracts of land is essential in order to maximize efficiency and promote the growth of the operation. The value of the operation is substantially reduced if no permits accompany the deeded ground since far fewer cattle can be maintained and the costs are higher. Feeding the cattle at the base operation costs about 50 cents per pound of weight gain (depending on feed costs) compared to 21 cents per pound out on the BLM range allotments (personal communication, Black 1989). Currently, there are few if any allotments in the county that are unused or effectively below carrying capacity (personal communication, Boltz 1989).

In addition, a diversity of range land (varying in terms of the potential level of productivity) is often necessary in order to most efficiently graze the cattle during various times of the year and various periods in the animal's life cycle. As an example of an Owyhee County cow-calf operation, 450 pound calves born and raised near the SCR are taken to the feedlot facilities for four to five months to feed on agricultural wastes and hay. At 600 pounds, the young cattle are taken to less productive range land such as the Dickshooter Ridge area where foraging requires more effort and the cattle get more exercise. At 800 pounds, those cattle that are to be mated are moved to the more productive range lands near SCR where foraging is easier and more time can be spent preparing for mating, thus completing the cycle. Without access to range lands, the productivity and efficiency of the cow-calf operation is reduced (personal communication, Black 1989).

S3.10.6.2 Mining Operations

According to the Owyhee County Comprehensive Plan Update (1980), mining is one of the fastest growing employment sectors in the county. The DeLamar mine, near Silver City, is the largest single employer in the county and the fifth largest silver mine in Idaho. A total of 3,614 acres are designated on county tax rolls as mineral land. Mineral resources currently being mined include gold, silver, lead, pumice, gravel, sand, and diatomite. In the near future, Grefco, Inc. plans to begin accessing a large deposit of diatomaceous earth near Grandview which it feels is of a quality unequalled in the United States (personal communication, Jenkins 1989). The existence and locations of mining claims, known mineral deposits, and miscellaneous mines in the area are described more thoroughly in section S3.7, Earth Resources.

S3.10.6.3 Recreation

Numerous recreational opportunities are available in Owyhee County, making tourism the third largest industry in the southwestern portion of the state. However, a very small proportion of recreational dollars are actually spent in Owyhee County. According to the Idaho Outfitters and Guides Association (IOGA), visitors spent approximately $126 per person per day on a typical guided, extended day wilderness trip in 1987. An average of 12 persons went on each trip and each trip lasted an average of four days. Six different river outfitters and two hunting outfitters currently operate in the county, but all are based outside Owyhee County (personal communication, Simonds 1989). Similarly, retail stores that cater to recreationists are located outside the county. Consequently, very little money is actually spent in Owyhee County.

The majority of people who take advantage of Owyhee County's recreational opportunities are individuals who plan, outfit, and lead their own excursions. Impacts to this component of the recreation industry would be more sociological than economic in nature. A more thorough description of the recreation industry in the area is provided in section S3.8, Land Use.

S3.11 WATER RESOURCES

S3.11.1 Definition of Resources

Water resources considered for assessment of potential impacts of the proposed range capability expansion include surface water and groundwater availability and use, water quality, and water rights.

S3.11.2 Region of Influence

The ROI for water resources includes all of Owyhee County except the northwestern tip. Potential impacts on water resources result from land disturbances associated with construction, use, and maintenance of an expanded range capability.

S3.11.3 Water Availability and Use

S3.11.3.1 Surface Water

Owyhee County is characterized by a semiarid climate. The major surface waters in Owyhee County consist of rivers and large creeks which drain north and west into the Snake River. These water courses are shown in Figure S3.11-1. The rivers and creeks have been impounded in many locations to create small reservoirs used for irrigation, recreation, power, and domestic and municipal water supplies.

There are three basic hydrologic basins within Owyhee County, all of which drain northward into the Snake River (Owyhee County 1980). The Bruneau River system covers the eastern half of the county and includes many tributary streams which are perennial near their headwaters and intermittent in the lower valleys. The Owyhee River drainage extends along the south side of the Owyhee Mountains, the Owyhee Range, and the entire southwestern plateau portion of the county. This water passes in and out of eastern Oregon before draining into the Snake River north of Owyhee County. The Snake River basin consists of several small, intermittent streams which feed directly into the Snake River along the northeastern front of the Owyhee Mountains. The largest reservoir in Owyhee County is the C. J. Strike Reservoir, with a total storage capacity of 250,000 acre-feet (Owyhee County 1980).

Lowlands on both sides of the Snake River are characterized by thick lake- and river-origin sediments that are interbedded extensively with basalt flows and generally referred to as the western Snake River Plain or Snake River valley. Most of the land is federally owned and is managed by the BLM or the National Forest Service. A majority of the private, state, or federally owned land is used as rangeland, but some lowland and foothill areas are used for irrigated agriculture. Large tracts of federally owned

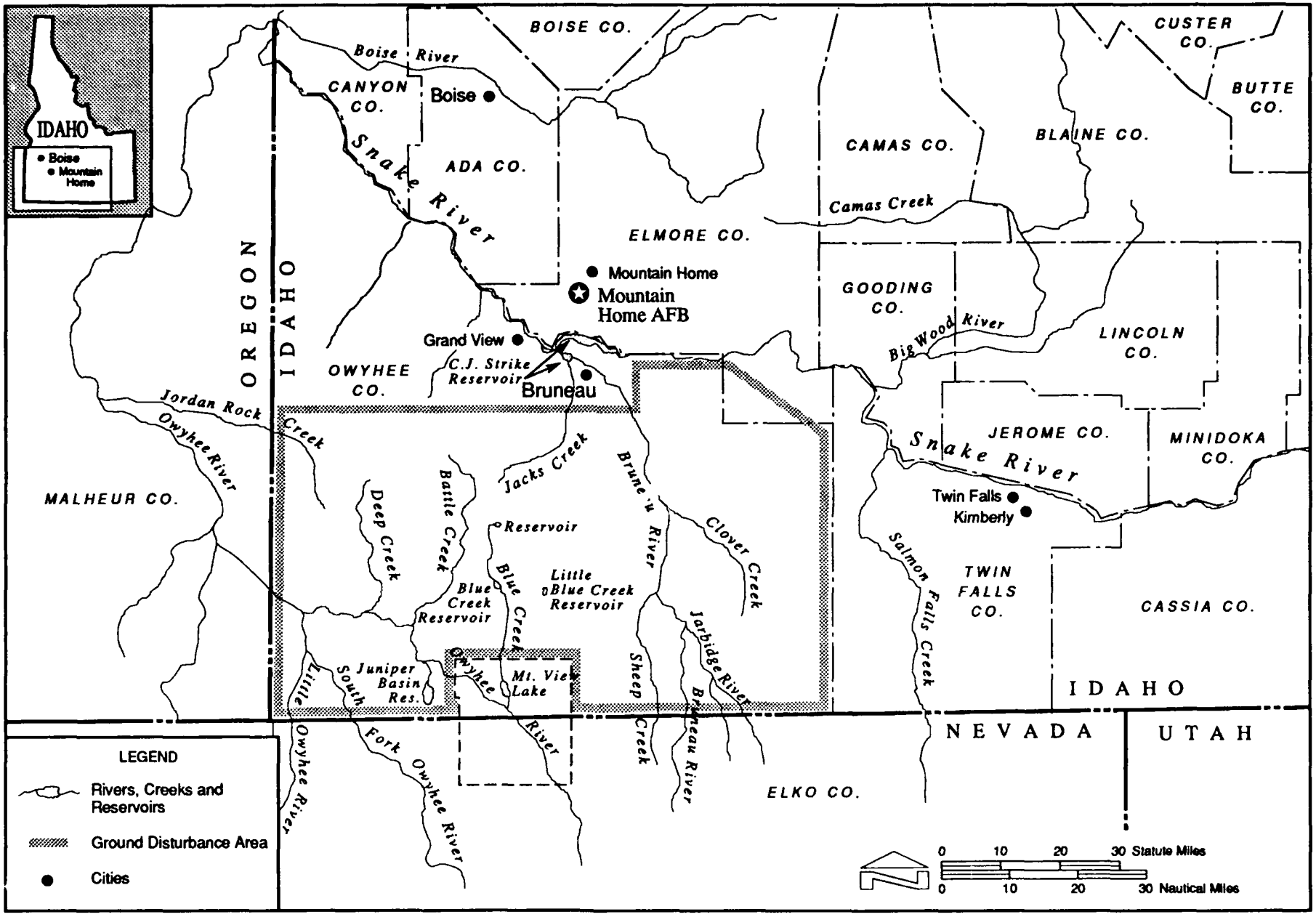


Figure S3.11-1

MAJOR SURFACE WATERS IN THE STUDY AREA

land have been made available for the development of irrigated agriculture. Irrigation water is diverted or pumped from surface water -- intermittent streams, the Bruneau and Snake rivers, and several reservoirs -- or from groundwater sources (Parliman 1983).

The SCR is situated on a relatively flat plateau that is bounded by the Snake River Canyon about 6 miles north of the range boundary and by the Bruneau River canyon along the western boundary. In the vicinity of the SCR, rainfall ranges from 8 to 12 inches per year. Surface water runoff accounts for 0.2 to 2 inches per year (USGS 1986), and the remainder either evapotranspires or recharges groundwater reserves. Surface water flowing across the SCR drains northward into the Snake River, mainly via the Bruneau River. Some surface water follows smaller streams or washes directly into the Snake River.

The central portion of the Bruneau River basin contains a high upland surface drained by numerous small washes. These empty into the deeply incised canyons of the major perennial watercourses through short, steep-sided canyons. The major watercourses of this central area are, from east to west, the East Fork of the Bruneau River, the Jarbidge River, the Bruneau River, and Sheep Creek. All join within the central portion of the SCR and bring water into the SCR from outside its boundaries.

The Owyhee River basin drains an area characterized by higher elevations, greater topographical relief, and more precipitation than other areas of Owyhee County. The higher precipitation is mainly in the form of snowfall on the Owyhee Mountains. Like the Bruneau River basin, snowmelt and rainfall is drained through deeply incised canyons of the major perennial watercourses. These watercourses include Blue Creek, Battle Creek, Deep Creek, the Owyhee River, the South Fork of the Owyhee River, and the Little Owyhee River.

There are no perennial bodies of water within the SCR. Closed playa depressions in the area hold some water after snowmelt and rains but are generally dry. Small watering ponds for livestock are used throughout the area.

S3.11.3.2 Groundwater

Owyhee County supports a rural population dependent primarily on ranching and irrigated agriculture. Wells drilled for irrigation generally yield thermal water, which ranges in temperature from 15 to more than 80 degrees Celsius. Except for some heating of homes locally, thermal groundwater in the area has been used largely for irrigation rather than for thermal energy (Young and Lewis 1980).

Thermal groundwater occurs over a large area south of the Snake River in Owyhee and Twin Falls counties. Deeply buried volcanic flows heat the groundwater, causing it to rise and form the numerous hot springs found along the Snake and Bruneau rivers. These springs are especially common in the

valleys of the SCR where groundwater is near the surface. The most well-known springs in the area are the Indian Bathtubs at Indian Springs and Murphy Hot Springs near the Nevada border.

Groundwater movement is generally northward toward the Snake River. Recharge to aquifers in foothills, uplands, and mountains of Owyhee County is primarily from infiltration of precipitation. Recharge to aquifers in the lowlands may be from interaquifer flow; infiltration from rivers, intermittent streams, irrigation canals, drainage ditches, reservoirs, applied irrigation water, precipitation, and septic-tank drainage fields; and leakage from perched-water tables. The amount of recharge is affected primarily by geologic structure, mineral composition, primary porosity, and rock textures of the geologic units comprising the aquifers (Parliman 1983).

The groundwater systems of the SCR are broadly similar to that of the Snake River Plain to the north. Groundwater is stored and moves through volcanic rocks except along the SCR's northern margin, where sedimentary rocks overlie the volcanic rocks and form a distinct groundwater system. Two types of volcanic rock are found within the SCR. Flat-lying basalts of low porosity cover much of the area's surface. Fractures in these basalts hold and transmit large volumes of groundwater, while vertical cracks in the rocks allow surface water to reach the horizontal water-bearing zones.

The second major type of rock found in the SCR area is rhyolite, usually found beneath the basalt. The total thickness of the rhyolite is greater than the thickness of the basalts. Rhyolite is also more porous than basalt, with more and larger holes in it. Silica (agate or jasper) found in these holes indicates that water moves through the rhyolite. Like basalt flows, the tops of the rhyolite flows are weathered, and porous stream deposits are often present. Both rhyolite and basalt flows will hold and transmit large volumes of water.

Water flow through the sedimentary rocks at the northern margin of the SCR is generally simpler than through the volcanic rocks. Here, surface water soaks into the predominantly sand and gravel soil to enter unconfined aquifers. Interbedded clay does not let water through easily, and some porous layers may be sealed off from surface water recharge by layers of clay. A water-bearing strata beneath an impermeable clay is called a confined aquifer. The sedimentary rocks along the northern edge of the SCR are likely to include clay layers alternating with porous sands and gravels, so that the area contains both confined and unconfined aquifers.

There are no single major consumers of groundwater in the Owyhee County ROI; instead, many scattered wells have been drilled to serve cattle and wildlife. The wells are developed by drilling into one of the water-bearing zones. The wells are normally drilled in an upland area so that water will flow downhill from the well head through a system of pipelines to watering troughs. Without the extensive use of groundwater on the dry upland surfaces, it would be difficult to graze cattle in the region. See

section S3.8.7, Land Use, for a more detailed discussion of range improvements throughout Owyhee County.

In response to declining groundwater levels in underlying aquifers, the Idaho Department of Water Resources has designated a portion of the area south of the Snake River as a Groundwater Management Area (Idaho Code, Section 42-233b). As discussed in section M3.11, the State of Idaho restricts water rights in a Groundwater Management Area by issuing permits and approving water usage. (Refer to Figure M3.11-3 for the location of Groundwater Management Areas in southern Idaho.) However, a recent (1988) study of groundwater resources in the Bruneau-Grand View area suggests that annual groundwater withdrawals have declined since 1982 to levels close to the estimated annual recharge rate of 5,000 acre-feet per year (Gemperle 1988). The recent decreases in groundwater withdrawal are attributed to a decrease in irrigation-intensive agriculture in the area. This trend is expected to continue, resulting in increasing stabilization of water levels in the Bruneau-Grand View Groundwater Management Area.

S3.11.4 Water Quality

S3.11.4.1 Surface Water

Rivers and streams in Owyhee County are fed by precipitation, snowmelt, irrigation runoff, and springs. In general, surface water quality throughout the county is good and reflects the source. For example, streams receiving much runoff from irrigated croplands show higher levels of chemicals found in fertilizers and pesticides. Streams fed by cold springs are generally very high quality, while those fed by hot springs are subject to thermal and saline pollution.

S3.11.4.2 Groundwater

Many factors affect the quality of groundwater, including the composition of aquifer materials, water temperature, and source of recharge. Groundwater quality in Owyhee County is generally acceptable for most uses, although local supplies may contain chemical constituents or physical properties that restrict its use (Parliman 1983). Some degradation of groundwater quality has occurred in certain areas, possibly due to infiltration of septic tank effluent. Increases in irrigated acreage, together with urban and commercial development, may further affect groundwater availability and quality.

In a USGS study, water-quality data collected from 92 wells in the western Snake River basin (from Swan Falls to Glenns Ferry) in 1980 were compiled with data collected from 116 wells prior to 1980 in order to define water-quality conditions in major aquifers of the area (Parliman 1983). The study found that cold water aquifers (less than 20 degrees Celsius) contain principally calcium, magnesium, and bicarbonate plus carbonate ions; hot water aquifers (greater than 40 degrees Celsius) generally

contain sodium, potassium, and bicarbonate plus carbonate ions. Warm water aquifers have an intermediate chemical composition.

In a separate USGS study, chemical analyses of water from 12 wells and 9 springs indicate that nonthermal waters are a calcium bicarbonate type, and have dissolved-solids concentrations generally less than 120 mg/l; thermal waters are a sodium bicarbonate type, and have dissolved-solids concentrations generally less than 400 mg/l (Young and Lewis 1980).

The salinity of most groundwater in Owyhee County is low to medium. The water is suitable for livestock and can be used for irrigation on most soils with most crops if a moderate amount of soil leaching occurs. Cold groundwater in Owyhee County contains generally higher overall concentrations of silica, fluoride, and sodium than cold groundwater in Elmore County. In Owyhee County, more land is irrigated with thermal water than cold groundwater. Medium to high salinity and high to very high alkalinity are common for warm and hot water wells in the Banbury Basalt units of Owyhee County (Parliman 1983).

S3.11.5 Flood Hazards

Streams throughout Owyhee County are subject to occasional and temporary flooding. These floods are caused by snowmelt in the surrounding mountains, high-intensity thunderstorms, or a combination of the two. Snowmelt is the main cause of floods on streams at high altitudes, while localized thunderstorms are the primary flood producers on streams below 6,000 feet (USGS 1976). While these floods increase stream-bank erosion and downstream sediment load, they do not pose a significant hazard. Streams in the ROI are often blocked intentionally in order to flood small meadows and improve the foraging available to livestock.

S3.11.6 Water Rights

A water right is a title to the use of a portion of the public waters for a beneficial use. Such uses include diversion for domestic purposes, water for stock, irrigation, municipal and industrial supply, power production, mining, and recreation. Water must be physically diverted by means of pumps, pipelines, dams, or canals before an individual may take possession of the water.

The State of Idaho is currently undergoing a water rights adjudication process for the Snake River Basin. Under this process, all individuals or associations currently using or wanting to use water from the Snake River or its tributaries must file a water rights claim with the State. The purpose for the adjudication is to determine exactly how much Snake River water is currently allotted; where and how the water is being used; and how much remains to be allotted. The adjudication process, which is

expected to continue into the 1990s, has little effect on current use of surface water resources within the ROI.

According to a database maintained by the Idaho State Department of Water Resources, there are 1,322 water rights currently listed within the ROI for the SCR expansion (IDWR 1989). These water rights are in various stages of application (e.g., permit, license, claim, or decree) and are comprised of 1,193 surface water rights and 128 groundwater rights. The 1,322 total water rights are fairly evenly divided between federal rights (708) and private rights (614). In many cases, private individuals may own or lease the right to pump or divert water which occurs on government-owned land.

The greatest use of water in Owyhee County is for agricultural purposes. The continued use of public surface and groundwater supplies is seen as critical to the cattle and sheep industry that dominates much of the county. Ranchers, in concert with the BLM, have made extensive range modifications throughout the county in order to provide their livestock with water. These modifications include wells, pipelines, troughs, and seedings. See section S3.8, Land Use, for a detailed discussion of livestock grazing in Owyhee County.

S3.12 SAFETY

S3.12.1 Definition

Safety issues discussed in this section relate to four major topics. The first deals with fire suppression history in the areas under consideration as a study area for a proposed expanded range capability. The second topic pertains to flight risks such as airspace congestion, hazardous weather conditions, obstructions and bird-aircraft strikes. The third major area encompasses military procedures such as flight and aircraft crash procedures. The last area is the use and control of hazardous materials that are controlled under the Federal Water Pollution Control Act, Solid Waste Disposal Act, Clean Air Act, Resource Conservation Recovery Act, or Toxic Substances Control Act.

S3.12.2 Region of Influence

The ROI is composed of the land area under examination for a proposed expanded range capability that includes approximately 3.5 million acres of Owyhee and Elmore counties. The ROI also includes the land overlain by the restricted areas, MOAs, and the eight MTRs that provide access to the SCR. These areas are depicted in Figure S3.6-1.

S3.12.3 Fire Suppression

The areas under consideration for the proposed expanded range capability lie within the Boise District of the BLM. This district contains 5.6 million acres of public land, 500,000 acres of state land, 49,638 acres of Bureau of Reclamation land, 109,465 acres of U.S. Air Force land, 139,600 acres of Boise National Forest land, and 3 million acres of private land.

The BLM has prime responsibility for fire suppression on all public lands and by interagency agreement for lands under authority of the Bureau of Reclamation, Boise National Forest, and the U.S. Air Force. The only exception is the land set aside by MHAFB as an impact area. As a result, the Boise District's fire suppression program is one of the largest within the BLM. This is due to both the amount of acreage covered and the high number of fires suppressed yearly. The average number of annual fires is 114, with approximately 188,000 acres burned per year.

The district is divided into three fire management zones (FMZs). The zones are formed to group together areas of like fire behavior. These areas are shown on Figure S3.12-1.

FMZ 1 is dominated by annual grasses such as cheatgrass and medusa head rye. These grasses ignite very easily. In very dry years, fires can spread extremely quickly, as much as 100 feet per minute or

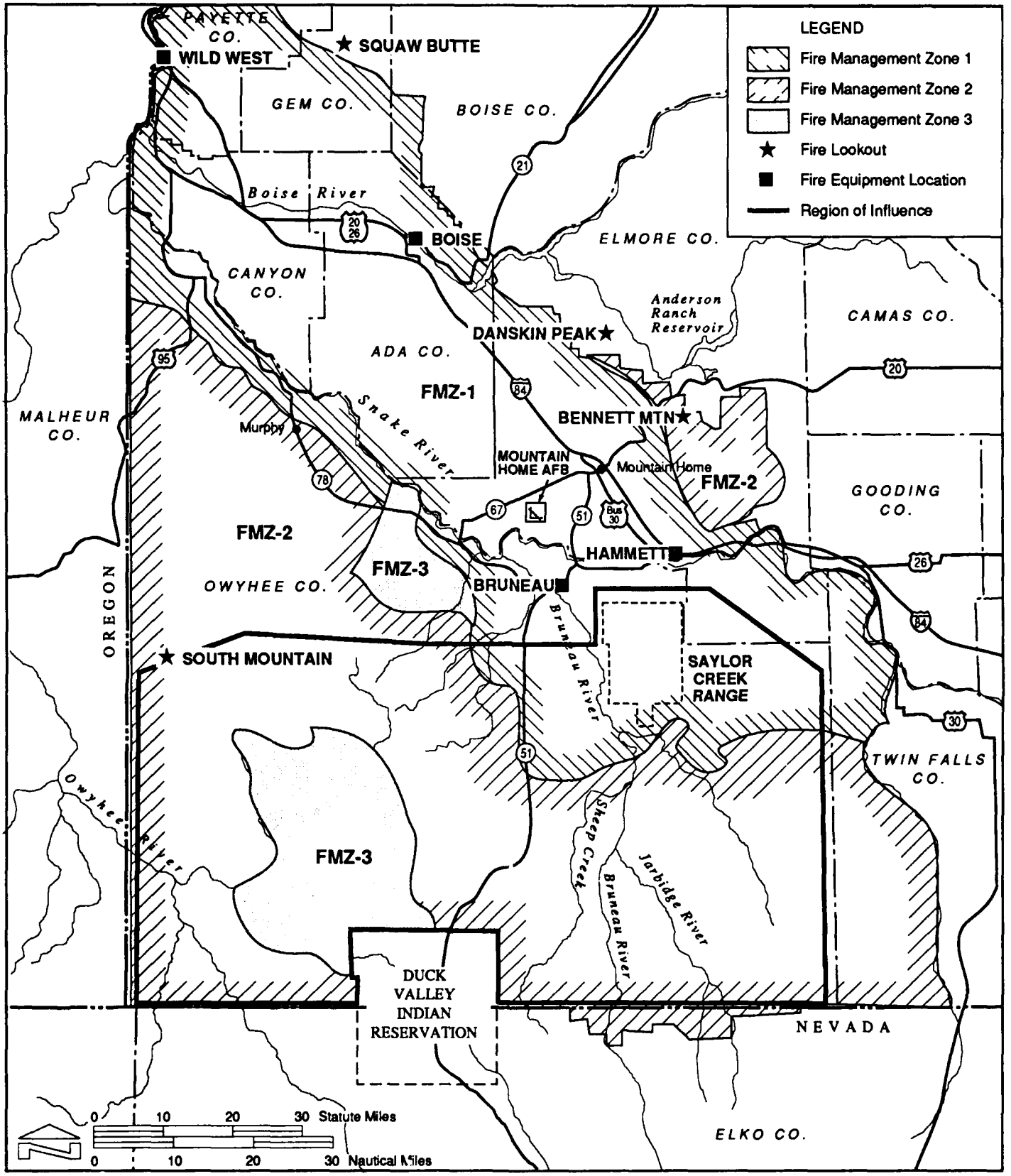


Figure S3.12-1

FIRE MANAGEMENT ZONES, FIRE EQUIPMENT DISTRIBUTION AND REGION OF INFLUENCE FOR SAFETY RESOURCES

more. Historically, this area experiences an annual average of 76 fires that burn an average of 128,000 acres. Because of the annual grasses and generally low elevations, fires occur earlier in the year. Fire season begins around late May or early June and lasts through October. FMZ 1 encompasses the SCR. For a complete breakdown of fires in this area from 1980 through 1986, see Table S3.12-1.

FMZ 2 is dominated by sagebrush and perennial grasses with Douglas fir and ponderosa pine found in the northern regions (see Figure S3.12-1). The largest fire zone within the Boise District, FMZ 2, averages 34 fires a season with an average of 60,300 acres burned yearly. This zone has a later seasonal development than FMZ 1, thus fires are not a threat until mid-July and the high fire risk lasts until early November. A complete breakdown of fires in this zone is found in Table S3.12-2.

FMZ 3 is the smallest zone and is dominated by juniper woodlands and sagebrush with some perennial grasses (see Figure S3.12-1). Fire occurrence in FMZ 3 is the lowest of all the zones. Due to the extremely rugged terrain in this zone and a history of low-intensity small-acreage fires inaccessible to heavy firefighting equipment, most fires are allowed to burn out naturally. This zone experiences only about 3 to 4 fires annually with only about 200 acres burned. For a complete listing of fires from 1980 to 1986, see Table S3.12-3.

Range fires in the impact area (exclusive use area) of the SCR are suppressed by a MHAFB contractor. The contractor is responsible for maintaining a 20- to 25-mile perimeter firebreak consisting of a cleared, disked area 120 feet inside the perimeter fence. In addition, the contractor must maintain 55 to 60 miles of interior 40- to 50-foot wide firebreaks that criss-cross the impact area. When a fire occurs on the 13,000-acre impact area of the SCR, the range is closed immediately and remains closed until firefighting activities are terminated. In order to reduce fire frequency, sections of the impact area are burned off in controlled burns each season.

Only one major fire has spread from the impact area to BLM-maintained lands. This fire burned in excess of 100,000 acres (personal communication, M. Hilliard 1989). However, since the Air Force established an on-site, immediate-response impact area fire suppression capability, no fires have spread to the land surrounding the impact area. Approximately 5 to 7 fires per year in the impact area have been suppressed by the contractor.

There have been a few fires that have been started in the greater range area by short or long bomb drops. In 1987, a 700-acre fire was begun by a bomb drop outside the range. It was suppressed by BLM. Over the past 18 years, two plane crashes outside the range have resulted in fires.

Table S3.12-1

FIRE HISTORY; FIRE MANAGEMENT ZONE 1

	1980	1981	1982	1983	1984	1985	1986
Person-Caused	42	71	48	41	66	52	65
BLM Acres	32,954	52,205	16,059	23,736	16,364	19,045	16,246
Other Acres	12,447	38,567	7,513	7,862	22,791	6,305	13,969
Total Acres	45,401	90,772	23,572	31,598	39,155	25,350	30,215
Lightning-Caused	10	12	20	44	40	28	37
BLM Acres	11,357	57,720	6,751	101,841	80,851	55,549	113,368
Other Acres	8,236	11,533	2,571	31,420	19,689	25,337	80,617
Total Acres	19,593	69,253	9,322	133,261	100,540	80,886	193,985
Total Fires	52	83	68	95	106	80	102
Total BLM Acres	44,311	109,925	22,810	125,577	97,215	74,594	129,614
Total Other Acres	20,683	50,100	10,084	39,282	42,480	31,642	94,586
Total Acres Burned	64,994	160,025	32,894	164,859	139,695	106,236	224,200
False Alarms	5	2	1	2	2	2	0
Total Fire Actions	57	85	69	97	108	82	37

Notes:
1. 7-year total acres = 892,903
2. 7-year total fire actions = 535
3. 7-year average acres = 127,558
4. 7-year average fire actions = 76

Source: Fire Management Plan Boise District BLM 1989.

Table S3.12-2

FIRE HISTORY; FIRE MANAGEMENT ZONE 2

	1980	1981	1982	1983	1984	1985	1986
Person-Caused	14	22	12	19	23	12	6
BLM Acres	7,935	17,920	3,463	8,012	5,425	24,341	449
Other Acres	1,411	4,726	92	442	1,074	4,373	896
Total Acres	9,346	22,646	3,555	8,454	6,499	28,714	1,345
Lightning-Caused	11	5	5	16	31	26	34
BLM Acres	15,292	6,722	15,548	2,472	39,618	124,774	80,087
Other Acres	865	2,232	640	1,198	4,498	6,070	41,402
Total Acres	16,157	8,954	16,188	3,670	44,116	130,844	121,489
Total Fires	25	27	17	35	54	38	40
Total BLM Acres	23,227	24,642	19,011	10,484	45,043	149,115	80,536
Total Other Acres	2,276	6,958	732	1,640	5,572	10,443	42,298
Total Acres Burned	25,503	31,600	19,743	12,124	50,615	159,558	122,834
False Alarms	1	1	0	0	0	1	1
Total Fire Actions	26	28	17	35	54	39	41

Notes:
1. 7-year total acres = 421,977
2. 7-year total fire actions = 240
3. 7-year average acres = 60,282
4. 7-year average fire actions = 34.2

Source: Fire Management Plan Boise District BLM 1989.

Table S3.12-3

FIRE HISTORY; FIRE MANAGEMENT ZONE 3

	1980	1981	1982	1983	1984	1985	1986
Person-Caused	1	4	-	-	2	2	1
BLM Acres	0	353	0	0	15	2	40
Other Acres	40	5	0	0	1	1	20
Total Acres	40	358	0	0	16	3	60
Lightning-Caused	0	1	3	0	3	3	4
BLM Acres	0	98	50	0	2	311	90
Other Acres	0	0	12	0	1	319	60
Total Acres	0	98	62	0	3	630	150
Total Fires	1	5	3	0	5	5	5
Total BLM Acres	0	451	50	0	17	312	130
Total Other Acres	40	5	12	0	2	320	80
Total Acres Burned	40	456	62	0	19	632	210
False Alarms	0	0	0	0	0	0	0
Total Fire Actions	1	5	3	0	5	5	5

Notes:
1. 7-year total acres = 1,419
2. 7-year total fire actions = 24
3. 7-year average acres = 203
4. 7-year average fire actions = 3.4

Source: Fire Management Plan Boise District BLM 1989.

S3.12.3.1 Fire Suppression Responsibility

A contractor is responsible for the suppression of fires in the impact area of the SCR. Their contract also includes maintenance of the targets, berms, strafe pits, electronic target scoring system, power generator system, and all operational buildings in the impact area. They are also required to periodically "sweep" the range area and dispose of all munitions residue and, if live ordnance is discovered, notify government Explosive Ordnance Disposal personnel. If firefighting is beyond the ability of the contractor, MHAFB and/or BLM fire protection resources can be called in to help.

Within the SCR but outside the impact area, fire suppression services are provided by the BLM. The BLM and MHAFB have signed an interagency agreement that specifies that BLM will have prime fire suppression responsibility on SCR land, excluding the impact area. Equipment and personnel are available from both the impact area contractor and MHAFB fire protection services if needed. However, MHAFB fire protection services do not have any fire suppression responsibilities within the SCR.

S3.12.3.2 Fire Detection Capability

Initial fire detection within the range area covered by the Boise District of the BLM is accomplished from four fire control lookout stations. These lookout stations (see Figure S3.12-1) are located at Squaw Butte, Mount Bennett, South Mountain, and Danskin Peak. Additionally, the BLM is in contact with the Pole Creek Ranger Station in northern Nevada for information on southern Idaho.

The risk of fire occurring is evaluated by a computerized fire index rating system. The Automated Forest Fire Information Retrieval Management System (AFFIRMS) combines weather information with estimated vegetation moisture, extent, and type of herbaceous growth within a region to estimate the risk of fire occurrence. Information for the region is collected from stations located at Mount Bennett, Squaw Butte, MHAFB, Boise, South Mountain, Horse Butte, and Mud Flat. If the risk is too high, all operations at the SCR are curtailed or stopped until risk declines.

During fire episodes, the spotter plane is used to feed information about fire size, direction, and speed to ground forces and to direct fire suppression activities. In addition, all flights using the SCR and the MOAs have the responsibility to report observed or suspected fires.

Fire within the impact area is detected by a fire watch within the two lookout towers in the impact area. The contractor's agreement calls for personnel in the tower to remain for 30 minutes after activities have ceased in the SCR to watch for potential fires and be ready to suppress, if necessary.

S3.12.3.3 Fire Suppression Capability

The main responsibility for fire suppression on the land surrounding the SCR impact area is handled by the BLM. Since the SCR is just part of the area handled by the Boise District, firefighting equipment is distributed among four different locations. Those locations are Boise, Bruneau, Hammett, and Wild West (see Figure S3.12-1) and the distribution of equipment is found in Table S3.12-4.

The BLM has specified objectives regarding the size and spread of a fire. In or near cities, the objective is to limit the size of a brush fire to 1 to 5 acres. The limit for important watershed areas is less than 50 acres. Range fires within FMZ 1 are to be limited to 300 to 500 acres while limits in FMZ 2 can vary from 25 to 1,500 acres. Currently, the BLM has been able to achieve these objectives an average of 53 percent of the time. In some parts of FMZ 1, these control objectives have been achieved only 23 percent of the time.

In order to achieve these objectives at least 67 percent of the time, the BLM has submitted a $1.6 million Fire Management Activity Plan that proposes an increase in equipment and personnel. The plan calls for one additional station to be opened in Rogerson.

Currently the BLM hires 84 people during the fire season to provide the bulk of fire suppression personnel. These are augmented by 55 permanent BLM employees who can be dispatched to help. The new plan and budget calls for an additional 20 seasonal employees. The increase is designed to meet conditions in the district as they now exist.

The SCR contractor supplies a 1,000-gallon towed trailer, a 500-gallon towed trailer, a grader, and a caterpillar to fight fires. Additionally they have a tractor and a 20-foot offset disk for maintaining fire breaks. The contractor currently employs 6 people to handle fire suppression needs in the SCR impact area. MHAFB fire protection department supplies personnel and equipment as needed to help the contractor or BLM but their main charge is related to base needs.

S3.12.4 Flight Risks

Flight risks apply to all aircraft and are not limited to the military. Based on established procedures, the range control officer terminates or curtails range operations when there is an aircraft crash and/or bailout, electrical power or radio failure, weather restrictions, birds within the range area or along run-in lines that pose a safety hazard, or any other unusual condition or situation that is potentially hazardous.

Table S3.12-4

BLM: CURRENT EQUIPMENT DISTRIBUTION

Equipment	LOCATION			
	Boise	*Bruneau*	*Hammett*	*Wild West*
2.5-ton engine, 4x4 600-800 gallon capacity	6	1	2	1
2.5-ton engine, 4x4 200-300 gallon capacity	3	0	0	0
1 ton truck, 4x4 100 gallon capacity	6	0	0	1
Water tender with 3,000-6,500 gallon capacity	2	0	0	0
Truck tractor with lowboy trailer and dozer	1	0	1	0
Roadgrader	1	0	0	0
Service rig, 4x4	2	0	0	0
Communication van	1	0	0	0
Fire Comp van	1	0	0	0
Culinary water trailer	1	0	0	0
Helicopter	1	0	0	0
Twin engine reconnaissance aircraft	1	0	0	0
BLM fire retardant aircraft 2,000 gallon capacity	Currently based at Pocatello, Idaho			

S3.12.4.1 Airspace Congestion

The increasing complexity and congestion of the national airspace system has created a greater potential for mid-air collisions or near mishaps (see section S3.1 for details on airports, airspace, and civil airways in the vicinity of the SCR). However, the airspace within the proposed expanded range capability ROI is typically uncongested and does not currently have any problems associated with overuse. Special operating procedures in the FLIP include avoiding airports by 1,500 feet vertically or 3 NM laterally, when practicable, to avoid any potential traffic conflicts with civil aircraft.

To prevent near misses and mid-air collisions in the restricted airspace associated with the SCR, the Air Force employs an avoid and identify approach. If an unauthorized aircraft enters the airspace when it is in use, the range control officer (RCO) notifies the aircraft using the range and, if necessary, directs them to an area where the unauthorized aircraft can be avoided. The RCO then informs radar approach control who attempts to contact the unauthorized aircraft and direct it out of the restricted airspace.

Air Force procedures for the SCR permit a maximum of five aircraft (four fighters and a forward air controller) to use the range simultaneously during daylight hours. Only two aircraft may use the range simultaneously at night or during training involving the instrument meteorological pattern. Additional aircraft may be allowed on the range for authorized and planned exercises.

Aircraft avoid exiting range airspace to the north, with the exception of the Indian Cove VMC recovery, since a heavily traveled airway passes due north of the range. For further discussion of airspace issues, including restricted airspace, MOAs, and MTRs, refer to sections S3.1 and S4.1.

S3.12.4.2 Obstructions

The aircraft commander leading the mission ensures that all aircrews are familiar with appropriate flight procedures. Aeronautical charts show the locations of most transmission lines, as well as most obstructions approximately 200 feet AGL or higher. In addition, potentially hazardous obstructions are listed in the special operating procedures in the FLIP. Table S3.12-5 shows the locations of transmission lines and towers along the MTRs that are included in the aeronautical charts and the FLIP.

S3.12.4.3 Hazardous Weather Conditions

Military aircraft are designed to operate in the most adverse flight conditions. Their crews have extensive flying experience and are trained to fly in all weather conditions. However, in the event of extremely hazardous weather conditions, scheduled flights are canceled.

Table S3.12-5

TRANSMISSION LINES AND OBSTRUCTIONS ON MTRS

Instrument Route/ Obstruction	*Location*
IR-300	
TL	C to D
TL	L to M
TL	O to R
IR-302	
TL	F to G
TL	G to H
TL	I to J
TL	J to K
O	190' AGL (43°17.5'N 113°12.0'W)
O	100' AGL (42°35.4'N 113°12.3'W)
IR-303	
TL	A to B
TL	B to C
TL	J to K
MB	Avoid by 1,000' AGL an area formed by 41°06N 117°21'W, 41°13'N 117°18'W, 41°13'N 117°15'W, 41°05'N 117°17'W to point of beginning.
IR-304	
TL	E to F
TL	F to G

Visual Route/ Obstruction	*Location*
VR-1300	
TL	A to B
TL	B to C
TL	C to D
TL	E to F
TL	G to H
TL	H to I
O	200' AGL (43°09'N 114°19'W)
O	100' AGL (42°35.5'N 113°12.3'W)
O	75' AGL (41°37.5'N 114°38.0'W)
VR-1301	
TL	A to B
TL	B to C
TL	C to D
TL	D to E
TL	E to F
VR-1302	
TL	A to B
TL	B to C
TL	D to E
O	80' AGL (42°22.0'N 116°04.0'W)
VR-1304	
TL	F to G
TL	G to H
TL	I to J
TL	J to K
O	190' AGL (43°17.5'N 113°12.0'W)
O	100' AGL (42°35.4'N 113°12.3'W)
O	75' AGL (41°37.0'W 114°38.0'W)

Legend: TL = Transmission line(s)
O = Obstruction
MB = Mine blasting

Sources: Flight Information Publication AP/1B (1989); Salt Lake City Sectional Aeronautical Chart (Scale: 1:500,000); Great Falls Sectional Aeronautical Chart (Scale: 1:500,000).

The SCR is closed when surface winds exceed 50 knots steady state. When ceiling/visibility prohibit safe visual pattern, aircraft transition to the IMC/night re-entry pattern. The RCO and Range Crew Chief obtain temperature, altimeter setting, and wind information hourly from the base weather station.

Severe weather is characterized into three phases. A Phase I weather condition is a precautionary condition requiring actions to limit/prevent damage in case of further deterioration of conditions. These include thunderstorms with gusts of less than 35 knots within 10 NM of the air base, surface winds of 25 to 34 knots, blowing dust/sand restricting visibility to not less than 3 NM (observed), and any other weather phenomena that might cause damage to aircraft, Aerospace Ground Equipment (AGE), support equipment, and fixed facilities.

A Phase II weather condition is a moderately severe weather condition that causes flying activities to cease. Actions are required to prevent damage to aircraft, AGE, support equipment, and fixed facilities. These include surface winds of 35 to 44 knots, blowing dust/sand restricting visibility to less than 3 NM (observed), thunderstorms with gusts to 35 to 44 knots and/or small hail (less than 1/2 inch diameter) at the base, snow with an accumulation of 2 inches or more expected within a 13-hour period, and any freezing precipitation.

A Phase III weather condition is a severe weather condition. Actions are required to prevent serious damage to aircraft, AGE, support equipment, and fixed facilities. These include tornadoes within 10 NM of the base, severe thunderstorms with gusts 45 knots or more and/or hail of over 1/2 inch diameter at the base, surface winds of 45 knots or more, and freezing precipitation in conjunction with winds of 25 knots or more. RCOs notify the range crew chief and EC mission control to recall personnel from range work areas when a weather condition Phase II or greater has been announced by the command post.

S3.12.4.4 Aircraft Malfunction

The RCO must see the aircraft prior to permitting the release of ordnance. If weather conditions prevent the RCO from seeing the aircraft even though the aircrew can see the target, the RCO does not give clearance to release. After completing all weapons events, established Air Force procedures require all aircraft to conduct and confirm an armament safety check before leaving the range. If the safety check indicates a potential problem, procedures are implemented to prevent the accidental release of ordnance.

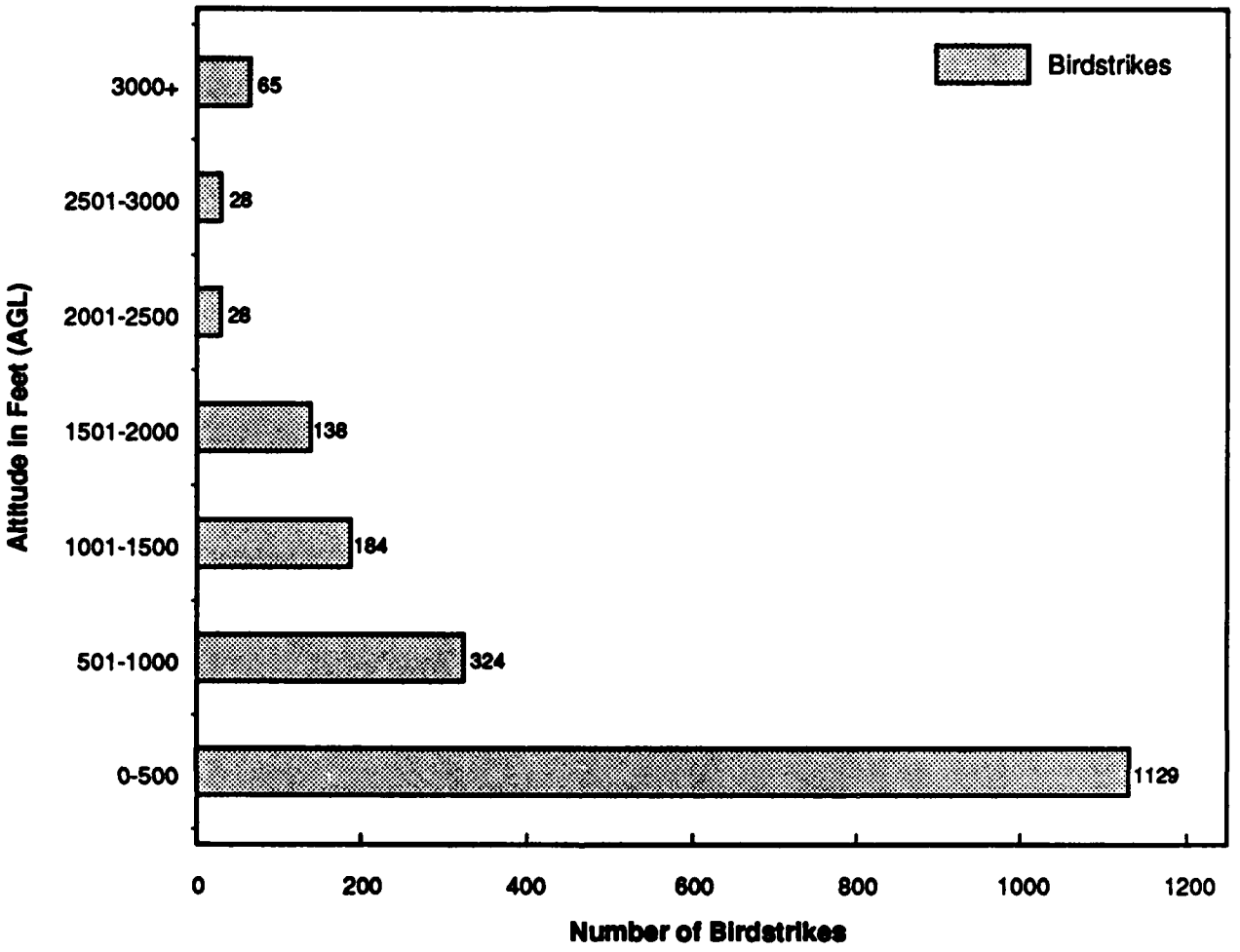
S3.12.4.5 Bird-Aircraft Strike Hazard

Birds can be encountered at nearly all altitudes. However, over 95 percent of all reported Air Force bird strikes are reported below 3,000 feet AGL. Approximately half of these bird strikes occur in the airfield environment, and approximately one quarter occur during low-level training (USAF 1987). Strike rates are highest at low altitudes (see Figure S3.12-2). Any gain in altitude represents a substantially reduced threat of a bird strike.

The potential for bird strikes is greatest in areas used as migration corridors (flyways) or where birds congregate for foraging or resting (e.g., open water bodies and wetlands). Migratory waterfowl (ducks, geese, and swans) present the greatest hazard to low-flying aircraft, although multiple strikes from flocks of smaller birds (particularly blackbirds and gulls) may, in some cases, may generate a greater BASH problem (USAF 1987). Waterfowl range considerably in size, from 1 to 2 pounds for ducks, 5 to 8 pounds for geese, and up to 20 pounds for most swans. There are two normal migratory seasons, spring (March to May) and fall (mid-September to December). Waterfowl are usually only a hazard during the migratory season. Waterfowl typically migrate at night and generally fly between 1,500 to 3,000 feet AGL during the fall migration and 1,000 to 3,000 feet during spring migration (USAF 1987). Ducks, primarily mallards, nest on the small potholes and reservoirs throughout the study area. These habitats are small and thus support few individuals, but they are dispersed throughout the area. In addition, BLM uses some of these small bodies of water for waterfowl production (personal communication, M. Hillard 1989). The Snake River is a major breeding area for ducks and geese (see section S3.4 for additional details). The Minidoka National Wildlife Refuge (NWR), located east of the area under consideration for a proposed expanded range capability, supports large numbers of waterfowl, particularly during the spring and fall migration periods.

Sage grouse are a relatively large game bird found throughout the study area. Although they are usually found near the ground, they typically migrate 500 to 800 feet AGL in flocks during the spring and fall.

The Snake River also provides an excellent habitat for raptors such as hawks, eagles, falcons, vultures, osprey, and owls. Raptors are also commonly found along the Bruneau, Jarbidge, and Owyhee rivers. Raptors can be particularly hazardous to aircraft because of their large size and widespread distribution. North American raptors range in weight from 0.5 pounds to 14.5 pounds. They are generally seen singly, but may be encountered in loose aggregations in thermal columns or during migrations. Raptors are most active during warm days from mid-morning to late afternoon. Feeding flights generally occur below 500 feet AGL, although under favorable conditions, or during migrations, birds may climb to many thousands of feet AGL. Concentrations of birds may be expected over thermal generating terrain such as ridge lines, rolling hills, and near water. Landfills are particularly



SOURCE: HQ USAF/LEEVN, 1987.

Figure S3.12-2

1987 AIR FORCE BIRDSTRIKES WORLDWIDE BY ALTITUDE

attractive to vultures. In the fall, many raptors migrate by day to areas of winter concentrations in the southern states (USAF 1987).

The Bird Avoidance Model (BAM) graph for the study area (Figure S3.12-3) shows a relatively low number of predicted bird strikes per million NM of flight. Figures S3.12-4 and S3.12-5 show the BAM graphs for IR-300, IR-302, IR-303, IR-304, VR-1300, VR-1301, VR-1302, and VR-1304. Most of the MTRs experience less than 10 predicted waterfowl bird strikes per annum. IR-303 shows a peak of slightly more than 10, while IR-304 shows a peak greater than 20. The FLIP has special operating procedures to avoid striking birds. Table S3.12-6 shows the recommended flight restrictions for the routes due to an increased bird strike potential.

S3.12.4.6 Mishap Potential

Currently, a Class A mishap involves loss of life, loss of aircraft, or damage of $1 million or more. Class B mishaps have damages between $200,000 and less than $1 million without the loss of life or aircraft. Prior to fiscal 1989, a Class A mishap involved a loss of life, loss of aircraft, or damages of $500,000 or more. A Class B mishap had damages over $100,000 but less than $500,000 (personal communication, CMSgt. Peyton 1989). Table S3.12-7 shows the number of flying hours, number of Class A and Class B mishaps, Class A mishap rates per 100,000 flying hours, and a total mishap rate per 100,000 flying hours for the B-1, B-52, F-4, and F-111 aircraft for fiscal 1987.

The number of calculated Class A mishaps per year (given flying hours per year on the SCR and the Air Force mishap rate) is shown in Table S3.12-8. The last column shows how often (in years) a Class A mishap is predicted to occur given the mishap rates and number of hours flown on the SCR. The actual number of mishaps will vary depending on type of mission and phase of flight, i.e., take-offs and landings tend to be more hazardous than high altitude flying.

S3.12.5 Military Planning and Procedures

S3.12.5.1 Flight Procedures

At the mission level, the mission commander ensures that the aircrew is familiar with all appropriate procedures and available information before beginning flight. Flight publications must be checked to determine if any specific considerations (such as airfields, population centers, sensitive wildlife areas, and unusual civilian air traffic such as Forest Service survey/fire detection flights) restrict flight activities. All flight plans must be cleared by the local FAA air route traffic control center (ARTCC). No deviations from the flight plan are allowed without prior ARTCC approval (USAF 1988).

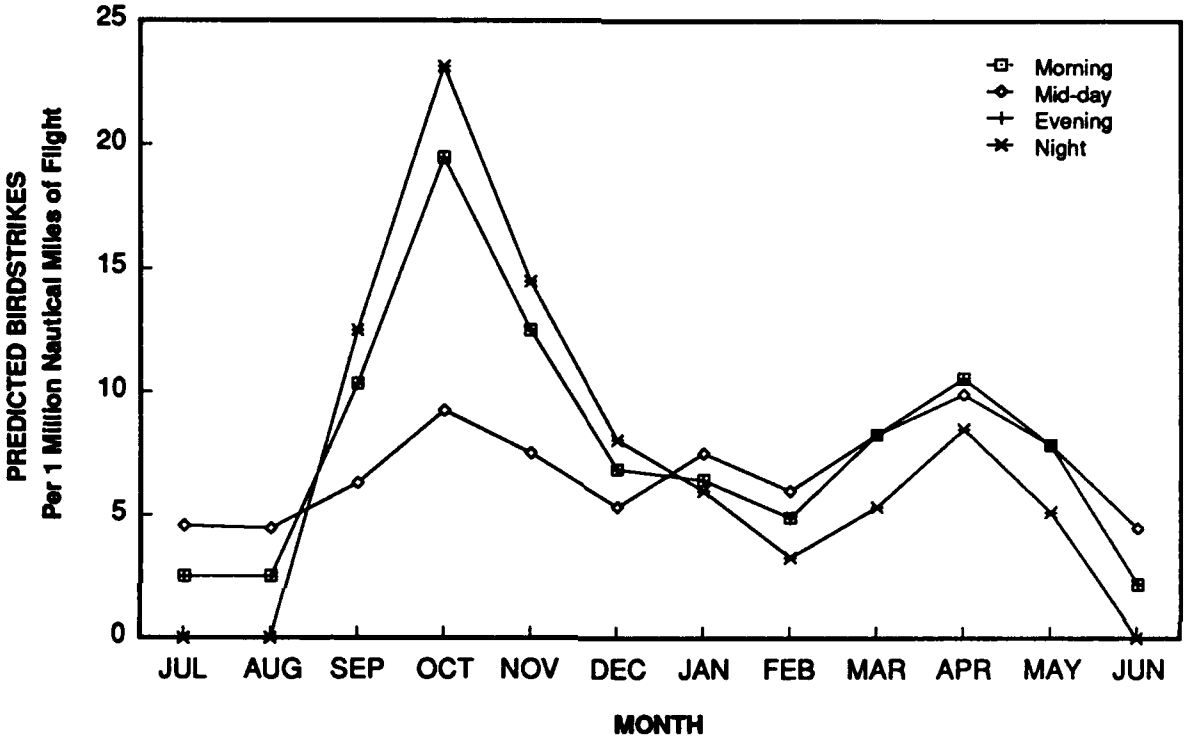


Figure S3.12-3

BIRD AVOIDANCE MODEL (BAM) AT 100 FEET AGL FOR CURRENT MOAs AND RESTRICTED AREAS

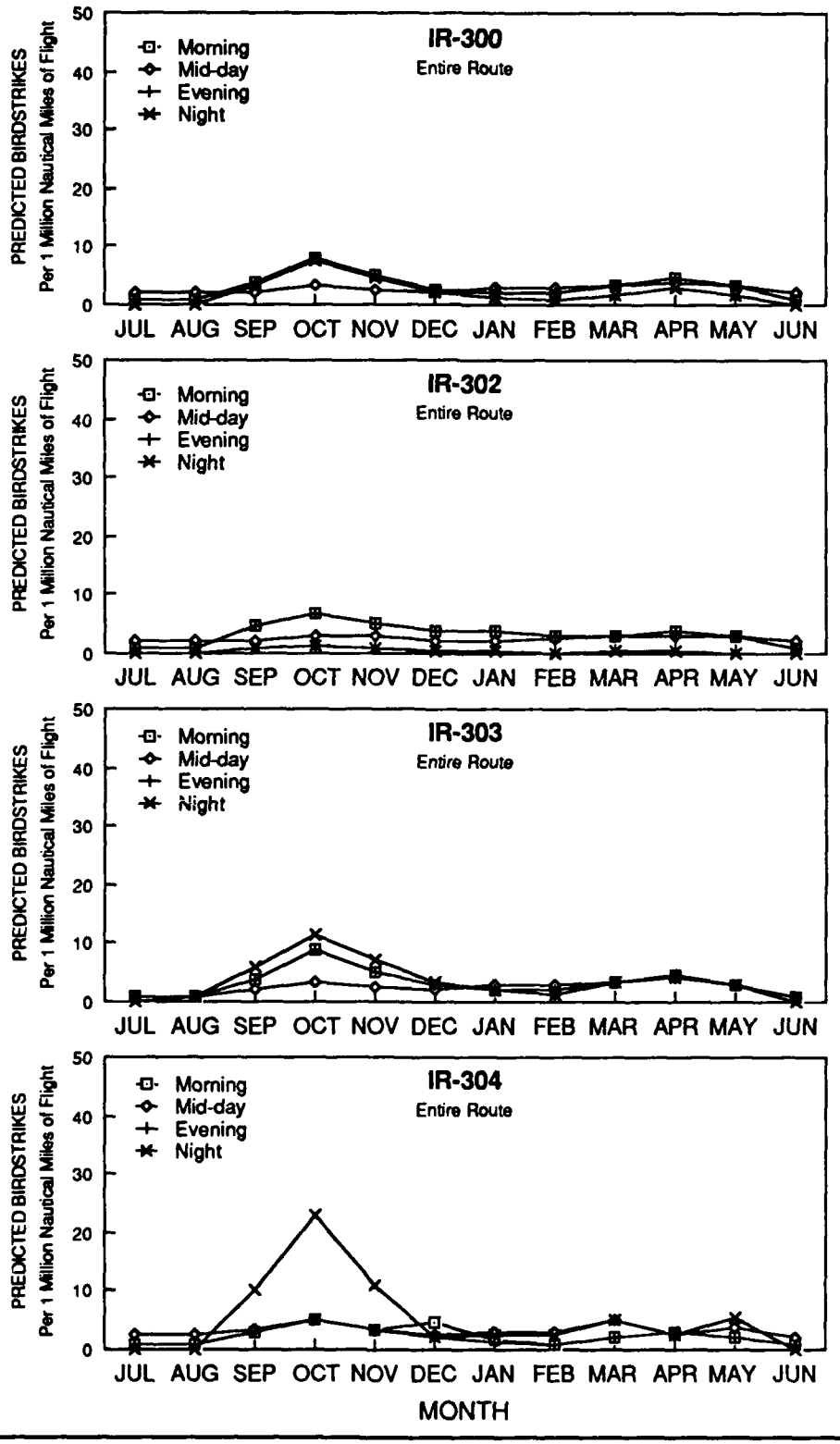


Figure S3.12-4

BIRD AVOIDANCE MODEL FOR IR-300, IR-302, IR-303 AND IR-304

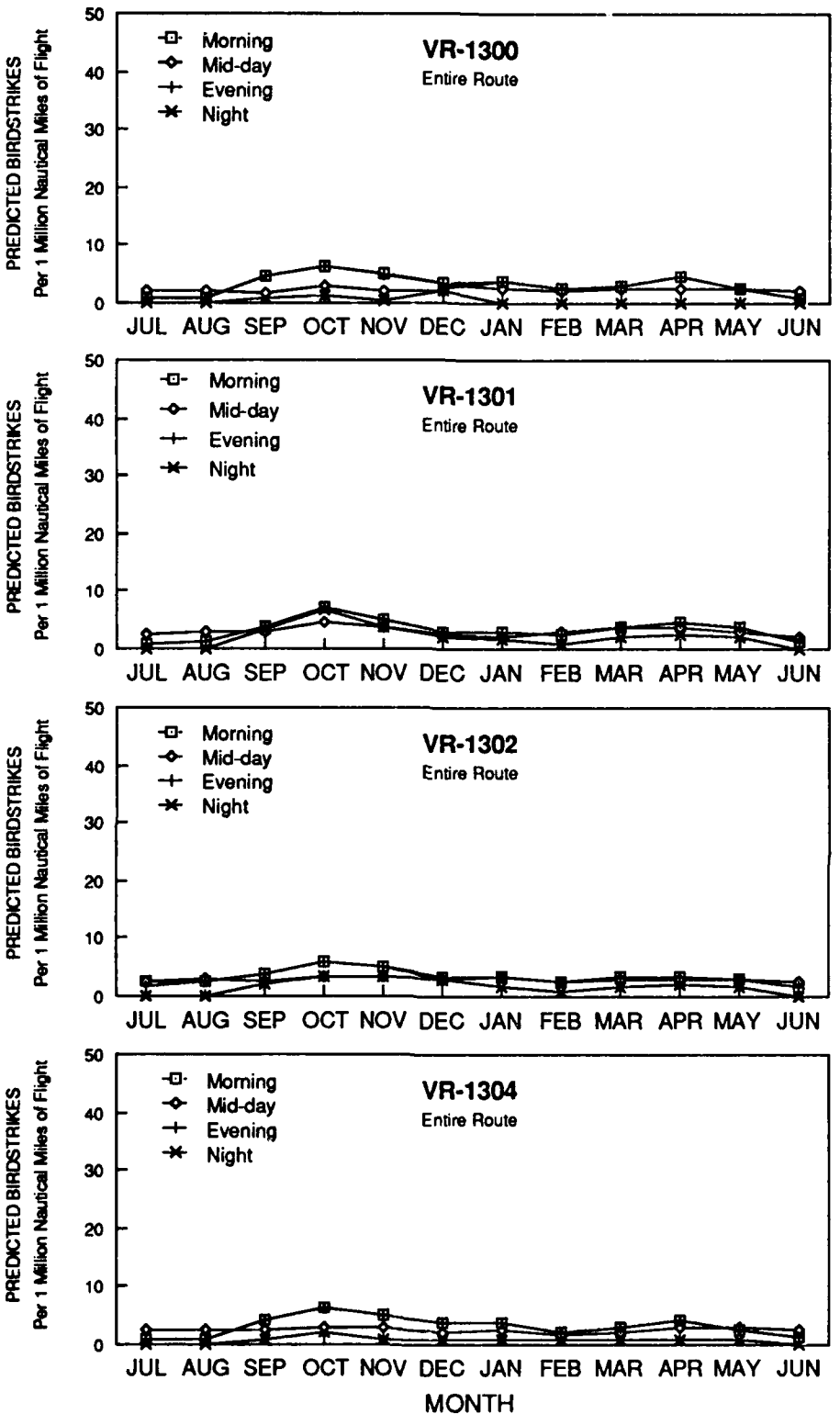


Figure S3.12-5

BIRD AVOIDANCE MODEL FOR VR-1300, VR-1301, VR-1302 AND VR-1304

Table S3.12-6

FLIGHT RESTRICTIONS DUE TO AN INCREASED BIRDSTRIKE POTENTIAL

Route	*Restriction*
IR-302	Due to birdstrike potential with indigenous waterfowl, the minimum recommended altitude between 5 NM prior to and until passing 5 NM beyond G is 1,000 feet AGL.
VR-1300	Due to birdstrike potential with indigenous waterfowl, the minimum recommended altitude between 5 NM prior to and until passing 5 NM beyond E is 1,000 feet AGL.
VR-1304	Due to birdstrike potential, the minimum recommended altitude from 5 NM prior to until 5 NM past the Snake River is 1,000 feet AGL.

Source: Flight Information Publication AP/1B (1989).

Table S3.12-7

USAF AIRCRAFT MISHAP RATES
(FY 1987)

Aircraft	*Flying Hours (Total USAF)*	*Class A Mishap*[1]	*Class B Mishap*[2]	*Class A Mishap Rate*[3]	*Total Mishap Rate*[3]
B-1	9,343	1	2	10.70	32.11
B-52	105,417	0	1	0	0.95
F-4	298,062	13	1	4.36	4.70
F-111	84,861	3	0	3.54	3.54

Notes:
1. Class A mishaps involve loss of life, loss of aircraft, or damage of $1 million or more.
2. Class B mishaps involve damages between $200,000 and $1 million without the loss of life or aircraft.
3. Mishap rate per 100,000 flying hours.
   Mishap Rate = # mishaps x 100,000/# flying hours

Source: Mr. Vince Murone, AFISC/SERR, Norton AFB, California 1989

Table S3.12-8

ESTIMATED SCR MISHAP RATES

Aircraft	*Current Flying Hours (per year)*	*USAF Class A Mishap Rates*[1]	*Calculated Number of Mishaps per Year*[1]	*Calculated Years between Mishaps*
B-1	172	1/9,343	0.0184	54.32
B-52	343	0	0	--
F-4	1,442	13/298,062	0.0510	19.62
F-111	82	3/84,861	0.0036	279.61

Note: 1. Calculated # mishaps per year = flying hours (per year) x mishap rate.

Source: SAIC 1989.

Military aircraft engaged in flight operations are under the same flight rules as civilian aircraft. The same 500-foot separation requirement, the yielding of right-of-way to the aircraft least able to maneuver, and see-and-avoid rules apply to both civilian and military aircraft.

S3.12.5.2 Air Force Aircraft Crash Procedures

In the event of an aircraft emergency/crash or ejection on the SCR complex, the RCO notifies the Command Post as soon as possible and closes the range. SCR personnel, under the direction of the RCO in the tower, go to the crash site to render assistance. Ground crews maintain two-way radio contact with the range tower. If the crew has ejected from the plane, the range crew chief dispatches a vehicle and personnel to pick them up. The range crew chief takes appropriate action to begin containing a range fire if one exists and notifies BLM for help. When there is evidence of back or neck injuries, aircrew personnel are not moved unnecessarily except by trained personnel or medical technicians. If an F-111 escape capsule is involved, range personnel remain well clear until the crew signals that it is safe to approach, unless the crew is obviously incapacitated. The crash site is secured and remains guarded and undisturbed.

Initial response to an aircraft accident on non-military property is the responsibility of the civilian authorities nearest the crash site. They provide emergency services such as fire, police, and medical assistance. They also notify the nearest military installation of the accident, who then notifies the nearest major Air Force installation (USAF 1988).

Upon notification of the accident, the commanding officer of the nearest major Air Force installation dispatches a Disaster Response Force (DRF) and notifies the major command (e.g., TAC) that owns the aircraft involved in the accident. The DRF includes personnel from the following offices: disaster preparedness, security police, hospital, fire department, public affairs, legal, aircraft maintenance, munitions, mortuary, and others as required. The DRF assists in matters of site security, fire suppression, medical evacuation, accident evaluation and investigation, and protective measures such as munitions disposal and hazardous/toxic materials protective measures (USAF 1988).

Once emergency actions are completed, the National Transportation and Safety Board (NTSB) is notified if the mishap involved civilian aircraft. Otherwise, the military has primary responsibility for investigating an accident involving military aircraft (personal communication, R. Wood 1989). Once the accident investigation is complete, the Air Force either contracts for the cleanup of the accident site or dispatches civil engineering crews to perform the cleanup.

S3.12.6 Hazardous Materials

Very little hazardous material is used or disposed of on the SCR. The only hazardous materials used on the SCR originate from practice ordnance dropped from aircraft during bombing runs. The spent ordnance is periodically recovered and disposed of by Air Force explosive ordnance (EOD) teams (see Figure S3.12-6 for location of the EOD disposal pit and landfill on the SCR). However, a small proportion of the ordnance shatters on impact or is buried in the soil and never recovered. This debris consists of concrete, cast iron, steel, tin, aluminum, and nylon (from parachutes). Most of this debris ultimately weathers into inert hydrous oxides. The potential for hazardous materials migration from the SCR is extremely low due to the characteristics of the wastes, the climatic conditions, and the depth to groundwater.

All practice, inert ordnance have a small "spotting" charge in the tip of the bomb. This charge goes off on impact and allows spotters to score the accuracy of the delivery. The spotting charges are composed of phosphorus or titanium tetroxide, which ignites and burns off within a few seconds. Only a very small amount of spotting charge residue remains after being burned.

These two types of ordnance debris are not considered to be a current source of soil contamination on the SCR. The inert portions of practice ordnance that are not reused are buried in a landfill permitted by the Idaho Department of Lands (No. 7020-9). Air Force EOD teams currently collect approximately 600 tons of practice ordnance per year.

Petroleum-based fuels and lubricants are used by SCR operators for staff transportation and range operations. Vehicle maintenance is performed at MHAFB, and hazardous materials generated during routine maintenance are managed and controlled by MHAFB staff. Aircraft operating over the SCR also carry petroleum-based fuels and lubricants. Catastrophic accidents could result in hazardous material releases.

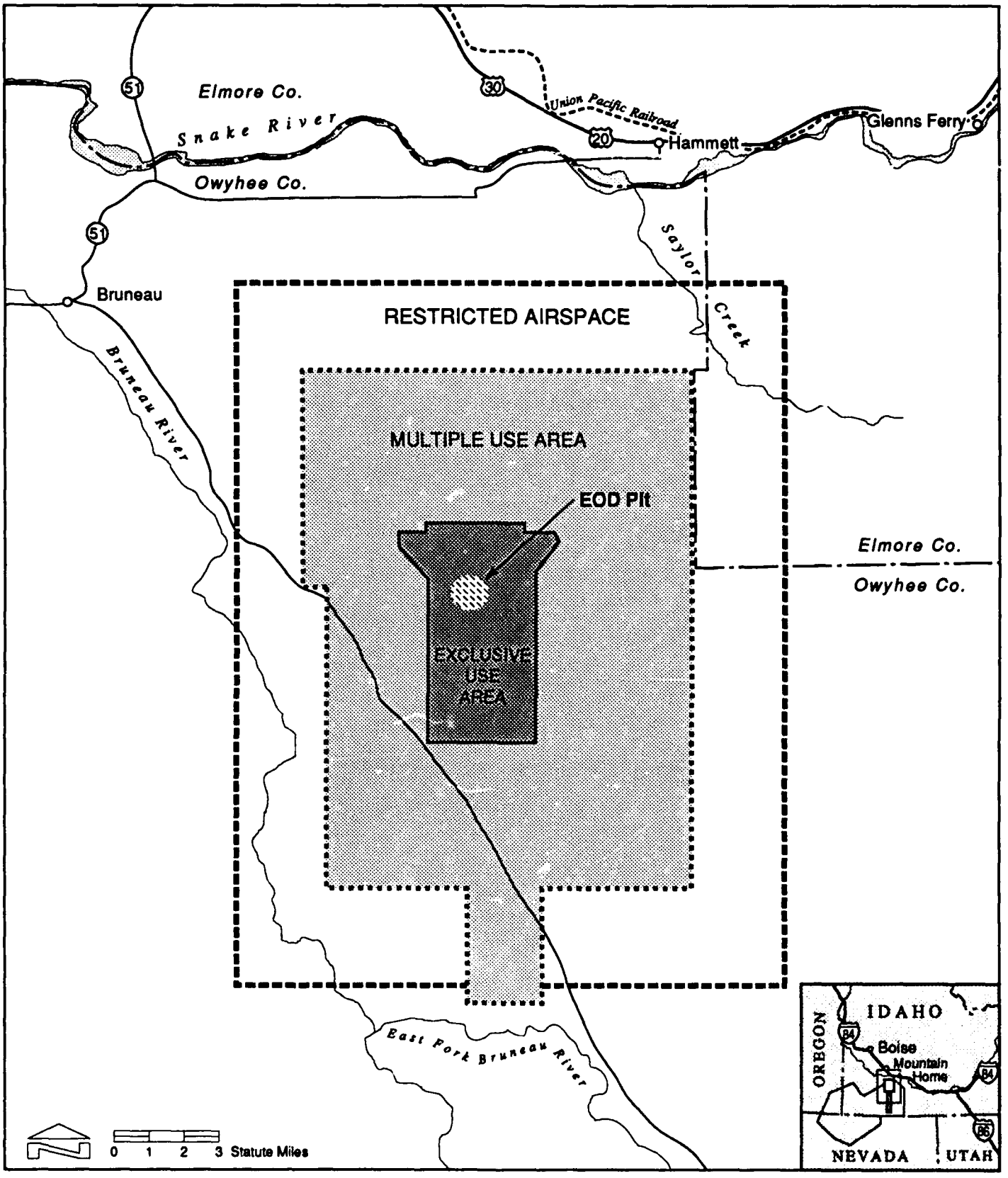


Figure S3.12-6

EXPLOSIVE ORDNANCE DISPOSAL PIT
SAYLOR CREEK RANGE

S4.0 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES: PROPOSED EXPANDED RANGE CAPABILITY

S4.1 AIRSPACE MANAGEMENT

S4.1.1 Regulatory Setting

The laws and regulations that govern the management of the National Airspace System are listed below, along with a brief discussion of the primary purpose:

Federal Aviation Act of 1958 created the Federal Aviation Administration and charged the FAA Administrator with ensuring the safety of aircraft and the efficient utilization of the National Airspace System, within the jurisdiction of the United States.

Federal Aviation Regulation Part 71 delineates the designation of federal airways, area low routes, controlled airspace, and navigational reporting points.

Federal Aviation Regulation Part 73 defines special use airspace and prescribes the requirements for the use of that airspace.

Federal Aviation Regulation Part 91 describes the rules governing the operation of aircraft within the United States.

FAA Handbook 7400.2C prescribes policy, criteria, and procedures applicable to rulemaking and non-rulemaking actions associated with airspace allocation and utilization, obstruction evaluation and marking, airport airspace analyses, and the establishment of air navigation aids.

FAA Handbook 7110.65 prescribes air traffic control procedures and phraseology for use by personnel providing air traffic control services in the United States.

Salt Lake City Center and Mountain Home AFB RAPCON Letter of Agreement delegates areas of control jurisdiction and established procedures for coordinating air traffic between Salt Lake City Center and MHAFB RAPCON.

S4.1.2 Issues and Concerns

Issues and concerns pertaining to this study include the following:

- Many of the existing weapons ranges cannot accommodate contemporary military training missions. The original designs of many of these ranges, including its special use airspace, are inadequate for many new aircraft types entering the military inventory.

- Many existing weapons ranges are at or near operational saturation as to the number of military aircraft sorties that can be accommodated. This saturation effect could be due to many reasons, including the following: a limited number of low-level MTRs into the ranges; limited special use airspace surrounding the ranges; small geographical size of the range; few target systems available for use; and/or limited availability of range operational hours due to manpower or other military resource restrictions.

- Access through special use airspace overlying weapons ranges that are surrounded by land that is not owned, leased, or controlled by the Air Force can be obtained from the controlling agency. The FAA requires that the Air Force provide aerial access through special use airspace to any property owner upon request, if the floor of the airspace is less than 1,200 feet AGL. The operational floor of restricted airspace around the majority of weapons ranges is the surface.

- Various types of military aircraft often cannot operate entirely within existing special use airspace above a weapons range because of specific aircraft training mission requirements and/or performance characteristics. The current design of exclusionary areas, i.e., impact and target areas, and the special use airspace that exist at many ranges often does not take into consideration new or "evolving" high-speed missions.

- Many governments at the state level have begun to realize the importance of air commerce to the economic well-being of their constituencies and consequently have begun to monitor and exert influence over airspace. This increased involvement is viewed as essential to the support of regional plans for economic expansion and growth, land use airport development, and other long-range projects. In support of these economic expansion activities, state governments are concerned about the military's utilization of and requirements for special use airspace, alleging that such airspace effectively blocks or restricts airspace necessary for air commerce opportunities (U.S. Navy 1987).

S4.1.3 Significance Criteria

The significance of potential airspace impacts depends on the degree to which the proposed action affects the airspace environment. Significant impacts occur where proposed actions (1) increase the potential for aircraft accidents, (2) impose major restrictions on air commerce opportunities, (3) significantly limit airspace access to a large number of users, or (4) require modifications to air traffic control systems and/or facilities.

S4.1.4 Methodology for Analyzing Impacts

Impacts to airspace were assessed by (1) comparing the projected military flight activity with existing and forecast civil aviation activity in the modified airspace environment; (2) individually and selectively analyzing the capability of affected airspace elements to accommodate projected flight activity of military and civil users; and (3) examining the interaction of the airspace areas with public- or private-use civil airports and the federal airway structure. The flight activity projections were developed from data provided by the Air Force, the Idaho Air National Guard, federal air traffic control agencies, and the state of Idaho.

S4.1.5 Impact Assessment

S4.1.5.1 Proposed Expanded Range Capability

The realignment of the F-4 aircraft to MHAFB will result in a substantial increase in the use of the special use airspace in the vicinity of the SCR. This special use airspace includes Owyhee, Paradise, Bruneau 1, and Bruneau 2 MOAs and restricted areas R-3202A, R-3202B, and R-3202C. The annual sorties that would be flown under the setting of the proposed expanded range capability could closely approximate the estimated sorties assessed under the no-action alternative (see section S4.1.5.2). These levels of use include the following:

- Current use of the MOAs is 5,102 annual sorties versus 26,434 sorties in the no-action alternative.
- Current use of the SCR is 7,153 annual sorties versus 29,214 sorties in the no-action alternative.

The principal difference between the assessment of airspace management issues of the proposed expanded range capability and the no-action alternative is the configuration of the weapons range. The overall geographical dimensions of the ROI and special use airspace in the proposed expanded range capability would remain similar to that assessed in the no-action alternative. Minor modifications

could be required depending upon the location of the proposed expanded range capability. Altitudes of use for both MOAs and restricted areas would be changed under the proposed expanded range capability, depending upon the mid- to long-term projected airspace needs. (The no-action alternative addresses the short-term airspace requirements.) Additional ATCAA airspace could be required above the current FL290 ceiling and the ceiling of the restricted airspace could be required to extend to unlimited. The shape of the MOAs and restricted areas would be realigned under the proposed expanded range capability, in that restricted airspace would need to overlie all impact areas.

S4.1.5.2 No-Action Alternative

The realignment will necessitate minor changes to MOA boundaries and will add supersonic flight operations to some of the special use airspace. Restricted areas and MOAs would be partially modified to accommodate the increased training requirements. MTRs would remain structurally unchanged while supporting an increased number of low-level sorties to the SCR and the surrounding MOAs.

Military Operations Areas and ATCAA

The MOAs and the overlying ATCAA airspace would be of sufficient volume to support air-to-air combat engagements, use of air defense systems, and provide maneuvering room for multi-aircraft strike formations. Threat reaction and simulated ordnance delivery would take place in the MOA airspace. However, there would be no arming of delivery systems or actual weapons delivery. The Owyhee, Bruneau 1, and Bruneau 2 MOAs would contain supersonic flight activity involving air-to-air training, advanced handling characteristics, and supersonic escape maneuvers (see Figure S4.1-1). Supersonic flight operations would occur between 5,000 feet AGL and FL290 (except the supersonic flight portion of functional check flights above 35,000 feet MSL). Supersonic speeds would generally be less than Mach 1.2. It is estimated that supersonic flight would occur on approximately 10 percent of the sorties flown in the MOA/ATCAA airspace. Table S4.1-1 presents a comparison of the existing airspace to that which is proposed. Table S4.1-2 shows projected annual MOA sorties by aircraft type.

The consequences of the proposed MOAs airspace actions relative to the overall airspace environment are discussed below.

Paradise MOA

The no-action alternative would retain the existing outer boundaries of the Paradise MOA, but the portion of the Paradise MOA that currently overlies Owyhee MOA would be deleted.

The floor of the Paradise MOA, which overlies Idaho and Oregon, would be lowered from 14,500 feet MSL to 10,000 feet MSL. There would be no change to the ATCAA outlining the Paradise MOA that

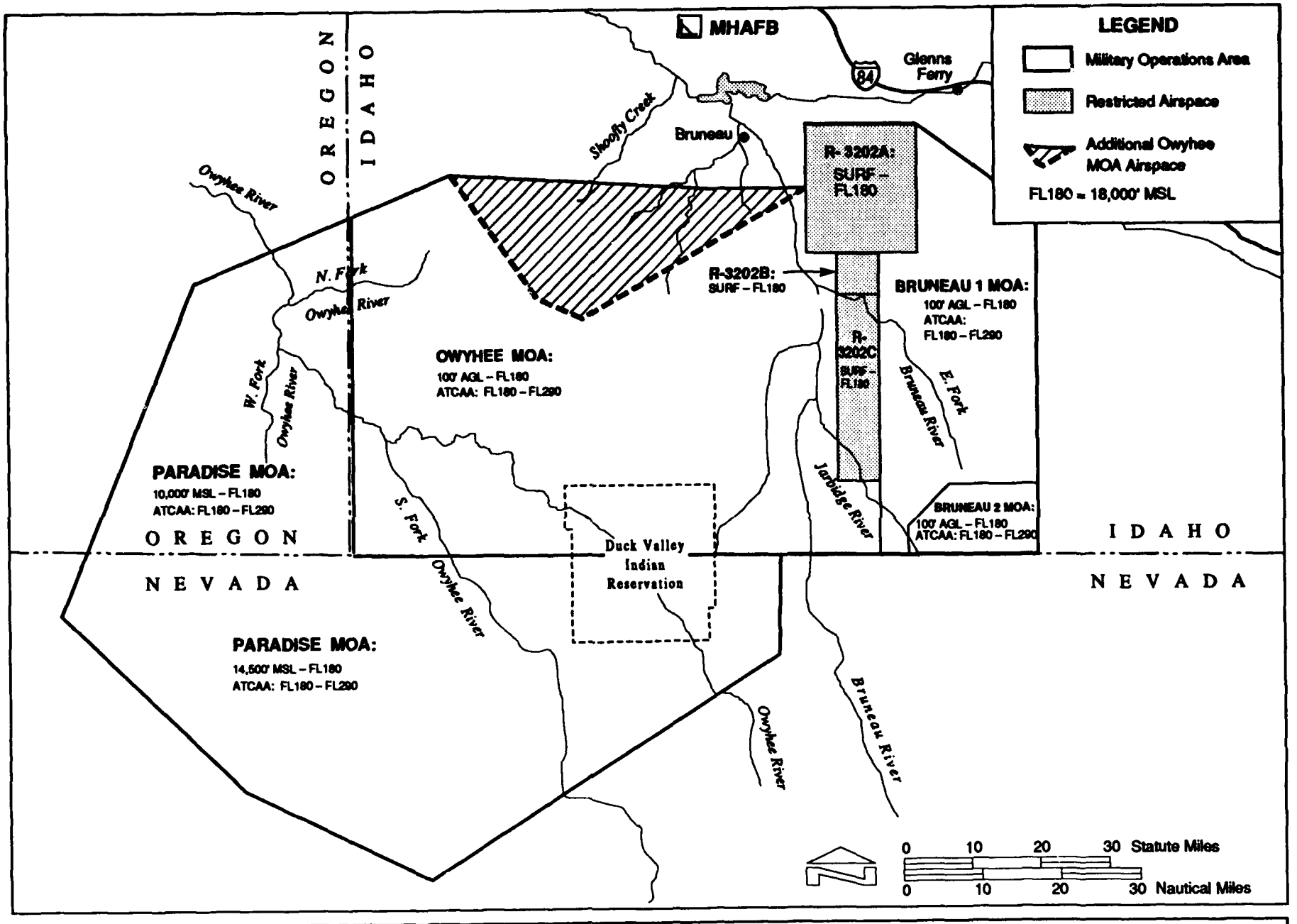


Figure S4.1-1

PROPOSED AIRSPACE CONFIGURATION

Table S4.1-1

COMPARISON OF CURRENT AND PROPOSED MOA ALTITUDES

MOA	*Current Altitude*	*Proposed Altitudes*
Bruneau 1	100' AGL[1] - 14,500' MSL[2]	100' AGL - FL[3]180
Bruneau 2	2,000' AGL - 14,500' MSL	100' AGL - FL180
Owyhee	100' AGL - to, but not including, 14,500' MSL	100' AGL - FL180
Paradise (overlying Owyhee MOA)	14,500' MSL - FL180	Incorporated into Owyhee MOA
Sheep Creek 1	100' AGL - 11,000' MSL	Incorporated into Owyhee MOA
Sheep Creek 2	100' AGL - 8,500' MSL	Incorporated into Owyhee MOA
Sheep Creek 3	100' AGL - to but not including 7,000' MSL	Incorporated into Owyhee MOA
Saylor	100' AGL - 14,500' MSL	Incorporated into Owyhee MOA
Paradise (Oregon, Idaho)	14,500' MSL - FL180	10,000' MSL - FL180
Paradise (Nevada)	14,500' MSL - FL180	14,500' MSL - FL180

Notes:
1. Above ground level
2. Mean sea level
3. Flight level

Table S4.1-2

PROJECTED ANNUAL MOA SORTIES BY AIRCRAFT TYPE

	MHAFB F-4E/G	*MHAFB EF-111A*	*LANG RF-4C*	*SAC B-1B*	*SAC B-52*	*Total*
Day	22,450	1,737	1,997	0	0	26,184
Night	150	100	0	0	0	250
TOTAL	22,600	1,837	1,997	0[1]	0[1]	26,434

Note: 1. No MOAs are proposed to be used by SAC aircraft except where MTRs are used to access the SCR restricted airspace.

extends to FL 290. Because of a current moratorium on further airspace withdrawals in Nevada, the ceiling of Paradise MOA and its ATCAA would remain unchanged at the currently authorized MOA and ATCAA altitudes.

The additional airspace between the current Paradise MOA floor of 14,500 feet MSL that overlies Oregon and the proposed floor of 10,000 feet MSL would reduce the airspace available to non-participating IFR aircraft. The additional airspace increases the airspace area within which non-participating VFR aircraft would have to operate with greater caution.

Bruneau 1 and Bruneau 2 MOAs

The eastern boundaries of Bruneau 1 and 2 MOAs would be extended to the east approximately one NM. The ceilings of each MOA would be raised to FL180, from their current 14,500 feet MSL level. The floor of Bruneau 2 MOA would be dropped from 2,000 feet AGL to 100 feet AGL. New ATCAAs would be established above both Bruneau 1 and 2 MOAs to FL290 (29,000 feet MSL).

The reconfigured Bruneau 1 and 2 MOAs would encompass more airspace than the current configuration (see Table S4.1-1). This would reduce the airspace for non-participating IFR aircraft and expand the area of caution that would be required for pilots of VFR aircraft.

Owyhee MOA

The no-action alternative would extend Owyhee MOA to the north and northeast a few miles. Owyhee MOA would also be extended to the east to incorporate the current Sheep Creek 1, 2, and 3 MOAs and Saylor MOA. The vertical boundaries of Owyhee MOA would extend from 100 feet AGL to a ceiling of 18,000 feet MSL. The exceptions to these limits are listed below.

- Indian Village sensitive area (41° 55.0'N x 116° 03.03' W, 41° 55.5' N x 116° 14.5' W, 42° 01.0'N x 116° 12.5' W) would be either overflown above 1,000 feet AGL or avoided by 3 NM. This is a current special operating procedure for IR-302 as stated in FLIP AP/1B.

- Noise sensitive area (Indian Village -- Duck Valley Indian Reservation) located within a 7-NM radius half-circle of 42° 00' N x 116° 13' W. This area, north of 42° north latitude, would be avoided by 750 feet AGL or 6,500 feet MSL.

- Grasmere Airport is designated for public use and would be avoided by 1,500 feet AGL or 3 NM. The airfield is located at 42° 22.0' N x 115° 52.5'W.

- Riddle Airport is a privately owned airfield that would be avoided by 1,000 feet AGL and 1 NM. The airfield is located at 42° 11.0' N x 116° 07.5' W.

The ATCAA would extend above Owyhee MOA to FL290.

The higher ceiling of Owyhee MOA, increasing from 14,500 feet MSL to FL180 and the expanded lateral boundaries of the MOA toward the north, would reduce the available airspace for non-participating IFR aircraft. Also, the area within which VFR aircraft would have to exercise greater caution would be expanded. The same situation would occur where the ceilings of the current Sheep Creek 1, 2, and 3 MOAs and Saylor MOA would be increased to FL180 and incorporated into Owyhee MOA (see Table S4.1-1).

The northern portion of Owyhee MOA would overlap with a portion of the 1,200-foot transition area southwest of MHAFB. This expanded MOA airspace would contain transition area airspace between 1,200 feet AGL and 14,499 feet MSL. Information obtained from the FAA indicates that an overlapping of MOA and transition area may require FAA review to determine specific operational effects. This review would cover proposed MOA activity, MHAFB terminal area operations, and ATC procedures. In this case, both the Mountain Home terminal area and Boise terminal area would be contained within the 1,200-foot transition area.

General Impacts to All MOAs

Changes to the vertical or lateral boundaries of MOA airspace would not influence access to the airspace by civil or military aircraft flying VFR. Thus, the reconfiguration of the Paradise, Bruneau 1, Bruneau 2, and Owyhee MOAs would not adversely affect airspace availability for VFR aircraft operations. The expanded lateral and vertical limits would create additional airspace in which civil and military pilots would have to exercise greater caution. The segment of civil aviation most affected by this action would be single-engine piston, multi-engine piston, and helicopter general aviation aircraft. These aircraft generally fly in the lower altitudes below 18,000 feet MSL. Except for short flight segments, turboprop and turbojet aircraft usually fly above 18,000 feet MSL, where they operate more efficiently.

There are no data that quantify the total number or type of civil aircraft which fly VFR through this region of southwest Idaho. However, Mountain Home Approach Control had a total of 4,914 VFR service operations in 1988, an average of 13.5 operations per day. Assuming a worst-case scenario that all of the daily 13.5 operations were north-south traffic, all of these aircraft would transit the MOA, but only a portion of them while the MOAs are active. Actual penetration of the MOAs by non-participating VFR aircraft would therefore appear to be infrequent. Such a pattern could change only through a substantial growth in numbers of aircraft operating in a north-south direction in the off-

airway environment. Consequently, the proposed MOA changes would not have any significant impacts to VFR aircraft operations.

The additional airspace in Paradise MOA that overlies Oregon and Idaho and the expansion of the vertical and lateral boundaries of Owyhee MOA, compared to existing conditions, would reduce the amount of airspace available to non-participating IFR aircraft. All MOA airspace is currently within the air traffic control area of the Salt Lake City Air Route Traffic Control Center (ARTCC). Because of existing inadequate radar and air-ground communications coverage below 14,500 feet MSL in the area of the MOAs, Salt Lake ARTCC cannot presently provide separation between non-participating IFR traffic and military aircraft activities in the MOAs. Under existing conditions, virtually all IFR traffic is vectored around the MOAs, when the MOAs are active.

There is a forthcoming project to improve the radar coverage of this area of the Salt Lake ARTCC airspace. This could involve a link with the airport surveillance radar (ASR) antenna at MHAFB. Additionally, there are plans to establish a remote communications air/ground facility (RCAG) that would provide radio communications capability between the region and the ARTCC.

Since the existing lack of radar coverage currently precludes IFR operations below 14,500 feet MSL through the MOAs, lowering the floor of Paradise MOA would not change existing conditions. Establishing a ceiling of FL180 for Owyhee MOA, in existing MOA areas wherein the ceilings are between 7,000 feet MSL (Sheep Creek 3) and 14,500 feet MSL (Saylor, Owyhee, and Bruneau MOAs), would increase the airspace in which positive ATC separation would be required.

The nature of the military flight training in the proposed MOAs would reduce the circumstances under which ATC separation can be provided between military aircraft and non-participating IFR aircraft. The tactical operations of the F-4 and EF-111 aircraft require offensive and defensive techniques that involve spontaneous and abrupt speed changes, high-angle climbs and descents, steep turns, and various aerobatic maneuvers. These tactical operations are not compatible with positive control by ATC, in which there is a prescribed flow of air traffic. Salt Lake ARTCC has indicated that off-airway en route traffic through this area is infrequent and that the volume of the projected military operations in these MOAs would not significantly affect this off-airway traffic.

There should not be any significant impacts to IFR en route traffic, because of the low level of IFR en route activity below 18,000 feet MSL in the area of the MOAs. The planned improvements to the ATC capability at Salt Lake ARTCC could mitigate some of the potential impacts of the expanded MOA airspace upon the flow of en route IFR aircraft operations. This would require the ARTCC to establish definitive ATC procedures. There could be a requirement for an FAA evaluation of the Owyhee MOA expansion into the Mountain Home/Boise 1,200-foot transition area.

No supersonic flight currently occurs within the existing MOAs. After realignment, supersonic operations are proposed to occur only within Owyhee, Bruneau 1, and Bruneau 2 MOAs, between 5,000 feet AGL and 18,000 feet MSL. Supersonic flights would also occur within the ATCAA above each of these MOAs up to FL290. Non-participating IFR aircraft flying in the ATCAA would be provided ATC separation from all aircraft.

Restricted Areas

No changes would be made to the lateral boundaries of existing restricted airspace areas R-3202A, R-3202B, and R-3202C, as depicted in Figure S3.1-2. The vertical limits of the restricted airspace would be from ground surface to, but not including, 18,000 feet MSL.

The restricted airspace would support training missions required to develop and maintain basic aircrew proficiency levels in air-to-ground bombing and gunnery. Operationally, the airspace would contain hazardous, intense flight activity associated with ordnance delivery training missions, electronic countermeasures, operational readiness exercises, and individual aircrew proficiency evaluations. The no-action alternative restricted airspace would be used to support a projected annual total of 29,214 sorties. Projected annual range sorties are shown in Table S4.1-3.

The vertical extension of restricted airspace would limit civil aviation use during military operations. Civil use would include commercial air carriers, general aviation, and government use other than the military. The effect on commercial air carriers would be negligible. Requests for direct, off-airway transit of the airspace typically occur infrequently. The existing federal airway structure appears to adequately accommodate air commerce in southwestern Idaho, northcentral Nevada, and southeastern Oregon. Increasing the restricted airspace altitudes would affect general aviation by limiting access to the airspace. However, while no specific data are available to quantify general aviation traffic in this area, the best information available from controlling agencies categorizes general aviation traffic volume as light. Given that assessment, the proposed change to restricted airspace appears to present the least possible effect on general aviation.

Government resource management agencies, such as the BLM and the Idaho Department of Fish and Game, would continue to access the restricted airspace through the existing telephonic coordination and scheduling procedure. This process has adequately accommodated outside user requirements to date. While increased military flight activity could generate potential airspace scheduling conflicts, these potential conflicts appear insignificant. Any scheduling conflicts would be alleviated by careful scheduling and by coordinating airspace access requirements further in advance than at present.

The limited impact of the reconfigured airspace on commercial, general, and government aviation be further minimized by designating the restricted areas as multiple joint space use, by the Air Force's

Table S4.1-3

PROJECTED ANNUAL SAYLOR CREEK RANGE SORTIES

Type	*MHAFB F-4E/G*	*MHAFB EF-111A*	*IANG RF-4C*	*SAC B-1B*	*SAC B-52*	*Total*
Conventional						
Day	9,024	0	0	480	480	9,984
Night	900	0	0	120	120	1,140
Total	9,924	0	0	600	600	11,124
Tactical without EW[1]						
Day	5,100	0	698	0	0	5,798
Night	60	0	0	0	0	60
Total	5,160	0	698	0	0	5,858
Tactical with EW						
Day	8,682	1,050	1,300	480	480	11,992
Night	0	0	0	120	120	240
Total	8,682	1,050	1,300	600	600	12,232
Totals						
Day	22,806	1,050	1,998	960	960	27,774
Night	960	0	0	240	240	1,440
Total	23,766	1,050	1,998	1,200	1,200	29,214

Note: 1. Electronic Warfare.

ability to selectively activate restricted or ATCAA airspace, and by releasing unneeded airspace to the FAA controlling agency for civil aviation use.

Military Training Routes

There would be no changes to the current MTR structure under the no-action alternative. Current aircraft flight parameters on the MTRs would essentially remain unchanged. These are:

- Groundspeeds from 350 knots to 560 knots (subsonic).
- Altitudes as published, with some flights as low as 100 feet AGL on approved route segments.
- Power settings from 88 to 92 percent of available thrust.

Table S4.1-4 shows the projected annual number of sorties by MTR and aircraft type. The data reflect a projected annual increase of 3,768 MTR sorties (34 percent) over the current level. The change in MTR sorties would range from an approximate 7 sorties per day decrease on one MTR to an increase of approximately 11 sorties per day on another. On average, the additional sorties will result in an increase of approximately 2 sorties per day per route based on 225 annual operating days.

The increase in sortie frequency on the existing low-level MTR structure could pose constraints on the surrounding airspace, though none of the eight MTRs currently operate at capacity. IR-300, IR-303, IR-304, and VR-1301 would experience a decrease in the numbers of sorties flown. IR-302 use would experience a growth of 125 percent over current levels, VR-1300 use will grow 74 percent, VR-1302 use would grow 287 percent, and VR-1304 use would grow 913 percent over current levels of operations. Route scheduling agencies (MHAFB, 124 TRG-Boise Air Center, and SAC) would monitor the scheduling of these routes closely, to ensure adequate safety margins between scheduled flights. Impacts on scheduling are considered to be insignificant.

Increased use of the MTR structure could pose a few minor constraints on general aviation operations at airports that underlie the individual routes. However, FLIP regulations require that any airport be avoided by 3 NM or 1,500 feet AGL when practical. Therefore, the impacts to civil airspace associated with the addition of two flights per route per day is considered to be insignificant. There should not be any impacts to commercial aviation as a result of the increased MTR activity.

The intersections of MTRs with federal airways would be slightly affected, due to a slight increase in the potential for air traffic conflicts at these points. There would be a higher potential for conflicts where VFR air traffic operates under visual meteorological conditions and without ATC guidance.

Table S4.1-4

PROJECTED ANNUAL MTR SORTIES

MTR	*MHAFB F-4E/G*	*MHAFB EF-111A*	*IANG RF-4C*	*SAC B-1B*	*SAC B-52*	*Total*
IR-300						
Day	559	18	24	192	192	985
Night	11	0	0	48	48	107
Total	570	18	24	240	240	1,092
IR-302						
Day	1,000	259	276	480	480	2,495
Night	20	0	0	120	120	260
Total	1,020	259	276	600	600	2,755
IR-303						
Day	608	440	264	96	96	1,504
Night	12	50	0	24	24	110
Total	620	490	264	120	120	1,614
IR-304						
Day	588	335	216	96	96	1,331
Night	12	50	0	24	24	110
Total	600	385	216	120	120	1,441
VR-1300						
Day	1,362	275	204	24	24	1,889
Night	28	0	0	0	0	28
Total	1,390	275	204	24	24	1,917
VR-1301						
Day	314	183	240	24	24	785
Night	6	0	0	0	0	6
Total	320	183	240	24	24	791
VR-1302						
Day	2,891	275	372	36	36	3,610
Night	59	0	0	0	0	59
Total	2,950	275	372	36	36	3,669
VR-1304						
Day	1,137	50	228	36	36	1,487
Night	23	0	0	0	0	23
Total	1,160	50	228	36	36	1,510
Totals						
Day	8,459	1,835	1,824	984	984	14,086
Night	171	100	0	216	216	703
Total	8,630	1,935	1,824	1,200	1,200	14,789

These VFR aircraft could be unaware of scheduled military operations on crossing MTRs. Potential air traffic conflicts would be minimized where all IFR and civil VFR aircraft are in contact with an ATC facility. FSSs would also provide advisories on scheduled MTR activity to requesting aircraft. Overall, the increased MTR activity will not have a significant impact on the federal airway structure.

Work-Arounds

As described in section 2.1.4.4, MHAFB training requirements can be partially satisfied using work-arounds, such as increasing range operating hours, training with no weapons delivery, and deployment and refueling. None of these work-arounds would significantly impact airspace management.

S4.1.6 Mitigations

S4.1.6.1 Proposed Expanded Range Capability

Airspace impacts associated with a proposed expanded range capability would be similar to those resulting from the no-action alternative. Consequently, the mitigations described below would also be appropriate for developing a range with expanded capability.

S4.1.6.2 No-Action Alternative

The following mitigations would ensure that no significant impacts to airspace management would occur as a result of the no-action alternative.

- The modified airspace reconfiguration would require coordination with the FAA for the increased MOA airspace and with Salt Lake City ARTCC for the additional ATCAA airspace.
- FSSs should disseminate to all civil pilots flying in the area scheduled military activity on MTRs, in MOAs, and on the SCR.
- Salt Lake ARTCC and MHAFB should coordinate the release of unscheduled MOA and restricted airspace back to civil ATC control.
- Salt Lake ARTCC and MHAFB should upgrade the radar coverage of the special use airspace in the vicinity of the SCR in order to provide enhanced radar control to participating military and non-participating civil aircraft.

- Public use airports in the vicinity of or directly beneath special use airspace, e.g., Grasmere, Grindstone Ag, and Murphy Hot Springs, should bc avoided by 3 NM or 1,500 feet AGL, if practical. Also, these should be noted on all military aeronautical charts and in the FLIP.

S4.2 AIR RESOURCES

S4.2.1 Regulatory Setting

The Clean Air Act, Title 40 CFR parts 50 and 51, dictates that the NAAQS must be maintained nationwide. The Act delegates authority to state and local agencies to enforce the NAAQS and to establish air quality standards and regulations of their own. The adopted state standards and regulations must be at least as restrictive as the federal requirements. The Idaho Board of Health and Welfare (IBHW) has the authority to regulate air pollution sources within Idaho (IBHW 1987). Air pollution sources within the study area, but outside of Idaho are regulated by the UBAQ, NDEP, and ODEQ. Although mobile sources such as aircraft are exempt from air pollution permitting requirements, the operation of these sources must comply with the state and federal regulations and ambient air quality standards shown in Table S3.2.1.

The Clean Air Act, Section 169A, states that it is a national goal to prevent any further impairment of visibility within federally mandated Class I areas such as National Parks and Wilderness Areas from manmade sources of air pollution. Visibility impairment is defined as (1) a reduction in regional visual range and (2) atmospheric discoloration or plume blight from exhaust effluents. Criteria to determine significant impacts on visibility within Class I areas exist for stationary emission sources, but do not pertain to mobile sources since they are generally exempt from permit review by regulatory agencies. However, the IBHW criterion for adverse effects on visibility is defined as any unacceptable anthropogenic change to the naturally occurring visibility within a Class I area (IBHW 1987).

S4.2.2 Issues and Concerns

Air quality impacts would occur within the proposed expanded range capability during construction and operation of the range. Construction-related impacts would result from fugitive dust and construction equipment emissions. Operational impacts would occur from aircraft and maintenance vehicle emissions and fugitive dust emissions from disturbed areas. Air quality impacts would also occur within the adjoining MOAs and MTR study area as a result of aircraft operations within these areas.

S4.2.3 Significance Criteria

Criteria to determine the significance of air quality impacts are based on federal, state, and local air pollution standards and regulations. Impacts would be significant if emissions (1) increase ambient

pollutant concentrations from below to above any state or federal ambient air quality standards (shown in Table S3.2-1) or (2) impair visibility within a federally mandated Class I area.

S4.2.4 Methodology for Analyzing Impacts

Emissions were estimated for typical construction and operation of an expanded range complex. Operational impacts from aircraft sources were determined by estimating the change in ambient pollutant concentrations that would occur with the increase in aircraft operations associated with an expanded range complex. Air quality impacts associated with operational fugitive dust and maintenance equipment sources and construction activities were assessed qualitatively.

The proposed aircraft operations would increase emissions within the range and adjoining MOAs and MTRs. Emissions were calculated for both aircraft based at MHAFB and transient aircraft by determining aircraft flight time within each airspace. The same emission factors used to estimate existing aircraft emissions were used in this analysis. Aircraft flight times within each MTR were determined by typical aircraft speeds and percentage of route lengths flown.

Since the increase in emissions within the range and adjoining MOAs and MTRs would occur mainly from aircraft operations, impacts on ambient pollutant concentrations were evaluated for these sources. Although a computerized dispersion model is often used to predict air quality impacts, there is no EPA-approved guideline model applicable for determining ground-level impacts from aircraft activities. As an alternative, a closed box technique was used to assess aircraft-related impacts. This technique assumes that aircraft emissions are homogeneously dispersed and contained within a given volume of air in which an aircraft operates. The pollutant concentration calculated within the box is assumed to be equal to the maximum ground-level impact. The closed box technique would be expected to estimate higher impacts than an analysis using a computerized dispersion model due to the conservative assumptions used in this approach. For example, aircraft emissions are confined within a limited airspace instead of dispersed downwind throughout a much larger volume of air.

The impact analysis focused on the range, since air traffic and resulting aircraft emissions would be greatest within this area. If impacts were determined to be insignificant within the range, impacts would also be insignificant within the MOAs and MTRs. The airspace assessed would follow a one mile length of flightpath flown by aircraft within the range. The cross-section of the volume enclosing aircraft emissions was assumed to be a square, with each side equal to twice the lowest flight path distance above ground level (200 feet). These dimensions simulate the extent of dispersion in the horizontal and vertical directions. To assess the most likely worst-case emissions scenario, a formation of four F-4E/G aircraft were assumed to fly the same flight path six times over a range target area within the same hour. This assumption results in a very conservative analysis, since the emissions from the four aircraft would impact the same airspace or ground-level location within the same hour.

To estimate the impacts of a proposed expanded range capability, concentrations of atmospheric pollutants predicted for proposed aircraft operations (see Table S4.2-1) were added to the background pollutant concentrations shown in Table S4.2-2. Total pollutant concentrations were then compared to the state and federal ambient air quality standards to determine if significant impacts would occur. To determine compliance with the Nevada and Oregon ambient air quality standards for total suspended particulates (TSP), TSP background concentrations were derived from the average second highest value monitored at the Overland station in Boise from 1983 through 1987. Background pollutant concentrations used in this impact analysis are expected to be substantially greater than worst-case ambient pollutant concentrations observed within the study area, since they were derived from monitoring stations located in areas with substantially more emission sources than the study area. To determine compliance with the Oregon ambient air quality standard for non-methane hydrocarbons (NMHC), the three-hour background concentration was assumed to be 50 percent of the state standard.

To compare one-hour modeled impacts to ambient air quality standards with averaging periods longer than one-hour, factors were used to convert one-hour impacts to longer averaging period impacts. This technique is consistent with that recommended by the EPA (1977). The factors used to convert one-hour impacts to longer averaging periods are as follows: 0.90 for three-hour impacts, 0.70 for eight-hour impacts, 0.40 for 24-hour impacts, and 0.10 for annual impacts.

The impact of aircraft emissions on visibility is an issue with regard to federally mandated Class I areas such as National Parks and Wilderness Areas. The Jarbidge Wilderness Area is the nearest Class I area to the study area, and is approximately 9 miles south of the southeast corner of the proposed expanded range capability. This Class I area is also adjacent to IR-302, IR-303, VR-1300, and VR-1304. The potential exists for aircraft emissions to impair visibility within the Jarbidge Wilderness Area while operating on these routes. This potential impact was evaluated by reference to the impact analysis performed for the proposed expanded range capability.

S4.2.5 Impact Assessment

S4.2.5.1 Proposed Expanded Range Capability

Construction Impacts

Short-term emissions would occur as a result of the construction of new administration facilities, target areas, fire breaks, and roads within the range. Most emissions would occur in the form of fugitive dust

Table S4.2-1

FUTURE EMISSIONS ASSOCIATED WITH THE IMPLEMENTATION OF THE PROPOSED ACTION WITHIN THE STUDY AREA
(tons/year)

	CO	*THC*	*NO_x*	*SO_2*	*PM*
Range aircraft operations	495.1	19.3	1,030.4	104.6	105.3
MOA aircraft operations	901.5	19.9	1,985.2	188.0	186.2
MTR aircraft operations	577.0	41.1	1,346.8	143.5	159.3
TOTAL EMISSIONS	1,973.6	80.3	4,362.4	436.1	450.8

Table S4.2-2

AIR QUALITY MODELING RESULTS FOR THE STUDY AREA
($\mu g/m^3$)

Pollutant	*Averaging Time*	*Impact of Proposed Action*	*Background Concentration*[1]	*Total Impact*	*AAQS*[2]	*Percent of AAQS*[3]
Carbon monoxide	8-hour	148.2	7085.7	7233.9	10,000	72.3
	1-hour	211.7	13,257.1	13,468.8	40,000	33.7
Nitrogen dioxide	Annual	4.3	50.0	54.3	100	54.3
Sulfur dioxide	Annual	4.1	18.3	22.4	60	37.3
	24-hour	16.3	156.4	172.7	260	66.4
	3-hour	36.7	391.1	427.8	1,300	32.9
PM_{10}	Annual	3.6	35.0	38.6	50	79.2
	24-hour	14.4	69.0	83.4	150	55.6
TSP	24-hour	15.0	134.6	149.6	150	99.7
Nonmethane hydrocarbons	3-hour	3.5	80.0	83.5	160	52.2

Notes:
1. CO, TSP, and PM_{10} background pollutant concentrations obtained from pollutant data monitored at Overland and Mt. View School stations in Boise. SO_2 background concentrations obtained from pollutant data monitored at Soda Springs stations, west of Conda (Idaho Air Quality Bureau 1988). Since NO_2 and nonmethane hydrocarbons are not monitored in Idaho, worst-case background concentrations were assumed to be 50 percent of the ambient air quality standard.
2. Refer to Table S3.2-1 for a summary of state and federal ambient air quality standards. If more than one standard applies to a given pollutant, the most stringent of the two (specified here as AAQS) has been listed.
3. The proposed action would be expected to have a significant impact on air quality if the total impact for any pollutant was 100 percent or more of the AAQS.

during grading activities, especially for roads and firebreaks. Uncontrolled fugitive dust emissions from ground disturbing activities could be as high as 1.2 tons/acre-month or 0.6 tons/acre-month of PM_{10}. Total fugitive dust emissions during construction cannot presently be estimated, since the total acreage of disturbed ground within the proposed range expansion will not be determined until the second phase of the tiering process.

Combustive emissions would also be generated by construction equipment. These emissions would be greatest during grading activities. Since construction activities would occur intermittently over several months, these emissions would have an adverse, but short-term, impact on air quality.

Operational Impacts

Fugitive dust emissions would occur from target areas, fire breaks, and roads maintained as bare soil within the range. Uncontrolled fugitive dust emissions from areas maintained as bare soil would be approximately 0.38 tons/acre-year (EPA 1985c), or 0.19 tons/acre-year of PM_{10}. The acreage of these areas will be defined in subsequent tiered environmental documents. During high wind conditions or weapons impacts within target areas, fugitive dust emissions from these areas could exceed EPA estimates for bare soil. The increase in fugitive dust emissions from areas maintained as bare soil in the range would have an adverse, long-term impact on air quality. These impacts would be mitigated through implementation of measures described in section S4.2.6.2.

Combustive emissions would occur from occasional operation of equipment for the maintenance of roads, fire breaks, and target areas within the range. The increase in combustive emissions from maintenance equipment in the range would have an adverse, but insignificant short-term impact on air quality.

Emissions associated with the proposed aircraft operations within the SCR and adjoining MOAs and MTRs are summarized in Table S4.2-1. Annual emissions estimated within these areas would be 1,973.6 tons of CO, 80.3 tons of THC, 4,362.4 tons of NO_X, 436.1 tons of SO_2, and 450.8 tons of PM. These emissions represent the following increases in emissions from existing levels within the MOAs and MTRs: 448.2 CO, 3.2 percent for THC, 125.3 percent for NO_X, 126.5 percent for SO_2, and 60.0 percent for PM.

The results of the impact analysis determined that the proposed aircraft operations would produce the following 1-hour ambient pollutant concentrations: 211.7 ug/m^3 of CO, 3.9 ug/m^3 of THC, 43.1 ug/m^3 of NO_2, 40.8 ug/m^3 of SO_2, 37.6 ug/m^3 of TSP, and 36.1 ug/m^3 of PM_{10} as a worst case. With the use of the conversion factors and the addition of background pollutant levels to estimated impacts of proposed aircraft operations, the total impacts would remain below the state and federal ambient air quality standards. Therefore the increase in aircraft emissions would have an adverse, but insignificant

impact on short-term air quality within the range, MOA, and MTR study areas. A summary of the proposed action impact analysis is presented in Table S4.2-2.

To accurately determine the impact of aircraft emissions on ambient O_3, a rigorous photochemical modeling analysis would be required. The impact analysis determined that 1-hour concentrations of O_3 precursors (photochemical reactive hydrocarbons, which are approximately 95 percent of THC for aircraft, and NO_x) would marginally increase as a result of project sources. Under favorable conditions, several hours are required to convert O_3 precursors to O_3 in the atmosphere. With this extended residence time in the atmosphere, project emissions of O_3 precursors would be well dispersed and not be expected to substantially increase ambient concentrations of O_3. Since existing background concentrations of O_3 are low within the study area (IAQB 1988), the total project impact on ambient O_3 would not be expected to exceed the NAAQS for O_3. Project impacts on ambient O_3 concentrations would therefore be insignificant.

The results of the impact analysis indicate that projected aircraft operations would minimally increase ambient pollutant concentrations within the study area. This would indicate that regional visibility reductions from aircraft operations within the range would also be minimal within the Jarbidge Wilderness Area, as emissions would be further dispersed during the travel distance of at least 9 miles to this location. Plume blight from aircraft exhaust would occur within an aircraft flight path, but only for a short time period immediately after passage of the aircraft. This effect would be limited to the expanded range area. Considering these effects and the extensive distance of the study area from the Jarbidge Wilderness Area, visibility impacts from aircraft operating within the range are expected to be insignificant within this Class I area.

Aircraft operating within IR-302, IR-303, VR-1300, and VR-1304 may have a significant impact on visibility in the Jarbidge Wilderness Area Class I area. Criteria to determine significant impacts on visibility within Class I areas usually pertain to stationary emission sources, since mobile sources are generally exempt from permit review by regulatory agencies. However, any further impairment of visibility within Class I areas from manmade sources of air pollution could be considered significant. It is expected that the infrequent aircraft operations proposed for IR-302, IR-303, VR-1300, and VR-1304 would not significantly degrade regional visibility within the Jarbidge Wilderness Area. However, plume blight from aircraft operating within these air spaces would be visible from the Jarbidge Wilderness Area and may be considered a significant impact.

S4.2.5.2 No-Action Alternative

Less construction activity on the range under the no-action alternative would result in less ground disturbance, fugitive dust, and construction equipment combustive emissions than under the proposed action. The lack of live ordnance and the reduced number of target areas associated with the no-action

alternative, when compared to the proposed action, would result in fewer fugitive dust emissions during operation of the range. This would result in a reduced potential for visibility impacts in the Jarbidge Wilderness area.

The air quality modeling used for the proposed expanded range capability is based on a representative programmatic analysis of concentrated flight activities at the existing range. The results of that analysis are also representative of the impacts of the no-action alternative. Aircraft operation impacts for the no-action alternative are also the same as those discussed for the proposed action.

S4.2.6 Mitigations

S4.2.6.1 Proposed Expanded Range Capability

Construction Impacts

Since construction would occur intermittently over several months, the increase in emissions from these activities would have an adverse, but short-term impact on air quality. Extensive water application during ground disturbing activities would mitigate fugitive dust emissions by at least 50 percent. Combustive emission impacts would be mitigated by efficient use of construction equipment, a phased construction schedule to reduce the number of units operating simultaneously, and performing regular programs of vehicle engine maintenance. If the above mentioned mitigation measures are implemented, it is not expected that any significant air quality impacts would occur during site construction.

Operational Impacts

Fugitive dust impacts from areas maintained as bare soil in the range could be significant during high wind conditions or weapons impaction. The following mitigation measures would minimize fugitive dust emissions from areas maintained as bare soil: (1) areas not disturbed by vehicle traffic or weapons impaction, such as firebreaks, could be treated with soil stabilizers or wetting agents, (2) roads and vehicle parking lots could be gravelled, paved, or treated with wetting agents, (3) wind breaks could be installed around target areas.

Plume blight from aircraft operating in proximity to or within the Jarbidge Wilderness Area could produce significant visibility impacts within this Class I area. To ensure that visibility is not impaired within the Jarbidge Wilderness Area, aircraft would need to avoid daytime operations in proximity to this area.

S4.2.6.2 No-Action Alternative

The impacts of the no-action alternative are similar to the impacts of the proposed expanded range capability and could therefore be mitigated using the procedures suggested above.

S4.3 NOISE

S4.3.1 Regulatory Setting

The analysis of noise and its impacts on the environment in the vicinity of a weapons range is addressed under *Executive Order 12088, Federal Compliance with Pollution Control Standards*. It requires the head of each executive agency to be responsible for ensuring that all necessary actions are taken for the prevention, control, and abatement of environmental pollution, including noise pollution, with respect to federal facilities and activities under the control of the agency.

S4.3.2 Issues and Concerns

The issues and concerns pertaining to the analysis of noise levels resulting from a proposed expanded range capability and the no-action alternative include the following:

- The change in the noise levels in the vicinity of the SCR from low-level, subsonic air-to-ground operations.
- The change in the noise levels beneath the reconfigured MOAs from mid- to high-level air-to-air operations.
- The area affected by sonic booms generated by the proposed mid- to high-level air-to-air operations of F-4E and F-4G aircraft.
- The change in the noise levels along the eight MTRs that are used to access the SCR and MOA airspace.

S4.3.3 Significance Criteria

The basis for determining the significance of noise impacts on the environment in the vicinity of military airfields is taken from the AICUZ program. The AICUZ provides threshold noise levels for various land uses that could typically be found near military bases. These thresholds can also be applied to areas under MTRs, MOAs, and near weapons ranges; and where humans live, work, and recreate. The AICUZ assists local communities and the Air Force in managing land uses that could be affected by noise and safety hazards generated by military aircraft operations.

The significance criteria for human activity beneath MTRs, MOAs, and weapons ranges that is exposed to noise generated by military aircraft include the following:

- o Noise levels less than 65 L_{dn} are considered to be insignificant. According to Department of Housing and Urban Development (HUD) guidelines, it is acceptable for humans to be exposed to noise levels less than 65 L_{dn}.

- o Noise levels between 65 and 75 L_{dn} are considered to be significant but mitigable, through the use of noise attenuation measures on the effected structures. HUD classifies this range of noise as normally unacceptable in protecting public health and welfare with an adequate margin of safety (DOT 1980).

- o Noise levels greater than 75 L_{dn} are considered to be significant and unmitigable. HUD classifies these noise levels as unacceptable.

(Refer to section S4.8, Land Use, for a discussion of the various land uses in the ROI that could be affected.)

S4.3.4 Methodology for Analyzing Impacts

The methodology for the analysis of noise is discussed in section S3.3.3, Analysis of Current Noise Environment. An additional background discussion of noise and its general impacts are presented in *Appendix F.*

The analysis of noise impacts at the SCR was performed utilizing data provided by the proposed users of the SCR and the 12th Air Force, Bergstrom AFB, Texas (USAF 1989). These aircraft operational data were compiled for the proposed primary aircraft users of the proposed SCR, MOAs, and MTRs: EF-111A (366 TFW/TAC); RF-4C (124 TRG/IANG); F-4E/G (35 TFW/TAC), and B-1B, FB-111, and B-52 (various wings of SAC).

Sonic boom environments are evaluated using the Day-Night Average C-Weighted sound level, LC_{dn}. It is the most appropriate noise description to account for the impulsive characteristics of such sounds (CHABA 1981). It is the most appropriate noise description to account for the impulsive characteristics of such sounds (CHABA 1981). This metric is identical to the L_{dn} metric, except that C-weighting instead of A-weighting is used to quantify the sound level.

LC_{dn} elliptical contours are generated by means of the Oceana model developed by the Air Force. A conversion can be made from the model's LC_{dn} values to equivalent annoyance L_{dn} values (dBA), to retain consistency when comparing subsonic and supersonic operational impacts.

S4.3.5 Impact Assessment

The assessment of noise impacts on the ground beneath special use airspace is addressed in this section. This includes a general discussion of the typical noise impacts associated with low-level, high-speed subsonic flight; noise impacts from the proposed operations on the MTRs in the study area; noise impacts from proposed air-to-air subsonic operations; the associated noise impacts from the proposed air-to-ground operations on a proposed expanded range capability; and the impacts associated with mid- to high-altitude supersonic operations.

S4.3.5.1 Proposed Expanded Range Capability

The realignment of the F-4 aircraft to MHAFB will result in a substantial increase in the use of the special use airspace in the vicinity of the SCR. This special use airspace includes Owyhee, Paradise, Bruneau 1, and Bruneau 2 MOAs and restricted areas R-3202A, R-3202B, and R-3202C. The annual sorties that would be flown under the setting of a proposed expanded range capability area would closely approximate the estimated sorties assessed under the no-action alternative (see section S4.3.5.2, No-Action Alternative). These levels of use include the following:

- Current use of the MOAs is 5,102 annual sorties versus 26,434 sorties in the no-action alternative.

- Current use of the SCR is 7,153 annual sorties versus 29,214 sorties in the no-action alternative.

The principal difference between the noise analysis of a proposed expanded range capabiity and the no-action alternative is the physical dimensions of the weapons range. The no-action alternative assesses a worst case scenario of squeezing all of the sorties onto the current SCR impact area, through it would be operationally difficult. The reason for this approach was to determine the worst possible noise impact anywhere within the ROI for the proposed expanded range capability analysis. However, the geographic area affected by a proposed expanded range capability would be larger than that presented in the no-action alternative. Therefore, aircraft operations would be spread over a larger area, reducing the associated noise levels.

S4.3.5.2 No-Action Alternative

Low-Altitude Subsonic Overflight

Noise generated by low-altitude, high-speed, subsonic aircraft is due to (1) airframe or aerodynamic noise generated by the passage of air over and around the body of the aircraft; (2) noise generated by

air entering a jet engine inlet and exiting out the rear after being compressed and burned; and (3) the downward (high) air pressure created beneath an aircraft's wings that is opposite of the upward lift (negative) air pressure created on an aircraft's upper wing.

The most common noise impact of overflights on a weapons range or on an MTR is annoyance to people. The noise from such overflights differs from aircraft-generated noise near air installations, due to the much higher airspeeds (300 to 500 knots) when compared to airspeeds associated with takeoffs and landings (100 to 200 knots). The noise receptor (human or animal) near a range or beneath an MTR has less warning of an approaching overflight due to its high-speed, low-level nature, i.e., the onset rate of the approaching noise levels is much more rapid. This particular characteristic of low-altitude, high-speed flights is compensated for by means of the L_{dnmr} noise metric. A penalty of 5 dB is added to the single event level of an overflight, depending on the airspeed, altitude, and unadjusted noise level generated by the aircraft. The adjustment of the L_{dn} metric to L_{dnmr} allows the "noise versus annoyance relationship" to be used for L_{dnmr}.

The potential impact of noise generated by aircraft overflights on animals and wildlife has not, as yet, been sufficiently studied to allow definitive assessment to be made (see section S4.4.6).

There is currently only a limited understanding of the effects on structures from low frequency airframe and engine noise generated by low altitude aircraft (Battis 1988). The available experimental data and supporting analytical models indicate the following (Sutherland 1989):

- Low-frequency acoustical loads have maximum sound levels, essentially independent of frequency, from about 5 to 50 Hz (hertz) in the range of 95 to 100 dB.
- There is a very low probability of damage to structures from SEL noise levels less than 100 dB.
- Structural response levels are normally well below damage threshold values (Siskind et al. 1980).
- The probability of damage to any given structure located near a low-level flight track is reduced due to the general random dispersion of the aircraft across the flight track.

The effect of aircraft overflights to man-made structures is most relevant for military flights on low-level MTRs. The probability of damage to relatively fragile structures, especially poorly constructed or poorly maintained wood frame buildings, is estimated to be less than one-third of one percent (0.3 percent), when the building is located directly under the nominal track centerline and is overflown by a large high-speed aircraft, e.g., a B-1B flying at 200 feet AGL and 540 KTAS (Sutherland 1989). The

probability of damage to these types of fragile structures decreases significantly for smaller and lower-airspeed aircraft. Also, structures located away from the nominal centerline of the flight tracks have an extremely low probability of being affected by low-flying aircraft.

The incidence of avalanches and landslides could be affected by low-level, high-speed aircraft operations, though the probabilities are extremely low (Perla 1980). The probability of triggering a slab avalanche involving large snow masses by the noise generated from a B-1B aircraft operating at 200 feet AGL and 540 KTAS is estimated to be less than one-one thousandth of one percent (0.001 percent). It is unlikely that this type of large aircraft would fly at 200 feet AGL over terrain with steep walls. Therefore, the actual probability of an avalanche being triggered by a subsonic aircraft would be even less. The probability of triggering a landslide is also expected to be very low: less than that for an avalanche by at least three orders of magnitude (Sutherland 1989).

Noise Impacts from Proposed Subsonic Military Training Route Operations

The impacts associated with the proposed increase in sorties to be flown on the eight MTRs leading into the SCR operating area are based on operational plans and sortie projections. (The SCR operating area, for purposes of simplification, refers to the restricted areas and MOAs that encompass the current SCR.) These projections were submitted to the 12th Air Force, Bergstrom AFB, Texas, by the proposed primary users to the SCR operating area airspace. The proposed distribution of sorties on the eight MTRs is listed in Table S4.3-1. The percentage change in sorties described below are based on a comparison of tables S3.3-2 and S4.3-1.

Aircraft operations on IR-300 would decrease 41 percent compared to current levels. A maximum noise level of 71 dB would be experienced directly beneath the centerline of the route, compared to the current 70 dB maximum. Though the operations on IR-300 would decrease, the L_{dnmr} would increase due to the change in aircraft types that will fly the route. The 70-dB contour would extend to approximately 2,000 feet to either side of the centerline. The 65-dB contour would extend 4,200 feet to either side of the centerline, compared to 4,000 feet for current operations. The slightly increased noise levels would be due to the increased use of the F-4E/G aircraft, though operations would decrease. The area beneath IR-300 that would be exposed to L_{dnmr} greater than 65 dB would increase by approximately 5 percent under the no-action alternative.

Operations on IR-302 would increase 125 percent over current levels. These operations would have a maximum noise level of 75 dB, compared to the current 69 dB maximum, directly beneath the centerline of the route. The 70-dB contour would extend to approximately 4,000 feet to either side of the centerline. The 65-dB contour would extend 5,800 feet to either side of the centerline, compared to 4,000 feet for current operations. The area beneath IR-302 that would be exposed to L_{dnmr} greater than 65 dB would increase by approximately 45 percent under the no-action alternative.

Table S4.3-1

PROJECTED MILITARY TRAINING ROUTE
ANNUAL SORTIES

MTR		*TAC 35 TFW F-4E/G*	*TAC 390 ECS EF-111A*	*IANG 124 TRG RF-4C*	*SAC B-1B*	*SAC B-52*	*Total*
All MTRs	Total	8,630	1,935	1,824	1,200	1,200	14,789
	Day	8,459	1,835	1,824	984	984	14,086
	Night	171	100	0	216	216	703
IR-300	Total	570	18	24	240	240	1,092
	Day	559	18	24	192	192	985
	Night	11	0	0	48	48	107
IR-302	Total	1,020	259	276	600	600	2,755
	Day	1,000	259	276	480	480	2,495
	Night	20	0	0	120	120	260
IR-303	Total	620	490	264	120	120	1,614
	Day	608	440	264	96	96	1,504
	Night	12	50	0	24	24	110
IR-304	Total	600	384	216	120	120	1,441
	Day	588	335	216	96	96	1,331
	Night	12	50	0	24	24	110
VR-1300	Total	1,390	275	204	24	24	1,917
	Day	1,362	275	204	24	24	1,889
	Night	28	0	0	0	0	28
VR-1301	Total	320	183	240	24	24	791
	Day	314	183	240	24	24	785
	Night	6	0	0	0	0	6
VR-1302	Total	2,950	275	372	36	36	3,669
	Day	2,891	275	372	36	36	3,610
	Night	59	0	0	0	0	59
VR-1304	Total	1,160	50	228	36	36	1,510
	Day	1,137	50	228	36	36	1,497
	Night	23	0	0	0	0	23

Operations on IR-303 would decrease 57 percent compared to current levels and noise levels would be lowered correspondingly. There would be a maximum noise level of 73 dB directly beneath the route centerline, compared to the current 74-dB maximum. The 70-dB contour would extend approximately 3,000 feet to either side of the centerline, compared to 4,000 feet for current operations. The 65-dB contour would extend approximately 5,200 feet to either side, compared to 6,000 feet for current operations. The area beneath IR-303 that would be exposed to L_{dnmr} greater than 65 dB would decrease by approximately 13 percent under the no-action alternative.

Operations on IR-304 would decrease 3 percent compared to current levels. There would be a maximum noise level of 73 dB directly beneath the route centerline, compared to the current 71-dB maximum. The 70-dB contour would extend approximately 3,000 feet to either side of the centerline, compared to 2,000 feet for current operations. The 65-dB contour would extend approximately 5,000 feet to either side, compared to 4,000 feet for current operations. The area beneath IR-304 that would be exposed to L_{dnmr} greater than 65 dB would increase by approximately 25 percent under the no-action alternative.

Operations on VR-1300 would increase 74 percent over current levels. There would be a maximum noise level of 70 dB directly beneath the route centerline, compared to the current 64-dB maximum. The 65-dB contour would extend approximately 10,000 feet to either side. The area beneath VR-1300 that would be exposed to L_{dnmr} greater than 65 dB would increase under the no-action alternative.

Operations on VR-1301 would decrease 2 percent compared to current levels. There would be a maximum noise level of 66 dB directly beneath the route centerline, compared to the current 63-dB maximum. The 65-dB contour would extend approximately 2,000 feet to either side. The area beneath VR-1301 that would be exposed to L_{dnmr} greater than 65 dB would increase under the no-action alternative.

Operations on VR-1302 would increase 287 percent over current levels. There would be a maximum noise level of 73 dB directly beneath the route centerline, compared to the current 64-dB maximum. The 70-dB contour would extend approximately 8,000 feet to either side of the centerline. The 65-dB contour would extend approximately 13,000 feet to either side of the centerline. The area beneath VR-1302 that would be exposed to L_{dnmr} greater than 65 dB would increase under the no-action alternative.

IR-302 and VR-1304 overlap each other for their entire lengths. Operations on IR-302 would increase 125 percent and on VR-1304 would increase 913 percent over current levels. The maximum noise level would be 75 dB directly beneath the centerline of these routes, compared to the current 69-dB maximum. The 70-dB contour would extend approximately 7,000 feet to either side of the centerline. The 65-dB contour would extend approximately 10,000 feet to either side of the centerline, compared

to 5,000 feet for current operations. The area beneath the overlap of IR-302 and VR-1304 that would be exposed to L_{dnmr} greater than 65 dB would increase 200 percent under the no-action alternative.

Where VR-1300 overlaps IR-302 and VR-1304, the maximum noise level would be 76 dB directly beneath the centerline of the routes, compared to the current 69-dB maximum. The 75-dB contour would extend approximately 3,000 feet to either side of the centerline. The 70-dB contour would extend approximately 8,000 feet to either side of the centerline. The 65-dB contour would extend approximately 10,500 feet to either side of the centerline, compared to 7,000 feet for current operations. The area beneath the overlap of IR-302 and VR-1304 that would be exposed to L_{dnmr} greater than 65 dB would increase 50 percent under the no-action alternative.

The sound exposure levels (SELs) presented below correspond to a single aircraft overflight of along an MTR at an assumed minimum altitude of 100 feet AGL. SELs do not reflect multiple aircraft flights or cumulative impacts to the receptor over time. The SELs correspond to the single-event measure of noise energy from a single point source. SEL measurements typically are higher than single peak measurements, because the noise energy is compressed into a one second period of time. These SELs are also based on an ambient air temperature of 54°F and a relative humidity of 54 percent. F-4E and F-4G aircraft would generate an SEL of 122 dB while operating on an MTR at 500 KTAS and 95 percent RPM. EF-111A aircraft would generate an SEL of 120 dB while operating at 480 KTAS and 95 percent RPM. B-1B aircraft would generate an SEL of 113 dB while operating on an MTR at 560 KTAS and 92 percent RPM. B-52 aircraft would generate an SEL of 124 dB while operating at 350 KTAS and 92 percent RPM.

Noise Impacts from Proposed Air-to-Air Subsonic Operations

Table S4.3-2 presents the projected short-term annual MOA sorties by aircraft type. Air-to-air operations are proposed for Paradise, Owyhee, Bruneau 1, and Bruneau 2 MOAs, and restricted areas R-3202A, R-3202B, and R-3202C. The F-4E FTU pilots and weapon systems officers (WSOs) would use this airspace at altitudes above 5,000 feet AGL for the six air-to-air mission profiles that they typically practice. Airspeeds during these profiles would range between 425 KTAS to 500 KTAS. The F-4Gs operational Wild Weasel unit would use this same airspace at altitudes from 300 feet to 15,000 feet AGL while practicing three of its mission profiles. The EF-111As would practice two air-to-air mission profiles, operating at altitudes from 5,000 feet AGL to 25,000 feet MSL and airspeeds from 480 KTAS to 530 KTAS. The RF-4Cs would be the final primary aircraft type that would use this airspace for air-to-air training. The altitude of use would be 500 feet AGL and airspeed would be approximately 400 KTAS. One-hundred sixty sorties would be flown at night, between the hours of 10 P.M. and 7 A.M. local, and would be flown only by the F-4Gs practicing their Weasel Orientation profile.

Table S4.3-2

PROJECTED SAYLOR CREEK RANGE SHORT-TERM MILITARY OPERATIONS AREA ANNUAL SORTIES

Operation	*TAC 35 TFW F-4E/G*	*TAC 390 ECS EF-111A*	*IANG 124 TRG RF-4C*	*SAC B-1B*	*SAC B-52*	*Total Sorties*
MOA Sorties						
Total	22,600	1,837	1,997	0	0	26,434
Day	22,450	1,737	1,997	0	0	26,184
Night	150	100	0	0	0	250
Supersonic - MOA Sorties[1]	7,500	360	0	0	0	7,680
Supersonic - MOA Hours[2]	125	6	0	0	0	131

Notes:

1. EF-111A MOA Supersonic Operations: based on 180 annual supersonic sorties while operating in Owyhee MOA above 5,000 feet AGL or 11,000 feet MSL; frequency will be one 1-minute run at greater than 1.0 Mach airspeed to simulate evasion and climb to retrograde orbit.
2. F-4E/G MOA Supersonic Operations: 7,500 annual supersonic sorties operating in Owyhee MOA; frequency will be two 30-second bursts per sortie at airspeeds greater than 1.0 Mach during air-to-air combat maneuverings.

To assess these proposed operational impacts, day-night average sound levels were computed. Each mission profile and operating area, i.e., MOA or restricted airspace, was modeled in order to arrive at an average L_{dn} for groundspace located beneath specific airspace areas. The modeling was based on the following elements:

- o Aircraft types flown in specific operating areas.
- o SELs for each aircraft type at varying altitudes and airspeeds.
- o Mission profiles to be flown in specific operating areas.
- o Proposed annual day and night sorties.
- o An assumed operational rate of 1.2 sorties per hour per day flown in each operating area.

Figure S4.3-1 illustrates the resulting average regional subsonic L_{dn}s for specific groundspace beneath the proposed air-to-air operations. These L_{dn}s are the average noise levels that could be heard on the ground below airspace where air-to-air operations are flown. The flight tracks flown during these maneuvers are randomly distributed. Therefore, specific noise contours cannot be calculated; only the average noise levels can be estimated. Groundspace in Oregon beneath Paradise MOA, where the floor of operations would be 10,000 feet MSL, would experience sound levels less than 65 L_{dn}. Groundspace in Nevada beneath Paradise MOA would also be affected by sound levels less than 65 L_{dn} where the floor of operations would remain at the current 14,500 feet MSL altitude. Groundspace beneath Owyhee MOA would be affected by sound levels from less than 65 L_{dn} to 79 L_{dn}. The lowest level would be experienced on the Duck Valley Indian Reservation, where the operational floor in the vicinity of the Native American village would be 750 feet AGL or 6,500 feet MSL. The highest sound levels would be in the eastern half of the MOA, where low-level operations by RF-4Cs and F-4Gs would occur. The remaining groundspace in the vicinity of the SCR, but that would not include SCR air-to-ground operations, would experience sound levels of approximately 66 L_{dn}.

Air-to-air operations would expose approximately 50 percent of this area to sound levels less than 65 L_{dn}, 40 percent of the area affected by sound 65 L_{dn} to 75 L_{dn}, and 10 percent of the area affected by sound greater than 75 L_{dn}.

Noise Impacts from Proposed Subsonic Saylor Creek Range Operations

The no-action alternative calls for the existing impact area at the SCR to be divided in half along a north-south bearing, forming an "east" range and a "west" range. Each range would operate

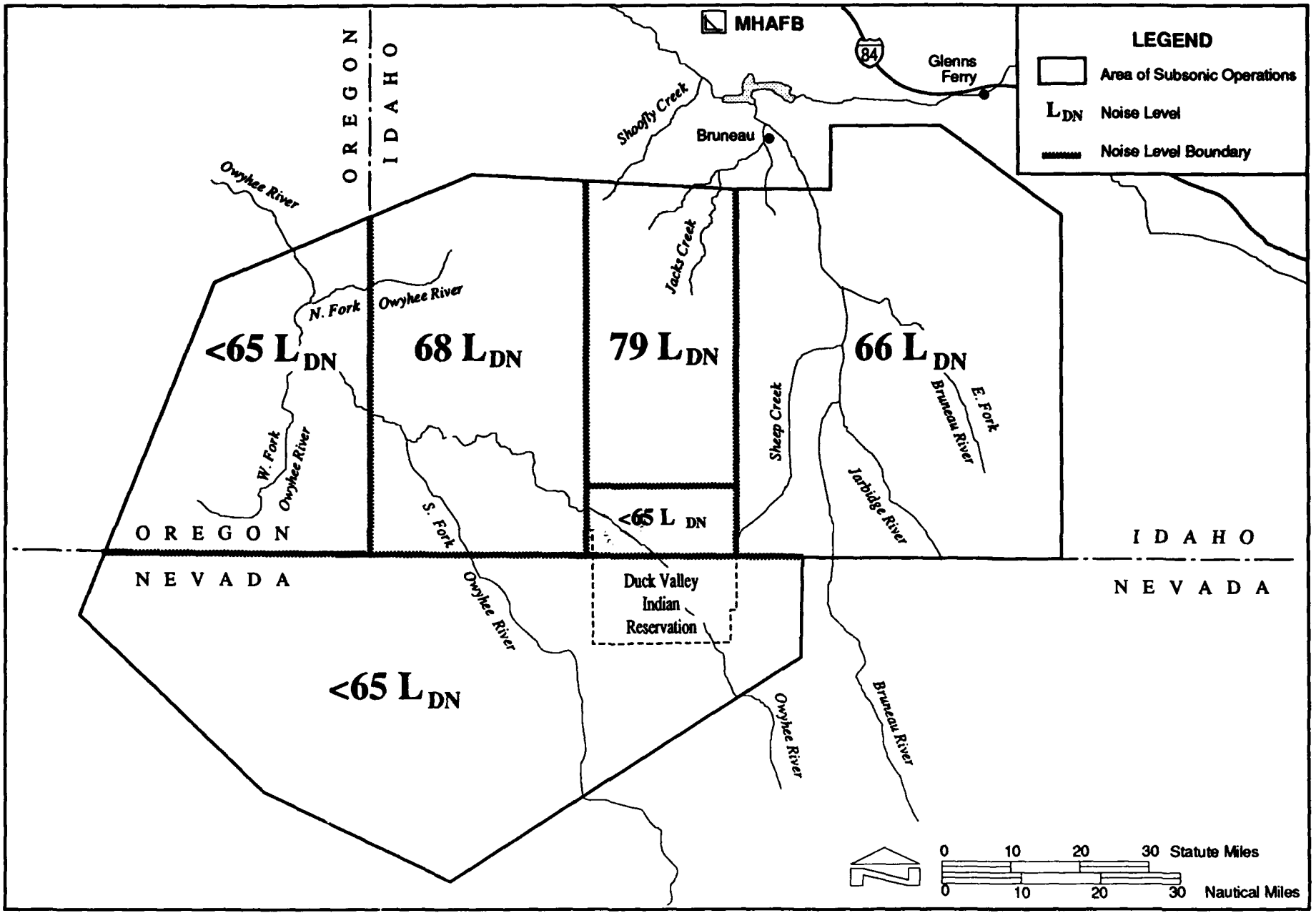


Figure S4.3-1

AVERAGE REGIONAL SUBSONIC NOISE LEVEL (L_{DN}) IMPACT FROM AIR-TO-AIR OPERATIONS

independently of the other and would be scheduled for simultaneous flight operations. This would partially facilitate the increased operational demands after realignment of MHAFB, though drastically limiting the aircraft to north headings on their bombing runs. The airspace around this re-configured range would severely constrain the training activities, due to the extreme proximity of the two impact areas. (Air safety could be compromised as a result of combining complex training profiles with very tightly configured airspace around each impact area.) For the no-action alternative noise analysis of the SCR, approximately 14,000 sorties were assigned to the "west" range and 15,000 to the "east" range. The B-1B would be restricted only to the east range in order to keep it within the confines of the SCR special use airspace. The B-1B has a large turning radius due to its high airspeed, though it is a highly maneuverable aircraft.

Air-to-ground operations on the SCR would involve the use of Owyhee MOA, Bruneau 1 and 2 MOAs, and restricted areas R-3202A, 3202B, and 3202C. The RTU sorties flown in the F-4E would involve three mission profiles on the range, where altitudes would range from 100 feet to 4,500 feet AGL and airspeeds around 450 KTAS to 500 KTAS. The F-4G sorties would be flown to practice five mission profiles, operating at altitudes between 300 feet and 12,000 feet AGL and airspeeds from 450 KTAS to 520 KTAS. The EF-111As would practice one profile on the range and would operate from 100 feet to 1,500 feet AGL at 540 KTAS. The B-52s would practice a basic bomb run profile, while operating between 200 feet and 2,200 feet AGL at 370 KTAS. The B-1Bs would also practice one profile but would remain relatively constant at an altitude of 400 feet AGL and 560 KTAS. The RF-4Cs would fly over the range on reconnaissance profiles at 500 feet AGL and 400 KTAS. Approximately 5 percent of the total proposed sorties for all aircraft types would be flown at night, between the hours of 10 P.M. and 7 A.M. local.

The same methodology and assumptions that were explained in section S3.3.3, Analysis of Current Noise Environment, were used to predict the impact from the proposed SCR operations. Information was gathered for particular flight tracks that could be flown within the proposed range configuration, given the airspace constraints. Altitudes, airspeeds, sorties, and aircraft types were analyzed for each of the 12 basic training profiles proposed to be flown on the SCR (see Table S4.3-3). Figure S4.3-2 depicts the assumed flight tracks that were used for the analysis of the proposed operations on the SCR. Typically, the aircraft would descend to their lowest altitude and highest airspeed while on final approach into the impact area. The projected 29,214 annual range sorties would produce approximately 140,000 passes or an average of 4.8 passes over the target area per sortie.

Figure S4.3-3 illustrates the resulting sound level L_{dnmr} for the groundspace situated in the vicinity of the SCR. The estimated noise exposures that would be caused by operations on the SCR are shown for L_{dnmr} 65- and 75-dB levels. The primary difference between the current operations and the no-action alternative is that the area west of the range would be exposed to increased noise levels. Noise

Table S4.3-3

PROJECTED SAYLOR CREEK RANGE
ANNUAL SORTIES

Operation	*TAC 35 TFW F-4E/G*	*TAC 390 ECS EF-111A*	*IANG 124 TRG RF-4C*	*SAC B-1B*	*SAC B-52*	*Total Annual Sorties*
Range Sorties						
Total	23,766	1,050	1,998	1,200	1,200	29,214
Day	22,806	1,050	1,998	960	960	27,774
Night	960	0	0	240	240	1,440
Conventional						
Total	9,924	0	0	600	600	11,124
Day	9,024	0	0	480	480	9,984
Night	900	0	0	120	120	1,140
Tactical w/o EW						
Total	5,160	0	698	0	0	5,858
Day	5,100	0	698	0	0	5,798
Night	60	0	0	0	0	60
Tactical w/EW						
Total	8,682	1,050	1,300	600	600	12,232
Day	8,682	1,050	1,300	480	480	11,992
Night	0	0	0	120	120	240

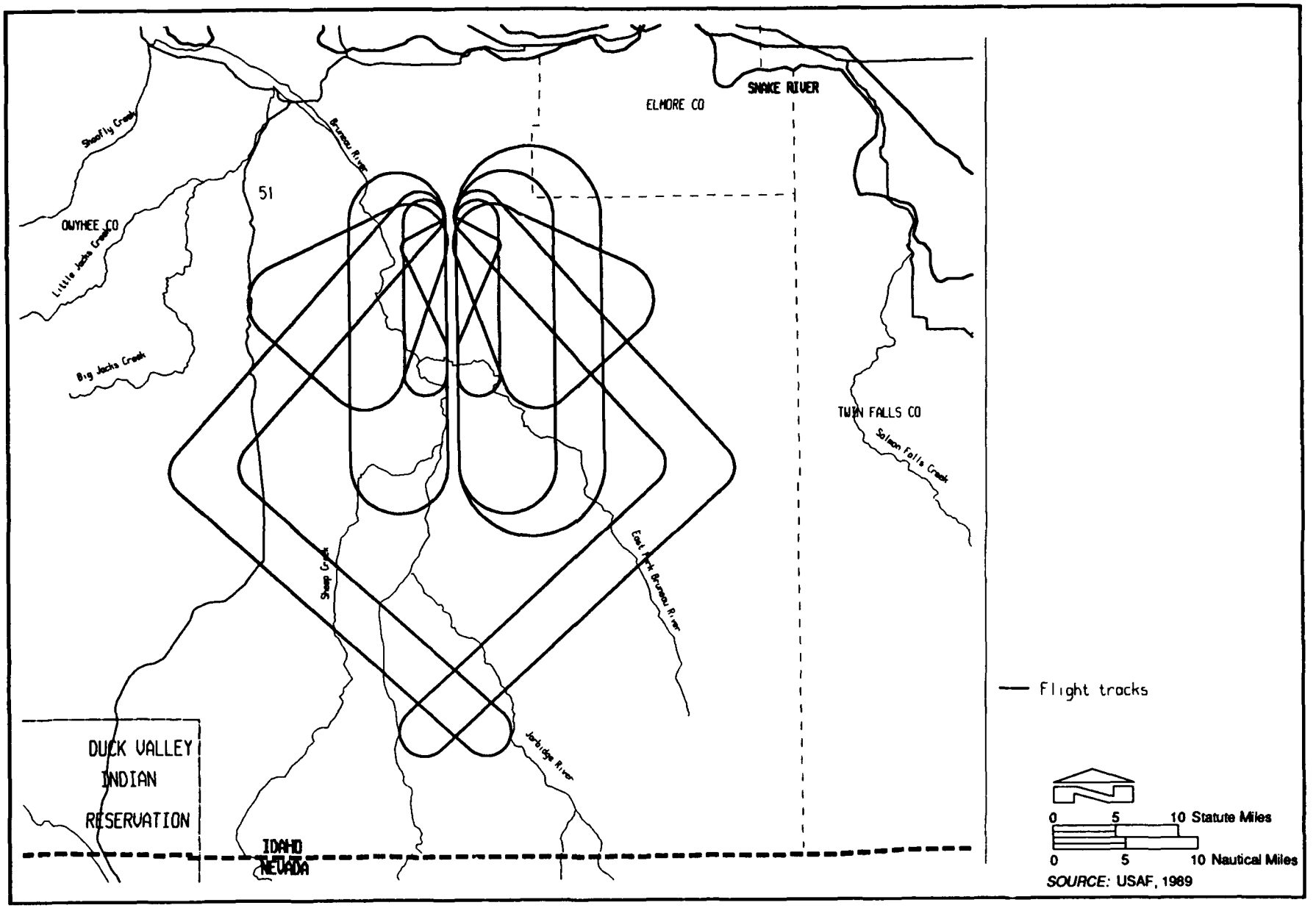


Figure S4.3-2

SAYLOR CREEK RANGE ASSUMED FLIGHT TRACKS

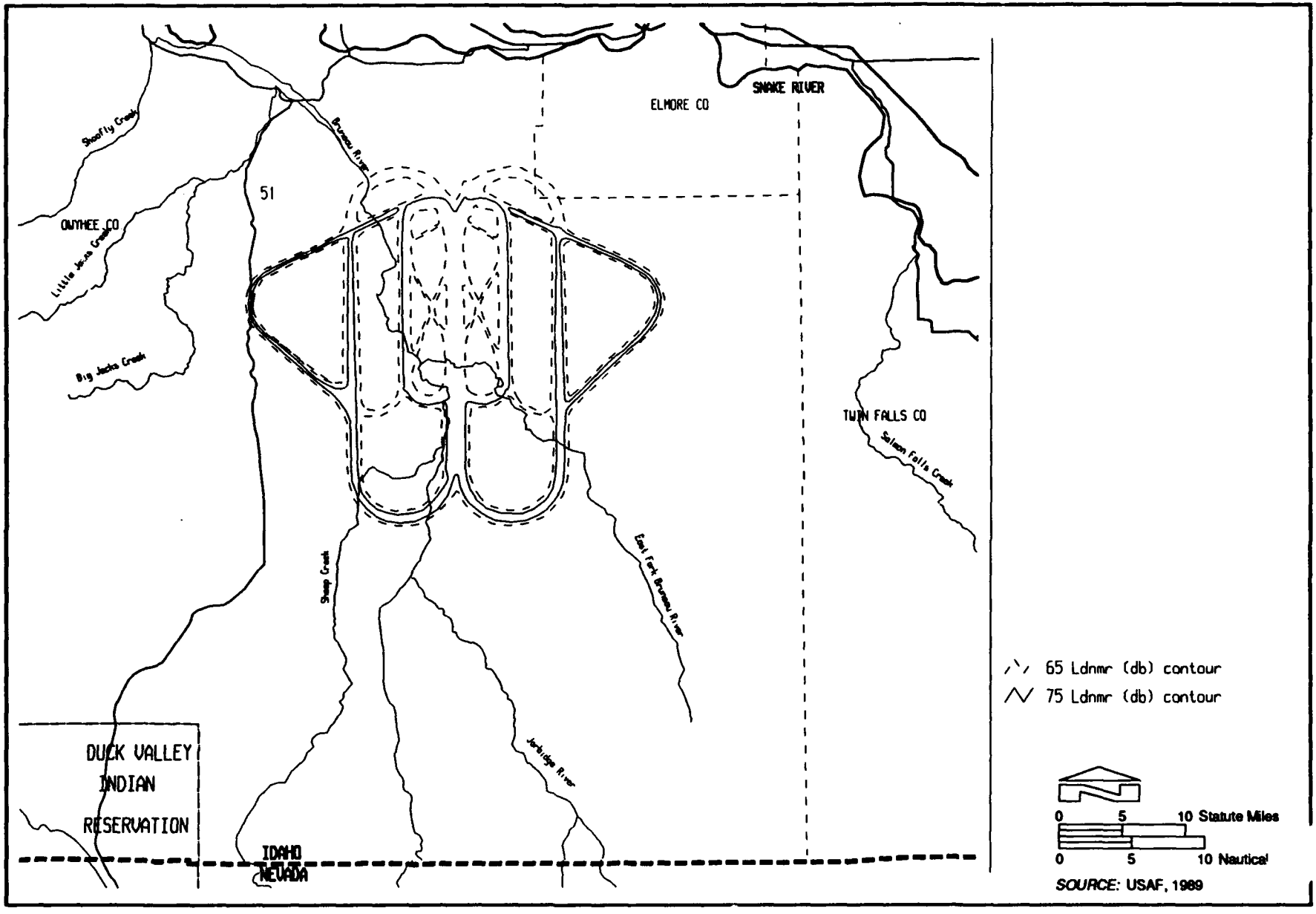


Figure S4.3-3

SAYLOR CREEK RANGE NOISE LEVEL (L_{dnmr}) IMPACT MAP

from "west" range activities would extend to the west an additional 9 miles from the current noise limits.

Table S4.3-4 exhibits the SELs for both F-4E/G and EF-111A aircraft at various altitudes above ground level and at assumed power settings and airspeeds. These sound levels correspond to a single aircraft overflight of the receptor at a particular altitude. SELs do not reflect multiple aircraft flights or cumulative impacts to the receptor over time. The SELs correspond to the single-event measure of noise energy from a single point source. SEL measurements typically are higher than single peak measurements, because the noise energy is compressed into a one second period of time. In general, the F-4 generates higher SELs than does the EF-111A. This is primarily due to the older model and less efficient power plant of F-4 aircraft.

Typical Sonic Boom Impacts

A sonic boom differs from most other sounds because (1) it is impulsive (similar to a double gunshot); (2) there is no warning of its pending occurrence; and (3) the peak levels of a sonic boom are higher than for most other types of outdoor noise. The resultant effects of a sonic boom on people and animals is typically that of startle or surprise. Secondary reactions range from annoyance to disruption of any preceding activity. The typical impacts from sonic booms generated by aircraft above 5,000 feet AGL are not sufficient to cause physical damage to people or animals, e.g., hearing loss. There is a small potential that windows could be damaged, particularly large plate-glass windows.

With further regard to the effects on people, the cumulative sonic boom descriptor is the C-weighted Day-Night Average Sound Level (LC_{dn}). This descriptor is similar to the L_{dn} metric used for general noise, except that it employs the C-weighting filter of sound level meters (ANSI, S1.4, 1983) to retain the low frequency content of impulsive sounds. The LC_{dn} metric was recommended by the National Research Council Committee on Hearing, Bioacoustics, and Biomechanics (CHABA 1981) as a means of assessing the probability of community annoyance caused by sonic boom exposures.

A sonic boom characterized over a very short period of time consists of an initial shock jump in the air pressure to a peak overpressure (positive delta-P), followed by a linear decrease in pressure (minus delta-P), ending with a second shock to the ambient air pressure. Such a sonic boom is quantified on the ground by measuring the peak overpressure (delta-P) in pounds per square foot (psf) and the duration of the boom (delta-T) in milliseconds (msec).

The overpressure and duration of a sonic boom is dependent on the aircraft configuration, its weight, airspeed relative to the speed of sound (Mach number), flight attitude, altitude above ground level, local atmospheric conditions, and the location of the flight path relative to the ground. For an aircraft in level flight, the boom amplitude is largest and the duration shortest directly beneath the flight path.

Table S4.3-4

SOUND EXPOSURE LEVELS (SELs) IN dB FOR AIRCRAFT AT VARIOUS ALTITUDES

	ALTITUDE ABOVE GROUND LEVEL (FEET)				
Aircraft	*300*	*500*	*1,000*	*2,000*	*5,000*
F-4 [1]	118	114	109	103	93
F-15 [2]	119	115	109	104	95
F-16 [3]	106	102	96	90	80
EF-111A [4]	112	107	102	95	85
B-52G [5]	109	106	100	94	84
B-1B [6]	118	115	110	104	95

Notes:
1. F-4E and F-4G aircraft at 98 percent rpm power setting, 500 KTAS, 51 °F ambient air temperature, and 54 percent relative humidity while operating within a MOA.
2. F-15 aircraft at 90 percent rpm power setting, 500 KTAS, 51 °F ambient air temperature, and 54 percent relative humidity while operating within a weapons range.
3. F-16 aircraft at 84 percent rpm power setting, 500 KTAS, 51 °F ambient air temperature, and 54 percent relative humidity while operating within a weapons range.
4. F-111A aircraft at 95 percent rpm power setting, 530 KTAS, 51 °F ambient air temperature, and 54 percent relative humidity while operating within a MOA.
5. B-52G aircraft operating at 88 percent rpm power setting, 390 KTAS, 51 °F ambient air temperature, and 54 percent relative humidity while operating within a weapons range.
6. B-1B aircraft operating at 98 percent rpm power setting, 560 KTAS, 51 °F ambient air temperature, and 54 percent relative humidity while operating within a weapons range.

Source: Mohlman 1983.

Atmospheric conditions limit the lateral distribution of a boom. There is a lateral cut-off distance beyond which it is not heard on the ground. For steady flight, one typically refers to a sonic boom "carpet" between the lateral cut-off points and along the ground track of the supersonic flight. It has become common usage to refer to steady flight sonic booms as "carpet booms" (personal communication, Plotkin 1989).

Supersonic flights for a given aircraft type at high altitudes typically create booms that have low overpressures but that cover wide areas. On the other hand, booms from flights at low altitudes have high overpressures but affect smaller areas.

Each occurrence of a sonic boom can be quantified by means of a C-weighted Sound Exposure Level (CSEL in dB) or by reference to the peak overpressure (in pounds per square foot, psf). Most sonic booms generated as a result of the no-action alternative would be expected to have peak overpressures at ground level on the order of 0.5 psf to 2.0 psf. These overpressures would be equivalent to CSELs of about 96 dB to 108dB. These levels would be well below the damage-risk criterion for hearing loss, even if such sonic booms occurred very frequently, e.g., such as more than 100 times per day (USAF 1984). The actual expected occurrences of sonic booms within the authorized SCR special use airspace would be less than 25 sonic booms per day. Occurrences of higher sonic boom overpressures, due to so-called "focus booms" from accelerating or maneuvering aircraft, could be of the order of 4 psf to 6 psf, with CSELs of 109 to 112 dB. These overpressures would be much less frequent and would be heard only in localized areas randomly scattered beneath the authorized SCR special use airspace.

The probability of structural damage resulting from sonic booms resulting from the no-action alternative would be very small (USAF 1984). The probability of window breakage for overpressures on the order of 2 psf would be about 75 broken panes per million window panes, if the aircraft approached the window in a head-on orientation. Overpressures of 6 psf, which would be much less likely to occur, would increase the probability of window breakage to about 4 panes per thousand. Therefore, the occurrence of window breakage due to sonic booms would be considered to be very rare.

Various studies of sonic boom effects on animals have been conducted without any conclusive results regarding adverse effects. Some observations indicate a brief startle reaction by avian species, minimal reaction by cattle and sheep, and no long-term impact on wildlife in general. Animals and wildlife on both the Nellis AFB and Luke AFB ranges have been exposed to sonic booms for more than 25 years with no apparent significant effect (USAF 1984). Further research on this subject is being conducted by both the Air Force and Navy, in conjunction with other federal agencies, e.g., U.S. Fish and Wildlife Service. No significant adverse effects have been reported from these studies to date.

The effects of sonic booms on unstable terrain are extremely difficult to predict. This is due to the variability in effects between sonic boom overpressures and seismic (ground) motion that could trigger a landslide. It has been reported that the probability of triggering an avalanche or landslide by sonic booms with overpressures less than 6 psf is extremely small (Cook et al. 1972). It is possible that a small disturbance of a highly unstable rock formation could trigger a slide. Such triggering would more likely be caused by wind loads or rain fall during storms.

Proposed Supersonic Operations and Profiles

The no-action alternative would involve supersonic flights within Owyhee, Bruneau 1, and Bruneau 2 MOAs and restricted areas R-3202A, R-3202B, and R-3202C. Authorized altitudes for supersonic operations would be from 5,000 feet AGL to FL290 (29,000 feet MSL), the ceiling of the ATCAA airspace.

Presently, EF-111A aircrews are only able to practice supersonic maneuvers when deployed on a special exercise elsewhere in the United States or abroad. There is no authorized accessible airspace for the EF-111As to practice supersonic flight operations on a regular basis in the vicinity of their home base, MHAFB.

Regular 30-second to 1-minute supersonic flights through the SCR operating area would expose the EF-111A aircrews to the high-speed operational environment that they would be required to operate in during hostilities. Therefore, the proficiency developed while flying supersonic would be applied more effectively during actual EF-111A survivability. The no-action alternative would result in 360 annual sorties of EF-111As conducting mid-level supersonic flights through the MOAs and restricted areas, for a duration of two 30-second intervals. Therefore, the practice of EF-111A escape maneuvers would result in approximately 6 hours of mid-level, supersonic flight operations per year (see Table S4.3-5).

F-4E and F-4G aircraft also are required to fly occasionally at supersonic airspeeds. However, their supersonic flights would typically occur during air-to-air maneuvering above 10,000 feet AGL.

The no-action alternative is for 7,500 annual sorties of F-4E/Gs attaining supersonic speeds above 5,000 feet AGL for a duration of two 30-second intervals. Practice of ACM by F-4E/G aircraft would subject the area beneath the MOAs and restricted areas to approximately a total of 125 hours annually of high altitude transient supersonic flight operations.

A second type of F-4 supersonic flight operation is for "functional check flights" (FCFs) of F-4E/G aircraft after a major overhaul. The no-action alternative is for 50 FCF sorties annually. An FCF requires that a high altitude Mach run be made above 35,000 feet MSL to test the engines and airframe.

Table S4.3-5

PREDICTED SONIC BOOM OCCURRENCES

Aircraft Type	*Altitude (feet)*	*Predicted Number of Sonic Booms per Year*
F-4	15-25,000	12,750
F-4	10-25,000	1,750
F-4	29,000 max	500
EF-111A	15,000+	360
EF-111A	8,500+	360
TOTAL PER YEAR		15,720

Table S4.3-6 shows the sonic boom "carpet" characteristics for F-4 and EF-111A aircraft operating at Mach 1.1. The "carpet" is defined as the ground area that is exposed to overpressures from a sonic boom generated at a certain altitude above the surface. This information was computed using the method in NASA TP 1122 (Simplified Sonic-Boom Prediction, H.W. Carlson), using standard atmospheric conditions and a ground elevation of 6,500 feet MSL. Table S4.3-6 lists the peak overpressure and duration (of the boom) at the center of the carpet and at the edge of the carpet at various altitudes AGL. Also included is the width of the carpet affected by the boom overpressures. The overpressures at the carpet edge are lower because of atmospheric attenuation effects.

Data in Table S4.3-6 indicate that the larger and heavier EF-111 at comparable altitudes generates a boom overpressure approximately 15 percent greater and the duration is 17 percent longer than an F-4. In addition, the data show a general trend of lower overpressures and wider carpets at higher altitudes. The exception to this is for the F-4 at 25,000 feet AGL, where the carpet width is 5,000 feet; this is due to the fact that the boom is just barely reaching the ground due to atmospheric attenuation.

The carpet boom data are appropriate when considering profiles at sustained supersonic airspeeds. The EF-111A escape maneuver, if sustained, would come close to this relationship, whereas most ACM performed by F-4E/Gs would not. During ACM, supersonic events last a few seconds or a few tenths of seconds and are associated with dives and/or tight turns. The ground area that would be affected by an ACM-generated boom would be much smaller than for a straight and level supersonic profile. "Focused" sonic booms are often the result of ACM, where the peak focus overpressure could be two to three times that of an adjacent carpet boom. However, the area affected by a "focused" boom is generally limited to an area of a few hundred feet.

The western portion of Owyhee MOA would have F-4E, F-4G, and EF-111A aircraft accelerating above the speed of sound along an assumed attack heading of east or west while the eastern half of the airspace would have an attack heading of north or south. These headings are based on the probable entry points into the area. The majority of ACM attack run-ins are located in the center portion of the operating area. Furthermore, the point at which the aircraft go supersonic is immediately after passing each other, when they are in the process of maneuvering to gain advantage over their adversary. The area on the ground that is affected by these booms is typically defined in the shape of an ellipse, the long portion of the ellipse oriented along the primary run-in headings.

Studies of past supersonic activities have revealed that the distribution of supersonic flight paths are typically confined to an area shaped in the form of an ellipse. Furthermore, they imply that the distribution of sonic booms heard on the ground is confined to an elliptically shaped area. A model was developed (Oceana Model) that utilizes the number of annual supersonic sorties (day or night) and

Table S4.3-6

SONIC BOOM "CARPET" CHARACTERISTICS FOR F-4 AND EF-111A AIRCRAFT

Altitude (feet AGL)	*Airspeed (Mach)*	--- CENTERLINE OF FLIGHT TRACK --- *Overpressure (psf)*	*Duration (msec)*	----- CARPET EDGE ----- *Overpressure (psf)*	*Duration (msec)*	*Carpet Width (x 1,000 ft)*
F-4 Aircraft						
5,000	1.1	6.8	110	2.7	140	45
10,000	1.1	3.9	125	2.1	155	60
15,000	1.1	2.8	145	2.0	160	55
20,000	1.1	2.2	160	2.0	170	43
25,000	1.1	2.2	175	2.2	175	5
EF-111A Aircraft						
5,000	1.1	8.0	130	3.2	170	45
10,000	1.1	4.6	150	2.5	185	60
15,000	1.1	3.2	170	2.7	195	55

that assumes that 80 percent of all sonic booms reach the ground. The model enables a quantification of supersonic activity in terms of contours of equal C-weighted day-night noise levels: LC_{dn}.

If 80 percent of the sonic booms generated in the special use airspace in the study area were to reach the ground, it is estimated that 48 sonic booms per day would affect the human and animal populations in the immediate area. Figure S4.3-4 illustrates the groundspace that would potentially be exposed to sonic booms from these activities. The areas are defined by supersonic maneuver ellipses that measure approximately 40 by 25 statute miles.

The net noise impacts of the proposed subsonic air-to-air operations practiced in the MOAs, the proposed subsonic air-to-ground operations on the SCR, and the proposed supersonic operations are depicted in Figure S4.3-5. The figure was compiled by adding together the regional special use airspace L_{dn}, the SCR L_{dnmr} contours, and the supersonic LC_{dn} levels. The SCR contours were reduced to one effective level of 70 L_{dn}, because the region around the SCR would be subjected to an average level of 66 L_{dn} from the air-to-air operations.

The supersonic noise impacts were effectively eliminated from the additive noise impact results, because the proposed subsonic operations in these regions would predominate the acoustic environment. The LC_{dn} was converted to L_{dn} in order to compare similar units for the cumulative analysis. For example, an LC_{dn} of 65 dB would be estimated to highly annoy 12 percent of exposed people, whereas it would require an L_{dn} of 70 dB to annoy that same percentage of people.

The areas that would be most affected by the no-action alternative on a long-term basis would be those portions of Idaho overlain by the SCR special use airspace. The groundspace beneath the western half of Owyhee MOA would be subjected to an average L_{dn} level of 68 dB. The eastern half of Owyhee MOA would be subjected to long-term noise levels of 79 L_{dn}, due notably to the intensive low-level mission profiles that the F-4Gs and RF-4Cs would practice in this area. The remainder of the special use airspace over the State of Idaho (Bruneau 1 and 2 MOA and restricted areas R-3202A, R-3202B, and R-3202C) would be subjected to an average L_{dn} noise level of around 66 dB, except those portions of groundspace that would be overflown on a regular basis by aircraft operating on the SCR. The latter areas would be subjected to long-term L_{dn} noise levels of greater than 70 dB. The Duck Valley Reservation would be exposed to an average noise level of less than 65 dB. The groundspace beneath the states of Oregon and Nevada would be exposed to L_{dn} levels less than 65 dB.

Work-Arounds

Work-arounds associated with the no-action alternative would likely have a minimal impact on noise. The level of operations for deployments and air-to-air refueling would not represent a significant increase over current operations, thus the noise environment would be minimally affected. Training

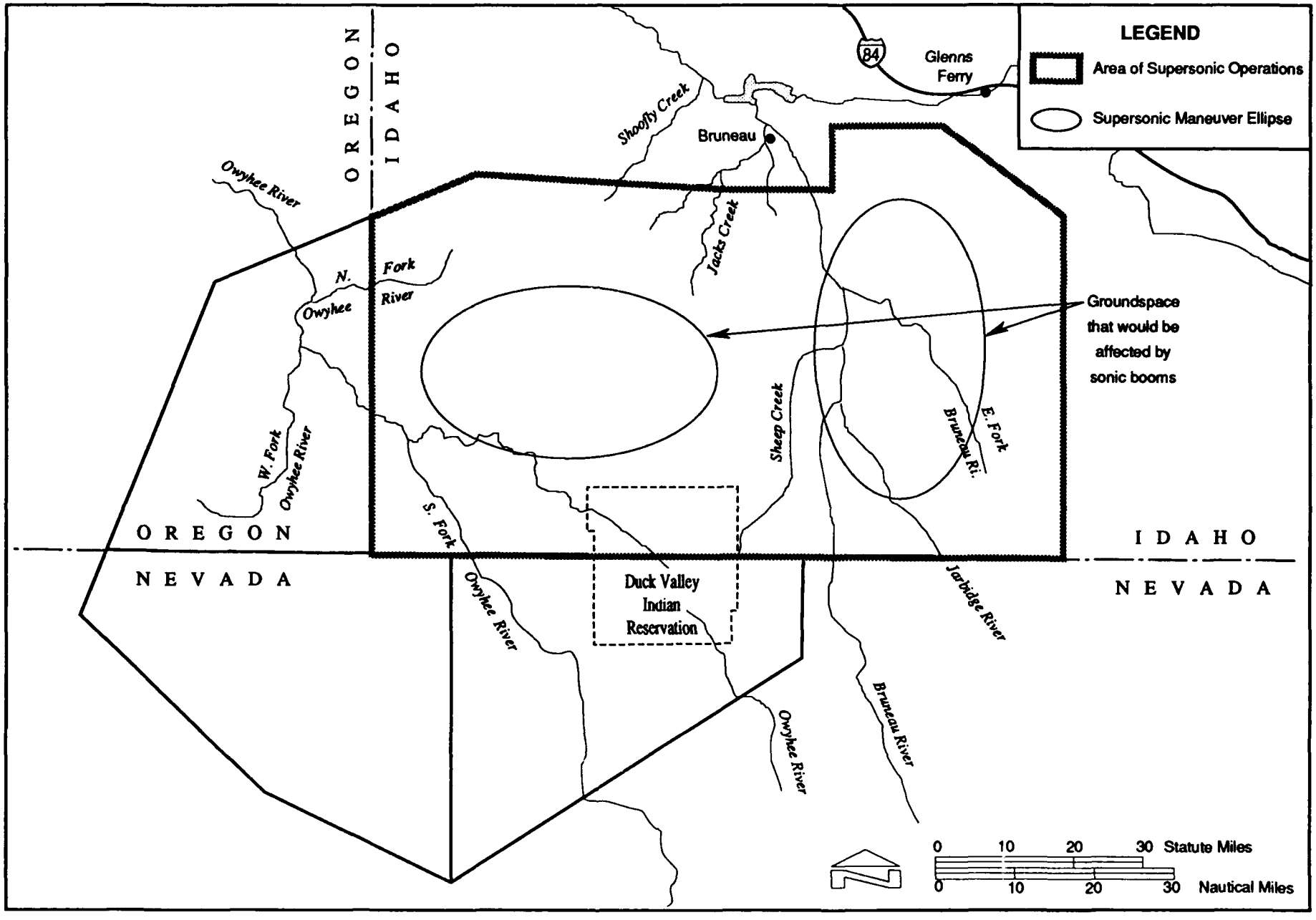


Figure S4.3-4

SONIC BOOM IMPACT MAP

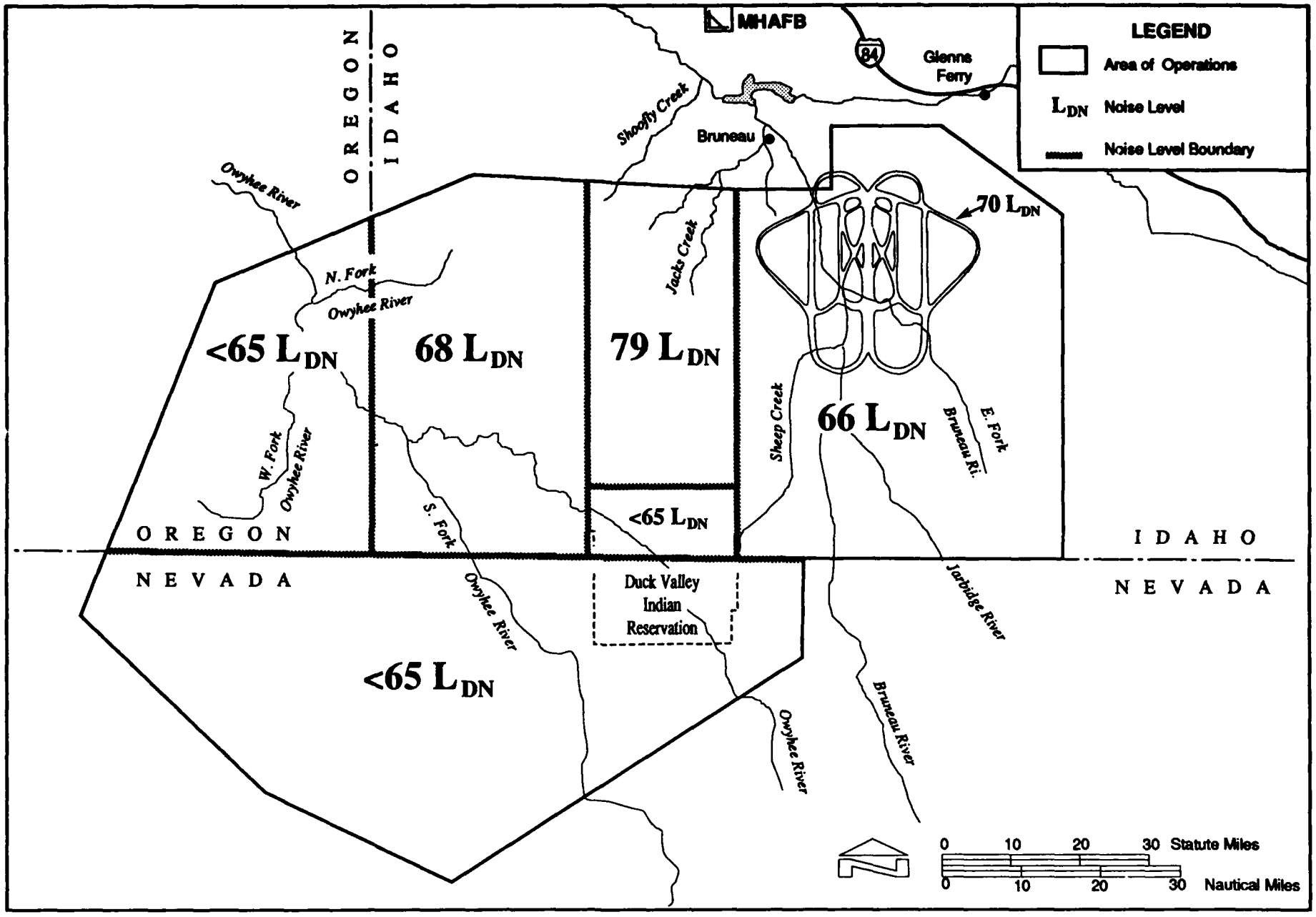


Figure S4.3-5

**NET NOISE IMPACT MAP FOR NO-ACTION ALTERNATIVE:
SUBSONIC AND SUPERSONIC OPERATIONS**

with no weapons delivery would result in similar noise impacts as described above for the special use airspace expansion, though some of the impacts over the SCR would shift to MOA areas. Increased hours of operation could have adverse local noise impacts in the vicinity of MHAFB, particularly if operations take place after 10:00 P.M. when noise is most annoying, and a 10-dB penalty is added to the L_{dn} measurement.

S4.3.6 Mitigations

S4.3.6.1 Proposed Expanded Range Capability

The mitigations recommended for the no-action alternative would be appropriate for a proposed expanded range capability.

S4.3.6.2 No-Action Alternative

Mitigations that could be instituted to minimize the impacts due to increased noise levels would be limited to acceptable constraints placed on the various mission profiles. Potential mitigations include the following:

- Avoid overflight of sensitive receptors through vertical and/or horizontal separation.
- Minimize the number of operations after 10:00 P.M.

Resource-specific mitigations designed to reduce noise impacts are discussed in the affected resource sections. These mitigations often are related to sensitive areas for each resource and are discussed in the resource-specific sections.

S4.4 BIOLOGICAL RESOURCES

S4.4.1 Regulatory Setting

The *Endangered Species Act of 1973,* 16 USC section 1531 et seq., as amended, protects proposed and listed threatened or endangered species. Formal consultation with the USFWS is required under section 7 of the act for federal projects and all other projects that require federal permits (e.g., Corps of Engineers permits) where such actions could directly or indirectly affect any proposed or listed species.

The *Migratory Bird Treaty Act of 1972,* 16 USC sections 703 through 711, protects migratory waterfowl and all seabirds by limiting the transportation, importation, kill, or possession of those birds.

The *Clean Water Act of 1977,* 33 USC 1251 et seq., requires a National Pollution Discharge Elimination System (NPDES) permit for all discharges to reduce pollution that could affect any form of life. Section 404 of this act regulates development in streams and wetlands and requires a permit from the U.S. Army Corps of Engineers.

The *Rivers and Harbors Act of 1899,* sections 9 and 10, 33 USC section 1344, regulates all types of development in or over navigable waters, including bridges, dams, dikes, piers, wharfs, booms, weirs, jetties, dredging, and filling by requiring a Corps of Engineers permit for such actions. Navigable waters are defined in title 33 CFR section 329 to include past, present, and potential future use in transporting commerce. Court decisions have expanded protection to estuaries and wetlands (Dedrick 1984).

Executive Order 12088, Federal Compliance with Pollution Control Standards, requires the head of each executive agency to be responsible for ensuring that all necessary actions are taken for the prevention, control, and abatement of environmental pollution with respect to federal facilities and activities under the control of the agency.

Executive Order 11990, Protection of Wetlands, requires governmental agencies to provide leadership and 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 their responsibilities. Each agency is to consider factors relevant to a project proposal's effect on the survival and quality of the wetlands by maintenance of natural systems, including conservation and long-term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, and wildlife. Agencies are required to provide for early public review of any plans or proposals for new construction in wetlands.

Executive Order 11988, Floodplain Management, requires that governmental agencies, in carrying out their responsibilities, provide leadership and take action to restore and preserve the natural and beneficial values served by floodplains. This order requires each federal agency to determine whether the project will occur in a floodplain and to consider alternatives. If no practical alternative is found, it requires minimizing harm and notifying the public why the project must be located in the floodplain, and it provides for public review and comment.

The *Fish and Wildlife Coordination Act*, 16 USC section 661 et seq., requires the Corps of Engineers to consult with the USFWS and state wildlife agency or agencies on all permit applications for projects in waterways or wetlands under Corps jurisdiction.

The *Federal Cave Resources Protection Act of 1988*, requires protection of significant caves on federal land and protects the flora and fauna within the caves. It establishes civil and criminal penalities for damaging or disturbing significant caves.

S4.4.2 Issues and Concerns

The biological resources analysis programmatically evaluates the potential for direct and indirect impacts to biological resources from a proposed expanded range capability.

The following types of impacts may affect biological resources within the study area: (1) direct and indirect impacts of construction of range target areas and associated facilities; and (2) direct and indirect impacts resulting from operation and maintenance of the range, associated facilities, and MOAs. These impacts could be short-term or long-term. Construction-related impacts include habitat loss and degradation resulting from construction or upgrading of roads and equipment storage areas, installation of targets and fences, and development of fire breaks. Operational impacts include detrimental noise and visual presence effects of subsonic and supersonic aircraft flights on wildlife, habitat degradation resulting from ordnance delivery (including chaff and flares) and maintenance of target areas, potential death of individual birds resulting from bird-aircraft strikes, possible damage to wildlife from lasers and electromagnetic radiation, and habitat changes resulting from accidental fires. Potential operational benefits include restriction of livestock grazing, which damages natural vegetation and wildlife habitat.

The primary issues to be addressed because of a proposed expanded range capability are:

- Habitat loss or degradation from land disturbance during construction of the range (including roads, targets, fences, firebreaks, and maintenance and fire equipment storage areas).

- Habitat loss or degradation from land disturbance during weapons delivery (inert and live ordnance) and target maintenance activities (mechanical disking of targets and removal of ordnance).

- Interference with the migration of large mammals due to the positioning of fences and roads.

- Degradation of vegetation and its value as wildlife habitat resulting from range fires started by ordnance.

- Detrimental noise and visual presence effects of low-flying jet aircraft on wildlife, particularly bighorn sheep and birds of prey.

- Increased mortality of birds, particularly raptors, due to collision with aircraft.

- Loss or degradation of rare plant and animal species habitat resulting from ground disturbance activities such as range construction, maintenance activities, weapons delivery, and ordnance-caused range fires.

- Increased potential for spread of exotic plant species into areas that are currently dominated by native species.

- Habitat degradation and disturbance of wildlife as a result of increased road access and increased recreation.

- Effects of lasers and electromagnetic radiation from planes, threat simulators, and other range facilities on wildlife.

- Pollution of terrestrial and aquatic habitats with chemicals from ordnance and other sources.

S4.4.3 Methodology

Impacts to biological resources were evaluated by comparing ecological resource maps to information regarding the construction and operational aspects of the proposed expanded range capability (e.g., types of facilities and amount of flight activity) and by analyzing the sensitivities of the resources to each proposed activity or feature that could cause disturbance. The resource maps were developed from data provided by the Idaho Department of Fish and Game; Idaho, Oregon, and Nevada Natural Heritage Programs; Oregon Department of Fish and Wildlife; USFWS; Nevada Department of

Wildlife (NDOW); and the U.S. BLM (Boise, Vale, and Elko Districts) planning documents. A brief reconnaissance field survey was conducted in portions of the study area.

The following analysis was conducted at a programmatic level. If a decision to proceed to a Tier 2 EIS is made, site-specific, detailed field surveys will be conducted to identify sensitive plants and animals occurring in the vicinity of areas proposed to be disturbed during construction. These surveys will also determine the existence of unique and sensitive habitats, including wetlands and caves in the vicinity of proposed construction sites. The survey methods for federally listed and candidate species will be described in detail in the biological assessment, a study that is being conducted in accordance with Section 7 of the Endangered Species Act. All potential disturbance areas will be surveyed during the late spring and summer of 1990 to determine the presence of threatened, endangered, and candidate species, unique and sensitive areas, and wildlife species that could be affected by the proposed action and alternatives. These field surveys will be supplemented by additional discussion of site-specific concerns with local and regional resource managers. The latter will include consideration of wintering areas, movement corridors, and fawning areas for important game species. Additional surveys and formal Section 7 consultation, if required by the USFWS, will be conducted prior to initiation of any construction activities in areas not surveyed in the summer of 1990. Data obtained in these surveys will be used to guide the range siting process, if a decision is made to proceed to Tier 2.

S4.4.4 Significance Criteria

Determination of the significance of impacts was based on: the importance (legal, commercial, recreational, ecological or scientific) of the resource; the proportion of the resource that would be affected relative to its occurrence in the region; the sensitivity of the resource to construction, operation, or overflight activities; and the duration or the ecological ramifications of the effect. In the wildlife analysis, impacts are considered significant if (1) wildlife management, as it relates to species of high concern, is adversely affected over relatively large areas and (2) overflight disturbances are sufficient to cause reductions in the population size or distribution of a species of high concern.

Impacts on biological resources under MTRs used to access a range with expanded capability and/or associated MOAs will be addressed in the Tier 2 EIS.

S4.4.5 Impact Assessment

S4.4.5.1 Proposed Expanded Range Capability

IMPACTS OF CONSTRUCTION

Activities associated with the proposed expanded range complex that could affect biological resources include building new access roads, upgrading existing roads, clearing for installation of targets, installing fences, constructing concrete pads for threat generators, removing vegetation in firebreaks, and constructing equipment storage areas. Vegetation clearing, grading, and noise and human presence accompanying these activities would alter the habitats present in the proposed expanded range capability area. Dust resulting from construction activities could also affect plants and animals in the area. Indirect impacts could result from increased road access to this remote area. Specific impacts to vegetation, wildlife, aquatic species, and threatened or endangered species are discussed below.

Vegetation

Construction of roads, targets, firebreaks, fences, threat sites, facilities, and equipment storage areas, in addition to upgrades of access roads, would affect vegetation within the proposed expanded range capability area through vegetation removal during site preparation, disposal of cleared material, generation of dust, and changes in runoff patterns. Impacts to vegetation include (1) reduction in acreage of plant communities; (2) potential reduction in the number and distribution of BLM-sensitive species (federal candidate species are discussed below) and their habitats; (3) physical damage to vegetation and habitats; (4) locally decreased productivity of species and, consequently, plant communities; (5) increased potential for erosion (wind and rain) and sedimentation; and (6) increased potential for spread of exotic plant species.

Factors related to disturbance in sagebrush-grass are variable and interactive. In the study area, these factors primarily include cultivation, fire, grazing, and use of herbicides. The impacts of fires are discussed in section S4.4.5.2. With regard to cultivation, Tisdale and Hironaka (1981) estimate that, after cultivation, good-condition sagebrush-grass communities do not recover completely for 40 to 50 years. Clearing of vegetation and disking soils along firebreaks and in target areas would be similar to cultivating areas, and could result in the same types of long-term effects. Use of herbicides and grazing are discussed below.

In the study area, all disturbance effects must be considered in conjunction with grazing, which reached maximum levels in the late 1800s through the 1930s and caused substantial changes in the vegetation of this area (Yensen 1982). A considerable portion of the vegetation on the plateaus in the proposed

expanded range capability area, especially the eastern section, is in poor ecological condition because of overgrazing (BLM 1985a). In addition, numerous natural and man-caused fires have reduced the density and productivity of sagebrush and native grass species in the area and facilitated the invasion of cheatgrass (*Bromus tectorum*), which prevents native grasses from recolonizing a site (Daubenmire 1968; Tisdale and Hironaka 1981). Many of the burned areas have been reseeded with wheatgrasses. Disturbance of these degraded communities would be adverse, but would not be likely to cause significant impacts. Clearing of less disturbed vegetation would likely cause an incremental increase in the number and kinds of exotic plant species present, especially cheatgrass. Effects of clearing could be significant, depending on the amount, location, and type of vegetation removed. Restricted access to areas in poor ecological condition combined with active management policies to improve productivity of sagebrush and native grass species could have a locally significant beneficial effect.

Depending upon the amount of area disturbed, developing a range with expanded capability could contribute to desertification. The definition of desertification adopted in Sheridan (1981) is "a change in the character of land to a more desertic condition, involving the impoverishment of ecosystems as evidenced in reduced biological productivity and accelerated deterioration of soils and in an associated impoverishment of dependent human livelihood systems." Desertification, usually associated with extensive overgrazing, excessive cultivation of erosion prone lands, or overdrafting of groundwater tables, is generally manifested by one or more of the following symptoms: (1) declining groundwater tables; (2) salinization of topsoil and water; (3) reduction of surface waters; (4) unnaturally high soil erosion; and (5) desolation of native vegetation (Sheridan 1981). Maintenance of extensive areas in a vegetationless state, as occurs with dry farming in arid areas, can lead to high wind erosion and weakening of the vegetative cover of adjacent areas. The weakened vegetative cover becomes more susceptible to drought, and, in turn, is prone to excessive soil erosion. Measures that inhibit wind erosion, including minimization of the amount of area devoid of vegetation at any one time, would be the most effective means of minimizing the potential for desertification.

Mountain big sagebrush-grass communities (those dominated by *Artemisia tridentata* ssp. *vaseyana*) are present in the extreme southern portion of the proposed expanded range capability area. Occurring at higher elevations, these communities generally receive more moisture from precipitation and have greater species diversity than the lower elevation big sagebrush-grass (dominated primarily by *Artemisia tridentata* ssp. *wyomingensis*), and are generally in fair to good ecological condition (BLM 1985a). As a result of both the increased availability of moisture and the increased plant density, these communities provide more cover and are more valuable to wildlife. Extensive clearing of these communities could cause significant impacts. Potential restrictions to recreational and other consumptive land uses could enhance these communities.

Scattered within the mosaic of sagebrush-grass and shadscale vegetation are numerous hard-bottom playa lakes -- often mapped as wetlands by the USFWS National Wetlands Inventory -- which very

often harbor Davis peppergrass (*Lepidium davisii*), a federal category 2 candidate for listing as endangered (DeBolt and Rosentretter 1989). Because of their status as wetlands and as potential habitat for a federal candidate species, disturbance of these communities could result in significant impacts. Impacts to Davis peppergrass are discussed below. If a decision is made to proceed with a proposed expanded range, these wetland areas will be identified during Tier 2 analyses, as discussed in section S4.4.3.

BLM-sensitive species such as the Simpson's hedgehog cactus (*Pediocactus simpsonii* var. *robustior*) occurring within the study area could experience a narrowing of their distribution if targets were located in their habitats; the significance of this would depend on the amount of habitat disturbed relative to its occurrence in the area. Federal candidate plant species affected by the proposed expanded range capability are discussed below.

Dust produced by construction activities such as clearing of vegetation for targets and vehicles driving on unpaved roads could affect vegetation by causing differential changes in productivity between species (Daubenmire 1974). Resulting impacts could cause changes in species composition, if the effects are strong and persistent (Wood 1976).

Construction activities would also result in increased soil erosion and compaction, degrading existing vegetation. Reduction in vegetative cover would increase wind erosion, which causes loss of topsoil, exposes roots to desiccation, and buries vegetation (Brady 1974).

Wildlife

Construction of new range facilities could directly affect wildlife through permanent loss or alteration of habitat and through temporary disturbance from noise and human presence. Vegetation clearing in areas that would not be covered with permanent structures (i.e., firebreaks, targets, and road shoulders) would alter wildlife habitat from its present condition by changing food, cover, and soil characteristics. Species composition and abundance of small animal populations (e.g., rodents, lizards, and some birds) are likely to change within and adjacent to the cleared areas. Vegetation alteration, even in small patches, has been shown to change use patterns by many rodents (Rosenzweig 1973). Ord kangaroo rats and the western harvest mouse prefer habitats with weedy plant species and/or sparse cover which allows for more efficient seed foraging. On the other hand, least chipmunks were more abundant in undisturbed habitats having dense vegetation and hard packed soil than they were along roads (HDR 1981). Clearing activities also could destroy the burrows of some burrowing owls, but the resultant open areas could increase the amount of habitat suitable for this species.

It is unlikely that caves would be present near proposed target areas, but this possibility would be investigated during Tier 2 surveys. Impacts on cave fauna and flora could result from ground vibration

and landslides during construction. Any caves exhibiting recent use by bats would be considered highly sensitive, and damage to them could be significant.

Larger animals such as carnivores, ungulates, and raptors could also be affected through decreases or increases in their food supply. Some species of rodents and lizards may increase in abundance, assuming that soil characteristics are such that burrowing activity would be enhanced by vegetation clearing and that food sources would be adequate to support the additional animals. This in turn would attract predators such as coyote, badger, bobcat, and raptors. For other species, however, habitat alteration would cause a decline in abundance due to a lack of cover or food. For example, loss of forage in crucial winter habitat for mule deer or pronghorn could reduce the survival or condition of these animals. Conversely, improvements in forage could improve survival rates. Loss of lek and brood use areas for sage grouse could decrease reproduction and, consequently, population size. Analysis of results of specific habitat studies performed as part of the environmental tiering process and consultation with resource managers will permit avoidance of good habitat and identify sites that could be improved because of existing degradation. These studies are discussed in section S4.4.3.

Most construction activities are expected to have little or no effect on raptor nesting since most nesting is concentrated on cliffs, such as in the river canyons, which would not be suitable for target sites. Several exceptions to this could occur, however. Road and bridge construction may be necessary in some of the canyons, and this could affect raptor nesting if the work were conducted in spring to early summer. Small cliffs away from the main canyons are also present in the study area, and some may be used for nesting. In addition, burrowing owls and ferruginous hawks nest away from canyons and could be affected by facility construction.

The particular species affected and level of impact would depend on the precise location and areal extent of ground disturbance within the study area. For some species, impacts would be long-term, but insignificant. Impacts on deer, pronghorn, and/or sage grouse, however, could be locally to regionally significant and long-term if key habitats were degraded. In addition, changes in the species composition and abundance of wildlife resulting from habitat alteration (i.e., soil and vegetation changes) could cause long-term ecological changes in the study area.

Noise, human presence, and ground clearing activities would displace mobile species from construction sites. Species intolerant of human presence or construction noise would also avoid the otherwise suitable habitat in the immediate vicinity of the construction. Pronghorn and sage grouse are likely to avoid construction sites by about 1 mile (HDR 1981). Less mobile species and those seeking refuge in burrows could be killed by construction activities. For most common and typical species in the area (including raptors), impacts would likely be temporary, local, and insignificant. Large mammals, such as deer and pronghorn, could be adversely affected if construction were to occur during winter and in crucial winter range or during spring in areas used for fawning. Bighorn sheep could be affected if

bridges or road construction were to occur in the Bruneau, Jarbidge, or Owyhee river canyons. Construction during spring could affect sage grouse populations if leks and brood use areas were abandoned. The level of impact would depend on the specific location and duration of construction activities. Data from figures S3.4-1 and S3.4-2 can be used as programmatic guides in locating less sensitive habitats for mule deer, bighorn sheep, and pronghorn. In general, these less sensitive areas are in the northeastern and west-central to central portions of the study area.

Dust resulting from construction activities could affect wildlife species downwind. Inhalation of dust could damage mucous membranes in the respiratory tract. Potential for impact would be very localized and short term. Any reduction in plant productivity would decrease the amount of forage available for herbivores. Dust coating plant surfaces would increase tooth wear in animals feeding on these plants and would also increase their intake of potentially toxic trace minerals. These effects would occur as long as the dust remained on the plants. Impacts on wildlife populations in the study area would most likely be insignificant considering the dispersed disturbance and current dust levels. Under some circumstances, however, dust could cause locally significant impacts. These types of impacts would be addressed in Tier 2.

Indirect impacts to wildlife could result from ORV use and poaching by construction workers in the study area. The potential for such impacts depends on the number of workers, construction schedule (primarily duration), worker residence location (temporary work camps vs. use of local workers that return home at night), location of facilities being constructed, and whether any restrictions are placed on workers regarding carrying firearms to the job site.

Aquatic Biota

Few aquatic habitats are likely to be directly affected by construction of facilities in the proposed expanded range capability area. Several of the smaller intermittent and ephemeral streams could be crossed by roads, and culverts or small bridges may need to be installed. Construction during the dry season when water is not present and restoration of the stream bed and banks to as near preconstruction conditions as possible would minimize impacts to these streams. Impacts on stream biota are predicted to be insignificant in most cases, but each crossing would need to be assessed prior to construction.

If expansion of range capabilities requires construction of a new bridge or bridges over (1) the East Fork of the Bruneau River for access to the Inside Desert, (2) the Jarbidge River or the West Fork of the Bruneau River for access to the Diamond A Desert, and/or (3) the Owyhee River and its major tributaries (South Fork and Deep Creek), aquatic biota may be affected. These are perennial streams that contain redband trout and a variety of other aquatic organisms. Impacts of construction will be

addressed in Tier 2 once the location, type of bridge, methods of construction, and schedule are determined.

Soil disturbance during construction activities would increase the potential for erosion during rain storms and snow melt with associated runoff of sediment into surface waters (streams and playas). Neither intermittent and ephemeral streams nor perennial streams are likely to be measurably affected, but further analysis needs to be done once specific sites for land disturbance are identified. Sediment runoff to the small playas and catchment basins could reduce their depth (i.e., water storage capacity), and impacts could range from insignificant to locally significant.

Construction of targets in ephemeral streams or playas with small temporary wetlands would impact aquatic species that colonize these when wet. The potential for this will be addressed in tiering analyses when target locations are determined.

Threatened and Endangered Species

Threatened, endangered, and candidate species include plants and animals, both of which could be affected by construction activities as discussed above. The following section discusses the potential for impacts to federally listed or candidate species occurring within the study area (see Table S3.4-2). Federally listed endangered, threatened, or proposed species are discussed first, followed by species that are candidates for federal listing.

The bald eagle is not likely to be affected by construction activities resulting from the proposed expanded range capability. This species is not known to nest in the area, although they do winter along the Snake River north of the study area and along the Owyhee River in Oregon. It is conceivable that some could roost on the cliffs of other river canyons in the ROI. Occasional migrating birds flying through the area are not likely to be affected by construction activities.

The peregrine falcon is also not likely to be affected by construction activities associated with the proposed expanded range capability. Historic nest sites within the study area have not been occupied since the mid-1970s, and no birds are currently known to nest within the area. The canyons within the proposed range expansion study area, however, do provide potential habitat for these birds. Occasional migrating birds are not likely to be affected by construction activities. Additional surveys could be conducted to determine the presence or absence of nests within the vicinity of any proposed construction area.

The gray wolf is not likely to be affected by construction activities resulting from the proposed expanded range capability. Except for a recent sighting reported near Grasmere (southwest of the proposed expanded range capability area), this species apparently has been absent from the study area

for many years. It occurs primarily in central Idaho, to the north of the study area. The isolated sighting near Grasmere could have been a solitary, wandering individual, in which case its chances of surviving and reproducing would not be high. The presence of other gray wolves in the area is possible but not likely.

Lahontan cutthroat trout are not likely to be affected by construction since this species occurs only in the Humboldt River drainage in Nevada and a few reservoirs in Owyhee County, outside of the proposed expanded range capability area. Likewise, the Bruneau Hot Springs snail would not be affected by construction since no construction activity is proposed for Bruneau Hot Springs.

Candidate species could be affected by construction activities, but the level of impact would depend on the precise location and areal extent of ground disturbance. Those species that could potentially be affected include ferruginous hawk, white-faced ibis, long-billed curlew, and about eight candidate plants and seven BLM state sensitive plants.

IMPACTS OF OPERATION

Activities or facilities associated with operation of the proposed expanded range capability and MOAs that could affect biological resources include: subsonic low-altitude overflights in the MOAs and over the range; supersonic overflights over the range and in the MOAs in Idaho; ordnance delivery; range maintenance; fences; radar and other electromagnetic emissions; dust; and accidents such as range fires. Improved public access could increase recreational uses that affect wildlife.

The major aspects of the proposed expanded range capability which may subject animals to more frequent or more intense overflight events include: changes in MOA boundaries and altitudes that would increase the area over which low-level flights would occur; increases in aircraft flight activity; substantial increases in supersonic operations; and a substantial increase in the number of F-4 flights in the MOAs and MTRs (the F-4 is a noisier aircraft than the F-111s that currently fly in the area).

Vegetation

During operations, vegetation is most likely to be affected by activities such as ordnance delivery and target maintenance through ground disturbance and fires. Road upgrades in the area could increase access and use of off-road areas resulting in disturbance and physical damage to communities and individual plants. Restriction of ORV access to areas could reduce disturbance and physical damage. Off-road vehicles can break, crush, and uproot vegetation, and undercut root systems. Off-road vehicle impacts would be adverse but not significant in most plant communities in the study area that include disturbed big sagebrush-grass, seeded areas, and burned areas. Off-road vehicle impacts could be significant in playa lakes or hard-bottom playas that harbor Davis peppergrass. Restriction of

disturbed and undisturbed areas to off-road vehicles and grazing could substantially improve the ecological condition of the area.

Ground Disturbance Effects. Aircraft overflights will not affect vegetation, but ordnance delivery would cause ground disturbance. The primary impacts to vegetation resulting from ordnance delivery would be degradation of vegetation, an increased potential for spread of exotic species, and potential changes in community species composition.

As observed on several existing Air Force ranges, most of the inert ordnance lands near the targets. Some practice weapons, however, land outside the cleared area around the targets for various reasons (e.g., inaccurate delivery or skipping upon impact, particularly for the heavy BDU-38/B and BDU-50 inert bombs when the tail fins and parachute break off). Individual inert bombs typically disturb an area of 2 to 40 square feet upon impact, and the zone of disturbance around targets generally extends from 75 feet for small targets to 700 feet for large targets, such as convoys. Maintenance crews pick up the expended ordnance, either by hand or using equipment such as a backhoe, for disposal. These activities can cause additional ground disturbance that would alter the habitat. Use of live ordnance would generally cause greater land disturbance than use of inert munitions. For most bombs, the area disturbed would be at least 100 square feet per bomb. Cleanup of live ordnance involves detonation of any unexploded bombs where they lie.

Ground disturbance from ordnance impact or detonation would remove any vegetation in the affected area and alter soil conditions. The latter would affect recolonization of the impacted area primarily by increasing the spread of exotic species. During the August 1989 field reconnaissance conducted for this analysis, it was observed that ordnance impact craters (generally less than 10 to 15 feet in diameter) on the SCR are being colonized by tumbleweed (*Salsola kali*) and prickly lettuce (*Lactuca seriola*) and that the entire impact area, which has been cleared of sagebrush either through fires or by mechanical means, is almost wholly dominated by cheatgrass and other weedy species. Once a sagebrush community loses its perennial plant cover, succession typically goes from tumbleweed to tumble mustard (*Sisymbrium* sp.), to tansymustard (*Descurainia* sp.), to cheatgrass within about five years (Wright and Bailey 1982). It is likely that the composition of sagebrush and seeded communities in proposed impact areas will become dominated by exotics such as those mentioned above. Other noxious weed species may increase in distribution.

Fire Effects. Use of inert and live ordnance on the proposed expanded range capability area would increase the potential for accidental range fires. Inert weapons typically contain spotting charges that can ignite vegetation, and the explosion of live ordnance can also start fires. Given that there is an abundance of cheatgrass, a highly flammable species, within the study area, an increase in the frequency of ordnance-caused fires is likely.

As mentioned under construction impacts, fire is one of the primary disturbance factors in sagebrush-grass vegetation. Daubenmire (1968) discussed many of the effects of fires in grasslands; the following discussion is summarized from his work. Fire can cause changes in species composition (i.e., by eliminating sagebrush, which is killed by fire, and by favoring forbs over grasses), and may improve grasslands from the standpoint of palatability to animals, depending on the species favored by fire. Fires also cause changes in the density and productivity of grassland communities, in addition to affecting other environmental parameters such as (1) increasing soil temperatures because of the decreased amounts of litter and humus, (2) increasing wind erosion, especially in sandy loams, (3) changing soil moisture, chemistry, pH, nutrient supply, and soil biota, and (4) removing food and cover for above-ground animals such as ground-nesting birds and rodents (see Wildlife section).

Generally, grass productivity increases after fire, but in the Great Basin and Columbia Plateau areas where fire has eliminated sagebrush and overgrazing has eliminated the perennial grasses, cheatgrass has invaded. In these areas, fires can decrease the productivity of these stands of vegetation in the first post-burn season, provided the fire is early enough in the dry season (i.e., June) that spikelets have not yet shattered and seeds have worked their way into the soil (Daubenmire 1968).

As summarized by Wright and Bailey (1982), grasses, shrubs, and other plants react differently to fire. Idaho fescue and needle-and-thread can be severely harmed, whereas bottlebrush squirreltail and bluebunch wheatgrass are slightly less susceptible to fire effects. Return to pre-burn production can take one to three years for bluebunch wheatgrass, three to eight years for needle-and thread, and 10 to 12 years for Idaho fescue. Fire effects on shrubs can be long-lasting; sagebrush productivity takes about 30 years to rejuvenate after a fire, and most other shrubs such as bitterbrush (*Purshia tridentata*), serviceberry (*Amelanchier* sp.) and mahoganies (*Cercocarpus* spp.) are damaged, at least temporarily. Rabbitbrush (*Chrysothamnus viscidiflorus*), an undesirable species, is enhanced, as it resprouts vigorously after fire.

It is believed that in pristine Wyoming big sage communities -- the driest of the sagebrush-grass communities -- fire frequency could have been as low as once every 100 years (Wright and Bailey 1982). However, with the invasion of cheatgrass following overgrazing, the frequency of both natural and man-caused fires has increased steadily within the region of influence, as evidenced by the abundance of burned areas.

A large range fire or an increase in frequency of smaller range fires could cause significant impacts by further facilitating the invasion of cheatgrass and by reducing cover for wildlife. Impacts of this could be significant, depending on the size, character, and location of the fire. Grazed sagebrush-grass communities in fair to good ecological condition would be most susceptible to these impacts. Since fires generally do not carry in low sagebrush communities because of the lack of fuel, significant impacts to these communities are not anticipated.

Wildlife

Operation of an expanded range complex and associated MOAs could affect wildlife through noise and visual stimuli from low-altitude overflights (subsonic and supersonic), bird-aircraft strikes, ground disturbance from ordnance delivery and maintenance activities, noise and ground vibration from live ordnance detonation, and habitat alteration or direct mortality from fires. Fences around targets, dust, chaff, flares, radar and other electromagnetic emissions, and recreational activities induced by improved road access could also affect wildlife.

Wildlife management activities by state and federal agencies may be disrupted because of safety hazards. Specifically, the use of airplanes and helicopters in aerial survey and related management tasks may be curtailed or subject to greater risk in areas of increased training activity. Complex maneuvering by jet aircraft may make it increasingly difficult to apply the usual "see and avoid" requirement for visual flight in areas of military activity.

Overflight Noise/Visual Effects. Recent reviews (Gladwin et al. 1987; Manci et al. 1988) have established the potential sensitivity of wildlife to the noise and visual stimuli associated with overflights by military aircraft. The potential for adverse impacts on wildlife needs to be considered where the frequency or intensity of aircraft activity is to be increased. For the proposed range expansion, new areas would be subject to low-level overflights, while areas that lie under existing special use airspace would experience more frequent, louder overflight episodes, a larger proportion of which would generate sonic booms.

Noise levels associated with the proposed expanded range capability are discussed in section S4.3. The primary concern with regard to impacts on wildlife is that of a startle effect or avoidance behavior in response to the relatively loud, sudden, short-duration noise produced by a passing jet. The sudden visual intrusion of a jet may also be startling. Short-term behavioral reactions can, for example, entail increased expenditures of energy, interference with important activities, or injury (e.g., Manci et al. 1988). Longer-term effects could include the avoidance of frequently overflown areas by wildlife, resultant use of less-preferable habitats, and ultimately, reduced growth, survival, or reproduction. The available evidence (e.g., Lamp 1989; Manci et al. 1988) suggests that low-level subsonic flights by jet aircraft are more adverse to wildlife than are sonic booms caused by relatively distant supersonic flights. Type of flight activity at the time the speed of sound is passed is an important factor to consider in assessing potential for impact since diving flight produces greater overpressures at ground level than does level flight (personal communication, M. Nelson 1989).

The following subsections consider the significance of overflight impacts on specific resources of concern. Only mammals and birds are considered because there is little evidence to suggest that aircraft noise or visual effects would adversely affect other animal groups.

MULE DEER. Observations were recently made of the reactions of mule deer to subsonic military aircraft, and to one high-altitude sonic boom under the Fallon Naval Air Station Supersonic Operations Area (SOA) (Lamp 1989). In most cases, no reaction was observed; in one case, deer paused in their feeding. These observations suggest that mule deer are either not especially sensitive to military aircraft, or that they become accustomed to these types of disturbances (Shotton 1982).

Incremental increases in the frequency of overflights or in sound levels from passing jets, in areas where this has occurred in the past, would not be expected to cause the abandonment of key habitat areas or to significantly alter the animals' behavior. Significant impacts are possible, however, in crucial winter range areas that were previously not subjected to low-level overflights or otherwise experience a sharp increase in the frequency of low-level flights. Areas of particular concern for mule deer include crucial winter range along the Owyhee River, Deep Creek, and Battle Creek, the area under the existing Bruneau 2 MOA near Murphy Hot Springs, and the area under the potential Owyhee MOA expansion near Big Jacks and Little Jacks creeks. A monitoring program, as described in the mitigation section, would address this issue.

PRONGHORN. Pronghorn are not known to be particularly sensitive to most aircraft noise and visual disturbance, including jet aircraft activity. In one study, pronghorn did run in response to steadily approaching helicopters (Luz and Smith 1976). Two herds presently use the SCR impact area with little regard for aircraft activity (personal communication, M. Moore 1989). Few specific crucial habitats for pronghorn have been identified in the study area at this time, primarily due to lack of recent survey data. The IDFG has indicated that several areas of winter habitat occur in the southeastern portion of the study area and that many pronghorn migrate from Nevada into this area for the winter. Pronghorn also use the area north of the Owyhee River, under the Owyhee MOA. Significant impacts of aircraft overflights in the latter region are not anticipated due to the history of aircraft activity in the area.

BIGHORN SHEEP. Sensitivity to noise and visual intrusion has been observed in individual bighorn sheep. In addition, they are more vulnerable to disease when under stress. Monitoring of bighorn sheep responses to military aircraft in Nevada (Lamp 1989) has not produced conclusive results. Observations of bighorn sheep responses to low-level jet overflights (about 400 feet AGL) in the Owyhee River drainage by Idaho DFG personnel has indicated that some exhibit a panic response (i.e., some ran 0.5 mile to the bottom of the canyon and continued running for some distance in the canyon) while others apparently ignored the aircraft (personal communication, L. Oldenberg 1989). The type of response may be related to the habitat type occupied by the sheep when the overflights occurred. The extent to which canyon-dwelling and open-range foraging bighorn sheep can become accustomed to military aircraft disturbance is unknown. Experience in mountainous habitat on both the Nellis AFB and Luke AFB ranges identify healthy bighorn sheep populations in restricted access areas that are subjected to frequent low-level jet overflights.

Significant impacts on established bighorn sheep populations may occur, at least in the short term, wherever their habitats are subjected to new training activities. Impacts on recent reintroductions could be long term if establishment and range expansion are retarded. The Big Jacks Creek and Little Jacks Creek areas contain actual and potential habitats that have not previously been subjected to intense, low-level use. A reintroduction was made in Big Jacks Creek in 1988. Supplemental transplants were made into Big Jacks and West Fork Bruneau River in 1989.

In addition, given the sensitivity of bighorn sheep to disturbance and the value attached to this resource, the potential exists for significant impacts of increased aircraft activity in areas already experiencing low-level training (e.g., Owyhee River drainage). It is recommended that area-wide monitoring of bighorn sheep herds be undertaken to (1) determine habitat use of the Jarbidge and Bruneau river canyons and (2) assess the potential for these types of cumulative impacts.

WILD HORSES. Based on reactions of domestic horses (Casady and Lehmann 1967; Nixon et al. 1968), military jet training flights, even if supersonic, are not expected to significantly affect wild horses. Temporary startle reactions to overflights may occur, but these reactions do not entail a significant risk of injury to unconfined animals.

OTHER MAMMALIAN WILDLIFE. In general, on-the-ground impacts associated with the proposed expanded range capability appear to have greater potential to impact mammals than do aircraft overflights. Mammals whose habitats afford dense cover, including rabbits, rodents, bats, and river otters, are not expected to abandon these areas in response to relatively distant disturbance; they may be expected to freeze or take cover in the worst case. Their use of relatively sheltered habitats would also tend to lessen the noise and visual stimuli of passing aircraft. Little is known of the sensitivity of relatively secretive and nocturnal carnivores such as the mountain lion, bobcat, and badger to aircraft disturbance. There is no evidence to suggest that these species might abandon areas--which they may defend as territories--in response to low-level aircraft activity. For all of these species, human activity or disturbance in their immediate habitat is likely to pose greater potential impacts than passing aircraft. As discussed in section S4.7, aircraft noise is not expected to cause sufficient ground vibration to trigger landslides or cave-ins; no impacts on caves and cave biota are expected. Jet aircraft noise is, for the most part, in frequencies below those that are important in bat communication/echolocation (Fenton 1985; Manci et al. 1988). This suggests that a passing jet would not seriously disrupt bat foraging activities.

RAPTORS. Significant impacts on raptors would arise if the abandonment of nesting or critical roosting areas were to occur. If the use of major migration corridors were to be disrupted, this would also be considered a significant impact. Data appear to be incomplete for much of the area that would be under the range and low-level MOAs, but for much of the area, the history of low-level aircraft operations suggests that resident birds would be accustomed to aircraft noise and visual effects. This

conclusion does not extend to tolerance for new types of air-to-ground training in new target areas. Areas under new low-level, special-use airspace would experience greatly intensified aircraft activity, relative to present conditions, and would have a correspondingly high potential for significant impacts.

The following paragraphs consider the potential for impacts on the major raptor species of concern in the study area. These include the prairie falcon, golden eagle, and red-tailed hawk, plus brief consideration of other species. Federally listed or candidate species such as the peregrine falcon, bald eagle, and the ferruginous hawk are discussed below. Supersonic flights would be above 5,000 feet AGL and most would be above 10,000 feet AGL. Thus, impacts of overpressures on eggs are expected to be negligible. This will be addressed in greater detail in the site-specific tiering documentation, if a decision is made to proceed with Tier 2.

Prairie Falcon. A comprehensive study of low-level, military jet aircraft effects on cliff-nesting raptors in central Arizona was conducted by Ellis (1981). In this experiment, military jets flew nearly 1,000 passes over the eyries of six species of nesting raptors. Sonic booms were also simulated with various explosive devices. The greatest number of observations were made on prairie falcons, red-tailed hawks, and peregrine falcons. Behavioral, physiological, and reproductive responses of the birds to the overflights and simulated sonic booms were found to be generally insignificant. Birds did not react appreciably to aircraft at distances beyond 1,640 feet. This study provides strong evidence that prairie falcons and other cliff-nesting raptors would not be significantly affected by low-level military jet traffic.

A more recent study concluded that blasting and construction activities along the Snake River were not likely to significantly affect prairie falcons (Holthuijzen 1989). The author suggested that the results could legitimately be extrapolated to peregrine falcons (see below). This study also provided evidence that birds in areas of greater activity were less sensitive to additional disturbances than birds inhabiting more remote areas.

These studies suggest that prairie falcons would not be significantly affected by overflights associated with the proposed expanded range capability. However, if intense flying activity occurs within river canyons where they nest, and if this activity leads to the abandonment of a nest site, this would be a significant impact.

Golden Eagle. The existing evidence suggests that golden eagles are not highly sensitive to noise or aircraft disturbance (Ellis 1981; Holthuijzen 1989). Accordingly, the same conclusions reached for prairie falcons apply to this species.

Red-tailed Hawk. Andersen et al. (in press) used controlled approaches in helicopters to determine the sensitivity of nesting red-tailed hawks to helicopter overflights such as are used in raptor censusing and management. By comparing the reactions of birds familiar with helicopter traffic to those of birds only

recently exposed to helicopters, the authors established the potential sensitivity of naive birds as well as the probability of eventual habituation to these types of disturbances. Ellis (1981) found that red-tailed hawks were relatively insensitive to passing jets and simulated sonic booms.

Red-tailed hawks appear to have lower sensitivity to jet aircraft than do ferruginous hawks. In addition, populations of red-tailed hawks have not declined to the same degree that those of ferruginous hawks have. The potential for significant impacts on red-tailed hawks is considered to be limited to situations where a nest site is located in close proximity to a new target site or in a canyon frequently used for flight training. It is appropriate to survey these areas prior to their use for targets, to monitor the ensuing effects, and to develop as mitigations the appropriate avoidance or off-site compensation measures.

Other Species of Raptors. In general any known raptor nesting site should be examined from the standpoint of its proximity to proposed target areas or flight paths and evidence of the sensitivity of the species to noise or aircraft disturbance. Among the species that may be encountered, Swainson's hawks are expected to be highly sensitive (Lamp 1987), while northern harriers are expected to be relatively insensitive (Jackson et al. 1977). These issues would be addressed in Tier 2 analyses.

WATERFOWL AND SHOREBIRDS. No specific waterfowl concentration areas have been mapped in the study area. Mass-concentration areas could be highly sensitive to new low-level jet training activities (Gladwin et al. 1987; Manci et al. 1988), but such areas are not known from within the proposed new range and low-level MOAs. Lamp (1989) found that Canada geese and ducks were little-affected by jet aircraft at high or low altitudes, although low-flying helicopters caused ducks to flush. Nesting locations in the study area appear to be widely spread along the major rivers and in other natural and manmade waterbodies. Adverse impacts on waterfowl production cannot be ruled out at this time but are considered unlikely. A monitoring program to address these impacts is recommended.

GALLINACEOUS BIRDS AND OTHER BIRDS. A number of considerations indicate that gallinaceous birds would not experience significant impacts as a result of a proposed expanded range capability. Species in this category are neither extremely rare, nor are they known to be highly sensitive to aircraft noise (e.g., Lynch and Speake 1978; Shotton 1982; Lamp 1987). There is no evidence to suggest that bird species of upland grassland or woodland habitats vacate areas in response to aircraft noise, (e.g., Shotton 1982; Manci et al. 1988). One study (Gunn and Livingston 1974) found poor reproductive success of lapland longspurs in an area subject to frequent helicopter noise and human activity. Temporary startle effects cannot be ruled out, but for many species, the most probable response of an affected individual would be either to freeze or to seek cover (e.g., Lynch and Speakes 1978).

Aircraft Effects. In addition to noise/visual effects, aircraft overflights could affect wildlife through interference with management activities of state and federal agencies and through direct mortality of

birds, particularly raptors, resulting from collisions with low-flying aircraft (see also sections M4.12.4 and S4.12.4).

WILDLIFE MANAGEMENT. Wildlife management throughout the study area could be adversely affected by a proposed expanded range capability. The use of survey aircraft throughout the MOAs would become increasingly hazardous under the proposed action and would be prohibited much of the time in the restricted airspace over the range while in use. Wildlife and land management agencies have expressed concern over the potential for greater limits on access to areas they manage, both for their staff and for the public who use the resources they manage. Current military flight activity has constrained their work through difficulties in scheduling airspace for aerial surveys, and this conflict is likely to increase with more flights and a larger restricted airspace as a result of the proposed expanded range capability. Specific impacts will depend on the location and extent of airspace changes, amount of increased flight activity, and operation of that airspace.

BIRD-AIRCRAFT COLLISIONS. Although no large water bodies used extensively by migrating waterfowl are present in the ROI, numerous smaller water bodies are present, such as stock ponds and rivers. In addition, raptors are concentrated along the river canyons where they nest and roost, using the adjacent uplands to forage over. For the ROI, excluding the MTRs, the predicted bird-aircraft strike rate (for waterfowl) ranges from a low in the summer (June and July) of about 9 birds per million NM of flight to a peak of approximately 71 birds per million NM in October (fall migration time). A smaller peak of 40 birds per million NM occurs in April (refer to Figure S3.12-3). Using the estimated increase in flight hours on the range and in the MOAs (assumed to be evenly distributed throughout the year) an average aircraft speed of 400 KTAS, approximately 91 more waterfowl would be killed each year as a result of the proposed action. No data are available to calculate the mortality rate of raptors.

Impacts on waterfowl populations in the ROI are expected to be insignificant at the above predicted mortality rate. The expected numbers of collisions involving either migratory or nesting waterfowl are extremely small in relation to other causes of mortality, hunting in particular. Although no mortality rate for aircraft strikes is known, impacts on raptor populations have the potential to be significant as discussed for MHAFB in section M4.4 of Volume 1, especially if the numbers are similar to those predicted for waterfowl. Potential impacts on raptors will be addressed in greater detail in the Tier 2 EIS, if a decision is made to proceed with the proposed expanded range capability.

Ground Disturbance Effects. Inert ordnance delivery and cleanup would alter wildlife habitat through changing soil characteristics, microtopography, and vegetation within the disturbance zone. Ordnance impact and cleanup activities would tend to loosen soils. The force of impact generally creates small craters with a surrounding ridge of displaced materials, thereby altering the local microtopography. As described above, vegetation responses to this disturbance include loss of many species and invasion of weedy species that can rapidly colonize disturbed soils. A few burrowing animal species may benefit

from the disturbance, as described above for construction, but most indigenous species are likely to decline in abundance. Munitions impacts on local populations are expected to be insignificant considering the dispersed distribution and relatively small size of the targets and the high reproductive potential for most of the species likely to be affected. Site-specific conditions, however, will be assessed when individual target locations are identified to ensure that isolated pockets of high animal productivity are not affected.

Loss or alteration of small amounts of habitat surrounding individual targets are not expected to have significant impacts on raptors, carnivores such as bobcat and coyote, and large ungulates in the range expansion area. Exceptions to this would be (1) if crucial winter range for deer or pronghorn were decreased or (2) if sage grouse leks were abandoned or lost. Furthermore, the cumulative amount of habitat disturbance for all of the proposed targets and other range facilities combined could have long-term ecological impacts on wildlife since large acreages could be affected.

Live ordnance may be used as part of a proposed expanded range capability. For most bombs, ground disturbance would exceed 100 sq ft (9 sq m) per drop. In addition to the larger ground disturbance (than for inert munitions), effects of the explosion (heat, noise, shock waves, and ground vibration) must be considered. Ground disturbance impacts would be similar to those described for inert ordnance targets, but larger in extent. Heat and chemicals from the blasts could alter soils and consequently wildlife habitat. Ordnance detonation, particularly for the larger bombs (up to 2,000 lbs), could affect animals some distance from the target through temporary loss of hearing, startle responses, and even mortality in some cases. Larger animals such as carnivores and ungulates are more likely to be affected than many of the burrowing species that would be protected while within their burrows, except in the case of burrow collapse. Cleanup activities for live ordnance involves detonation *in situ* of any unexploded bombs. Cluster bomb units (CBUs), however, are generally left in place and could accidentally be set off by wildlife contact. Most impacts would be close to the targets, but ground vibration from transmitted shock waves could affect both large and small animals several miles from the target.

Ground-disturbance impacts on caves and cave biota would be assessed in the Tier 2 site-specific surveys. Caves that are used by bats are considered highly sensitive, and ground-disturbance impacts in the immediate area would be potentially significant.

Of particular concern are potential effects on bighorn sheep that reside in the canyons and forage on the plateaus near the canyon rims. The populations in the Bruneau and Jarbidge river canyons are from recent reintroductions, and their numbers are expanding. The area has the potential to sustain approximately 800 bighorns (personal communication, L. Oldenberg 1989). The Owyhee River canyon and several tributaries contain about 350 animals, while the Little Jacks Creek area contains over 300 (Toweill et al. 1988). This species is particularly susceptible to diseases, and any additional stress could

increase the mortality rate (Wishart 1978). In addition, frequent disturbance could cause them to avoid portions of the canyons or plateaus nearest the targets, thereby reducing the amount of habitat available or fragmenting that habitat. Impacts will be assessed in the tiered environmental documentation.

Where permanent facilities are placed, wildlife habitat would be lost. Due to the small size and dispersed locations of these facilities, impacts on most species are predicted to be insignificant. As for habitat disturbance, loss of crucial winter range for deer or pronghorn and loss of sage grouse leks could have significant impacts depending on the specific location and size of these facilities.

Maintenance activities include ordnance cleanup, which has been addressed above; disposal of spent munitions; and target and firebreak maintenance. Inert ordnance is picked up and hauled to a disposal site on the range. This usually consists of a large open pit that has been excavated away from the targets. Disposal areas have not been sited yet so specific impacts cannot be addressed. Land disturbance effects would be additive to those from other range activities. Target and firebreak maintenance is likely to occur about twice a year. This involves disking to remove vegetation so that targets are visible to pilots and to maintain the effectiveness of firebreaks.

Effects of Chaff and Flares. Chaff and flares released from aircraft performing exercises on the range or in the MOAs have the potential to affect wildlife. For chaff, this would be through startle effects, ingestion or inhalation, and external contact, while flares could cause temporary impairment of vision and startle effects. The chaff likely to be used in the study area is composed of very fine silica glass fibers (high purity silicon dioxide) 0.5 to 2 inches long and 0.001 inches in diameter that are coated with aluminum. These fibers are released in bundles that initially form a cloud approximately 300 feet in diameter and then disperse with the wind. Estimates for accumulation on the ground indicate a maximum of 184 fibers/m^2 from a release at 500 feet AGL with no wind. The maximum aluminum concentration in this case was calculated to be 2.7 mg/m^2. Much greater dispersal is obtained when a wind is present. Chaff would be used on about 70 percent of the sorties.

Light reflecting from the chaff's aluminum coating as it floats to the ground or moves in the wind while suspended on vegetation could startle wildlife, particularly birds. Responses could range from no visible alteration in behavior to flight from the area. Chaff releases spread over the range complex. Impacts of startle responses on wildlife are expected to be insignificant, particularly since the chaff releases would be associated with the presence of aircraft (i.e., noise and visual stimuli).

Chaff debris would accumulate on the ground and on vegetation and could be ingested or inhaled by foraging animals. It could also fall on surface waters and accumulate in downwind areas where waterfowl forage. No studies have been conducted to assess the effects of this accumulation on wildlife. Toxicity of orally ingested aluminum is very low in animals (Venugopal and Luckey 1978;

Browning 1969), and pure silicon dioxide is inert. Thus, no chemical toxicity would be expected. Ingested chaff fibers, however, could puncture the intestinal mucosa and result in ulceration, but the fibers would not be taken up by cells and transported to other parts of the body, as has been shown for asbestos fibers, due to their larger diameter (West et al. 1988). For surface-feeding ducks, ingestion could lead to chaff fibers becoming compacted in the gizzard and causing blockage of the digestive system. No studies have been conducted to assess the potential long-term effects of fiberglass ingestion on wildlife species such as deer, pronghorn, and ducks. Consequently, impacts cannot be currently assessed.

Inhalation of chaff fibers from the air or while foraging could cause an inflammatory response in the respiratory system. Fiber diameter and length is important in determining how far into the respiratory system they can penetrate and how easily they can be cleared out. Asbestos fibers, which are much smaller than chaff fibers, are clearly associated with several lung diseases, but manmade fibers are considered substantially less hazardous than asbestos (West et al. 1988). Although no studies have been conducted to test for the effects of inhaled chaff fibers in humans or other animals, the potential for impact to wildlife species is low due to the relatively large size of the fibers, their dispersal to low concentrations by winds, and the sparse distribution of wildlife in the study area.

External contact with glass fibers irritates the skin due to puncture of the dermis. Wildlife could come in contact with the fibers on the ground while walking or lying down in areas where chaff is deposited or through use of chaff as nesting material (primarily birds and rodents). The hair or feathers covering wildlife bodies and their hooves or tough foot pads would minimize the potential for direct skin contact with chaff fibers. Any glass fibers that do penetrate these coatings and enter the skin would likely cause minor irritation, probably equivalent to a flea bite, that would have negligible impact on survival.

Flares would be used on most range sorties. Use of flares, particularly at night, could startle wildlife and may temporarily impair vision. Species most likely to be affected are nocturnal predators such as owls, bobcats, and mountain lions and nocturnal foragers such as some species of rodents. Effects of individual flares would be local and of short duration but would add to the overall impact of overflight activity. Information on the brilliance and duration of flare light and on the chemical composition of flares before and after use is necessary for analysis of potential impacts on wildlife. Impacts will be addressed in more detail in the site-specific Tier 2 EIS.

Fencing Effects. Individual targets or target arrays for inert ordnance will likely be fenced to exclude cattle in order to prevent injury from falling ordnance. Live ordnance impact areas will all be fenced for obvious safety reasons. Fencing small polygons (less than 5 acres) of land at intervals on the rolling plains is not expected to interfere with the movement patterns of large ungulates. (Small animals can pass freely under the fences.) Fencing around larger polygons, including the live ordnance impact areas, however, could affect pronghorn and possibly mule deer if traditional movement corridors to

crucial winter habitat were blocked. Deer can jump most fences, although they do not always choose to do so. Pronghorn will seldom jump a fence, but they can readily crawl under if the bottom wire is at least 16 inches above the ground and smooth. Impacts would depend on the location of the fences relative to key habitat and behavior of the animals.

Dust Effects. Target and firebreak maintenance activities and associated traffic on unpaved roads would generate dust. Impacts on wildlife would be similar to those described for construction.

Electromagnetic Radiation Effects. Operation of threat simulators, radar, and communications and other equipment on the range would expose wildlife to electromagnetic emissions and lasers. Data on animal responses to such emissions and on the amount and kind likely to be present on the range are inadequate to assess the potential hazard to wildlife (Tyler 1973; Steneck et al. 1980).

Effects of Accidents. Several types of accidents are possible on the range. These include range fires started by spotting charges in inert ordnance, flares, or live ordnance; aircraft crashes; and misfiring ordnance so that target areas are missed entirely. The latter two have a very low probability of occurrence and are unlikely to have any significant effects on wildlife unless they result in range fires.

Operation of the SCR has resulted in a number of range fires, and similar events would be expected from operation of the expanded range complex. Range fires affect wildlife through a temporary loss of forage and cover, direct mortality, and in some cases long-term habitat alteration. Loss of vegetation in burned areas removes a food source for herbivores and cover for a variety of species. Effects on local populations depend on the areal extent of the fire, season of occurrence, and type of vegetation lost. Fires during winter and just before spring green-up would have little impact on small mammals, birds, and reptiles because most hibernate or migrate in winter and a new food source would become available soon. For large ungulates, however, fires on winter ranges could have significant impacts on survival rate. Late summer or early fall fires could adversely affect small herbivores in the burn area through removal of a food source necessary for winter survival.

For fires of limited areal extent impacts are predicted to be insignificant since little habitat would be affected and mobile species can move to adjacent unburned areas, assuming that the carrying capacity of these adjacent lands has not been reached. Larger fires, however, could have measurable effects on a number of species, including sage grouse, mule deer, and pronghorn. According to the BLM (personal communication, J. Clark 1989), wildlife in the Saylor Creek Planning Unit still show effects of a 150,000-acre range fire that started on the SCR impact area. A reduction in forage would affect herbivores such as rodents and rabbits which in turn could affect predators such as raptors and bobcat.

Fires can alter the vegetation present as discussed above by removal of sagebrush. A reduction in the amount of sagebrush present in the study area would likely change the distribution and abundance of many wildlife species.

Indirect Effects. Roads (new or improved existing) for (1) access to targets for maintenance, (2) movement of mobile threat simulators, and (3) fire equipment response to fires would improve public access to areas that currently have poor to no access, assuming that fences would not have locked gates. This would create the potential for increased ORV use, poaching, and disturbance/harassment of wildlife. ORV use could adversely affect wildlife through noise, loss of vegetation, soil disturbance, and direct mortality. A number of studies have shown that wildlife abundance and species diversity decrease substantially in ORV areas with heavy to moderate use (Bury et al. 1977; Byrne 1973; Luckenback 1978). Poaching could increase with an increase in access to remote areas that normally receive low hunting pressure. Increased human visitation to remote areas is likely to result in disturbance or even harassment of wildlife, particularly by ORV users. Conversely, the possible designation of restricted areas could reduce human visitation to other areas. Increased human activity in the vicinity of caves could adversely affect cave biota. Tier 2 analyses would be required to address these impacts.

Aquatic Species

Operation of an expanded range and associated MOAs could affect aquatic biota through runoff of sediment from disturbed soils, chemical pollutants from ordnance and unburned flares, and chaff. Erosion from disturbed soils around targets and in firebreaks would continue as described for construction. Chemicals in live ordnance, spotting charges, and flares, including those that do not fire, could enter surface waters with storm runoff. The potential for impact to aquatic species would depend on the target locations relative to surface waters and the types and quantities of ordnance to be used. Potential pollutants include titanium tetrachloride and phosphorus. This issue would be addressed in greater detail in the Tier 2 EIS.

Chaff fibers could enter surface waters via runoff and from direct aerial fallout. The fibers could clog the gills of fish or be ingested with food. They could also penetrate the skin of aquatic species that do not have hard body coverings such as scales or exoskeletons (e.g., aquatic insects). In addition, aluminum leaching from the fiber coating could be taken up by organisms. The amount of chaff material entering streams, however, is expected to be small and should have no significant impacts on aquatic species. This would be addressed in greater detail in the Tier 2 analysis.

Threatened and Endangered Species

Operation of a range with expanded capability and associated MOAs could affect threatened and endangered species primarily through noise and visual stimuli from low-level jet overflights (subsonic and supersonic), although collisions with aircraft and ground disturbance from ordnance delivery and maintenance activities could affect some species. Improved access to remote areas could increase the amount of recreation in the study area. Impacts from population growth associated with the realignment are discussed in section M4.4.

BALD EAGLE. Depending on proximity and other circumstances, the noise and visual stimuli associated with all types of human activities are potentially disturbing to bald eagles (Stalmaster 1987). In the ROI, potential for impact is limited to the winter when occasional migrant overwintering birds are present, primarily along the Snake and Owyhee rivers. Disturbance to wintering bald eagles would be of particular concern because it imposes additional energy demands at the time of year when eagles are attempting to minimize energy expenditures (Stalmaster 1987).

There have been controlled, experimental investigations of the effects of light aircraft and helicopters on bald eagles, prompted by the use of these types of aircraft in resource management. Studies by Sprunt et al. (1973), White and Sherrod (1973), Krauss (1977), and Fraser et al. (1985), among others, have found that light aircraft approaching within a few hundred feet have minimal effects on nesting or perching bald eagles. Helicopters appear to have a greater potential to disturb the birds. Light, propeller-driven aircraft flying at a distance of 100 to 300 feet would be expected to generate sound exposure levels of approximately 80 to 90 dB (Rau and Wooten 1980). Military jets would be expected to exceed this level when they are within approximately 2,000 feet.

Comprehensive analyses of the impacts of jet aircraft and other types of disturbance have been conducted on nesting bald eagles (Forbis et al. 1985; Grubb and King MS). Grubb and King (MS) report on the responses of nesting bald eagles in central Arizona to a variety of types of human disturbance, including pedestrians, vehicles, boaters, aircraft, and noise (gunshots, sonic booms). Their observations include 588 instances of jets, many of which were military jets on training flights, passing at a median distance of 1,640 feet from the birds under observation. At least one case of eagle nest abandonment following a close pass by a military jet has been documented (Forbis et al. 1985).

Grubb and King (MS) found that distance was the most important variable determining the frequency and severity of eagles' responses, followed by duration of the disturbance, visibility, number per event, position relative to the affected eagle, and noise level. Pedestrian activity elicited the strongest responses, while aircraft elicited the weakest. Based on their results, Grubb and King recommend that, to protect nesting eagles in central Arizona, aircraft be restricted or prohibited within 575 feet horizontally of an occupied eagle nest, and within 2,000 feet AGL vertically; the birds are more

sensitive to aircraft directly overhead. They further recommend a duration limitation of 3 minutes on aircraft activity in a larger, secondary zone surrounding an active nest. They recommend that loud noises (such as gunshots and sonic booms) which are audible at an active eagle nest be restricted or prohibited within distances of 1,800 to 3,280 feet.

USFWS guidelines for the bald eagle management in the southeastern United States (USFWS 1987b) specify that helicopter and fixed-wing aircraft not operate within 500 feet vertical distance or 1,000 feet horizontal distance of a bald eagle nest. It is further recommended that low-level aircraft operations not take place during the nesting season within a zone of 1,500 feet to 1 mile, depending on site-specific circumstances.

The above guidelines would be applicable to any bald eagle nest site or winter-roost site which was found to be overlapped by the proposed expanded range. At present, no such critical areas are known from under the study area and associated low-level MOAs, though some winter-roost sites may occur.

Increasing the frequency of low-altitude flight activity over the Owyhee River in Oregon would increase the probability of an eagle being hit by military aircraft.

PEREGRINE FALCON. Impacts would be similar to those described for prairie falcons above, except that peregrines currently do not nest in the ROI and are uncommon migrant visitors. Thus, the probability of impact is lower.

BRUNEAU HOT SPRINGS SNAIL. Operation of an expanded range capability would not affect this species, but increased recreational or other uses of the springs where they live could adversely affect their population, as discussed for the MHAFB realignment.

FERRUGINOUS HAWK. Ferruginous hawks are relatively sensitive to noise disturbance (White and Thurow 1985) and are common in the study area. Potentially significant impacts would exist if new target areas were located in the vicinity of active or historical nest sites. The same considerations apply to areas of new low-level flight activity.

WHITE-FACED IBIS, LONG-BILLED CURLEW. Recent reviews and surveys (Gladwin et al. 1987; Asherin and Gladwin 1988; Manci et al. 1988) suggest the susceptibility of large aggregations of wintering or migratory shorebirds to aircraft disturbance. In most cases, passing jet aircraft elicited no response from flocks of white-faced ibis under the Fallon Naval Air Station Supersonic Operating Area, although birds flushed and vacated feeding areas in response to two low-level bombing runs (Lamp 1987). Present information does not indicate that major concentration areas for these species are likely to be overflown at low levels, and the impacts on small numbers of birds in localized areas are not expected to significantly affect populations of either species.

REDBAND TROUT AND BULL TROUT. Improved access could result in greater fishing pressure on redband and bull trout in the Jarbidge and West Fork of the Bruneau rivers. Impacts on the populations of these two species would be addressed in the Tier 2 EIS after specific new road locations have been determined.

S4.4.5.2 No-Action Alternative

Most of the impacts of the no-action alternative will be less substantial than the impacts of the proposed expanded range capability. This results primarily from the decreased amount of ground disturbance required by the no-action alternative.

The indirect effects will be similar to those of a expanded range complex although the increased access to sensitive sites resulting from new road construction will not be as pronounced as with the no-action alternative.

Since the population increase and resultant increase in recreational use of the study area will occur with either alternative, the recreation-related impacts would be the same for both the no-action and proposed expanded range capability alternatives. Potential impacts associated with aircraft overflights could be slightly higher for the no-action alternative since the no-action alternative concentrates the flights into one small area.

S4.4.6 Mitigation Measures

S4.4.6.1 Proposed Expanded Range Capability

General mitigation measures that would reduce impacts on biological resources are listed below. Site-specific mitigations will be applied to facility siting in Tier 2, if a decision is made to proceed to this tier.

- Site roads, targets, and other range facilities to avoid crucial winter range and migration corridors for mule deer and pronghorn.
- Avoid known sage grouse leks to the extent feasible when siting range facilities.
- Avoid siting targets within approximately 3 miles of canyons to protect bighorn sheep and raptors.
- Avoid siting range facilities or allowing use of live ordnance in the vicinity of caves that may be used by bats.

- Control dust during construction and during range maintenance (i.e., targets and firebreaks).

- Include in the range operating manual that no flights will occur below the rim of the Jarbidge River or the West Fork of the Bruneau River, or the Owyhee River and its main tributary canyons as appropriate for the range expansion area selected.

- In the spirit of multiple use, devise a program that would reduce livestock grazing on portions of the withdrawn lands and restore the wildlife value of these habitats to pregrazing levels. Riparian and wetland habitats are especially important wildlife habitat needing restoration, and their restoration within the withdrawn lands would be very beneficial to wildlife and aquatic species. Upland habitats should be restored at a ratio of at least 2 acres for every acre cleared or disturbed. The actual ratio used should take into consideration the existing value of the lands disturbed by an expanded range capability and the existing value of the lands to be restored.

- To protect bighorn sheep and raptor populations in the MOAs along Big Jacks Creek (Idaho), Little Jacks Creek (Idaho), South Fork of the Owyhee River (Idaho and Nevada), the Owyhee River (Idaho and Oregon) in the Paradise and Owyhee MOAs, Bruneau River (Idaho), and Jarbidge River (Idaho), no flights should be allowed below the canyon rims. These restrictions should be published in the MOA flight manual.

- Reduce sedimentation by constructing culverts and fords across streams during summer; restore the stream bed and banks to their original condition at the end of construction at each site; and control sediment runoff into flowing streams by using sediment curtains and straw bales.

- Avoid siting range facilities in playa lakes to minimize impacts to these wetlands and the rare plant species they sometimes contain.

- Supplement existing firefighting capability with standby aerial and ground-based capabilities to minimize spread of range fires.

- Seed new burns and other disturbed areas, such as road shoulders, with native grasses and shrubs to return the area to conditions as good as or better than those extant before development of the proposed expanded range capability.

- Limit use of flares during dry summer and fall periods to minimize the potential for range fires.

- Perform any road/bridge construction in river or stream canyons in mid to late summer to avoid disturbing nesting raptors.

- Construct all fences with a smooth bottom wire that is at least 16 inches above ground to allow pronghorn passage.

- Damage to vegetation and wildlife could be prevented by not using live ordnance on the range.

- Establish a specific communication link between MHAFB and the states (Idaho, Oregon, and Nevada) and federal wildlife agencies as well as a protocol whereby these agencies can schedule their aerial surveys at the appropriate time of year with minimal risk from maneuvering military aircraft.

- Conduct surveys for ferruginous hawk nests in proposed target areas, in the region that lies under any special use airspace. Feasible site-specific mitigations and off-site, compensatory mitigations should be developed in consultation with state and federal agencies prior to the action's implementation. A monitoring program should evaluate the effects of aircraft overflights on nesting in these areas. Comparisons should be drawn with control nest sites outside of the study area.

- Conduct a monitoring program to evaluate the impacts of overflights on bighorn sheep, mule deer, and pronghorn in the area near Murphy Hot Springs and in the Owyhee MOA over Big Jacks and Little Jacks creeks, the Owyhee River, Deep Creek, and Battle Creek canyons. It is particularly critical that a baseline be established prior to implementation of the proposed expanded range capability and MOA expansion. The monitoring program would establish the extent of impacts on big game populations and habitat utilization in these areas, and develop mitigations as appropriate. Part of the monitoring program should include the recording of aircraft noise and sonic booms. If significant impacts are demonstrated, mitigation could consist of either seasonal limitations on overflights or the types of training conducted in these areas; or compensatory, off-site measures could be undertaken to enhance big game populations in other areas.

S4.4.6.2 No-Action Alternative

Since the impacts of the no-action alternative will be similar in nature and smaller in scope than the impacts of the proposed expanded range capability, the mitigation measues recommended above would apply equally to either alternative.

S4.5 CULTURAL RESOURCES

S4.5.1 Regulatory Setting

Numerous federal laws and regulations require federal agencies such as the Air Force to consider the effect of a proposed action on cultural resources. Based on these laws and regulations, the Air Force issued counterpart regulations concerning cultural resources. These laws and regulations stipulate a process for compliance, define the responsibilities of the federal agency proposing the action (e.g., Air Force), and prescribe the relationship among other involved agencies (e.g., BLM, ACHP). Compliance with the requirements of these laws, regulations, and processes involves three fundamental steps: (1) identification of significant cultural resources potentially affected by a proposed undertaking; (2) assessment of the impacts of the proposed undertaking on those resources; and (3) development and implementation of measures to eliminate or mitigate adverse impacts. Table S4.5-1 lists the most pertinent laws and regulations guiding the compliance process.

S4.5.2 Issues and Concerns

This programmatic level environmental evaluation is designed to identify potentially sensitive areas that could be impacted by the proposed range expansion and to present mitigation measures to reduce impacts to cultural resources. The proposed range expansion includes selection and development of a location for the range, increasing the frequency of subsonic flights over the selected range and associated MOAs, increasing supersonic flights over the proposed expanded range capability and MOA within Idaho, and increasing the use of four of eight existing MTRs to access the new range. The programmatic level issues associated with these actions will include:

- Potential disturbance or destruction of cultural resources during construction of the range.
- Potential disturbance or destruction of cultural resources during weapons delivery (inert and live ordnance impacts) and target maintenance activities (disking of target areas, collection and disposal of expended ordnance).
- Creation of Exclusive Use Areas that restrict access to cultural resources, thereby limiting both damage to and scientific investigation of the cultural resources.
- Potential indirect impacts resulting from increased access to archaeologically sensitive areas. Specific impacts considered include damage from vandalism, illegal excavation and artifact theft, and inadvertent disturbance from ORV use.

Table S4.5-1

CULTURAL RESOURCE LAWS AND REGULATIONS

Law/Regulation	*Primary Purpose*
National Historic Preservation Act (1966)	Establishes National Register of Historic Places; defines Section 106 process requiring federal agency to consider effects of an action on cultural resources on or eligible for the National Register.
Executive Order 115903 (1971)	Directs land-holding federal agencies to identify and nominate cultural resources to the National Register.
36 CFR 800	Defines the standards and requirements of the Section 106 process.
American Indian Religious Freedom Act	Defines Native Americans rights to exercise traditional religions and access to ceremonial sites.
Archaeological Resources Protection Act (1979)	Defines civil and legal penalties for illegally obtaining archaeological resources on federal or Native American lands.
36 CFR 60	Defines criteria for evaluating eligibility of cultural resources to the National Register.
Programmatic Memorandum of Agreement among U.S. Department of Defense, Advisory Council on Historic Preservation, and National Council of State Historic Preservation Officers (1986)	Establishes a basic program for documentation and treatment of World War II military buildings and facilities on lands held by the Department of Defense.

- o Potential indirect benefits from limiting access to areas within the proposed expanded range capability with a corresponding reduction in vandalism, artifact theft, and ORV damage.

- o Indirect and direct impacts caused by fires resulting from range use.

- o Physical damage to cultural resources from subsonic and supersonic overflights.

- o Disturbance of Native American ceremonies and sacred areas from subsonic and supersonic overflights.

- o Visual impacts to resources listed on the National Register of Historic Places.

S4.5.3 Significance Criteria

Because this document is an EIS and the terms "significance" and "significant" carry special connotations, it is necessary to clearly define the manner in which these terms are used relative to cultural resources. The impact assessment process, as outlined in federal cultural resource laws and regulations, centers on two types of significance: cultural resource significance and impact significance. As described below, these two types of significance are tightly integrated with regard to cultural resources.

Resource Significance

The significance of prehistoric-archaeological, historic, and architectural resources is evaluated based on the criteria for inclusion in the National Register of Historic Places as defined in 36 CFR 60.4 and in consultation with the State Historic Preservation Officer. According to these criteria, the quality of significance is present in districts, sites, buildings, structures, and objects that:

a. are associated with events that have made a significant contribution to the broad patterns of history, or

b. are associated with the lives of persons significant in the past, or

c. embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic value or represent a significant and distinguishable entity whose components may lack individual distinction, or

d. have yielded, or may be likely to yield, information important in prehistory or history.

Criterion d forms the basis for evaluating the significance of most prehistoric and historic archaeological sites. For some historic archaeological resources (e.g., battlegrounds, historic event sites, trails), criteria a and/or b apply. Architectural resources commonly are significant because they meet criterion c, although many are also associated with important historical events (criterion a) or people (criterion b).

Cultural resources determined to be significant according to National Register criteria are termed historic properties. To be listed in or determined eligible for listing in the National Register, a property must meet at least one of the above criteria and must possess integrity -- an attribute defined as the authenticity of a property's historic identity as evidenced by the survival of physical characteristics that existed during the property's historic or prehistoric occupation or use. Included are integrity of location, design, setting, materials, workmanship, feeling, and association. If a property retains the physical characteristics it possessed in the past, it has the capacity to convey information about a culture or people, historical patterns, or architectural or engineering design and technology.

Evaluating the significance of Native American cultural resources requires consultation with affected tribal groups to develop relevant defensible criteria for establishing the relative importance of tangible and intangible resources. Certain categories of tangible Native American cultural resources, such as ancestral settlements or petroglyph and pictograph sites, may be afforded protection through their eligibility for the National Register. However, natural features such as biota and spiritual locations are not addressed in historic preservation legislation unless their historic use can be documented. Such features, as well as the more intangible resources that contribute to the uniqueness and maintenance of Native American cultures and communities, are afforded protection under the American Indian Religious Freedom Act.

Impact Significance

To warrant consideration with regard to project impacts, an evaluation must establish the significance of a cultural resource, and thus define it as an historic property. A project results in impacts to an historic property when it alters the property's characteristics, including relevant features of its environment or use, that qualify it for inclusion in the National Register. Impacts may include:

- Physical destruction, damage, or alteration of all or part of the property.
- Alteration of the character of the property's surrounding environment that contributes to the property's qualification for the National Register.
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting.

- o Neglect of a property resulting in its deterioration or destruction.

Direct and indirect impacts are considered significant (adverse) if they result in loss, alteration, or destruction of properties listed on or determined eligible for listing on the National Register or considered important to contemporary Native American groups.

S4.5.4 Methodology for Analyzing Impacts

Impact assessment employed a programmatic approach that considered the generic impacts associated with the proposed expanded range capability relative to the cultural resource sensitivity of the study area. Specific impacts to particular cultural resources were not addressed in this tier of the EIS.

Both direct and indirect impacts were assessed by (1) identifying the types of potential components (e.g., target areas, firebreaks, facilities, roads) and operations (e.g., low-level subsonic flight) potentially needed for the proposed expanded range; (2) defining the types of impacts resulting from each proposed component and operation; (3) identifying the categories (e.g., prehistoric, historic) of cultural resources present in the study area as well as the sub-types (e.g., lithic scatters, sheepherder camps) subsumed under each category; (4) evaluating the potential significance of the cultural resource categories and sub-types; (5) analyzing how the proposed components and operations might affect each category and sub-types; and (6) evaluating the potential for adequate mitigation.

S4.5.5 Impact Assessment

S4.5.5.1 Proposed Expanded Range Capability

Impacts Within the Ground-Disturbance ROI

Prehistoric and Historic Archaeological Resources

Significant (adverse) direct and indirect impacts to prehistoric and historic resources are expected to occur as a result of a number of ground-disturbing activities required for the construction and maintenance of the proposed expanded range. These activities could disturb or destroy sites, thereby resulting in loss of integrity and valuable scientific data. Such ground-disturbing activities include but are not limited to the construction, use, and maintenance of the following: target areas, scoring systems and instrumentation towers, threat generation systems, access roads and construction staging areas, administration and maintenance facilities, water and sanitary systems, firebreaks, energy-related systems, helipads and vehicle parks, and equipment and fuel storage areas.

The ground-disturbance ROI contains an abundance of prehistoric and historic sites and the level of significant impacts is expected to be high. Impact areas have not yet been defined so it is not possible to identify specific areas (and resources) that may be directly affected. Nonetheless, it is possible to suggest areas that seem best suited for the proposed use. For example, assuming that planners will try to minimize difficulties of vehicular access for construction, operation, and maintenance of the proposed expanded range, the relatively broad desert plains located between major drainages might be selected for use as impact areas.

The sensitivity of desert plains vary from location to location, depending on elevation, topography, nearness to perennial streams and other water sources, and other factors. High sensitivity locations occur throughout these plains, although much of this area can be characterized as a low sensitivity zone. Playas, springs, perennial streams, and canyon edges are highly sensitive locations because they contain a relatively high density and diversity of prehistoric and/or historic resources. As noted, however, presently available data indicate that low sensitivity characterizes most of the open, desert plains because site densities are relatively low and site types are fewer. Habitation sites are rarer and limited activity sites such as prehistoric lithic scatters and rock alignments are more common. Figure S3.5-5 illustrates these sensitivities; over 96 percent of all sites are located within one mile of playas, springs, perennial streams, and other water sources.

Direct impacts to cultural resources will vary in magnitude according to their location within the ground-disturbance ROI. Due to a high density of water sources and high potential for significant cultural resources, impacts would be highest west of Highway 51 (see Figure S3.5-5). Although highly sensitive locations also occur east of the highway, the eastern portion of the ground-disturbance ROI contains larger blocks of land characterized by low sensitivity. If new construction avoided sensitive areas by a mile or more, direct impacts could be reduced considerably by siting the expanded range east of the highway.

Impacts would not be limited to the range, however, because access roads would be required to connect range areas with administrative, operational, and maintenance facilities either at MHAFB or in remote locations. At least some of these roads would probably cross highly sensitive areas, including river and creek drainages that contain the highest density and diversity of resources. Road construction, use, and maintenance could therefore result in direct disturbance of a wide variety of resources in drainages as well as upland locations. Again, impacts would be higher west of Highway 51 due to higher densities of resource-rich drainages.

Creation of exclusive use areas may also result in direct impacts to cultural resources. Such areas, designed to enclose target areas for public safety, potentially preclude vandalism, scientific monitoring, and investigation of the cultural resources within their confines. Those resources within such areas, but beyond the limits of direct impacts of target areas or administrative facilities, could be considered

subject to direct impacts as well. Such impacts, however, could be mitigated to insignificance through a program similar to that described in section S4.5.6 and Appendix G.

As important as direct impacts may be, indirect impacts may result in an equal level of disturbance and destruction of cultural resources. Vandalism, which includes "pot-hunting" (unauthorized excavations and artifact theft) and defacement, and ORV use are recognized as the primary sources of impact to cultural resources located on public as well as private lands. This awareness has fostered a number of in-depth studies by federal agencies and academic archaeologists, including *Vandalism to Cultural Resources of the Rocky Mountain West* (Williams 1978), *Impacts: Damage to Cultural Resources in the California Desert* (Lyneis et al. 1980), *The Impact of Casual Collecting on Archaeological Interpretation Through Regional Surface Survey* (Lightfoot and Francis 1978), and others, including Reid (1979), Coombs (1979a, 1979b), Warren et al. (1980), and Scott (1980). These studies unanimously indicate that in many cases indirect impacts far outweigh direct impacts as the primary threat to the resource base.

A number of generalizations about vandalism can be made from the existing literature noted above. In general, the following factors increase the probability of pot-hunting and other forms of vandalism:

- Greater access to cultural resources.
- Greater density and distribution of the resources.
- Greater visibility (either due to sparse ground cover or the highly visible nature of some site types such as caves).
- Greater probability of recovering "attractive" or well-made objects (e.g., caves and villages have relatively high densities of artifacts in general and more well-made, stylistically attractive artifacts in particular).
- Greater regional population densities.
- Greater familiarity (in some areas pot-hunting is a long-standing recreational pursuit and many pot-hunters know the locations of the "best" sites).

Vandalism and pot hunting are serious problems currently affecting cultural resources throughout southwestern Idaho. In some highly sensitive areas, vandalism and other forms of site destruction have affected 50 to 100 percent of the resources (BLM 1985a). The proposed range expansion will exacerbate this resource loss if it provides better access to previously remote areas. Studies of indirect impacts (cited above) indicate prehistoric villages, historic structures, caves, rockshelters, and rock art

sites sustain the highest level of disturbance and destruction. The focus of vandalism and pot-hunting on these resource types is of special concern because, with the exception of rock art, they contain sequences of cultural strata that are essential in establishing a securely dated sequence of human occupation, a critical factor in archaeological and historical analysis. Given the currently high levels of vandalism on BLM lands in southwestern Idaho, the difficulties in controlling such vandalism, and our limited scientific knowledge of prehistoric and historic use of the area (see section S3.5), an increase in indirect impacts to these and other types of sites resulting from the proposed expanded range would be considered significant. Restricted access to the area combined with a plan (see Appendix G) to monitor resources, periodically collect data on their condition, and provide for additional protection or mitigation, should the need arise, could mitigate these impacts. Implementing such a plan would require a long-term commitment by the BLM and the USAF, if not others.

Architectural Resources

Architectural resources will be affected by the same activities described above for prehistoric and historic resources. Levels of impacts will vary, however. The expected low density of architectural resources suggests that few would be directly affected by construction activities on the proposed expanded range. On the other hand, the visibility of such resources suggests they may be subject to relatively high levels of indirect impacts from vandals, artifact thieves, and ORV users. In addition, data from other ranges (ARC 1979) indicate that architectural resources within defined ranges and exclusive use areas often suffer from use by pilots as so-called "targets of opportunity" during bombing practice.

Placement of proposed range facilities, especially towers and buildings, might alter the integrity of the historic visual setting of significant architectural resources. However, resources within the ground-disturbance ROI occur in locations (i.e., valleys) unlikely to be used for proposed range facilities. Therefore, the potential for adverse impacts is low.

Native American Resources

Significant impacts to Native American resources would be expected to occur as a result of increased vandalism, pot-hunting, and recreational activities in the region. These actions are particularly damaging because they often concentrate on resources considered sacred such as caves and rockshelters, rock art, villages and other habitation sites. Comments made by Native Americans from the Duck Valley Indian Reservation suggest that areas west of Highway 51 are of greatest concern, presumably due to higher densities of ancestral archaeological sites and sacred areas. It is possible to design and implement a plan to monitor certain resources, periodically collect data on their condition, and provide for additional protection or archaeological mitigation should the need arise, all sites could not be protected. Also, many Native Americans feel archaeological excavations are a form of impact

rather than a form of mitigation. Consultations with Native Americans from the Duck Valley Reservation and nearby areas ultimately will be necessary. Procedures for incorporating Native American concerns into the design of cultural resource mitigation measures are described in Appendix G.

Vibration, Noise and Visual Impacts under the Airspace ROI

Proposed use of the airspace ROI within Idaho involves subsonic flights as low as 100 feet AGL and supersonic flights above 5,000 feet AGL. For the portions of the airspace ROI in Nevada and Oregon, the proposed expanded range capability consists of only subsonic flights above 14,500 feet MSL and 10,000 feet MSL, respectively. While not resulting in ground disturbance, potential vibratory, auditory (i.e., noise) and visual impacts warrant consideration.

Section S4.7.5 establishes that the probability of vibration damage to structures from low-level subsonic flights is very low (<0.3 percent). This probability applies to even fragile, poorly constructed wood-frame buildings. Moreover, the likelihood of damage decreases with distance from the centerline of the flight path. Vibration-induced landslides and rockfall are less probable (<0.001 percent probability), so, by inference, rock alignments and cairns are unlikely to be disturbed. Based on these data, impacts to prehistoric, historic and architectural resources are predicted to be negligible to nonexistent as a result of subsonic flights within the airspace ROI.

Noise analyses indicate that sonic booms from supersonic flights above 5000 feet AGL can result in minimal damage to structures (e.g., houses, barns). However, the potential for such damage is considered low for two reasons: (1) the probability that sonic booms at 5000 feet AGL will damage elements (e.g., windows, ceiling plaster) of a structure ranges from a maximum of only 10 percent to a minimum of 10^{-8} percent; and (2) approximately 95 percent of the proposed annual supersonic flights will occur between 15,000 and 29,000 AGL, thereby reducing the effects of sonic booms. Similar low probabilities for damage apply to rock alignments and cairns. Therefore, proposed use of the airspace ROI for supersonic flights is anticipated to result in negligible impacts to prehistoric, historic and architectural resources.

Subsonic and supersonic flights are expected to result in significant auditory and possibly visual impacts to Native American resources, especially ceremonial and spiritual sites. Native Americans may perceive overflights and sonic booms as severe intrusions into these sites. Although prevention of direct low-level overflights of specified sites would reduce the potential for impacts, the nature of the proposed training activities (e.g., air-to-air combat) make it unlikely that all sites could be avoided. Additionally, the auditory effects of overflights and sonic booms extend over large distances.

Vibration, Noise and Visual Impacts under the MTRs

For the same reasons described above, the proposed increase in low-level subsonic flights in four (i.e., IR 302, VR-1300, VR-1302, VR-1304) of the eight MTRs is anticipated to result in negligible impacts to prehistoric, historic and architectural resources. Although not yet identified, locations and sites considered important by contemporary Native American groups potentially occur within the extensive area under the MTRs. That VR-1304 crosses over the Fort McDermitt and Wild Horse Indian reservations increases this probability. If such sites occur under these MTRs, affected Native American groups may perceive an increase in visual and auditory intrusions from overflights as a significant impact. However, mitigation measures emphasizing consultation with affected Native American groups and implementation of flight restrictions (e.g., flight altitude requirements) in sensitive locations may reduce impacts to insignificance.

S4.5.5.2 No-Action Alternative

Most of the impacts of the no-action alternative will be less substantial than the impacts of the proposed expanded range capability. This results primarily from the decreased amount of ground disturbance required by the no-action alternative.

The indirect effects will be similar to those of the expanded range complex although the increased access to sensitive sites resulting from new road construction will not be as pronounced with the no-action alternative.

Since the population increase and resultant increase in recreational use of the study area will occur with either alternative, the recreation-related impacts would be the same for both the no-action and proposed expanded range capability alternatives. Potential impacts associated with aircraft overflights could be slightly higher for the no-action alternative since the no-action alternative concentrates the flights into one small area. However, the location of the concentrated flights on the SCR may be preferable from the Native American's viewpoint and possibly from the standpoint of archaeological, architectural, and historic resources.

S4.5.6 Mitigations

S4.5.6.1 Proposed Expanded Range Capability

Specific mitigation measures for cultural resources will be identified in a Programmatic Agreement (PA) signed by the Air Force, ACHP, the SHPO, and the BLM. This brief, legally binding document will carefully outline the basic processes that will be used to consider the effects on cultural resources resulting from the proposed expanded range capability as well as any related actions (e.g., realignment

of MHAFB). The processes of a PA mirror those required by Section 106 of the National Historic Preservation Act; when executed (i.e., signed), the PA will conclude the Section 106 process.

The PA will not, however, define the specific methods and procedures to be used in the cultural resource studies conducted for the program. Rather, for description of the methods and procedures, the PA will reference an associated document: the Cultural Resource Management Plan (CRMP).

Appendix G provides a detailed discussion of the PA, CRMP, and mitigation measures. The basic tasks, processes, and stipulations that would be addressed in the PA and the CRMP include: Conduct Class II sample surveys and further background research to collect additional data on the nature, density, distribution, and potential significance of cultural resources within the ROI; use these data to assist the U.S. Air Force in developing proposed plans for an expanded range and to minimize impacts; identification and evaluation of the significance of cultural resources directly affected by the proposed expanded range; mitigation measures (e.g., avoidance, data recovery) for significant cultural resources directly affected by the proposed expanded range; development and implementation of a monitoring and treatment program for cultural resources subject to indirect impacts; consultation with Native Americans; and establishment of standards for cultural resource studies.

S4.5.6.2 No-Action Alternative

The impacts of the no-action alternative will be similar in nature to the impacts of the proposed expanded range capability, and most will be of smaller scope. Therefore, the mitigations discussed above will apply equally to the no-action alternative.

S4.6 VISUAL RESOURCES

S4.6.1 Regulatory Setting

A small amount of private land is located within both ROIs, but most of the land is managed by federal agencies. The following is a summary of general federal policies and regulations pertaining to visual resources within the study area.

BLM Visual Resource Management (VRM) System assesses and manages the scenic resources of BLM lands.

The National Wild and Scenic Rivers Act designates wild, scenic, and recreational rivers and establishes limits to management activities. Regulated corridors average 1/4 mile on each side of the river.

BLM Interim Management Policy and Guidelines for Lands Under Wilderness Review guides assessment and documentation for BLM lands under wilderness.

These regulations and guidelines provide a basis for evaluating the compatibility of components (e.g., targets, buildings) of a proposed expanded range capability with the existing visual character of the area. No such regulatory foundation exists for visual impacts from overflights. The FAA has not established specific regulations with respect to overflights of environmentally sensitive areas. An interagency cooperative agreement between the USFS, BLM and FAA suggests that aircraft remain above 2,000 feet AGL when overflying wilderness areas.

S4.6.2 Issues and Concerns

The proposed expanded range capability raises two primary issues and concerns with regard to visual resources:

- Potential degradation of the visual qualities of the landscape within the ground disturbance ROI as a result of construction and use of facilities.

- Potential alteration of visual settings in the airspace ROI as a result of the proposed increase in flight activity.

S4.6.3 Significance Criteria

Significance is defined in terms of thresholds of acceptable modification from ground disturbance and construction activities associated with the proposed expanded range. The BLM's VRM classification system establishes these thresholds. Components of the proposed expanded range that exceed the threshold for a particular area are considered to result in significant impacts. The VRM classifications, which range from Class I to Class IV, provide a standard for evaluating potential visual impacts.

- *VRM Class I* represents unique areas (e.g., wilderness areas) where the existing character of the land is preserved. Any contrast (e.g., modification to the landscape) created within the characteristic visual landscape by construction or management activities that attracts attention is considered a significant impact.

- *VRM Class II* applies to areas where a project may result in a contrast to the natural setting that may be seen, but should not be evident. Changes to the visual setting that exceed this threshold may produce adverse impacts.

- *VRM Class III* defines areas where contrasts caused by projects or management activities to the basic landscape elements may be evident but subordinate to the existing setting.

- *VRM Class IV* identifies areas where project and management-related contrasts to the characteristic landscape may attract attention. Changes in characteristic landscape may dominate the focus of the viewer's attention. A high degree of change is tolerated within VRM Class IV areas.

Significance will also be defined in terms of acceptable thresholds with respect to increases in aircraft overflights. If the increase in aircraft activity is substantial enough to alter the visual character of an area, then the acceptable threshold will have been exceeded and the increase would be identified as a significant impact. Definition of the degree of acceptable alteration considers the nature, density, and extent of sensitive visual resources that contribute to the visual character of an area.

S4.6.4 Methodology for Analyzing Impacts

Land disturbance resulting from development of the proposed expanded range may modify visual settings. However, specific impacts cannot be evaluated until sites are selected and infrastructure plans are developed. If the decision is made to proceed to Tier 2, site-specific impacts will be addressed. For the purposes of this study, only generic impacts associated with the construction and maintenance of roads and or facilities are evaluated for the ground disturbance ROI. The BLM's VRM classes

within the ROI (see above) provide the basis from which generic impacts can be assessed. The impacts of the components (e.g., target areas, control towers) of the proposed expanded range as well as those associated with range use (e.g., dust) are analyzed relative to the degree of modification allowable in areas assigned to each of the four VRM classes. All visual impacts on historic features or Native American resources are evaluated in section S4.5.5.

Impacts from aircraft overflights on the visual resources of an area are very difficult to identify. The difficulty lies in not being able to separate the visual impacts from the noise of aircraft overflight. In most conceivable instances, aircraft overflight is noticed primarily due to the accompanying noise. Therefore, analysis of impacts focuses on (1) identifying locations and areas sensitive to linked noise and visual impacts, (2) determining if proposed increases in overflights would substantially increase linked noise and visual impacts for these areas, and (3) evaluating the potential to mitigate impacts.

S4.6.5 Impact Assessment

S4.6.5.1 Proposed Expanded Range Capability

Impacts from Range Components

The components of the proposed expanded range include construction of target areas, targets, roads, towers, and administration buildings and other facilities. Generally, structures higher than a single story represent the type of developments with the greatest potential to impact the visual resources of the area. The SCR and other similar ranges primarily contain a few low buildings and one or two taller towers. Broad (i.e., target areas) and long (i.e., roads) areas that lack vegetation also can modify the visual character of the landscape, although in flat terrain, such areas are rarely noticeable from a distance.

The visual classification map (Figure S3.6-2), described in section S3.6, graphically summarizes the results of the following discussions of visual classes.

VRM CLASS I. No portion of the ground disturbance ROI has been designated a VRM Class I area.

VRM CLASS II. The visual resources identified in this class are sensitive to changes in the existing visual setting. As identified, 20 percent of the ground disturbance ROI was classified as VRM Class II. These areas include the entire Owyhee canyonlands system in Idaho, the Bruneau-Jarbidge system, and all WSAs within the ground disturbance ROI. Although the VRM system permits limited modifications of VRM Class II areas, the types of components (e.g., towers, buildings) proposed for the expanded range capability could exceed allowable thresholds. In so doing, significant impacts to

visual resources would result. However, the terrain and context offered by most of the VRM Class II areas probably are unsuitable for placement of range facilities.

VRM CLASS III. Within this class, the visual resources are more homogeneous (in terms of shape, color, and form) and less unique than in the previous two classes. Often, areas assigned to this class include existing modifications of the landscape. Most of the areas containing improved roads and development (i.e., small towns) are in this class. Although dispersed, 21 percent of the ground disturbance ROI is considered VRM Class III. In a VRM Class III area, some modifications (e.g., graded target areas) and dispersed low buildings and facilities would not exceed allowable thresholds. Conversely, tall structures (i.e., towers) and clusters of range components potentially would exceed thresholds for these areas and result in significant impacts.

VRM CLASS IV. The areas assigned to this class represent those that have previously been modified or are the least sensitive to changes in the landscape. As described in section S3.6, 55 percent of the ground disturbance ROI is defined as VRM Class IV. The thresholds for VRM Class IV areas permit substantial modification and development. Such modifications can even attract a viewer's attention. Placement of components of a proposed expanded range within VRM Class IV areas is expected to result in negligible impacts to visual resources. However, placement of components on the margins of a VRM Class IV area potentially could affect the visual setting of adjacent, more visually sensitive zones.

VRM Class IV areas constitute the largest and least visually sensitive contiguous areas present in the ground disturbance ROI. Development of the proposed expanded range in these areas would be unlikely to result in significant impacts. In contrast, VRM Class I and VRM Class II areas are small and dispersed. These characteristics, coupled with low thresholds for modification, establish the VRM Class I and VRM Class II areas as the least appropriate locations for range facilities.

Construction and maintenance of range components -- especially graded target areas, firebreaks, and roads -- will produce fugitive dust that may affect visibility (see Section S4.2). If it occurs near a visually sensitive area, reduced visibility could result in temporary impacts to visual resources. The severity of the impacts depends on the location of the dust source, the meteorological conditions in the area, the size of the dust source, and the methods used to suppress dust emissions during construction and maintenance activities. Since BLM reseeding activities involve substantially more acreage than activities related to the proposed expanded range, it is expected that they would produce more fugitive dust.

S4.6.5.2 Impacts from Increased Aircraft Overflights

The airspace ROI is composed of the MOAs and the eight MTRs. As identified in section S3.6.3, the most visually (and noise) sensitive areas in the MOAs include the river canyons, state parks, recreation areas, forests, WSAs, and wilderness areas. Other sensitive areas include Bruneau Dunes and Three Island Crossing State Parks; the area along the Snake River in Idaho; existing and proposed wild and scenic rivers; and parts of the Humboldt National Forest and the Wild Horse Recreation Area in Nevada. All of these sensitive areas constitute locales where visitors seek varying degrees of solitude (see Figure S3.6-2).

It is very difficult to assess the impacts from the proposed increase because aircraft are transient and travel at high speeds. Also, as was previously mentioned, aircraft are not required to follow set routes once they enter the MOAs so they could pass over any of the sensitive areas. Similarly, flight altitudes vary from low-level (100 feet AGL) to high level (above 15,000 feet AGL).

Aircraft overflights currently occur within the airspace ROI. The area within the MOAs is used 1,902 hours per year or 37 percent of the daylight hours available per year. The proposed increase is to 4,804 hours per year, or 93 percent of the annual daylight hours. The proposed increase in hours of activity do not mean that aircraft would be constantly flying over every part of the MOAs; safety and airspace management policies preclude this type of activity. However, the proposed increase is sufficient to enhance the probability that substantially more overflights will pass over sensitive areas. High level flights are unlikely to draw the attention of viewers, unless accompanied by sonic booms. In contrast, subsonic low-level flights would be more noticeable. Although the proposed number of low-level flights over sensitive areas remains unknown, an increase is predicted to be perceived as a significant impact. Moreover, if training missions are concentrated over wilderness areas, WSAs, Indian reservations, parks, wild and scenic rivers, canyons, or forest areas within the MOAs, the proposed increase is anticipated to result in significant impacts to visual resources.

If conducted over sensitive areas, large low-level training exercises involving groups of aircraft also are anticipated to be perceived as a significant impact to visual resources. High-altitude operations would be unlikely to result in significant impacts.

Along the MTRs, elevations and flight paths are more strictly controlled. The visually sensitive areas include a number of wilderness areas, WSAs, recreation areas, Indian reservations, and some forest areas. Along VR-1302, aircraft activity is proposed to increase from 949 to 3,669 sorties per year. Although this is a rather dramatic increase, there are no highly sensitive areas located directly under the MTR. Monument Rock Wilderness is not within the MTR corridor and therefore would not be affected by the increase in overflight. Along IR-300, the proposed increase is from 1,223 to 2,755 sorties per year. This MTR includes parts of the Humboldt Forest and Fort McDermitt Indian

reservation. Along VR-1300, which overflies the Craters of the Moon Wilderness Area and National Monument, a 74-percent increase in activity is proposed. Finally, the 287-percent increase in activity along VR-1304 could significantly affect the Sawtooth Wilderness and Recreation Area and City of Rocks National Reserve. The proposed increases are likely to raise awareness of the overflights as a result of linked auditory and visual impacts. As with the MOAs, the proposed increase in overflights may be considered a significant impact on visual resources in the sensitive areas. However, mitigation measures described in section S4.6.6.1 could substantially reduce the effects of the proposed increase in overflights in both the MOAs and MTRs.

S4.6.5.2 No-Action Alternative

Ground disturbance and component construction stemming from the no-action alternative could consist of grading new target areas and construction of new components within the SCR's Exclusive Use Area. Outside this area, small electronic emitter locations may be constructed. Impacts from construction and disturbance activities within the Exclusive Use Area are anticipated to be negligible because (1) the Exclusive Use Area lies well within a VRM Class IV zone that can accommodate substantial changes to the landscape, and (2) the construction and disturbance will be compatible with the existing character of the area.

Construction and use of the small emitter sites potentially could impact visual resources if the sites are placed within or adjacent to visually sensitive areas. Avoidance of such areas could reduce impacts to insignificance.

Impacts from increased aircraft activity associated with the no-action alternative (and work-arounds) are likely to be similar to those identified for the proposed expanded range capability. However, under the no-action alternative, aircraft activity would be more concentrated in the area of the SCR. Concentration of aircraft activity in this area may result in a reduced potential for significant impacts since the area encompasses few sensitive visual resources.

S4.6.6 Mitigations

S4.6.6.1 Proposed Expanded Range Capability

Mitigations for Range Components

Construction related impacts can most easily be mitigated by avoidance of visually sensitive areas. Avoidance of the VRM Class II areas along the Bruneau, Jarbidge, and Owyhee proposed wild and scenic rivers, as well as all WSAs within the ground disturbance ROI would preclude significant impacts in these areas. For Class III areas, mitigation measures could include: (1) design of buildings

and other structures to ensure compatibility with existing developments in terms of shape, form, line, and color; (2) dispersal of facilities and structures in order to prevent clustering of landscape modifications; and (3) use of natural topography and vegetation to screen modifications from view. These mitigations would reduce impacts to insignificant levels. Although the components of a proposed expanded range capability are compatible with use of a Class IV area, potential impacts to adjacent, more visually sensitive areas could be mitigated through avoidance of area boundaries and careful design of project components.

Mitigation measures associated with fugitive dust emissions are identified in sections S4.2 and S4.7. If implemented, the measures could prevent impacts to visual resources.

Mitigations for Increased Aircraft Overflights

Because of the linkage between auditory and visual effects, a proposed increase in overflights within the MOAs and four MTRs potentially will result in significant impacts to visual resources. These impacts would be restricted to portions of the MOAs and segments of the MTRs that overlie sensitive visual resources and areas. Mitigation measures to ameliorate the impacts could include:

- Establishing altitude restrictions of 2,000 feet AGL above visually sensitive zones within the MOAs.

- Limiting flights along the long axis of the sensitive areas within the MOAs; most of these consist of river canyons.

- Maintaining the maximum feasible horizontal and vertical separation from sensitive receptors along the MTRs.

S4.6.6.2 No-Action Alternative

The no-action alternative may impact visual resources as a result of placement of emitter sites and increased aircraft overflights. Mitigation measures to substantially reduce the impacts could include those defined above.

S4.7 EARTH RESOURCES

S4.7.1 Regulatory Setting

The following is a summary of laws, general policies, and regulations that govern earth resources in the to the study area. This regulatory framework also provides the guidelines and management practices to mitigate or prevent adverse impacts to these resources.

Federal Statutes and Regulations

Mining Law of 1872, sets the guidelines for staking mining claims on locatable mineral deposits (i.e., gold, silver, lead, asbestos, mica, fluorspar, etc.).

43 CFR 3000 Series, pertains to minerals management including exploration and mining operations (43 CFR 3809).

Federal Cave Resources Protection Act of 1988, provides measures to secure, protect, and preserve significant caves on federal lands.

Historic Sites Act of 1935, provides the basis for the establishment of National Natural Landmarks which represent "outstanding examples of landforms, geological features, etc., or fossil deposits."

State Laws of Idaho

Idaho Surface Mining Act of 1971, governs all surface mining in Idaho and provides guidelines for land reclamation.

Idaho Dredge and Placer Mining Act of 1954, administrates the mining of placer deposits and requires reclamation plan filing.

Idaho State Code, Chapter 70, section 18-7035, proscribes damage to caves and their contents.

Idaho State Code, Chapter 181, section 67-4119-67-4112, protects vertebrate paleontological resources as well as other resources.

S4.7.2 Issues and Concerns

Earth resources issues associated with the proposed expanded range capability include:

- o Soil erosion due to construction, operation, and maintenance of targets, roads, and support facilities.
- o Restriction of mineral rights in areas of limited or no access.
- o Increased demand for road and facility construction materials (e.g., sand and gravel).
- o Restriction of access to paleontological resources in areas of limited or no access.
- o Potential damage to geological and paleontological resources from explosive ordnance and construction of range components.
- o Disturbance of cave and paleontological resources due to increased population.

S4.7.3 Significance Criteria

Exposed surface soil materials are prone to erosion by wind and water. Soil erosion would be the primary impact on soil resources. The loss of soil is evaluated in tons (soil) per acre with a loss of 20 percent of the soil horizon being a significant adverse effect for the disturbed soils.

In order to evaluate impacts on mineral rights, it is necessary to identify the mineral of concern and the areal extent of the resource. Mineral deposits are evaluated upon their economic potential (developable) and occurrence. Occurrence is evaluated upon rarity of occurrence locally, statewide, nationwide, and worldwide. Potential adverse effects are evaluated based upon the significance of the mineral deposit relative to the known and expected reserves of this mineral on a local, state, national, and world basis.

Significant caves consist of those that possess value for scientific, educational, or recreational purposes. Therefore, actions that alter or disturb such caves are considered adverse impacts. Increased access to the study area and increased recreational use of the area represent the indirect impacts with a potential to affect cave resources.

To evaluate impacts to paleontological resources, it is necessary to identify the scientific significance of the resource and the location, type, and extent of disturbance generated by the proposed expansion. In general, paleontological resources are considered significant if they are rare or unique or if they have

scientific value (i.e., can yield information important in understanding the past). Rarity and uniqueness presupposes that the resource is uncommon or it possesses a characteristic that is uncommon. A resource may belong to a species not usually discovered or it may be a particularly well-preserved specimen of a species known from less-intact individuals elsewhere. The assessment of scientific value of a resource takes into consideration important characteristics such as age, assemblage association, geological setting, type, rarity, and condition (preservation). The evolution of species, environmental conditions, species migration, and habitat diversity may be investigated using well-preserved fossils of several species within a single geological stratum. The chronological association of strata within a region may be used to investigate changes in species adaptation through time. In addition, paleontological resources may be significant when associated with another resource (e.g., late-Pleistocene fauna associated with archaeological remains) that can contribute to our knowledge about adaptations of early human inhabitants in North America. Paleontological resources are significantly affected if their characteristics are altered. Potential effects include the destruction or deterioration of the resource or the removal of the resource from its natural environment without proper cataloging.

S4.7.4 Methodology for Analyzing Impacts

The analysis of potential impacts to earth resources includes the following procedures: (1) identify the location of earth resources that may be influenced or affected by proposed expanded range capability; (2) consider potential construction activities; (3) examine the proposed use and associated maintenance activity (i.e., access road upkeep); (4) define potential indirect affects associated with the proposed range expansion; and (5) assess the impacts to earth resources using the established significance criteria.

S4.7.5 Impact Assessment

S4.7.5.1 Proposed Expanded Range Capability

Direct impacts to earth resources in the study area could result from loss or restriction on mineral rights, construction of facilities, use of the area, and maintenance activities associated with targets in the range. Increased access due to road construction associated with a range expansion may produce indirect impacts to cave and paleontological resources. Creation of exclusive use areas that restrict access to caves or paleontological resources would limit both damage to and scientific investigation of the resources.

Geology

The proposed expanded range capability has the potential to limit or prevent access to large areas of land that are of interest to geologists, collectors, and people holding mineral rights and mining claims

in these areas. However, the proposed expanded range capability will not necessarily preclude mining and mineral exploration outside of target areas, exclusive use areas, and facility locations.

The study area contains many areas of scientific importance including evidence of volcanic events and hot spot migration (e.g., the Bruneau-Jarbidge caldera). Jasper deposits within the study area are of value to collectors and have been commercially mined. Geothermal resource areas also exist in the study area. Restrictions on use resulting from the proposed expanded range capability may limit continuing research and development of the resources. The exact locations chosen for target areas, exclusive use areas, and facilities areas will determine the impacts to these resources.

Topography

A wide variety of ordnance is proposed for use and would create the potential for damage to topographic features. Since the size, location, and configuration of proposed target areas have not been determined, it is not possible to evaluate impacts to topographic features. The significance of individual land features and the potential for damage to these depends on the the location of the proposed target areas and the type of ordnance used. Site-specific analyses would need to be conducted for the Tier 2 EIS if the decision is made to proceed with the proposed range expansion.

Soils

Soils would be disturbed during construction activities and during maintenance of targets and firebreaks. Grading of roads and foundations for administrative and operational facilities as well as target arrays and firebreaks would increase potential soil erosion from wind and water. Delivery of live ordnance would have an impact on the soils. The potential damage to these soils depends on the location of proposed target areas and the type of ordnance used. If implemented, the Tier 2 EIS would require analysis of locations proposed for construction and other soil-disturbing activities.

Caves

Given the requirements of the proposed expanded range capability, it is unlikely that areas containing caves will be affected by direct impacts from construction or use of target arrays, roads, or facilities. For similar reasons, restricted areas probably will not include caves, so they will remain accessible for scientific and recreational purposes. However, indirect impacts may occur as a result of increased access due to road construction and road improvement. Better access may increase the potential for vandalism and disturbance to caves.

Paleontology

Construction activities and increased ease of access (e.g., new roads) associated with a proposed range expansion may create direct and indirect impacts on paleontological resources. These impacts may adversely affect resources both within the study area and in the vicinity of the study area.

Direct impacts will include construction of administrative and operational facilities (office, buildings, storage buildings, helipad, vehicle parks, observation towers, fuel storage areas), target areas, and roads. If construction activities require development of new sources of sand and gravel, paleontological resources could be affected. Ground disturbance associated with construction and quarrying could destroy or damage paleontological resources or remove them from their natural setting and lessen their scientific value. If such activities affect significant paleontological resources, the impacts would be considered adverse.

Indirect impacts may occur as a result of increased access to the area due to road construction and road improvement. Paleontological resources adjacent to new or improved roads are most likely to be affected. Erosion may have a potentially beneficial effect on paleontological resources by exposing them, but once exposed, they are at greater risk of being disturbed or removed in addition to deteriorating with additional erosion. Given the potential importance of fossil localities within the study area, disturbance, unauthorized fossil collecting, and erosion would produce adverse impacts to these resources.

Although creation of exclusive use areas or other restricted areas would reduce vandalism to and illegal collection of paleontological resources, it would also prevent scientific investigation of the fossils. Without scientific documentation and collection, exposed fossils in restricted areas would deteriorate. Loss of these fossils would represent a potentially adverse impact.

Mineral Resources

Figure S3.7-1 identified mining claims, prospects, and mineral deposits in the study area. There are three concentrations of claims: southeast of Triangle in the northwest portion of the study area; along SR50 in the central portion of the study area; and in the southcentral area along forks of the Bruneau River. Potential impacts to these and other mineral claims would include limited access, limitations on development, or possible prevention of development of presently unidentified mineral deposits. Depending on the type of mineral resource, these impacts could be significant.

Construction of range facilities and roads will require use of sand and gravel deposits. Use of these construction materials is not expected to deplete local sources or result in significant impacts to sand and gravel deposits.

S4.7.5.2 No-Action Alternative

The no-action alternative would result in substantially lower impacts to earth resources than would the proposed expanded range. Reconfiguration of the target areas within the Exclusive Use Area would involve ground disturbance from construction and maintenance of targets, roads, and firebreaks. Increased use of the target areas would also result in greater disturbance from delivery of inert ordnance. Construction or preparation of some small emitter sites outside the Exclusive Use Area may also result in ground disturbance. Although these impacts would increase the potential for soil erosion, the potential would be far less than that estimated for the proposed action.

Available data indicates that the Exclusive Use Area within the SCR possesses a low potential to contain paleontological and mineral resources; the area includes no caves. Therefore, the no-action alternative is anticipated to result in negligible impacts to these resources.

S4.7.6 Mitigations

S4.7.6.1 Proposed Expanded Range Capability

Geology

Identification of the proposed target, road, and facility locations is necessary to determine the measures needed to mitigate impacts to geologic resources. If areas of geologic importance to scientific research fall within these locations, there would be impacts. Impacts to the structure of the surface geology due to live ordnance delivery will depend upon the geologic features exposed at the surface in these areas. If Tier 2 is implemented, one of the mitigation goals will be to identify sensitive resource areas and, where feasible, avoid disturbance.

Soils

Construction of administrative and operational facilities, target arrays, and roads will increase soil erosion. Mitigative measures to minimize soil erosion due to construction could include:

- Identifying all potential erosion causes to minimize soil loss.
- Minimizing the size of the disturbed area associated with each construction site.
- Stockpiling and protecting from wind and water erosion all soils that have been removed.

- o Landscaping and revegetating disturbed areas.

- o Surfacing (e.g., gravel) roads to minimize erosion.

- o Avoidance of soil disturbance on and near steep slopes.

If these measures are implemented during construction activities, soil erosion impacts due to construction may be negligible. Disking and grading soils in target areas to simulate roads, runways, and threat emplacements will increase soil erosion in these areas. These target areas will be maintained as exposed soil in order to be seen more easily from the air. Evaluation of the soil characteristics of the proposed disturbed areas would be included in Tier 2 analyses. Once these areas are identified, evaluation of the soil characteristics will determine the actual impacts.

Caves

New and improved roads will provide better access within a proposed expanded range, thereby increasing the potential for vandalism and disturbance to caves. General mitigation measures to reduce this potential could include: identify known and probable cave locations; plan road construction to avoid these locations; evaluate the significance of caves in the vicinity of planned roads when avoidance is infeasible; monitor the condition of significant caves in the vicinity of the road to determine levels of vandalism and disturbance; implement documentation and protective measures if monitoring indicates that increased access has resulted in degradation of a cave's significant characteristics.

Paleontology

If the decision is made to proceed to Tier 2, the locations of specific impact areas will be assessed. General mitigation measures to lessen the impact on paleontological resources are listed. For direct impacts associated with construction, target areas, and exclusive use areas:

1. Avoid known fossil localities and those with potential fossil-bearing deposits. Construction, target areas, and exclusive use areas placed in uplands should minimize adverse impacts.

2. Known fossil localities should be evaluated when they cannot be avoided.

    a. Evaluation of a fossil locality includes recording the location, size, age, geologic setting, associational context, and condition of the fossil deposit. It also includes judging the uniqueness and scientific value of the deposits in order to determine their

importance. To judge their uniqueness, identification of the genus and species of the fossils may be required.

b. If the locality poses a potential for adverse effects from the project, it should be avoided if possible.

c. If avoidance is not possible, adverse impacts should be mitigated. Mitigation of adverse impacts to significant localities includes data recovery (collection and/or excavation of deposits), analysis, curation, and report production.

3. Areas containing known fossil-bearing deposits should be paleontologically evaluated.

a. A paleontological survey of known fossil-bearing deposits should be conducted prior to site disturbance.

b. If remains are found, they should be evaluated using the criteria and procedures discussed above.

The following mitigation recommendations concern indirect impacts to paleontological resources *resulting from the proposed expanded range capability. These impacts are related to road construction* and improvement and increased use of non-restricted areas.

1. Areas that are susceptible to adverse impacts should be identified. They may include known localities that are highly visible or already known to the public, or known localities that are already disturbed.

2. Since adverse impacts may occur to resources adjacent to new or improved roads and new facilities, known fossil localities and areas containing known fossil-bearing deposits should be avoided. Avoidance can be accomplished by using the siting criteria discussed under direct impacts.

3. If avoidance is not possible, then preventative measures can be initiated to lessen impacts.

a. For U.S. Air Force and contractor personnel:

i. distribution of information packets and lectures on the importance of not disturbing paleontological resources and their scientific importance in the region;

ii. placing fossil localities and areas of known fossil-bearing deposits off-limits to personnel;

b. For the general public:

i. placing gates on roads leading only to Air Force facilities that provide access to fossil localities and known fossil-bearing deposits;

ii. limit use of potential fossil and known fossil localities including the need to acquire a permit to travel off-road;

iii. promote appropriate fossil recovery by allowing scientists to collect in areas containing fossil resources;

4. In addition to preventative measures, a monitoring program should be established to record future disturbance at susceptible areas.

a. Unique, rare, or previously disturbed locations may need additional measures to protect them. These measures may include placement of signs forbidding unscientific collection of or vandalism to fossils. The signs should promote scientific collection and research.

b. All susceptible areas should be visited periodically and the level of disturbance, if any, should be recorded.

c. If monitoring shows that additional disturbance has occurred, then data recovery may be necessary. The locality should be evaluated using the criteria established for direct impacts, and, if significant adverse impacts are occurring, the disturbance should be mitigated. Mitigation measures include data recovery (collection and/or excavation), analysis, curation, and report preparation.

Mineral Resources

Mitigations to mineral resource impacts would include a mineral resources survey for areas included in the proposed expanded range capability. The survey results would provide a basis for planning the range to permit access to areas of mineral resource concentration. Shaping of the range in the Tier 2 EIS combined with coordination with BLM would permit adoption of broad area and site-specific mitigation measures.

S4.7.6.2 No-Action Alternative

The impacts (i.e., soil erosion) anticipated as a result of the no-action alternative could be mitigated using the measures identified above.

S4.8 LAND USE

S4.8.1 Regulatory Setting

The following is a summary of the relevant laws, regulations, and plans that govern land use decision making in the project vicinity.

Federal Land Policy and Management Act (FLPMA) of 1976: Defines the mission of the BLM and requires the BLM to inventory and manage all resources within the lands it administers.

Wilderness Act of 1964: Requires a wilderness review of roadless areas to determine suitability for designation by Congress as a Wilderness Area.

Engle Act of 1958 (43 USC 155 et seq.): Requires an Act of Congress to withdraw more than 5,000 acres for any one project planned by the DOD.

National Wild and Scenic Rivers Act (1968): Defines wild, scenic, and recreational rivers, designates a river classification, and establishes limits to development on shoreland areas.

Owyhee National Wild River Management Plan (1986): Establishes a comprehensive set of actions to provide the Owyhee River a level of resource protection management and public use consistent with the Wild and Scenic Rivers Act.

Idaho Recreation 2000 Implementation Plan (1989): Contains BLM management plans, objectives, and issues to protect and enhance the recreation resources of Idaho's public lands.

Owyhee County Comprehensive Plan (1980): Contains an inventory of the environmental and socioeconomic resources of the county and establishes goals and objectives for the county's growth and development.

Elmore County Comprehensive Plan (1980): Contains an inventory of the environmental and socioeconomic resources of the county and establishes goals and objectives for the county's growth and development.

S4.8.2 Issues and Concerns

The proposed expanded range capability would place restrictions on land currently under BLM jurisdiction plus lesser amounts of state and private land. The proposed action would also include

increases in the number and type of sorties flown as well as the use of live ordnance. If the decision is made to proceed with the proposal, details regarding boundaries and specific impact areas will be addressed in the Tier 2 EIS. The proposed expanded range capability has raised citizen and agency concerns pertaining to several land use issues, including the following:

- o Loss of private ownership of land would occur within the range expansion area.
- o Increased noise levels from increased aircraft activity and sonic booms from supersonic flight may adversely impact recreation, particularly the solitude and serenity often sought in a primitive recreation setting.
- o Potential loss of primitive recreational land due to proposed expanded range capabilities.
- o Restricted use or loss of use of privately owned ranches, leased grazing allotments, and associated range improvements may occur within or near the live ordnance impact areas.

S4.8.3 Significance Criteria

S4.8.3.1 Land Ownership

If the proposed expanded range capability would result in a change of land ownership status (i.e., federal, state, or private ownership), the impact would be considered potentially significant.

S4.8.3.2 Recreation

If the proposed expanded range capability resulted in a reduced accessibility of important recreation resources or if sensitive recreation resources were exposed to either significantly increased visual impacts or increased noise levels (L_{dn}, L_{dnmr}, or LC_{dn}) greater than 65 dB, the impact would be considered potentially significant. Any human activity in both the ground and airspace ROIs would be considered rural, with ambient noise levels sufficiently low for 65 dB to be viewed as potentially intrusive.

S4.8.3.3 Special Use Areas

If the proposed expanded range capability resulted in degradation of the visual quality and an increase in the noise levels (L_{dn}, L_{dmnr}, or LC_{dn}) greater than 65 dB, the impact would be considered

significant. A noise level of 65 dB in a wilderness setting where human activity is low can be viewed as being potentially intrusive.

S4.8.3.4 Livestock Grazing

If the proposed expanded range capability would result in the loss of private ownership of lands that include a home or ranch, the impact would be considered significant. If the proposed action would result in the loss of grazing rights, water rights, investment in range improvements, or the ability to maintain water pipelines; the impact would be considered significant.

S4.8.4 Methodology for Analyzing Impacts

The analysis methodologies for land use impacts resulting from range expansion require evaluation of the proposed expanded range capability boundaries and the land uses occurring within those boundaries. The imposed restrictions on access and use of the various portions of the expanded range determine the degree of potential impact on existing land uses. Because no configuration of an expanded range capability has been determined, analysis of specific range expansion impacts will not be addressed in this Tier 1 EIS but will be addressed in the Tier 2 EIS.

S4.8.4.1 Land Ownership

The analysis methodology for determining impacts on land ownership requires identification of the ownership status (federal, state, or private) of lands that fall within the proposed expanded range capability area and within the proposed ordnance impact areas. Any state-owned or privately-owned lands so identified would be considered impacted.

S4.8.4.2 Recreation

The methodology for determining impacts on recreation resources involves two separate analyses to: (1) determine the noise and visual impacts on recreational activities due to expansion of flight operations in the air and (2) identify reduced or lost recreational opportunities due to expansion of the range on the ground.

The analysis of noise impacts on recreational activities requires review of the noise analysis (refer to section S4.3) to determine the average daily noise levels and single-event sound exposure levels anticipated. Any areas that would be exposed to increased L_{dn}, L_{dnmr}, or LC_{dn} greater than 65 dB are reviewed to determine the presence of recreation resources. Any recreation resources present would be considered to be impacted.

The analysis methodology to determine impacts on recreational resources due to the proposed range expansion requires identification of the recreation resources that are within the proposed expanded range study area. The potential restrictions imposed on access and use of those resources determine the degree of impact.

S4.8.4.3 Special Use Areas

The methodology for determining impacts on special land uses involves (1) determination of the noise and visual impacts which, in turn, affects the perceived quality of life experience, in outdoor settings; and (2) identification of reduced or lost special land uses due to the proposed range expansion.

The changes in perceived quality of the outdoor experience are associated with the change in noise and visual impacts from current use. Problems such as being acutely startled, and the loss of serenity and solitude are linked to increases in noise and can result in a decline in the perceived quality of the outdoor experience.

The analysis of noise impacts on special land use settings requires review of the noise analysis (see section S4.3) to determine the average daily noise levels and single-event sound exposure levels anticipated in different portions of the aircraft disturbance ROI. Areas that would be exposed to increased noise greater than 65 dB are reviewed to determine the presence of special land uses. Any special land use present would be considered to be impacted.

The analysis methodology to determine impacts on special land uses requires identification of the special land uses that are within the proposed expanded range capability study area. The potential restrictions imposed on access and use of those resources determine the degree of impact.

S4.8.4.4 Livestock Grazing

The analysis methodology to determine impacts on livestock grazing requires identification of the grazing interests that are within the proposed expanded range capability study area (e.g., private land owned or used by ranchers, BLM grazing allotments, and existing range improvements) and determination of the degree to which continued access to and use of those interests would be restricted.

S4.8.5 Impact Assessment

S4.8.5.1 Proposed Expanded Range Capability

Land Ownership

An expanded range capability would require withdrawal of public land presently managed by the BLM and acquisition of private and state-owned lands and rights. The land withdrawal and acquisition process is described in Appendix E.

Potential impacts of the withdrawal and acquisition actions would vary with location, depending upon the current owner and current use. Most BLM land that is currently used for grazing would still be available for grazing (with some restrictions) except inside the ordnance impact areas. State land could remain in state ownership and be leased to the federal government or it could be exchanged for BLM land outside the expansion area. Private land would be acquired as described in Appendix E, although some acquired private land could remain available after acquisition for grazing or other uses, similar to the BLM land.

The withdrawal and acquisition actions involve several potentially significant adverse impacts, especially those actions that would affect grazing allotment rights, water rights, mineral rights, and private ownership of land. All of these impacts can be mitigated to some degree. If the decision is made to proceed with the proposed range expansion, the degree of impact and the mitigation required will be determined in the Tier 2 EIS.

An expansion of the land area of the range could potentially have a significant impact across a county boundary. As described in section S3.8.3 and depicted in Figure S3.8-1, almost 6 miles of the eastern boundary of the existing range is contiguous with the Owyhee-Elmore county line. If the proposed range expansion extended to the east across the county boundary, Elmore County would be directly affected. Approximately 70 square miles of Elmore County lies within the proposed range expansion study area, including more than 12 square miles of private land as shown in Figure S3.8-2. The significance of an expansion into Elmore County cannot be precisely determined until the boundaries of a proposed expanded range are identified. However, one potentially significant impact would be the acquisition of private land. Most of the private land in Elmore County is in the Sailor Creek and Deadman Creek drainages and could be easily avoided. The probability of a significant impact on private land in Elmore County is very low. This potential impact will be further evaluated in the Tier 2 EIS, if the proposal is carried forward.

Recreation

Satisfying primitive recreation experiences occur in places where the visitor finds opportunities for solitude in a natural setting. In intensive use areas where human contact is common and recreational facilities are built near highways, recreation areas would not be adversely affected by military overflights. However, in primitive recreation settings any disruption of solitude or naturalness may affect the quality of the primitive recreation experience. Primitive recreation is sought in areas such as designated Wilderness Areas, WSAs, Wild and Scenic Rivers.

Land withdrawal due to range expansion may decrease or change the character of the land available for primitive and developed recreation activities. Facility construction and the fencing of impact zones could decrease the land available for recreation and degrade the visual quality of the primitive recreation. Visitors seeking pristine primitive settings might then concentrate on other remote areas. However, military access roads would also open up remote areas previously unreachable or difficult to access. Management of these new recreation areas would need to be incorporated or increased.

The external influence most frequently affecting the solitude of primitive recreation areas in the ROI is low-level flights by military aircraft. Visitors in recreation areas have reportedly complained of being startled by low-flying military aircraft. A startle effect occurs when a very loud noise (e.g., low altitude jet aircraft) is experienced in a setting where it is not expected (e.g., a wilderness area) and when there is no visual or audible warning of the noise source. (See section S4.3.5.1 for further explanation.) The startle effect often occurs in canyon regions where a low-flying jet may not be heard until it suddenly appears directly overhead. Incidents also have been reported of travelers in vehicles in open country being startled by low-flying jets. Horses also have been known to spook and throw their riders when startled by jet overflights (personal communication T. Dew 1989). In primitive wilderness areas where visitors experience moments of quiet, the startle effect can decrease the wilderness experience by disturbing the tranquility and solitude of the outdoor setting. On open plateaus where vegetation is low and visibility is unimpaired, the visual effects of low-flying aircraft may also impair the sense of solitude and naturalness for individuals seeking a primitive recreation experience (see section S4.6). Land areas that have the greatest potential of being affected by a decrease in solitude are WSAs in Idaho, Oregon, and Nevada; ACECs, along the Owyhee River system, and Bruneau-Jarbidge River System; and the Owyhee River designated in Oregon and proposed in Idaho as a Wild and Scenic River.

Increased air operations would cause increased noise levels that may adversely impact these and other recreational resources. The types of operations and the areas where they would occur are described in the following paragraphs:

LOW-LEVEL MTR OPERATIONS. These are the operations primarily responsible for the "startle effect." A general discussion of noise impacts associated with low-level, high-speed subsonic operations is

presented in section S4.3.5.1. The frequency of low-level, high-speed operations is expected to increase in most areas with the possible exception of MTR IR-303, where a significant decrease in operations is anticipated. An increased frequency of low-level, high-speed operations would result in an increased incidence of the startle effect at recreation locations along the MTRs. In addition to being highly annoying, the startle effect may present a threat to safety during recreational activities such as horseback riding or rock climbing.

Noise levels due to subsonic operations on the MTRs are presented in section S4.3.5.2. Existing noise levels (measured in L_{dnmr}) on the MTRs range from less than 65 dB to 74 dB. The no-action alternative would increase noise levels on all MTRs (except IR-303) to a range of 66 dB to 76 dB. (IR-303 would decrease slightly from 74 dB to 73 dB.) IR-302 (which is coincident with VR-1304 and partially with VR-1300) would reach the highest noise levels at 75 dB (or 76 dB where it overlaps with VR-1304 and VR-1300). The recreational resources under IR-302 include the Craters of the Moon National Monument and 12 WSAs (Jerry Peak, White Knob Mountains, Friedman Creek, Appendicitus Hill, Great Rift, Bad Lands, Owyhee Canyon, South Fork Owyhee River, Lookout Butte, Owyhee River Canyon, Middle Fork Owyhee River, and Horsehead Spring). These recreation resources, as well as those under the other MTRs, are shown in Figures S3.1-3 through S3.1-11.

AIR-TO-AIR MOA AND RESTRICTED AREA OPERATIONS. Anticipated noise levels due to proposed air-to-air subsonic operations within the MOAs are described in section S4.3.5.3. Paradise MOA over Oregon and Nevada would have L_{dn} noise levels below the significance threshold of 65 dB. The Idaho MOAs would exceed this threshold, with noise levels ranging from 62 dB to 79 dB. The highest noise levels would be experienced in the eastern half of Owyhee MOA, where low-level operations by RF-4Cs and F-4Gs would occur. Recreational resources in the latter area include five WSAs (Little Jacks Creek, Big Jacks Creek, Duncan Creek, Battle Creek, and Juniper Creek). These recreational resources, as well as those under the other MOAs and restricted areas, are shown in Figure S3.8-3 and Figure S3.1-11. Existing noise levels from current air-to-air operations within the MOAs were not modeled due to the relatively small amount of activity, but the anticipated levels in the Idaho MOAs would be higher than current levels.

AIR-TO-GROUND SCR AND RESTRICTED AREA OPERATIONS. Noise impacts from increased air-to-ground subsonic operations over the SCR during an undetermined interim period prior to expansion of the range are described in section S4.3.5.4. The resulting noise levels (L_{dn}) in the vicinity of the range are illustrated in Figure S4.3-3. These levels can be compared with the current SCR noise environment illustrated in Figure S3.3-3. The Bruneau River and Jarbidge River WSAs are within this area. Air-to-ground noise impacts on recreation resources over an expanded SCR configuration will be evaluated in the Tier 2 EIS.

SUPERSONIC OPERATIONS. Supersonic flights will only occur within the MOAs and restricted areas that overlie Idaho. The proposed supersonic operations and typical sonic boom impacts are described in section S4.3.5.6 and section S4.3.5.5, respectively. Noise impacts from the proposed supersonic operations are specifically addressed in section S4.3.5.7. Maximum sonic boom levels are estimated to be 24 booms per day. The recreational resources within the two areas potentially impacted by sonic booms include seven WSAs. These are Battle Creek, Yatahoney Creek, Owyhee-Deep Creek, Upper Deep Creek, Pole Creek, Bruneau River, and Jarbidge River WSAs.

Special Use Areas

The presence of low-flying aircraft may be perceived as conflicting with the goals of wilderness areas to provide opportunities for solitude and primitive recreation in a primeval atmosphere, particularly as the public use of motorized vehicles and aircraft within the area is prohibited. Users of the Jarbidge and Monument Rock wilderness areas would benefit from the proposed action as the number of sorties flown would decrease from 2,181 to 1,614 per year on IR-303, and from 1,489 to 1,441 per year on IR-304. Both Craters of the Moon and Sawtooth wilderness areas would have an increase in overflights that would significantly impact the perceived quality of the wilderness experience.

WSAs are managed as to not jeopardize their potential wilderness designation. Impacts to WSAs, wild and scenic rivers, and other special land use areas used for primitive recreation are discussed in section S4.8.5.2.

Based on reactions of domestic horses (Casady and Lehmann 1967; Nixon et al. 1968), military jet training flights, even if supersonic, are not expected to significantly affect wild horses. Temporary startle reactions to overflights may occur, but these reactions do not entail a significant risk of injury to unconfined animals.

The significance of overflight impacts on bighorn sheep are discussed in Biological Resources subsection S4.4.5.2.

Livestock Grazing

Livestock grazing practices will be affected by the land acquisition and withdrawal processes for the proposed expanded range capability. The location and degree of impacts and their significance cannot be determined until a specific expansion plan is prepared for evaluation in the Tier 2 EIS.

Most of the land within the expansion area would remain open for livestock grazing, depending on location and Air Force training requirements. This would be similar to the situation on most of the

existing range where much of the land is managed by the BLM. Ordnance impact areas, however, would be fenced and closed to entry.

Range improvement projects throughout most of the expansion area would be unaffected and many ongoing projects could be continued. But in the live ordnance impact areas, access would be restricted and the value of improvements would be lost. An impact that would be difficult to mitigate involves the loss of sections of gravity-fed water lines that may cross ordnance impact areas. Live ordnance use and the inability to inspect the lines regularly, would require that these lines be rerouted. Rerouting could preclude a gravity-fed system and require the use of pumps and other system improvements with greater replacement cost and maintenance. Site-specific consideration of avoidance or rerouting will be incorporated into the Tier 2 documentation.

The greatest potential adverse impact on livestock grazing involves the potential loss of private ownership of home ranches that may be included within an expanded range. Some ranches have been operated by the same families for generations. In such cases, monetary compensation may not be considered adequate mitigation by the affected families. Avoidance may be the preferred mitigation by some individual ranchers.

S4.8.5.2 No-Action Alternative

The no-action alternative has a smaller exclusive use area and has no acquisition of private or further withdrawal of BLM lands. The only grazing activity expected to be impacted is the West Saylor Creek Grazing allotment in the Jarbidge Resource Area that uses currently non-exclusive use areas on the SCR.

Overflight impacts of the Jarbidge and Monument Rock wilderness areas are expected to be greater under no action than under a range expansion. This is because a range expansion would permit greater flexibility in routing when compared to the no-action-induced high intensity of operations on the SCR.

The overall impact to land use resulting from the no-action alternative is expected to be less than those associated with an expanded range capability.

S4.8.6 Mitigation

S4.8.6.1 Proposed Expanded Range Capability

Land Ownership

Impacts on private landholders could be limited by selecting a range expansion alternative that minimizes the need on acquire private land. Impacts on public lands could be mitigated by providing access to grazing and water allotments.

Land use impacts of the proposed expanded range capability on Elmore County could be reduced to zero by avoiding any expansion across the county line. If the range expansion extended into Elmore County, land use impacts in Elmore County could be reduced to insignificance by avoiding private land and by not locating any ordnance impact areas across the county line.

Recreation

Recreation impacts could be mitigated by prohibiting or limiting low-level flights over sensitive recreation areas and by adjusting flight activity along the route corridor to minimize noise and visual impacts on sensitive recreation areas. Flight activity over some MTRs could be curtailed during certain times of the year to allow for popular recreation activities (e.g., hunting in the fall and whitewater boating in the early spring) to occur with less interruption to solitude.

Special Use Areas

Over special use areas, the recommended flight altitude would be 2,000 feet AGL. The National Park Service, the USFWS, and the BLM have interagency agreements with the FAA establishing 2,000 feet AGL as the requested minimum altitude for aircraft flying over sensitive lands under their jurisdiction, including wilderness areas. At this altitude, impacts are not considered significant by these agencies. However, recreational users of the area would be aware of nearby aircraft, and thus wilderness areas should be avoided to the extent feasible.

Avoidance of WSAs during any Tier 2 siting of an expanded range capability will result in minimum ground disturbance impact to the WSAs.

Livestock Grazing

Impacts on ranchers could be partially mitigated by adequate monetary compensation for private property, grazing rights, and improvements. (See section S4.10 for economic aspects of mitigation measures for impacts on ranchers.)

S4.8.6.2 No-Action Alternative

Land use impacts within the aircraft disturbance ROI resulting from the no-action alternative will be comparable to those associated with the proposed range expansion. Mitigations identified above are applicable to reduce the no-action impacts.

No land use impacts are projected from the no-action alternative within the ground disturbance ROI except within the SCR. No land use mitigations are anticipated from the no-action alternative land use impacts within the SCR.

S4.9 TRANSPORTATION

S4.9.1 Regulatory Setting

No specific regulations apply to the construction of new roads in the ROI. The Idaho Department of Transportation requires a permit for the construction of access points to existing state or federal roadways, but does not otherwise regulate or control road construction in the area.

For design of new roadway facilities, several documents are utilized for planning purposes as well as standard operational practices. These are *The AASHTO Policy on Design of Urban Highways and Arterial Streets, The Manual on Uniform Traffic Control Devices and Arterial Streets and Highways*, and *The Highway Capacity Manual*, which is also used for analysis of existing operational conditions.

S4.9.2 Issues and Concerns

The primary issue associated with the proposed expanded range capability focuses on any potential change in the utilization of the road network within the ROI. Within the SCR, the public has access to virtually all areas with the exception of the impact zones, and this idea of cooperative use is planned for any proposed expansion.

Another issue centers on the effects of a proposed expanded range capability on use of civil airports within the ROI. Although not intensively used, the five civil airports represent elements of the transportation system. The effects of airport closure or restriction of use are addressed in section S4.1, Airspace Management.

S4.9.3 Significance Criteria

The impacts of the realignment on traffic and the roadway network are based on the following significance criteria:

- *Level-of-Service*. A change in a level-of-service is significant; however, only a reduction below the minimum desirable design standard (LOS C) should warrant mitigative action.

- *Safety*. An increase in the number of accidents at a given location could change the accident rate. A significant rate change, for example, a rate above the state-wide average for a similar type of section, could neccesitate a change of traffic control or geometric improvement.

- o *Roadway Maintenance or Improvements*. Construction or closure of roads in the network is significant if the consequential re-routing of traffic significantly impacts other links of the existing network. Should maintenance activity increase, a benefit-cost analysis should be considered.

- o *Civil Aviation*. The closure of an airport or a major existing flight path would be a significant impact.

Since no significant impacts are expected on rail transportation facilities from the proposed expanded range capability, significance criteria for rail transport are not presented here.

S4.9.4 Methodology for Analyzing Impacts

Impacts on the users of the transportation roadway network can be broken into two groups: user impacts and facility impacts. User impacts can be measured by changes in levels-of-service and an increase in accidents. Facility impacts stem from either an increase in maintenance activities or the necessity for providing new or improved airports, roadways, or bridges. An example of a facility impact would be an increased roadway deterioration rate caused by an increase of heavy trucks on the system. Another example would be rerouting of traffic should a new road be built.

User impacts are evaluated based on the change in level-of-service (see section S3.9) and accident rates for the network. Traffic patterns generally follow an hierarchical order. Local traffic typically has origins (or destinations) such as homes, businesses, or schools. Local streets feed into higher volume roads known as collectors, which in turn provide access to higher volume arterial roads. An expansion of range capability would cause an increase in local vehicular traffic and a detailed impact evaluation will be conducted for Tier 2. Given the relatively light traffic flows on the existing local roads in the area, there is sufficient excess capacity to absorb the relatively minor traffic increases.

S4.9.5 Impact Assessment

S4.9.5.1 Proposed Expanded Range Capability

Increased traffic on the roadways should be insignificant. A few support facilities would be constructed by the Air Force, and roads would have to be provided to these facilities. As with most roads in the area, dirt or gravel roads would likely be constructed. Traffic movements between the base and the existing range are few, and substantial increases are not expected as a result of the proposed expansion. During construction of new facilities, some roads may experience heavier volumes, but none that would cause congestion on the roadways. The disturbance of the soils that would accompany roadway construction is assessed in section S4.7. Construction of new or improvement of existing roads is

unlikely to engender a demand for sand and gravel that would substantially deplete existing sources of these materials (see section S4.7) Potential disturbances to plants and wildlife are discussed in section S4.4.

Changes in the use of the network would be significant if road closures or construction occurs such that traffic must be rerouted, thereby possibly affecting other components of the system and/or inconveniencing the users of the system. Such is the case with cattlemen, who are concerned with maintaining access to water lines. These lines must be checked daily during certain periods of the year.

The utilization of the existing roads in the ROI is not expected to change; therefore, no significant negative impacts are expected as a result of a proposed expanded range capability.

No major flight paths would be closed, therefore no significant impacts to civil aviation are expected. Other impacts on civil aviation are discussed under section S4.1, Airspace Management.

S4.9.5.2 No-Action Alternative

No range expansion results in no new access roads except perhaps on the SCR. It would require no upgrading of the roadways. Likewise, it would not impact civil aviation.

S4.9.6 Mitigations

S4.9.6.1 Proposed Expanded Range Capability

None are required.

S4.9.6.2 No-Action Alternative

None are required.

S4.10 SOCIOECONOMICS

S4.10.1 Regulatory Setting

Impacts on socioeconomic resources are primarily related to changes in land use that might occur as a result of a proposed expanded range capability. Consequently, applicable policies and regulations are described in section S4.8, Land Use. Laws and regulations specifically related to government land withdrawal are described in Appendix E.

S4.10.2 Issues and Concerns

The proposed expanded range capability can be expected to affect both economic and sociological resources in Owyhee County. From a sociological perspective, the effects of the noise associated with increased military flight training, particularly supersonic flight noise, is an important issue. The economic issues that have been identified are related to the withdrawal of public and private land from the existing pattern of land uses and the definition of adequate compensation. These and other related issues are described in more detail in section S4.10.5, Impact Assessment.

S4.10.3 Significance Criteria

Impacts to socioeconomic resources would be significant under the following circumstances:

- o if the economic health or viability of an individual or group is threatened, directly or indirectly, as a result of the proposed action; and
- o *if the action results in changes to local government finances such that the provision of* public services cannot be maintained at baseline levels.

These criteria will be quantified and expanded when site-specific analyses are undertaken for the Tier 2 EIS process.

S4.10.4 Methodology for Analyzing Impacts

The assessment of potential impacts is based on an inventory of the baseline socioeconomic conditions in the ROI, including public and private sector activities; a general description of activities required to implement the proposed expanded range capability; and a data collection effort involving interviews with local experts and reviews of published literature, including environmental documentation for

similar actions. Indirect economic impacts will be assessed using the RIMS II model when site-specific impacts are evaluated for Tier 2.

S4.10.5 Impact Assessment

S4.10.5.1 Proposed Expanded Range Capability

An expansion of range capability would ultimately require land withdrawal. Programmatic impacts associated with the withdrawal of public and private lands from current uses in the area would involve the economic health of local agricultural concerns, particularly cattle and other livestock grazing operations. The magnitude of this impact would depend to a great extent on the specific lands subject to withdrawal for restricted-use impact areas, the form and amount of compensation paid for the loss, and the availability of adequate alternative grazing lands within a reasonable, cost-effective distance of a particular livestock operation. According to the BLM, there are currently no grazing allotments in the county that are unused or effectively below capacity.

An important issue is whether or not grazing permits are assigned any value in the determination of adequate compensation. The BLM recognizes a grazing permit as a privilege only, while the IRS and some lending institutions acknowledge that permits represent assets having a specific market value. In a true economic sense, the permits do have substantial value to a grazing operation, as discussed in section S3.10.6.1. Grazing lands surrounding the SCR are the most productive and most valuable in the county.

The mix of the withdrawn lands, in terms of private, state or federal ownership, may also affect the magnitude of the potential economic impacts. In some respects, the placement of impact areas on land withdrawn as much as possible from the private sector would involve less risk to the economic well-being of the ranchers. This is due to the fact that compensation for private land is based on the assessed value of the land. Compensation for public lands, alternatively, would ultimately be decided by Congress, regardless of what the Air Force and any displaced ranchers agree upon. While Congressmen from western states may be sympathetic to the value of grazing permits, others may consider the ranchers to have no economic claim to public lands. Economic impacts to specific livestock operations in the area of proposed expanded range capability could be significant.

The withdrawal of private lands for military use would impact county tax revenues to some extent by replacing taxable property with funds from PILT. The magnitude of this impact would depend on the quantity and assessed value of private lands withdrawn. As an example, the Owyhee County Assessor's Office determined that federal acquisition of 15,000 acres of private land would cost the county $11,122 per year in tax losses, to be compensated by only $1,500 in added PILT funds. The net loss to the county would amount to $9,622 per year or approximately 1.5 percent of the current county budget

(personal communication, Owyhee County Assessor's Office, 1989). These losses in county tax revenues could be partially offset by PILT.

Finally, there is a potential for loss of income from present and future mining ventures due to land withdrawal. This would be dependent on the availability of mineral resources in the areas withdrawn, the existence of alternative mineral deposits, and the market value of the resource.

Impacts to any of these resources may also lead to significant indirect impacts. For example, a substantial reduction in the size of a cow-calf operation would lead to a loss of jobs, fewer expenditures in the local economy, and, possibly, the out-migration of people from the area.

The expansion and increased use of military airspace associated with the proposed action could impact the enjoyment and use of recreation resources in Owyhee County. These impacts to recreational enjoyment may lead to economic impacts to the recreation industry, located largely outside of Owyhee County.

S4.10.5.2 No-Action Alternative

Airspace-related impacts on socioeconomics resulting from the no-action alternative would be similar to those associated with a proposed expanded range capability. However, no action would result in no land withdrawal and no impact on mining or grazing interests except on the SCR. This results in reduced impacts when compared with the proposed expanded range capability.

Work-arounds proposed for the no-action alternative would have no impact on socioeconomics.

S4.10.6 Mitigations

S4.10.6.1 Proposed Expanded Range Capability

The following measures would help mitigate socioeconomic impacts of a proposed expanded range capability. In addition, section M4.10.6 describes a variety of government programs that can provide economic assistance to those parties affected by military actions. More specific mitigative measures will be developed during the Tier 2 analysis, when site-specific actions and impacts can be addressed.

Air Force Participation in the Formation of a Local Coordinating Committee

A local coordinating committee can serve as a forum to identify, discuss, and prioritize the issues that are of concern to affected jurisdictions and can help to develop ways to address these issues. The

citizen/government working group organized by BLM and the Air Force could provide the initial framework for receiving public input regarding proposed range expansion issues.

Acknowledgment of the Economic Value of Use Permits on Public Lands

In order to limit the economic burden of the land withdrawal on displaced business interests, the Air Force would assess the feasibility of including the fair market value of grazing permits (and any other special use permits) in negotiation of adequate compensation. Such compensation would also include the value of range modifications and improvements (e.g., wells, pipelines, fences). An additional mitigation would involve coordination with BLM and ranchers to enhance rangeland. Improvements in water availability and seeding may significantly increase the AUMs. The net result could be reduction in total grazing land by 250,000 acres but no net loss in AUMs and, consequently, no adverse effect on the county economy.

Minimize the Amount of Private Lands Withdrawn

PILT funds do not adequately substitute for tax income generated by deeded land. Considering the current small proportion of private lands in Owyhee County, further acquisition of such land should be minimized.

Minimize Direct Overflights of Popular Recreation Areas

Economic impacts to the recreation industry can be mitigated to some degree by coordinating training activities with recreational use patterns and avoiding direct overflight of sensitive areas. By monitoring noise complaints to identify sensitive receptors, and adjusting flight activity whenever possible, the Air Force could potentially mitigate some of these impacts.

S4.10.6.2 No-Action Alternative

Mitigations pertaining to overflights described above would be applicable to the no-action alternative. However, no significant impacts would result from the no-action alternative, and no mitigations would be required.

S4.11 WATER RESOURCES

S4.11.1 Regulatory Setting

The following is a summary of the statutes, regulations, and executive orders that help protect water resources and that form the basis for policy guidelines and management practices.

S4.11.1.1 Federal Statutes and Regulations

Clean Water Act, 33 USC section 1251 et seq. Under the Clean Water Act, any point source waste that discharges into waters of the United States requires a National Pollution Discharge Elimination System (NPDES) permit. Section 404 of this act regulates development in streams and wetlands and requires a permit from the U.S. Army Corps of Engineers prior to such activities.

Safe Drinking Water Act, 42 USC section 300f et seq., requires the Environmental Protection Agency (EPA) to establish a program which provides for the safety of the nation's drinking water. Regulations under this act can be found in 40 CFR, section 141 et seq.

Underground Injection Control (UIC) Program, 40 CFR Part 146. As part of the Safe Drinking Water Act, the UIC program establishes regulations for the injection of fluids into wells for storage or disposal which are designed to protect underground sources of drinking water.

Federal Compliance with Pollution Control Standards, Executive Order 12088, requires the head of each executive agency to be responsible for ensuring that all necessary actions are taken for the prevention, control, and abatement of environmental pollution with respect to federal facilities and activities under the control of the agency.

Executive Order 11988 - Flood Plain Management directs that "any federally undertaken, financed, or assisted construction project must provide leadership and take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains." This order requires each federal agency to determine whether the project will occur in a floodplain and to consider alternatives. If no practical alternative is found, it requires minimizing harm and notifying the public as to why the project must be located in the floodplain. It also provides for public review and comment.

Executive Order 11990 - Protection of Wetlands, requires that leadership shall be provided by involved agencies to minimize the destruction, loss, or degradation of wetlands. The order was issued to "avoid to the extent possible the long and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands whenever there is a practicable alternative." Federal agencies are required to provide for early public review of any plans or proposals for new construction in wetlands.

S4.11.1.2 State Statutes and Regulations

Idaho Code, Chapter 2, regulates water rights throughout the state. The constitution and statutes of the State of Idaho declare all the waters of the state, when flowing in their natural channels, including the waters of all natural springs and lakes within the boundaries of the state, and groundwaters of the state, to be public waters. These public waters may be appropriated and put to beneficial use. All water rights within the state are issued on a "first in time, first in right" basis.

Idaho Code, Section 42-233b, allows the State of Idaho to establish a Groundwater Management Area or Critical Groundwater Area where groundwater levels are declining due to overuse of an aquifer. The state may restrict water rights within the boundaries of a groundwater area by issuing permits and approving any additional water usage.

S4.11.2 Issues and Concerns

The proposed expanded range capability can be expected to affect water resources within the range boundaries. This analysis considers the potential impact on water availability and use, water quality, and water rights within the ROI.

S4.11.3 Significance Criteria

Criteria for determining the significance of environmental impacts on water resources associated with the SCR expansion are based on water availability and use, quality, rights, and applicable regulations. An impact on water resources is considered significant if it will:

- Reduce water availability to, or interfere with the supply of, existing users.
- Endanger public health or safety by creating or worsening an adverse health hazard or safety condition.

- o Threaten or damage unique hydrologic characteristics in an area.

- o Violate laws or regulations adopted to protect or manage the water resource system.

It may be possible to mitigate significant impacts to insignificant levels, depending on the availability and effectiveness of specific mitigation measures. Impacts that do not meet any of the above criteria will be considered insignificant.

S4.11.4 Methodology for Analyzing Impacts

The proposed expanded range capability can be expected to have some impact on water resources in the local area. This analysis describes those potential impacts, evaluates their significance in accordance with the above criteria, and identifies any mitigations which may reduce impacts on water resources to an insignificant level.

S4.11.5 Impact Assessment

S4.11.5.1 Proposed Expanded Range Capability

Water Availability and Use

Expansion of range capability in the study area could require the purchase of additional land. This action can be expected to impact the availability and use of both surface water and groundwater in the expansion area. These impacts are discussed below under Water Rights. See section S4.8.5.4, Land Use, for further discussion of impacts on livestock grazing and other activities within the range expansion area.

Any expansion of the SCR, particularly construction of additional roads and buildings, would temporarily increase water use in the study area. Any increase in personnel associated with expanded range activities would also increase water use locally. However, this increase is expected to be insignificant, with no overall impact on water availability or use.

Water Quality

Construction of additional roads, target areas, and other range support facilities needed for an expanded range capability would disturb existing groundcover, thereby increasing the potential for soil erosion and runoff in the impact area. However, any increase in surface water runoff would depend to a large degree on the soil type. Since precipitation is low and intermittent at lower elevations in Owyhee County, it is anticipated that increased ground disturbance would not significantly increase soil

erosion and runoff and would not result in degradation of surface water quality in the vicinity of the expanded range.

The realignment of MHAFB, along with the proposed expanded range capability, would result in an increase in munitions delivery within the range impact area. While most ordnance dropped on the range would be inert and could be recovered and disposed of, some would shatter on impact or be buried in the soil. In general, ordnance debris from inert munitions consists of concrete, cast iron, steel, tin, aluminum, and nylon from parachutes. Small amounts of residue from the phosphorus spotting charges in the practice munitions can be expected to remain on or within ordnance debris. The above chemicals are harmless, break down into harmless by-products or quickly dissipate to nondetectable levels. Leaching of chemicals from inert ordnance debris into either surface water or groundwater supplies is unlikely; therefore, ordnance debris from inert munitions is not considered a source of soil or water contamination.

Live ordnance debris contains many chemicals, including traces of heavy metals (e.g., mercury, lead, arsenic, cadmium, barium, and chromium) that may collect in the soil of the impact area. A study conducted at Fort Leonard Wood, Missouri, involving the detonation of a high level of live ordnance in a confined test area, found that these chemicals are unlikely to accumulate to a toxic or hazardous level in the soil (personal communication, Brown 1989). Therefore, the potential for leaching of chemicals from live ordnance debris into either surface water or groundwater supplies is low and is not considered to pose a potentially significant impact.

Flood Hazards

The proposed action is expected to have a negligible impact on flooding hazards in Owyhee County.

Water Rights

As discussed in section S3.11, more than half of the 1,322 water rights listed in the ROI are held by the federal government, and the remainder are owned by private individuals. In many cases, private parties may lease the right to pump or divert water which occurs on government-owned land. The proposed expanded range capability in Owyhee County is expected to result in restricted public access to portions of the range. Restricted access may preclude or limit the use of both surface water and groundwater resources within the range expansion boundaries. Since the economy of Owyhee County depends to a large extent on livestock grazing, appropriating or otherwise restricting the use of water may be viewed as a potentially significant impact upon that industry. Tier 2 documentation will address specific cases.

S4.11.5.2 No-Action Alternative

The no-action alternative would have no impacts on water resources since no expansion of range area would occur.

S4.11.6 Mitigations

S4.11.6.1 Proposed Expanded Range Capability

The only potentially significant impact on water resources of an expanded range capability would be on water rights due to restricted access. The Air Force can mitigate these impacts, to a large degree, by negotiating with individual users to protect access to existing water rights.

S4.11.6.2 No-Action Alternative

None required.

S4.12 SAFETY

S4.12.1 Regulatory Setting

The following listings cover the federal and state laws, Air Force regulations, and BLM agreements and plans that apply to public safety for activities on the SCR.

BLM Fire Management Activity Plan -- Boise District: Reviews range fire experience to date in the range land managed by the Boise District of BLM, outlines response criteria for each fire management zone, and lists the budget needed to meet various percentages of the fire suppression goals.

BLM Normal Fire-Year Rehabilitation Plan: Outlines the reseeding program on burned range lands.

Interdepartmental Support Agreement between MHAFB and BLM -- Boise District: Outlines the areas of authority for range fire control on the SCR. The agreement also sets the fee paid by the Air Force to BLM for fire control on non-impact range lands within the SCR.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 Superfund Amendments and Reauthorization Act (SARA) of 1986: Provide for liability compensation cleanup and emergency response for hazardous substances released into the environment and the cleanup of inactive hazardous waste disposal sites.

Resource Conservation and Recovery Act (RCRA) of 1984: Regulates storage, transport, treatment, and disposal of hazardous waste that could have an adverse affect on the environment.

Federal Water Pollution Control Act (FWPCA): Provides for water pollution control activities to eliminate pollution discharge.

Solid Waste Disposal Act (SWDA) and Amendments of 1980: Amends RCRA with additional regulation of energy and materials conservation and the establishment of a National Advisory Council.

Toxic Substance Control Act (TSCA): Principally regulates PCBs.

Title 42 of the Idaho Code, Chapter 38.

S4.12.2 Issues and Concerns

The proposed expanded range capability raises the following issues and concerns with regard to public safety:

- Additional aircraft operations will generate additional hazardous material from weapons releases and other tactical operations.

- A large portion of the ROI for the proposed expanded range lies within BLM's Boise District Fire Management Zone (FMZ) #1. The fire risk in this area is extremely high. Any munitions activity has the potential to start wildfires.

- The equipment levels and personnel levels of both the BLM and the SCR contractor are insufficient to handle fire suppression for a larger range.

- With an increase of flight activity, aircraft mishap potential increases.

- An increase in flight activities over areas such as the raptor habitat of the Snake River and waterfowl habitats will increase bird strike potential, especially during low-level training flights.

- The increase in training activities will enhance the potential for inadvertent releases of ordnance and for aircraft malfunctions associated with ordnance.

S4.12.3 Methodology for Analyzing Impacts

In analyzing fire risk and the measures necessary to control it and reduce the acreage burned, the history of range fires was reviewed in the Fire Management Activity Plan for the Boise District of BLM. Additionally, discussions with BLM personnel were used to estimate the impact of increased range fires on their capability to manage the increased fire risk.

The risk of bird-aircraft strike hazard on a range with expanded capability was estimated using the BASH Plan developed for the base. The plan estimates the number of potential bird strikes per one million NM flown.

The methodological approach taken in the analysis of impacts related to hazardous materials is (1) to identify how activities at a range with expanded capability may influence or affect hazardous materials generation or management and (2) to assess impacts of these activities using reference laws pertaining

to hazardous materials management. The primary law for hazardous materials management for aircraft operations and maintenance at MHAFB is RCRA.

S4.12.4 Significance Criteria

- o If the fire protection requirements for a proposed expanded range capability exceed the current level of service, the impacts would be significant.
- o If the public or environment are inadvertently exposed to hazardous or toxic materials, this localized impact would be considered significant.
- o If the increased incidence of bird strikes results in a substantially increased risk to public safety, the impact would be significant.
- o If increased flight operations result in a substantially increased risk to public safety, the impact would be significant.

S4.12.5 Impact Assessment

S4.12.5.1 Proposed Expanded Range Capability

Fire Suppression

There would be unavoidable adverse fires as a result of any expansion of range capability in southwest Idaho. Regardless of location of an expanded range, pre-fire suppression activities such as disking, firebreaks, or controlled burnoffs within the impact range would reduce fires but would also reduce ground cover and increase wind and water erosion. Other ground disturbance would result from actual fire-suppression activities such as bulldozing and logistic support to maintain firefighting capabilities. There would also be increased risks of wild range fires from ordnance dropped short or long of the impact area. These impacts can be reduced with adequate fire suppression equipment and personnel, but they cannot be eliminated.

RANGE FIRE AND DAMAGE POTENTIAL. The study area is composed of parts of three FMZs. The three zones have different wildfire potentials with FMZ #1 having the highest potential and fire spread rate. With any expansion proposal, additional impact areas would be required.

Currently, the SCR is entirely within FMZ #1. In order to reduce fire risk, firebreaks around the perimeter of the entire impact area have been disked and vegetation killed. Additional firebreaks criss-cross the impact area and large firebreaks are constructed around targets and strafing areas. If

additional impact areas are constructed within FMZ #1 or #2, similar firebreaks would need to be established. Currently, 25 to 30 miles of perimeter are kept disked, but if additional impact areas are constructed, additional miles of perimeter exterior firebreaks would need to be prepared and maintained.

During the high fire season (June 1 through October 1), there would be frequent fires within impact areas until areas are burned off around live munition target areas and practice bombing and strafing areas. Potentially large areas would have to have all vegetation removed. Due to constant and sometimes high winds common in the area, soil would be removed by wind erosion. Water erosion would add to the degradation of the soil but not to the same degree as wind erosion (see section S4.7).

For impact areas within FMZ #2, over a period of time sagebrush and perennial grasses would be replaced by annual grasses such as cheatgrass. This would increase the fire risk in the area above that currently defined for FMZ #2. Thus, over a period of time, the ecosystem of plants found in FMZ #1 would spread into the impact areas that could be developed in FMZ #2 or FMZ #3.

From a fire risk standpoint, impact areas within FMZ #3 would be much more feasible due to low fire spread rates. Firebreaks would consist of removing juniper trees. Disking would not be needed on the rocky soil. From a firefighting standpoint, access to this area is much more difficult due to the rugged terrain. Fires in FMZ #1 and FMZ #2 can be accessed by 4-wheel drive equipment, but in FMZ #3 access is only by airplane or helicopter.

FIRE SUPPRESSION RESPONSIBILITY. The scope and magnitude of fire control efforts between the BLM and the SCR contractor would expand for both parties. Fire-suppression costs for impact areas for an expanded range capability would expand over current costs at the SCR. Payments to the BLM for fire suppression on non-impact range lands would also increase.

FIRE DETECTION CAPABILITY. Within each impact area additional firewatch towers would be needed to keep the entire impact area within observation. Currently the BLM maintains four fire lookout points. Additional lookout towers would need to be constructed for an expanded range capability. All of the current towers are north of any potential ranges or impacts areas. Suggested general locations for additional towers are shown in Figure S4.12-1.

FIRE SUPPRESSION CAPABILITY. Currently, neither the BLM nor the SCR contractor have the equipment or personnel to handle the increased fire risk caused by a proposed range expansion. Most of the ROI under consideration is not accessible from current equipment locations in Bruneau or Hammett due to canyon areas along the major rivers in the region. Additional roads and equipment bases would need to be set up within or near an expanded range to aid in response time for range fires.

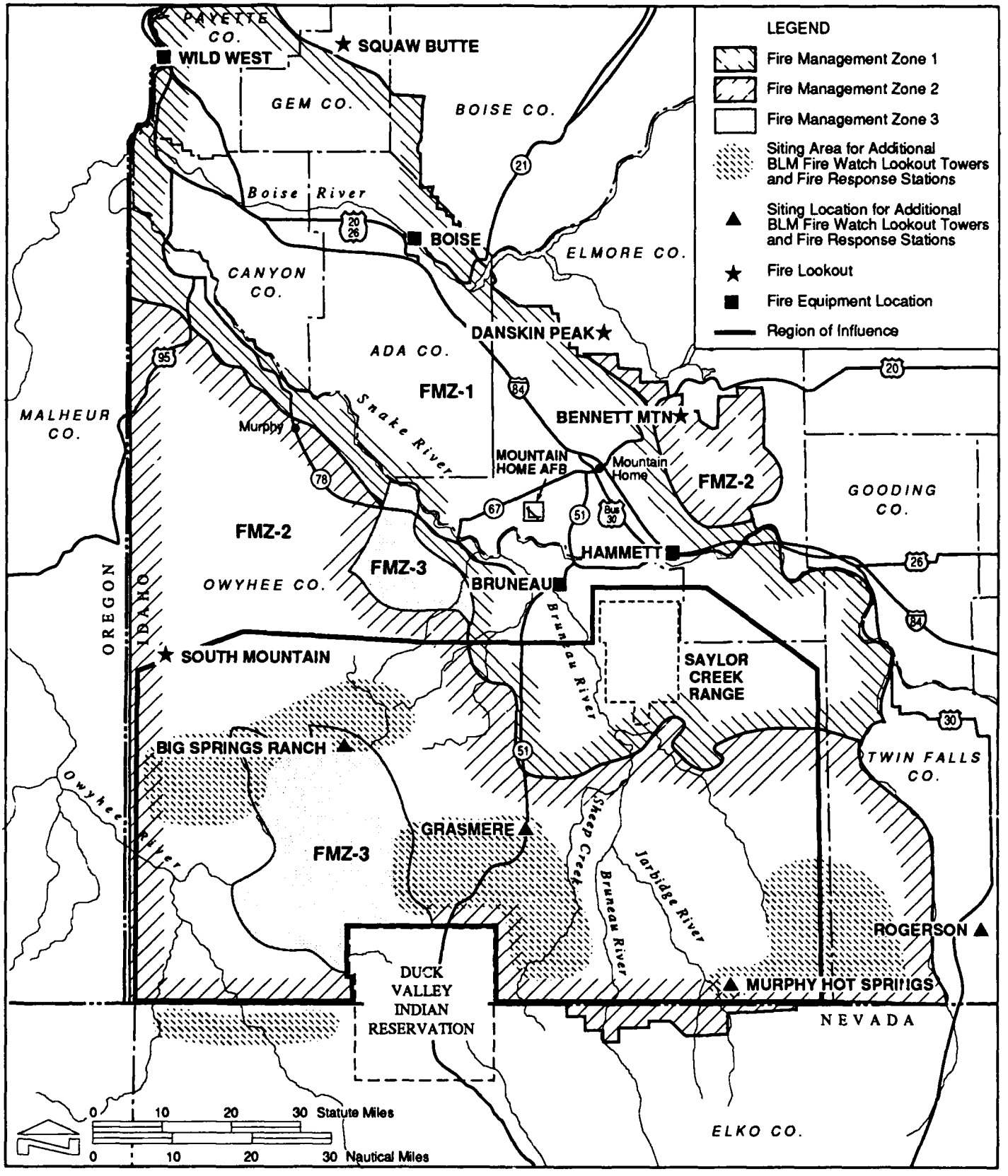


Figure S4.12-1

REGION OF INFLUENCE AND SITING AREAS FOR LOOKOUT TOWERS AND FIRE SUPPRESSION EQUIPMENT

Flight Risks

With a 486-percent proposed increase in sorties at the proposed expanded range and using an average of the mishap rate for F-111s and F-4s (see Table S3.12-7), and assuming a 486-percent increase in the average flying time for both, the potential for a mishap increases to one incident every three to four years. Beyond the lives of the crew, the risk to populated areas is low due to the sparse population density. However, the risk of wildfire on the range from May to October is very high.

Due to increased aircraft flying time resulting from a proposed expanded range capability, the potential for bird strikes would increase. With the MOAs expanded over the canyon areas, there is increased risk that endangered species of raptors living in the canyon areas will be involved in bird strikes.

The increased use of the SCR special use airspace could mean a potential for increased near-misses; however, this should not be a problem due to the scheduling procedures employed by the Air Force. Schedules and special use airspace are tightly controlled by the Air Force in order to minimize potential air traffic conflicts.

Aircraft Malfunction

Proposed increases in aircraft activities associated with an expanded range capability and use of the MOAs and MTRs would increase the potential for aircraft malfunctions, including inadvertent releases of ordnance. Established range safety procedures are designed to minimize these events and ensure the safety of the public. In addition, the design (i.e., shape, location, size) of impact areas place a priority on public safety.

Hazardous Materials

The proposed expanded range capability would result in the use of additional amounts of chaff, flares, and practice and live ordnance. The use of these materials pose a minimal hazardous materials adverse impact. Chemical residue from each of these would not expected to be sufficiently concentrated to present a hazardous materials management impact. Existing Air Force policies and procedures would be sufficient to prevent uncontrolled hazardous materials contamination.

The addition of new tactical threat sites, aircraft operations, and support personnel on the SCR would present new and additional requirements for hazardous materials management. These new requirements would be met through the implementation of existing Air Force policy regarding the use and control of hazardous materials and the safe operation of aircraft and vehicles.

S4.12.5.2 No-Action Alternative

Intensified use of the SCR associated with the "east-west" range scenario would create hazardous flight conditions. The potential for crashes would be much higher than the current situation because of the substantially increased number of flight operations over a small geographical area. No action would have significantly greater impacts on safety than a proposed expansion of range capability.

No live ordnance delivery would be allowed under the no-action alternative. This would reduce the risk to safety posed by wildfires and hazardous material compared to a proposed expansion of range capability.

Potential impacts of work-arounds would be minimal. Increased hours of operation could possibly lessen the adverse effects on safety associated with the east-west range scenario if the number of flight operations on the SCR were spread out over 16 rather than 12 hours. No weapons release on some of the F-4G and EF-111 sorties would potentially decrease the potential risks to safety generated by ordnance delivery. The work-arounds involving air refueling and deployments would have minimal effect upon safety.

S4.12.6 Mitigations

S4.12.6.1 Proposed Expanded Range Capability

Fire Suppression

If a proposed expanded range capability requires land listed in BLM's FMZ #1 or FMZ #2 and impact areas also lie in these fire management zones, the following measures must be taken.

- The practice of disking up a fire break around the perimeter of the impact area and additional fire breaks through the interior of the area should be expanded to the new impact area. All areas where soil is cleared of growth by disking or by burning off should be treated with a soil stabilizer or wetting agent to minimize wind erosion.

- The relationship between the contractor for fire suppression inside impact areas and the BLM for fire suppression of the expanded range area should continue.

- The contractor should be staffed and equipped to handle the fire suppression needs of each impact area. Additionally, each impact area should have enough firewatch towers so that all of the impact area is visible from the towers.

- o Depending on the configuration of a proposed expanded range, the BLM should establish additional firewatch towers along the southern edge of the range. Also, at least one or two new fire equipment stations should be established to improve the access time to range areas during high fire risk seasons.

- o Additional roads and existing roads and trails would have to be built or improved to aid in access to all areas of a range with expanded capability.

Flight Risks

Special use airspace in the study area has been developed to minimize the potential public hazard by avoiding flyovers of densely populated areas, but additional practice on disaster response situations dealing with aircraft mishaps should be conducted. Currently, a practice response is conducted yearly but it should be increased to semi-annually. While the risk of a mishap would increase as a result of an increase in flight operations, more frequent disaster response drills would reduce the potential damage and loss of property and life.

By following the BASH Plan closely, the additional aircraft on an expanded range should not endanger the public safety from bird-aircraft strikes. The increase should moderately affect the bird population.

Aircraft Malfunctions

Public and aircrew safety represent priority concerns with regard to development of an expanded range capability. The proposed increase in flight activity would increase the potential for aircraft malfunctions associated with ordnance delivery. Established Air Force policies concerning the prevention of the events and careful design of impact areas would minimize the risk to public safety. If such an event occurs outside the impact areas, the Air Force, according to established procedures, would locate and remove the ordnance. In addition, the Air Force would pay compensation for any damage to private property.

Hazardous Materials

There are no additional mitigations needed to prevent uncontrolled hazardous materials contamination as a result of the proposed expanded range capability. POL controls would be sufficient to adequately protect the environment from purposeful or accidental releases of these materials.

S4.12.6.2 No-Action Alternative

Mitigations described above for a proposed expanded range capability would be applicable for minimizing impacts resulting from the no-action alternative.

S5.0 UNAVOIDABLE ADVERSE IMPACTS: PROPOSED EXPANDED RANGE CAPABILITY

S5.1 AIRSPACE MANAGEMENT

S5.1.1 Proposed Expanded Range Capability

Potential airspace impacts resulting from a proposed expanded range capability would be similar to those associated with the no-action alternative. No unavoidable adverse impacts are expected.

S5.1.2 No-Action Alternative

Increased flight operations in special use airspace resulting from implementation of the no-action alternative would generate potential conflicts with civil aviation activities. In addition, increased use of MTRs could pose constraints on general aviation operations at airports that underlie the individual routes. All potential impacts can be mitigated, and no unavoidable adverse impacts are anticipated.

S5.2 AIR QUALITY

S5.2.1 Proposed Expanded Range Capability

The results of the analysis of construction activities in the study area indicate that adverse, short-term impacts would occur from the increase in construction equipment and fugitive dust emissions. Implementation of mitigation measures identified for these emission sources would result in no significant air quality impacts during construction.

The increase in fugitive dust emissions from areas maintained as bare soil within a range with expanded capability would have an adverse, long-term impact on air quality. Mitigation measures have been identified to reduce fugitive dust emissions for these areas. However, fugitive dust impacts could be significant during high wind conditions and/or weapons impacts.

The analysis of aircraft operations within a range with expanded capability determined that adverse, short-term impacts would occur from the increase in aircraft emissions. However, the total pollutant impacts from these sources would not exceed any state or federal ambient air quality standard. As a result, no significant air quality impacts, as they relate to ambient air quality standards, would occur from aircraft operations.

Exhaust plumes from aircraft operating in special use airspace near the Jarbidge Wilderness Area would be visible. To ensure that visibility is not impaired within the Jarbidge Wilderness Area, aircraft would need to avoid daytime operations near this Class I area.

S5.2.2 No-Action Alternative

The impacts on air quality from the no-action alternative would be similar to those of the proposed expanded range capability. Significant impacts could occur from fugitive dust from bare soil areas during high wind conditions or periods of heavy bombing activity.

S5.3 NOISE

S5.3.1 Proposed Expanded Range Capability

Potential noise impacts resulting from a proposed expanded range capability would be similar to those associated with the no-action alternative. Unavoidable adverse impacts would occur because of increased flight operations.

S5.3.2 No-Action Alternative

The training requirements of the F-4 units would result in substantially increased numbers of overflights of southwestern Idaho. Those portions of Owyhee County overlain by special use airspace (MOAs and restricted areas) would be subjected to unavoidable noise impacts due to the increased training operations.

Four of the eight MTRs that can be used to access the SCR special use airspace would experience a significant increase in use. The areas beneath these MTRs would be unavoidably impacted by increased noise levels.

S5.4 BIOLOGICAL RESOURCES

S5.4.1 Proposed Expanded Range Capability

A proposed expanded range capability and use of associated MOAs and MTRs have the potential to impact biological resources through ground disturbance, fires, aircraft overflights, and airspace and land access limitations.

Ground disturbance from construction and operation of range facilities, particularly targets and firebreaks, would cause a loss or major alteration of habitat at discrete locations throughout a range

with expanded capability. The specific location and size of the facilities and the significance of the impacts would be determined in the Tier 2 EIS.

Fires resulting from use of a proposed expanded range capability are likely to significantly alter vegetation and, thus, wildlife habitat. Successful revegetation with native species of the plant communities present prior to disturbance would mitigate the impact and could enhance the quality of the environment.

Aircraft overflights could have significant impacts as a result of (1) noise/visual effects on wildlife, and (2) collisions between birds and aircraft. Potentially sensitive habitat areas are identified in section S4.4. Associated with these overflights and use of an expanded range capability would be restrictions on airspace and land access that could impact wildlife management, particularly aerial surveys. Land access restrictions to recreation and grazing combined with native plant species revegetation could significantly enhance the ecological condition in potential range expansion areas currently categorized as poor or fair.

S5.4.2 No-Action Alternative

The impacts from the no-action alternative associated with overflights would be similar to those of the proposed expanded range capability. This would also be true of the population-induced recreation impacts, although the no-action alternative would require fewer new or upgraded roads. The impacts resulting from ground disturbance would be less for the no-action alternative due to the smaller amount of disturbed area required.

As a result of noise, chaff, flares, and vibration, the concentration of flights onto the relatively small impact area of the SCR could have significant impacts on wildlife. However, since the SCR is currently used for similar operations, it is likely that sensitive species have already left the immediate area and other species have become habituated to the disturbance.

S5.5 CULTURAL RESOURCES

S5.5.1 Proposed Expanded Range Capability

Overflights in special use airspace are expected to result in unavoidable significant (adverse) impacts to Native American resources, specifically spiritual and ceremonial sites. Although consultation with affected Native American groups to avoid such sites will reduce impacts, the nature of the training activities (e.g., air-to-air combat) will necessitate use of extensive airspace and potentially result in inadvertent overflights of sacred or ceremonial areas. Disruption of or intrusion upon ceremonial

activities at these sites is anticipated to be considered a significant impact to Native American traditional values.

Direct impacts to cultural resources from road and facility siting will be addressed in Tier 2 environmental documentation.

Improved access has the potential to increase recreational impacts. A mitigation to reduce such impacts would be limited access, although it is unlikely that all impacts could be mitigated.

S5.5.2 No-Action Alternative

The impacts of the no-action alternative would be similar to those described for the proposed expanded range capability with the exception of those impacts resulting from ground disturbance and changes in access. The amount of ground disturbance would be less for the no-action alternative and there would be less new road construction or improvement. These differences would reduce or eliminate many of the direct impacts when compared to the proposed expanded range capability.

S5.6 VISUAL RESOURCES

S5.6.1 Proposed Expanded Range Capability

Specific mitigations in response to construction-related impacts have been identified in section S4.6.6.1. If implemented, these recommendations would reduce impacts on the visual resources of the area to insignificant levels.

Due to the direct linkage between auditory and visual effects of overflights, levels of impact and feasible mitigation measures are difficult to define. However, the proposed increase in aircraft overflights would result in significant impacts to visually sensitive areas (i.e., canyons, wilderness areas, and parks). Mitigation measures have been identified in section S4.6.6.1 that would reduce but not completely eliminate these impacts.

S5.6.2 No-Action Alternative

No construction-related impacts to visual resources are anticipated. However, the increase in aircraft overflights associated with the no-action alternative may result in significant impacts to visually sensitive areas. The identified mitigation measures could reduce but not eliminate the impacts.

S5.7 EARTH RESOURCES

S5.7.1 Proposed Expanded Range Capability

Programmatic-level mitigation recommendations for soil erosion resulting from construction activities associated with the proposed expanded range capability have been outlined in section S4.7.6.1. These recommendations, if implemented, will minimize soil erosion during construction activities. These mitigative measures cannot prevent all soil erosion, so some soil erosion will result from the proposed expansion of range capabilities.

Restrictions on use may limit continuing research and development of earth resources but may also serve to protect the resources. The restriction of access to mineral rights within a proposed expanded range complex could be a significant impact. The potential for this impact could be reduced by the careful placement of range facilities, based on a mineral resources survey of the area. However, an unavoidable adverse impact could result if planning cannot ensure access to mineral rights and areas of mineral exploration.

Increased recreational use of the region and increased access could result in adverse impacts on paleontological and cave resources. The mitigation measures identified in S4.7.6.1 could reduce these impacts, but they will not eliminate them. Restriction of access to exclusive use areas will reduce the potential for inadvertent damage and vandalism to cave and paleontological resources. However, if such restrictions prevent scientific investigation of these resources, an unavoidable adverse impact would result.

S5.7.2 No-Action Alternative

The no-action alternative could cause unavoidable adverse impacts as a result of soil erosion. Mitigation measures defined in S4.7.6.2 will substantially reduce soil erosion stemming from construction and maintenance activities in the exclusive use area of the SCR and for the small emitter sites outside this area. However, these measures will not eliminate erosion completely. No other types of earth resources will be subject to unavoidable adverse impacts from the no-action alternative.

S5.8 LAND USE

S5.8.1 Proposed Expanded Range Capability

Significant unavoidable adverse impacts on land use will include:

- o Change from private ownership to public ownership of land within the area of proposed expanded range capability.

- o Reduction in grazing allotments in the exclusive use areas.

- o Increased aircraft noise, including sonic booms, which would adversely affect recreational activities, especially in existing or future wilderness areas.

Specific impacts within the ground disturbance ROI are to be addressed in Tier 2 environmental documentation.

Measures identified in section S4.8.6, particularly siting of boundaries and exclusive use areas to avoid land use conflicts, have the potential to reduce the impacts within the ground disturbance ROI. Noise-related impacts in the aircraft disturbance ROI are expected to be unavoidable. Mitigations such as local altitude limitations, seasonal limitations, and avoidance of sensitive areas could substantially reduce noise-related impacts to recreational and related resources.

S5.8.2 No-Action Alternative

No unavoidable adverse impacts within the ground disturbance ROI are projected for land use outside the SCR. Intensified use of the SCR associated with no action is projected to produce unavoidable impacts to current grazing operations using the SCR.

Increased use of the existing MTRs and MOAs associated with the MHAFB realignment will result in noise impacts to recreational and related resources comparable to those projected for the proposed expanded range capability. Measures noted in section S5.8.1 may be required to mitigate these overflight impacts.

S5.9 TRANSPORTATION

S5.9.1 Proposed Expanded Range Capability

No significant unavoidable impacts on transportation have been identified.

S5.9.2 No-Action Alternative

No significant unavoidable impacts on transportation have been identified.

S5.10 SOCIOECONOMICS

S5.10.1 Proposed Expanded Range Capability

The withdrawal of large tracts of land that would be required by a proposed expanded range capability, combined with the expansion and increased use of military airspace, is expected to result in adverse impacts on the socioeconomic resources in the study area. The unavoidable and/or significant nature of the impacts would depend on the degree of mitigation proposed and accepted. Some cattle ranches and other businesses may need to reduce the size and efficiency of their operations, while some businesses could cease to operate. Range enhancements through water development and seeding could mitigate these impacts. Any possible reduction in private land could impact the provision of public services at the county level. Access restrictions and reductions in the quality of wilderness recreation could reduce recreational use of the area, but increased population and recreation associated with realignment at MHAFB could offset such impacts.

S5.10.2 No-Action Alternative

No unavoidable adverse impacts on socioeconomics would occur as a result of the no-action alternative.

S5.11 WATER RESOURCES

S5.11.1 Proposed Expanded Range Capability

Programmatic mitigations were identified in section M4.1.6 to reduce the potential for soil erosion resulting from construction activities associated with a proposed expanded range capability. These recommendations would also serve to minimize soil erosion and surface water runoff during construction activities. Disking and grading soils in target areas to simulate roads, runways, and threat emplacements and to create firebreaks will increase the likelihood of soil erosion and runoff in these areas. Study of the soil characteristics and runoff patterns of the sites chosen will be performed in tiered documentation to determine the severity of increased soil erosion and surface water runoff in the range target and construction areas.

The proposed expanded range capability can be expected to impact water rights within the range boundaries. In particular, restricting public access to portions of the range may preclude or inhibit the ability of individuals to pump or divert their allotted water. However, the Air Force can mitigate these impacts, to a large degree, by negotiating with individual users to protect access to water rights.

S5.11.2 No-Action Alternative

No unavoidable adverse impacts on water would occur as a result of the no-action alternative.

S5.12 SAFETY

S5.12.1 Proposed Expanded Range Capability

The major safety problem that cannot be completely mitigated is the additional risk of fire and fire-related damage. The study area for a proposed expanded range capability already has 140 to 160 fires annually from lightning strikes and other causes. Use of an expanded range and impact areas would result in additional fires.

With additional firebreaks being constructed within new impact ranges and the grass and vegetation being burned off to reduce fire risk in the impact zones, wind and water erosion will be significantly increased. Additionally, as areas within FMZ #2 are burned off, and without reseeding with native species, the grass and plants that replace the native species will have characteristic fire spread rates like FMZ #1.

The increased level of flight operations in special use airspace would cause some increase in bird strikes. Therefore, there would be the potential of an unavoidable adverse impact due to bird strikes.

The increase and change in aircraft operations at a range with expanded capability would be expected to result in a small increase in the use and disposal of hazardous materials (bombs, flares, etc.) within the designated target areas and adjacent to new tactical threat sites. Existing Air Force policies, regulations, and procedures would help ensure that no unavoidable adverse impacts occur as a result of the handling, storage, treatment, or release of hazardous materials.

S5.12.2 No-Action Alternative

In the case of the no-action alternative, the mishap potential on the SCR and in the surrounding MOAs would increase substantially. There would be an increased potential of unavoidable adverse impacts associated with mishaps within the SCR special use airspace due to increased aircraft operations. The small size of the current SCR, particularly after dividing it into an east and west range, as well as the proposed usage of the range, would increase the potential for mishaps. Any additional mishaps would be unavoidable adverse impacts as a result of the no-action alternative.

6.0 CUMULATIVE IMPACTS

The realignment of MHAFB and the proposed expanded range capability are two of several actions proposed to be implemented in the region at approximately the same time. The cumulative impacts of all projects, programs, and plans must be addressed to provide decisionmakers with adequate information. Cumulative environmental impacts are the sum of all the incremental impacts resulting from a proposed action and other presently proposed or reasonably likely projects or actions. The individual impacts of the projects may be minor, but collectively they may pose significant impacts.

The projects considered in the cumulative analysis include (1) new or upgraded facilities at the Idaho Army National Guard Orchard Training Area (OTA), (2) rangeland improvements for domestic livestock grazing, (3) mining developments, (4) transmission lines, (5) land withdrawal by Congress for inclusion in the wilderness or wild and scenic river systems, (6) new dams on the Snake River, and (7) a new tourist attraction at Grasmere. Each of these is described briefly below followed by the impact analyses for each resource.

Orchard Training Area. The Army National Guard has proposed to upgrade or construct three training facilities on the OTA, and an EIS was prepared for this action (CH2M Hill 1988). The proposed action includes (1) upgrading the multipurpose range complex (MPRC), (2) constructing an on-site ammunition storage point (ASP), and (3) constructing an on-site mobilization and training equipment site (MATES). Upgrading the MPRC would involve loss of about 2 acres of wildlife habitat, some additional water and electricity consumption, and creation of a few jobs. Construction of the ASP and MATES would result in loss of 17 acres of wildlife habitat, withdrawal of 200 acres of grazing land, use of 3 million gallons of water a year, and create 75 permanent jobs and 130 temporary (12 to 15 months) construction jobs. The projects would add $1.5 million to the local economy each year and save 11,000 man-hours plus $500,000 in fuel and equipment per year. The OTA is used for ground maneuvers and artillery practice, and it has restricted airspace associated with it. Neither of these would change as a result of the realignment of MHAFB or a proposed expanded range capability.

Rangeland Improvements. The BLM and private ranchers are continually modifying the rangeland to increase livestock production. These activities include seeding after burns, installing/maintaining water pipelines, putting in fences, and removing sagebrush. Disturbance is small at each water development or fence site but is spread throughout most of southwestern Idaho. Seeding and sagebrush clearing, however, are generally on moderate to large tracts of land and involve use of equipment such as drill seeders and brush hogs or disks pulled by caterpillars. The seeding occurs after range fires or sagebrush removal to restore the grazing capacity of burned areas or to create new areas for grazing from areas that were previously sagebrush and other native species. Fires usually occur every year, and therefore, the reseeding goes on every year and will continue into the foreseeable future.

Mining Developments. Grefco is in the process of developing a diatomaceous earth mine just north of Dickshooter Ridge at T 12 S, R 2 W, S 3. Access is from Grand View along a road that the company recently upgraded. Grefco also has other mining claims in southwestern Idaho.

Transmission Lines. Pacific Power and Light is in the process of constructing a power line across the study area.

Land Withdrawal. A number of wilderness study areas (WSAs) occur in southwestern Idaho, southeastern Oregon, and northern Nevada, particularly along the major river canyons. Some of these WSAs are being recommended for wilderness designation. In addition, portions of the Bruneau, Jarbidge, and Owyhee rivers in Idaho have been recommended for inclusion in the National Wild and Scenic River System, and a national park has been proposed by environmental organizations for the Owyhee River canyonlands. If these are acted upon by Congress, land use would change in the study area.

Dams on the Snake River. Two dams have been proposed for the Snake River: Dikes Dam and A. J. Wiley Dam. These are located between Glenns Ferry and Bliss.

Grasmere Tourist Attraction. Webb Standards is planning an old west town tourist attraction for Grasmere. This would involve multiday wagon train rides from Grasmere to Silver City. Thousands of tourists are predicted to visit this attraction.

Idaho Air National Guard Aircraft. The IANG expects to receive 6 RF-4 aircraft in fiscal 1990. These aircraft will be based at Gowen Field in Boise.

6.1 AIRSPACE MANAGEMENT

Combining the potential impacts of other projects with the effects of the realignment and proposed expanded range capability would not generate significant impacts on airspace management. None of these other actions would involve increased use of airspace in the study area.

6.2 AIR RESOURCES

The air quality impacts identified for project construction and operation activities within the study area, when combined, would not be substantially larger than those already analyzed. Since the project areas associated with other actions are separated by large distances, air emissions occurring in one area would be well dispersed and would not substantially interact with air emissions in another area to increase ambient pollutant concentrations. Additionally, there are no reasonably foreseeable future sources of substantial air emissions proposed that would increase ambient pollutant concentrations

within the study area. As a result, cumulative impacts are expected to be similar to those identified for individual activities associated with the MHAFB realignment and a proposed expanded range capability.

6.3 NOISE

The significance of noise impacts would not be affected by combining the effects of other projects with those generated by the realignment and proposed expanded range capability. None of these other actions would involve increased aircraft operations. In addition, construction-generated noise resulting from these other actions would be short term and insignificant.

6.4 BIOLOGICAL RESOURCES

Impacts of the realignment and proposed expanded range capability would be additive to those from the other proposed projects in the study region. Power line construction, OTA alterations, BLM/private rancher rangeland modifications, and the proposed expanded range capability would have additive effects on vegetation and wildlife through combined habitat loss or alteration. A proposed expanded range capability has the potential to result in much greater impacts than any of the other projects, particularly construction and OTA alterations. Rangeland modifications, however, could, in the long term, affect areas as large as an expanded range complex. One of the major issues is cumulative impacts on birds of prey. The study region provides abundant nesting and foraging habitat for these birds, but data for use of areas outside the BOPA are limited. Effects of ranching activities and low-altitude aircraft on raptors are poorly known for the study area so it is difficult to assess quantitatively how additional disturbance would affect the birds. Increased flight activity, however, would add to the existing potential for mortality through collision with aircraft, particularly when the birds are courting.

Another issue is the cumulative impact on wildlife management that increasing the amount of restricted airspace and of land with limited access would have.

6.5 CULTURAL RESOURCES

Combined impacts from MHAFB realignment, development of an expanded range, and the projects listed in section 6.0 would reduce the number of undisturbed cultural resources in southwestern Idaho. Fragile resources, already disturbed by such activities as ORV usage, grazing, and vandalism, are likely to be further degraded by the combined impacts. As noted in section M5.5, increased unrestricted recreational use of the environment stemming from population growth associated with the realignment is expected to result in unavoidable significant impacts to cultural resources.

Activities at the Idaho Army National Guard Training Area, range modifications, and the dams on the Snake River represent the most extensive of the ongoing and proposed undertakings in the region. In addition to improvement and construction of facilities, the Training Area receives use for maneuvers and gunnery practice -- both of which can affect cultural resources. However, a recent inventory (Addington 1987) and establishment of a monitoring program have markedly improved protection and treatment of cultural resources within the area. Although numerous, most BLM range modifications involve small areas and limited disturbance. Moreover, the BLM promotes avoidance of impacts to cultural resources wherever feasible. The other extensive projects -- two dams on the Snake River -- are planned for an area with abundant and diverse cultural resources. If approved and constructed, the dams and the associated raising of reservoir levels would undoubtedly impact cultural resources. While this action would result in diminishment of the resource base, the scientific studies (e.g., evaluation, data recovery) prompted by impacts to cultural resources probably would provide substantial information on the history and prehistory of the area.

With the exception of Congressional designation of wilderness areas and wild and scenic rivers, the other proposed projects and undertakings lack sufficient scope to result in appreciable degradation of the region's resource base. Creation of wilderness areas would afford increased protection to the cultural resources they contain.

The cumulative projects are unlikely to cause extensive loss of cultural resources and information. Cumulative impacts are not anticipated to be markedly greater than realignment and proposed expanded range capability impacts, and most of these impacts can be reduced to an insignificant level with measures outlined in sections M4.5.5 and S4.5.5 and Appendix G.

6.6 VISUAL RESOURCES

The other proposed projects could have localized impacts on visual resources, but would not contribute to overall degradation of the resources in the study area. These projects are predominantly located on BLM lands and the BLM thus would require impact assessment and identification of feasible mitigation measures to significant impacts on visual resources. The proposed land withdrawal for wilderness and wild and scenic river designation would, in fact, serve to protect the visual resources of the area. Realignment activities would not result in significant impacts to the visual resources of the base and its environs. Increased overflights associated with the proposed expanded range capability are anticipated to result in significant impacts to visual resources, but adding these to the limited impacts of other local projects would not increase the level of impacts.

6.7 EARTH RESOURCES

Impacts to earth resources due to the realignment of MHAFB and a proposed expanded range capability would be supplemental to impacts resulting from other proposed projects or actions in the region. Construction activity will increase the chance for soil erosion locally in the other project areas, but the large distances separating these projects from MHAFB and a proposed expanded range capability will diminish cumulative impacts. Increased population growth due to other projects (e.g, Grasmere tourist attraction) may produce additive indirect impacts to paleontological and cave resources as described in sections S5.7 and M5.7. Additionally, the possible withdrawal of public lands for wilderness study, for inclusion in the wild and scenic river system, and for national park status will create impacts additive to those associated with a proposed range with expanded capability. These withdrawals would affect mineral exploration and the development of mineral claims.

6.8 LAND USE

Impacts resulting from MHAFB realignment, the proposed expanded range capability, and the other projects identified in this analysis could have some cumulative land use effects. The growth at the Orchard Training Area would contribute to the growing population base, which increases recreation demand. New tourist attractions in the vicinity would attract people to the area and further impact the wilderness qualities of solitude and naturalness. Rangeland improvement projects would be adversely affected in exclusive use ordnance impact areas. The other projects involving changes in land use status could also affect these improvement efforts, although the cumulative impacts would not be substantial.

Because an expanded range area, if created, could conflict with mining development projects and transmission line routing, these other projects could be required to explore other areas or use other routings. In so doing, land use in these other locations may be affected. Although the change in location might result in additional land use impacts, they would not be markedly greater than those resulting from the proposed expansion of range capability.

Conflict potentially exists between the proposed expanded range capability and other land withdrawals under consideration in the area. A number of wilderness study areas are within the ground disturbance ROI. In addition, portions of the Bruneau and Jarbidge rivers have been recommended for inclusion in the wild and scenic rivers system, and a national park has been proposed for the Owyhee River canyonlands. If the expanded range capability overlaps with any of these other proposals, the suitability of the lands for wilderness designation may be impaired.

6.9 TRANSPORTATION

Of the proposed projects described, none should have significant impacts on the transportation systems in the ROI when combined with effects of the realignment and proposed expanded range capability. Some increases in traffic may occur as a result of these projects, but increases will be either temporary or small enough so that no significant impacts will result.

6.10 SOCIOECONOMICS

Potential impacts of the realignment will not change substantially when combined with the effects of other proposed projects. Realignment-generated impacts upon schools and police and fire protection will be significant, irrespective of the other projects; however, impacts upon other resources in Elmore County, such as health services and utilities, will not be significant when combined with effects of other projects in the region.

Increased revenues generated by construction activities at the Orchard Training Area will help offset reductions in income generated by the proposed expanded range capability. If expansion of range capability restricts future revenue-generating projects in the region, such as mining, recreation and tourist activities, unavoidable adverse impacts would occur. Limiting installation of power lines because of potential land withdrawal may impact the level of service provided to residents and businesses in the region. In sum, combining the effects of other projects in the region with the effects of the proposed expanded range capability could lead to unavoidable adverse impacts.

6.11 WATER RESOURCES

No significant, unmitigable impacts on water resources due to the base realignment have been identified. However, the projected increase in on-base population will necessarily result in increased demand for and use of groundwater within the ROI, a region that has been designated by the State as a Groundwater Management Area. Other proposed actions in the vicinity of the base, particularly activities at the Idaho Army National Guard Training Area, will contribute to the increased demand for groundwater in the ROI. Construction of new facilities at the training area is projected to result in the additional use of 3 million gallons of water per year. This is a negligible amount of water given that the current (maximum) one-day use on the base is 7.09 million gallons and is projected to increase to 8.87 million gallons (see section M4.11.5.1). Therefore, the cumulative impact on groundwater use is essentially the same as the realignment-specific impact identified in section M4.3.

Unlike the base realignment, a proposed expanded range capability may result in an overall decrease in water use in Owyhee County. Public access would be restricted within the impact area boundaries, and this restriction may prevent some individuals from utilizing their allotted surface water or groundwater

within the ROI. Other proposed land withdrawals in Owyhee County include wilderness study areas, a national park in the Owyhee River canyonlands, and inclusion of portions of the Bruneau and Jarbidge rivers in the Wild and Scenic River system. Combined, these proposed actions would substantially reduce the amount of land available for livestock grazing and would restrict access to current water rights in portions of the ROI. No other potentially significant impacts on water resources have been identified.

6.12 SAFETY

The Idaho Army National Guard Orchard Training Area has withdrawn about 19 acres for ground training maneuvers and artillery practice. While not nearly as vast as withdrawals needed for the proposed expanded range capability, there will be a cumulative impact from both projects. Bombing and strafing by aircraft and impact of artillery will start fires in their respective impact areas. Without proper and sufficient personnel and equipment staged near probable fire start areas, many more wild range fires will be added to the many lightning-caused fires begun each year in this area.

No other known aircraft-related projects or actions would result in any increase to the cumulative mishap potential in the study area.

There are no other identified actions that would result in potential cumulative impacts from hazardous materials use, storage, or treatment at MHAFB or a proposed expanded range capability area.

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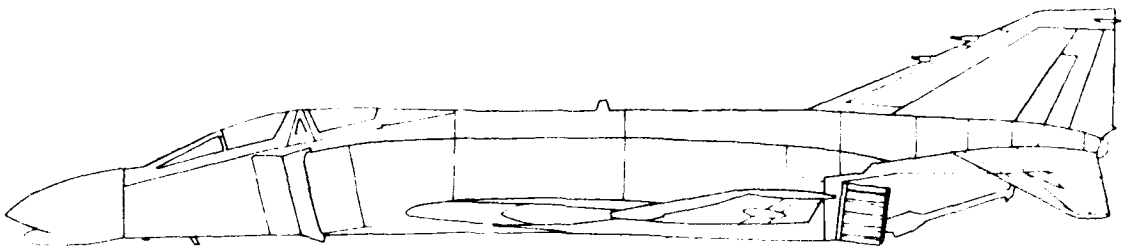
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Appendix A

AIRCRAFT AND ORDNANCE DESCRIPTIONS



F-4 Phantom II

The F-4 Phantom II is a twin-engine, all-weather tactical fighter-bomber that can perform a variety of tactical air roles -- air superiority, interdiction, reconnaissance, electronic combat, and close-air support.

The F-4 can operate at speeds of more than 1,600 miles per hour and can be flown to altitudes close to 60,000 feet. Flight speeds from 150 to 165 miles per hour, necessary for short landing and field operations, are made possible by the use of high-lift flaps and boundary layer control techniques.

Currently, more than 1,000 F-4s are in the Air Force inventory. They are assigned to the Tactical Air Command, United States Air Forces in Europe, Pacific Air Forces, Air National Guard, and Air Force Reserve.

The Air Force flew its first F-4 model -- the F-4C -- in May 1963. It is the Navy's F-4B model modified to meet Air Force requirements. These modifications include wider-tread, low-pressure tires; larger wheels and brakes; cartridge starters; dual controls; boom in-flight refueling; and an inertial navigation system. This model has a pod-mounted 20mm multibarrel gun and outer mountings for a large weapon load. The Air Force National Guard began flying the F-4C in January 1972. The Air Force Reserve received its first Phantom II in June 1978.

The F-4D model has major changes that increase accuracy in weapons delivery. The Air Force received its first F-4D in March 1966; the Air National Guard received its first in 1977; and the Air Force Reserve received its first in 1980.

The first F-4E was delivered in October 1967. This model has an additional fuselage fuel tank, leading-edge slats for increased maneuverability, an improved engine and an internally mounted 20mm multibarrel gun with improved fire-control system. In 1985 the Air National Guard received its first F-4E.

Starting in 1973, F-4Es were fitted with target-identification systems for long-range visual identification of airborne or ground targets. Each system is essentially a television camera with a zoom lens to aid positive identification. Current updating modifications being made on this model include the Pave Tack system that provides a day/night all-weather capability to acquire, track, and designate ground targets for laser, infrared, and electro-optically guided weapons. Another change is a digital intercept computer that includes launch computations for all AIM-9 Sidewinder and AIM-7 Sparrow air-to-air missiles.

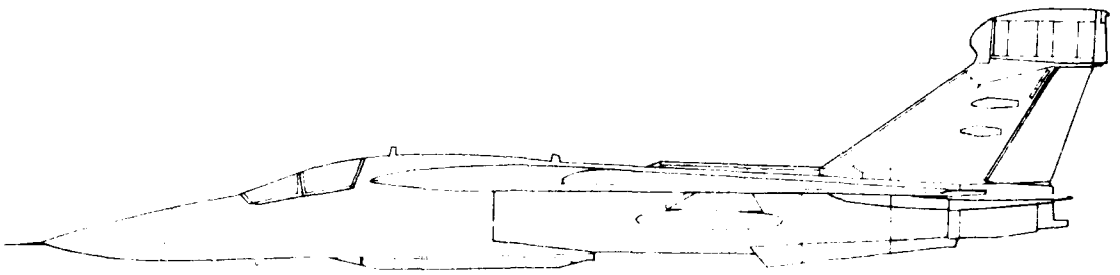
The RF-4C Phantom II is a long-range, multisensor aircraft capable of all-weather day and night reconnaissance in a high- or low-threat environment. The RF-4C specifications and design are similar to the F-4 Phantom II. Optical, infrared, and tactical electronic reconnaissance systems make the RF-4C one of the most versatile reconnaissance aircraft in the world. All of these reconnaissance systems are operated primarily from the rear seat.

The F-4G Wild Weasel models increase the survivability of tactical strike forces by seeking out and suppressing or destroying enemy radar-directed anti-aircraft artillery batteries and surface-to-air missile sites. They are E models modified with sophisticated electronic warfare equipment in place of the internally mounted 20mm gun of the F-4E. The F-4G also can carry more weapons than previous Wild Weasel aircraft. It can carry a greater variety of missiles as well as conventional bombs. Primary weapons include Rockeye cluster bombs and air-to-surface missiles such as Shrike, HARM (high-speed anti-radiation missile), Maverick, and air-to-air missiles.

Specifications

Primary function: all-weather tactical fighter-bomber
Prime contractor: McDonnell Aircraft Co., McDonnell Douglas Corp.
Power plant/manufacturer: two General Electric turbojet engines with afterburners, F-4C/D -- J79-GE-15, F-4E/G -- J79-GE-17
Thrust: each engine with afterburner, F-4C/D -- 17,000 lb; F-4E/G -- 17,900 lb
Dimensions: wingspan 38 ft 11 in; length F-4C/D -- 58 ft 3 in, F-4E/G -- 62 ft 11 in; height 16 ft 5 in
Speed: more than Mach 2 at 40,000 ft
Ceiling: above 60,000 ft
Crew: two -- pilot and weapon system officer
Maximum takeoff weight: 58,000 lb
Armament: F-4C/D -- four AIM-7E Sparrow and four AIM-9 Sidewinder missiles, provisions for 20mm gun pods at fuselage centerline station or outboard pylons, and one fuselage centerline bomb rack and four pylon bomb racks capable of carrying up to 12,500 pounds of general purpose bombs; nuclear weapon capability; F-4E -- one 20mm M61A-1 multibarrel gun; four AIM-7 Sparrow and four AIM-9 Sidewinder missiles, and one fuselage centerline bomb rack and four pylon bomb racks capable of carrying 12,500 pounds of general purpose bombs; RF-4C -- none. F-4G -- same as F-4E except gun removed and Shrike, HARM capability added.
Status: operational

Source: USAF Fact Sheet 86-7 and 88-14.



EF-111A Raven

The EF-111A Raven is designed to provide electronic countermeasures support for tactical air forces. The EF-111A can detect, sort, and identify different enemy radars observing an attack force and make the threat radars ineffective, thereby preventing interception of the attack force by hostile air defenses.

The EF-111A is a modified F-111A. The F-111A is well-suited for modification to the role of an airborne electronic warfare platform because of its structural strength, maneuverability, and performance -- including the ability to penetrate enemy airspace and escape at supersonic speed.

Exterior modifications to convert the F-111A to EF-111A standards include a narrow canoe-shaped radome, about 16 feet long, on the underside of the fuselage. This houses antennas for the high-powered jamming transmitters. Also, a fin-tip pod is mounted on the reinforced vertical stabilizer to house the receiving antennas and ancillary equipment, including a processor to detect hostile radar emissions. The total weight of this equipment is about 3.5 tons.

Other modifications of the original F-111A structure include general structural reinforcement, an improved environmental cooling system, and equipment for increased electrical output.

The cockpit of the Raven also has been rearranged. The right-seat crew member -- the electronic warfare officer -- no longer performs flight-related duties. Flight controls have been removed from the right-hand cockpit, and the aircraft's navigation equipment has been relocated to allow access by both crew members. The resulting space is used for controls and displays of the aircraft's electronic jamming equipment. The electronic warfare officer, through computer management, operates and monitors these systems, which previously would have required several operators and more equipment.

The self-protection subsystem is designed to protect the EF-111A against radar-directed anti-aircraft artillery and missile or aircraft threats.

The EF-111A provides protection to tactical forces in three ways. In its standoff jammer role, the aircraft orbits outside enemy territory. From there, safely out of range of enemy ground-based weapons, EF-111A jamming systems screen the routes of friendly attack aircraft.

In its penetration role, the EF-111A flies along with the attack force through critical phases of its mission, providing countermeasures as required to protect friendly aircraft from surveillance and acquisition radars.

The close-in jamming role calls for the EF-111A to neutralize enemy battlefield acquisition radars while the attack force delivers its attack on enemy armor. The EF-111A can also screen marshaling aircraft over a friendly area.

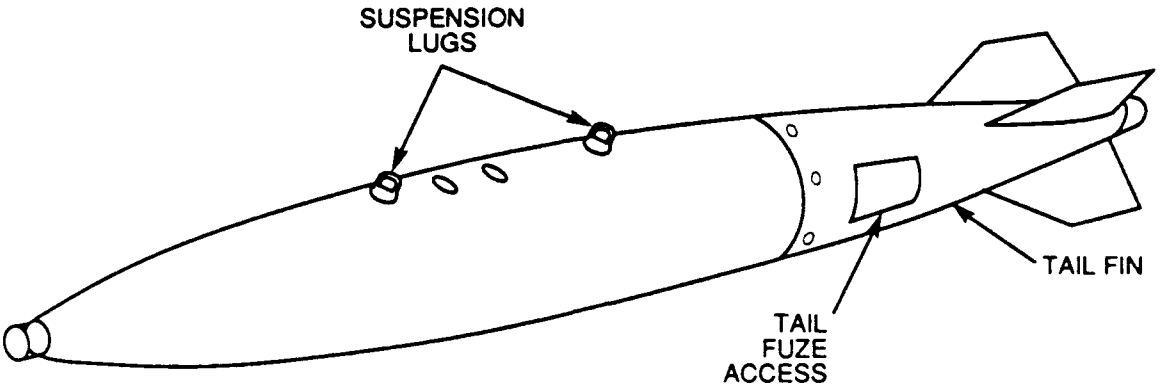
In a typical mission, several orbiting EF-111As could use their vast jamming power to create an electronic barrier masking the movement of friendly attack aircraft. By preventing the enemy from monitoring these aircraft, friendly aircraft are able to refuel, regroup, and begin another attack, undetected by enemy radar.

The first production EF-111A flew in June 1981 and was delivered to Tactical Air Command's 388th Electronic Combat Squadron, now the 390th Electronic Combat Squadron, at Mountain Home Air Force Base, Idaho, in November 1981. A total of 42 EF-111As are currently in the Air Force inventory. The final EF-111A was delivered to Mountain Home Air Force Base in November 1985. EF-111As are stationed at Mountain Home Air Force Base and Royal Air Force Upper Heyford, England.

Specifications

Prime function: electronic countermeasures support
Prime contractor: Grumman Aerospace Corp.
Power plant/manufacturer: two Pratt & Whitney TF30-P-3 turbofan engines. Converting to P-109 engines
Maximum thrust: 21,000 lbs. class each engine
Range: 2,000 miles
Speed: over Mach 2.2 at 40,000 ft.
Ceiling: up to 50,000 ft.
Crew: two (pilot, electronic warfare officer)
Dimensions: wingspan (fully extended) 63 ft., length 76 ft., height 20 ft.
Maximum takeoff weight: 89,000 lbs.
Status: operational

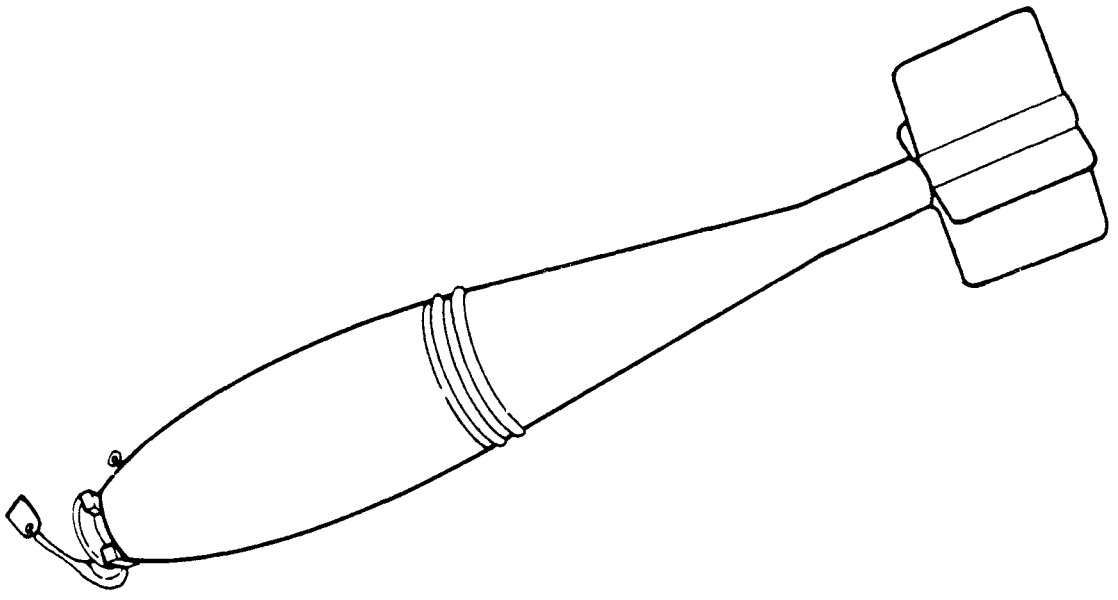
Source: USAF Fact Sheet 88-15.



CHARACTERISTICS	MK 82	MK 83	MK 84
Weight	531 lbs.	985 lbs.	1972 lbs
Length	7 ft. 2 in.	9 ft. 11 in.	12 ft. 8 in.
Diameter	11 in.	14 in.	18 in.
Fin Span	15 in.	20 in.	25 in.
Fin Assembly	MK 82 or MAU-93/B	MK 83	MK 84
Suspension Lug Spacing	14 in.	14 in.	30 in.

Figure A-1

MK 82, MK 83, AND MK 84 GENERAL PURPOSE BOMBS

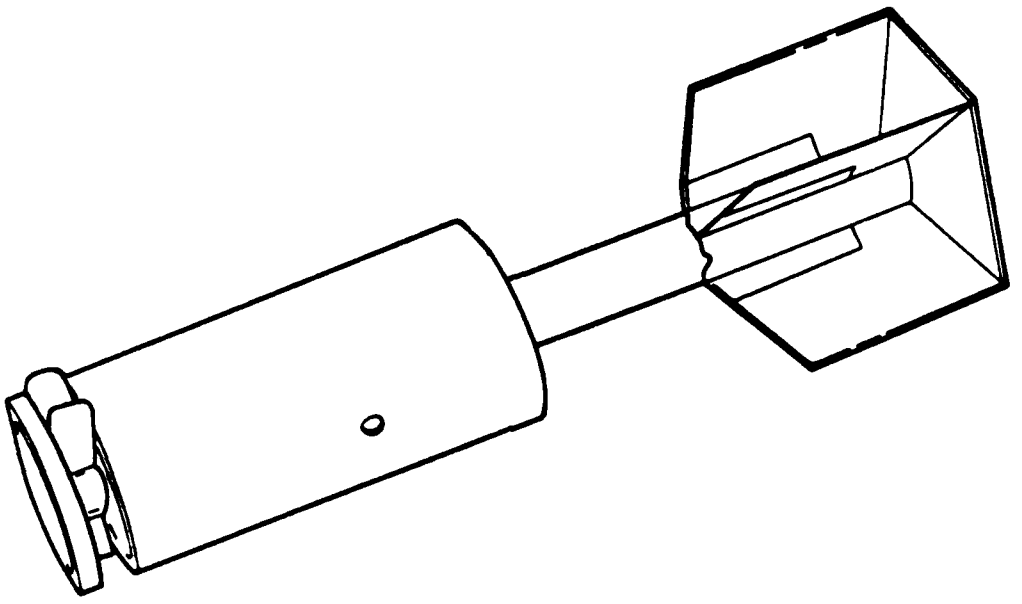


Characteristics:

Weight	25 lbs.
Length	22.5 in.
Diameter	4 in.

Figure A-2

BDU-33 PRACTICE BOMB



Characteristics:

Weight	5 lbs.
Length	19 in.
Diameter	4 in.

Figure A-3

MK-106 PRACTICE BOMB

Appendix B

REQUIREMENTS AND ALTERNATIVES ANALYSIS AND DEFINITIONS

Appendix B

Requirements and Alternatives Analysis and Definitions

1.0 RANGE DEFINITIONS

1.1 CONVENTIONAL RANGE

A conventional range is an air-to-surface range that is specifically constructed for teaching and practicing air-to-surface gunnery techniques in a highly controlled environment. A conventional range contains bulls-eye targets and manned range towers for scoring and safety During range activity, bombing scores are provided to aircrews immediately, in order to give the aircrews the opportunity to improve their bombing accuracy. Only training/inert ordnance would be dropped on this range.

1.2 TACTICAL/ELECTRONIC COMBAT RANGE

A tactical/electronic combat range is a range constructed to simulate a portion of a battlefield. These ranges are normally unmanned and scores may be provided by automated means but feedback is delayed. A tactical/electronic combat range allows aircrews the opportunity to sharpen skills learned on a conventional range in a more realistic environment. A significant portion of a tactical/electronic combat range is an array of threat simulators. These simulators provide electronic signals that are associated with the types of threats an aircrew would expect to encounter in combat, such as surface-to-air missiles, anti-aircraft artillery, or even enemy aircraft. On a tactical/electronic combat range, aircrews practice threat evasion and reaction. Normally, training/inert ordnance is dropped on this type of range, although live ordnance can be used in designated areas.

1.3 RANGE COMPLEX LAND USE DEFINITIONS

1.3.1 Multiple Land Use

The purpose of multiple land use is to maximize public use of government land. All of the land inside the boundaries of the proposed range complex area that is not fenced, would be available for compatible joint use. For example, 97,000 acres of the 109,000-acre withdrawal for the SCR are multiple use. The majority of the land would be available for compatible joint use. This concept allows the public maximum continued use of available government lands and is compatible with the Air Force mission.

1.3.2 Shared/Seasonal Land Use

The purpose of shared/seasonal land use is to permit public access to government land including seasonal livestock grazing. This area would be used by the Air Force and others on a non-interference basis.

1.3.3 Exclusive Land Use

The purpose of exclusive land use is to provide the Air Force with permanent use of a small portion of the land within the range complex to be used for live ordnance bombing and for obvious safety and security reasons. This land would be fenced and the public would be permanently restricted from access or use. Exclusion of the public from live-ordnance drop target areas is necessary to ensure adequate safety.

2.0 TARGET AND THREAT SPATIAL RELATIONSHIP DEFINITIONS

2.1 FORWARD EDGE OF THE BATTLE AREA (FEBA)

The FEBA is the area where opposing forces are in contact. A typical FEBA covers an area from 2 to 10 miles deep and up to hundreds of miles in width. FEBA targets will generally include troops in contact, tanks, tactical armor formations, artillery, and mobile air defense systems. Associated with these targets would be the various electronic emitters that accompany the mobile surface-to-air missiles (SAMs) and anti-aircraft artillery (AAA) threats.

2.2 BATTLEFIELD AIR INTERDICTION (BAI)

The BAI area is generally defined as that area immediately behind the FEBA and extends to the furthest point of influence by ground forces. This distance is usually defined by the range of supporting artillery and other surface-to-surface weapons. A typical BAI target area may extend anywhere from 10 to 50 miles beyond the FEBA. BAI targets will generally include convoys, trains, bridges, bunkers, marshalling areas, depots, and lines of communication. These targets will be heavily defended by concentrated SAMs, AAA, and enemy aircraft with overlapping fields of coverage.

2.3 DEEP INTERDICTION

Behind the BAI area and extending as far as aircraft can reach is the deep interdiction strike target area. This deep interdiction area may extend several hundred miles beyond the FEBA and contains

mostly strategic targets. These high value targets are heavily defended by fixed and mobile SAMs, AAA, multiple radars, and aircraft.

It is imperative for realistic aircrew training to array the range complex with defense in depth, i.e., two areas of primary enemy defenses before reaching the deep targets. Such a complex provides visual and electronic realism to an aircrew. When the above three areas are combined, an aircrew would fly over (penetrate) the FEBA area first, the BAI area second, and then the deep interdiction area to bomb the enemy high-value target.

3.0 FUEL CONSIDERATIONS

The following scenario illustrates the fuel considerations of F-4 aircraft operating from MHAFB on a range other than SCR (see Appendix A for a detailed description of the F-4). The UTTR is used as the example since after SCR, it is the closest usable range to MHAFB. The distance to the Eagle Range at UTTR is 173 NM of direct flight. This example does not include the additional distance and time that would be incurred by using airways, range entry procedures, and holding for clearance into the UTTR.

Aircraft Configuration: One MER (centerline) with 6 BDU-33 practice bombs, two TERs (inboard stations) with 3 BDU 33 each, two external wing tanks, ALE 40 chaff and flare dispensers mounted on inbound pylons[1].

Gross Weight: 50,625 lb.

Drag Index: 42.1

1. A MER is a multiple ejector rack and a TER is a triple ejector rack. Both are bomb racks that are mounted externally on the F-4 to carry ordnance. A MER can carry as many as six bombs and a TER can carry up to three bombs. BDU stands for bomb dummy unit. A BDU-33 is a small practice bomb. An ALE-40 is a small chaff and defensive flare dispenser mounted under each wing.

	Pounds	*Gallons*
Beginning fuel load	16,870	2,800
Fuel used in start, taxi, takeoff	1,900	300
Fuel to climb to 20,000 feet AGL	870	150
Fuel remaining at level-off	14,100	2,350
Fuel to fly remaining 171 NM (after level-off) at 420 KTAS (25 minutes)	3,100	500
Fuel remaining at range	11,000	1,850

Because of the distance from the UTTR to MHAFB, F-4s would be required to depart the range with enough fuel to return safely to MHAFB or to be able to divert and land elsewhere if landing at MHAFB is precluded. Therefore, fuel required at departure from UTTR is estimated to be 6,000 to 9,000 lbs (1,000-1,500 gallons). Weather conditions are the major determinant for the fuel needed at range departure. This requirement allows from 2,000 to 5,000 lbs (350-800 gallons) of fuel to conduct operations on the range. That translates to 10 to 20 minutes of range time.

	Pounds	*Gallons*
Fuel remaining on range	11,000	1,850
Required fuel reserve	2,000	325
Fuel for return to MHAFB	4,000	675
Fuel needed at range departure	6,000	1,000
Fuel available on range (best case)	5,000	850
Variable for weather (added to range departure fuel)	3,000	500
Fuel available on range (worst case)	2,000	350

4.0 COMPUTATIONS FOR DEPLOYING FROM MHAFB TO NELLIS AFB FOR RANGE TRAINING

The following is a summary of the major costs required to deploy and maintain one F-4 squadron (24 aircraft) at Nellis AFB, Nevada. Nellis AFB was selected as an example because of its access to both electronic and air-to-surface gunnery ranges. Further, based on historical data, some range time would be available. The George-based F-4 aircraft used 1,646 Nellis range periods in fiscal 89. The figures that follow are based on deploying/maintaining a squadron size detachment at Nellis for one year with a rotation of personnel back to MHAFB every 60 days.

A squadron operation requires the following numbers of personnel.

294 General/specialized maintenance enlisted personnel
plus
6 Operations enlisted personnel
equals
300 Total enlisted personnel

5 Maintenance officers
plus
62 Rated officers (aircrew members)
equals
67 Total officer personnel

300 enlisted plus 67 officers equals 367 total personnel

Deployment Costs. To transport the above personnel and associated maintenance support equipment to Nellis would require eight C-141 aircraft airlift missions. The average cost per C-141 mission is $10,909; the eight C-141 missions would cost $87,272.

Twenty-four F-4 aircraft would require transfer to Nellis to initiate flying operations. Flying time from MHAFB to Nellis is approximately one hour. Cost per flying hour in the F-4 is $2,945. As a result, the total cost of the transfer would be:

24 F-4 hours multiplied by $2,945/hour = $70,680

Total Deployment Costs = $157,952

Monthly Personnel Operating Costs. Since personnel would be permanently assigned to MHAFB and temporarily operating at another location, the Air Force is required to provide additional pay and allowances to offset temporary living expenses. Enlisted personnel are reimbursed $5.30 per day for per diem and lodging expenses, and officers receive $34.00 per day for per diem and lodging. All personnel would also receive a family separation allowance of $60.00 per month while deployed to Nellis.

300 Enlisted personnel at $5.30 per day = $1,590.00

$1,590.00 multiplied by 30 days = monthly cost of $47,700.00

67 Officer personnel at $34.00 per day = $2,278.00

$2,278.00 multiplied by 30 = monthly cost of $68,340.00

Monthly family separation allowance for 367 personnel at $60.00 per month = monthly cost of $22,020.00

Total Monthly Personnel Costs: $138,060.00

Personnel Rotation Costs. Every two months all personnel at Nellis would be replaced by another squadron of personnel from MHAFB. A rotation would require three C-141 airlift flights to accomplish the change over from MHAFB to Nellis and three from Nellis to MHAFB. Considering a one year period, five such rotations would be required thirty C-141 flights at $10,909 per flight equals the yearly cost of personnel changeovers ($327,270.00).

Consolidation of the figures given above results in an estimate of annual costs for deploying a squadron of F-4s to Nellis AFB as follows:

Deployment	$87,272
Annual personnel temporary duty costs ($138,060.00 monthly cost multiplied by 12 months)	$1,656,720
Personnel rotation costs	$327,270
Total Nellis Cost per Year (above normal operating costs)	$2,071,262

5.0 COMPUTATIONS FOR UTILIZING INFLIGHT REFUELING TO INCREASE RANGE TRAINING TIME (A COMPARISON OF THE COSTS OF USING THE SCR AND USING AIR-TO-AIR REFUELING TO FLY AT UTTR)

Because the UTTR is substantially farther (173 NM) from MHAFB than the SCR, the operational costs of training at UTTR will be significantly greater than the costs of using the SCR. The additional costs are attributable to the increased flight time and the inflight refueling support. An F-4 sortie from MHAFB to the SCR requires a total flight time of 1.4 hours for a round trip. The 1.4 hours of flying

time includes 30 minutes of area training time. To accomplish 30 minutes of area training on a sortie to UTTR, a total flight time of 2.4 hours would be required if inflight refueling is used. This also takes into account the additional 346-mile round trip. Whereas missions to the SCR could be flown without inflight refueling, each sortie to UTTR airspace would require aerial refueling either en route to or from the area to accomplish 30 minutes of area training time. One KC-135 refueling aircraft could provide enough fuel to support three F-4 missions to UTTR. If the number of missions from MHAFB unable to obtain range time on the SCR were 16 per day, then six KC-135s would be required per day. The total flight time for each KC-135 mission would average approximately five hours. Using fiscal year 1990 costs per flying hour figures for the F-4 and KC-135, Table B-1 summarizes the daily operating costs for each range.

6.0 SUMMARY OF AIRCREW TRAINING NEEDS

A summary of aircrew training needs pertaining to requirements is provided in Table B-2. The table summarizes the results of a 1987 survey of TAC aircrews to assess what types of training they need to enhance combat capability. The table includes aircrew responses for all types of TAC aircraft and for F-4 aircraft only. Definitions for terms used in the table are:

REACTIONS: Reaction to SAMs, AAA, or air-to-air interceptors (AIs). Reaction to these threats deal with rapidly changing the aircraft flight path to avoid being fired upon or to avoid any projectile that may be or has been fired at the aircraft. The aircrew would need to see the threat, either visually or otherwise, determine the type of threat, then take the proper action.

EMPLOYMENT: Employing electronic counter measures (ECM) or employing chaff or flares. One type of reaction to a threat (or threats) is the use of ECM or chaff and/or flares. ECM is the use of electronic signals to defeat the radar(s) associated with SAMs, AAA, or AIs. Further, the crew is required to use a specific electronic signal against a specific threat. Similarly, chaff can be used to defeat radars. Chaff is small pieces of foil-type material released by the aircraft that deceives the enemy radars. Flares are released from the aircraft to foil enemy heat seeking missiles. Often ECM, chaff, and flares are used in conjunction with a reaction. In all cases, the crew must evaluate the threat to determine proper countermeasures or reaction.

RWR EMPLOYMENT: Most fighter aircraft employ a radar warning receiver (RWR). This device is much like a radio receiver that allows the crew to receive a warning signal of any radar that is pointed at the aircraft. Through practice, the crew can distinguish the type of threat that they encounter, based on the radar signal associated with a threat, and can respond with ECM, chaff, flares, physical reaction, or any combination thereof.

Table B-1

COSTS REQUIRED TO ACCOMPLISH RANGE TRAINING[1]

		SCR	*UTTR*
1.	Number of F-4 sorties	42	42
2.	Number of F-4 flights at 3 aircraft per flight	14	14
3.	F-4 flight time per sortie	1.4	2.4
4.	Number of KC-135 refueling aircraft required to support daily F-4 flights to areas	N/A	5
5.	KC-135 flight time per mission	N/A	5
6.	F-4 cost per flying hours (FY 90)	$2,945	$2,945
7.	KC-135 cost per flying hour (FY 90)	N/A	$2,400
8.	F-4 cost:		
	a. F-4 operational cost per range sortie (line 3 multiplied by line 6)	$4,123	$7,068
	b. Total daily F-4 cost to obtain range training (line 1 multiplied by line 3a)	$173,166	$296,856
9.	Refueling support costs:		
	a. Cost per KC-135 mission (line 5 multiplied by line 7)	N/A	$12,000
	b. Number of KC-135 missions required per day (line 4)	N/A	5
	c. Total daily refueling cost (line 9a multiplied by line 9b)	N/A	$60,000
10.	Total daily F-4 and KC-135 cost to conduct range training (line 8b plus line 9c)	$173,166	$356,856
11.	Cost per F-4 sortie for 30 minutes of range training time (line 10 divided by line 1)	$4,123	$7,068

Note: 1. All costs calculated on 1989 prices.

Table B-2

AIRCREW TRAINING NEEDS

	All Aircraft Types (485 responses)	*F-4 Only (174 responses)*
REACTION		
Reaction to SAMs	366 (75%)	134 (77%)
Reaction to AAA	375 (77%)	138 (79%)
Reaction to AIs	267 (55%)	117 (67%)
EMPLOYMENT		
Employ ECM	362 (75%)	130 (75%)
Employ Chaff/Flares	291 (60%)	48 (28%)
RWR ASSESSMENT	245 (51%)	102 (59%)
LOOKOUT		
Visual Lookout	205 (42%)	88 (51%)
Radar Lookout	171 (35%)	54 (31%)
MISSILE EMPLOYMENT	192 (40%)	60 (34%)
TACTICAL FORMATION	39 (8%)	18 (10%)
MUTUAL SUPPORT	118 (24%)	74 (43%)

Source: Survey administered as part of TAC War Fighting Skills Analysis, 1987.

LOOKOUT: Visual or radar lookout is accomplished either visually or by the onboard aircraft radar. Lookout involves maintaining formation, finding an assigned target, or finding a potential adversary. Lookout techniques, either visual or with radar, must be continually practiced.

MISSILE EMPLOYMENT: Properly employing air-to-air missiles involves flying skills, knowledge of the aircraft, missile, and the adversary. Proper employment means maneuvering an aircraft to arrive at a position where a missile can be fired with a high probability of success.

TACTICAL FORMATION/MUTUAL SUPPORT: In combat, several aircraft flying in proper formation can provide a higher probability of success than a single aircraft. A formation implies flying an aircraft in a position that helps another aircraft in the formation (usually through improved lookout or multiple weapon employment). A formation usually provides mutual support to survive or accomplish the mission through whatever means available.

Appendix C

MEETINGS AND NEWS RELEASES

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 366TH TACTICAL FIGHTER WING (TAC)
MOUNTAIN HOME AIR FORCE BASE, ID 83648-5000

Dear Interested Citizen

Thank you for your interest in the base realignment activities taking place at Mountain Home Air Force Base, Idaho.

To keep you abreast of what is occuring on this vital issue, we have included for your information and use, the announcement we provided to members of the news media; a fact sheet and maps on the range expansion; an exerpt from the Federal Register that announces the Air Force's intent to propose a plan for an expanded range; and a speaker's request/comment form for our scheduled scoping meetings.

Scoping meetings are scheduled for:

- Sept 5, Boise City Hall, Boise,
- Sept 6, College of Southern Idaho, Twin Falls,
- Sept 7, Glenns Ferry-Area Rural Health Clinic, Glenns Ferry, and
- Sept 11, Rimrock High School, Grandview

I hope that you will be able to attend one of our scoping meetings, but if you cannot, you can still make an input to the process by submitting the speaker's request/comment form witn any enclosures, to:

Hq TAC/DEEV
Attn: Capt. Wilfred T. Cassidy
Langley AFB VA 23665-5001

Your concerns and questions will be considered equally with those that are provided to us in the scoping meetings. We look forward to your inputs and participation.

Sincerely

STEVEN M. SOLMONSON, Capt, USAF
Chief, Public Affairs Division

6 Atch
1. Media Announcement
2. Fact Sheet
3. Roadmap
4. Range boundries map
5. Notice of Intent
6. Request/comment form

MOUNTAIN HOME AIR FORCE BASE
MEDIA ANNOUNCEMENT

WHAT: Public scoping meetings on proposed Saylor Creek Range expansion are scheduled for four Idaho cities.

WHEN: Sept. 5, 6, 7, and 11, 1989, at 7:30 p.m.

WHERE: Sept. 5, Boise City Hall, 150 N. Capitol St.
Sept. 6, Twin Falls, College of Southern Idaho, Aspen Building, 315 Falls Ave.
Sept. 7, Glenns Ferry, Area Rural Health Clinic
Sept. 11, Grandview, Rimrock High School Auditorium

WHY: To permit public comment on the Air Force's proposal to expand the Saylor Creek Tactical Range, resulting from passage of the Base Realignment and Closure Report.

WHO: U.S. Air Force and Bureau of Land Management officials are working together as cooperating agencies in the Environmental Impact Statement process. Air Force officials from Mountain Home Air Force Base, 12th Air Force at Bergstrom Air Force Base, Texas, Tactical Air Command at Langley Air Force Base, Virginia, Headquarters, U.S. Air Force, Washington, D.C., and BLM officials from Boise will be prepared to take questions and comments from the American public, as required by the National Environmental Policy Act.

HOW: Public comments and questions will form the basis for preparing a draft Environmental Impact Statement which is projected to be filed in November. After the draft EIS is filed, a public comment period is scheduled in December 1989, where further public inputs can be made on the process. The final EIS is scheduled to be filed in May 1990.

BACKGROUND: The proposed mission realignment at Mountain Home Air Force Base, as directed by the Base Realignment and Closure Report, represents a major step for the Air Force to consolidate like missions for greater effectiveness and efficiency while saving valuable tax dollars in the process.

The transfer of the 35th Tactical Training Wing and assets from George Air Force Base, Calif. will combine the air defense suppression mission of the F-4G aircraft with the tactical jamming mission of the EF-111 aircraft currently stationed at Mountain Home Air Force Base. The Base Realignment and Closure Report also directs the transfer of F-4Es from George Air Force Base.

The 94 F-4s being transferred to Mountain Home Air Force Base require air-to-ground and air-to-air training which cannot be accomodated at the current Saylor Creek Tactical Range. To meet the F-4's comprehensive training requirements, a larger training range, incorporating state-of-the-art electronic combat technology and supersonic flight is needed upon their arrival in October 1991. Additionally, the Base Realignment and Closure Report directs the Air Force to look at, and incorporate all forseeable tactical training needs in the expansion of the Saylor Creek Range.

SAYLOR CREEK BOMB RANGE EXPANSION

The recent announcement of the proposed Saylor Creek Bombing Range expansion has increased the public's awareness of Mountain Home AFB realignment plans. The Air Force is actively providing the public the latest information on both the expansion and the realignment. The proposed expanded range boundries are not "set in concrete." The final lines will be drawn only after everyone concerned has a chance to make their inputs and have their questions answered. In keeping with the NEPA (National Environmental Protection Act), four public scoping meetings will be held in Idaho to record public concerns. These meetings are tentatively scheduled for early September. They will be held at 7:30 p.m. in Boise, Twin Falls, Glenns Ferry and Grandview, Idaho.

Answers to all questions will be provided in the final Environmental Impact Statement, which will be released to the public. The Air Force is seeking to expand the range at Saylor Creek to provide for the combat training of the increased number of aircraft to be stationed at Mountain Home AFB. A range expansion project was already under consideration when the announcement was made that the Air Force plans to operate 94 F-4Es and Gs plus 23 EF-111s from the base (117 aircraft). The existing range was not large enough to meet the training requirements of the 58 F-111s assigned.

The positive economic impact is extensive. The Air Force is proposing to spend $97 million in the next three years at Mountain Home AFB for construction projects to meet the needs of the larger flying operations. The Saylor Creek Range expansion will require another $8.5 million in construction. In the next three years, the local area will gain more than $105 million in construction projects, plus 2,000 more bread-winners working at the base.

There are four areas of public impact: 1) **Land Use:** The Air Force will retain current land use as much as possible, 2) **Supersonic Flying:** The Air Force will request permanent supersonic flight clearance, 3) **Wilderness Study Areas:** Impact areas in the range avoid known or proposed WSAs, and 4) **Economic Benefits:** Many construction contracts will be let and the range operating budget increased. The Air Force will allow public access on the proposed range expansion to the maximum extent possible. We intend to continue to be the same good neighbor in the expanded range as we have for the last 47 years on the current Saylor Creek Range.

We have purposefully avoided the pristine canyon areas by three miles on either side of the rivers to ensure public recreation, so that whitewater rafting and hiking can continue. The live bomb area will be less than 20 percent of the proposed 1.4 million acre withdrawal. The Air Force's goal is to minimize restrictions on the public; maximize public safety and; develop a model joint-use land program with the public, the state of Idaho, and the BLM, that we can be proud of for generations.

Exerpt: **Federal Register**/Vol. 54, No. 155/
Monday, August 14 1989

AMENDMENT TO THE NOTICE OF INTENT (NOI) TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT FOR THE REALIGNMENT OF MOUNTAIN HOME AFB, ID

On February 8, 1989, the Department of the Air Force published a notice of intent document in the Federal Register (54 FR 6256). Please add the following:

To accommodate the move of the 35TTW and associated assets from George AFB, California to Mountain Home AFB, Idaho, additional air-to-ground gunnery range and associated airspace will be required at Saylor Creek Weapons Range. The exact size of new airspace and air-to-ground range expansion is still under study and will be included in the Mountain Home AFB, ID Realignment Environmental Impact Statement (EIS). As part of the range expansion, some lands managed by the Bureau of Land Management (BLM) will need to be withdrawn for Air Force use and some private and state lands will need to be acquired. The anticipated total acquisition will represent approximately 1,500,000 acres. Where compatible and possible, land use will remain as it is now. However, some weapons impact areas for the air-to-ground ranges will be designated sole (exclusive) Air Force use.

The proposal for additional airspace requirements includes lowering the floor of the existing military operating areas (MOAs) to 10,000 feet mean sea level (MSL) for subsonic flight training over Nevada and Oregon, and possibly extending the boundary of Paradise MOA further south. The proposal for supersonic flight operations includes the proposed Owyhee MOA and the expanded Saylor Creek Range, all in the state of Idaho. Supersonic flight operations are a desirable capability for all modern fighter aircraft. Supersonic operations and associated impacts will be evaluated within the context of the EIS for the Mountain Home AFB Realignment and Saylor Creek Expansion.

Since the EIS includes a proposed withdrawal, the Bureau of Land Management (BLM) will be a cooperating agency for the EIS. This may require BLM land use plans to be amended and updated to cover the expanded range areas. All issues involved in the range and airspace expansion will be addressed in the EIS.

The range and airspace expansion were not included in the original notice of intent because the requirements associated with these expansions were being evaluated.

We plan to hold additional scoping meetings. Specific dates and times will be announced in the local media.

Questions concerning this proposal, additional scoping, or the draft EIS may be directed to: Captain Wilfred Cassidy, HQ TAC/DEEV, Langley AFB, VA 23665-5542. Telephone (804) 764-4430.

Written comments should be submitted by August 31, 1989.

Patsy J. Conner,
Air Force Federal Register Liaison Officer
(FR Doc. 89-18941 Filed 8-11-89; 8:45 am)

News Release

United States Air Force

Public Affairs Office
Mountain Home Air Force Base, Idaho 83648-5428

366th Tactical Fighter Wing (Tactical Air Command)
(208) 828-6800 AUTOVON 857-6800

RELEASE NO. 89-09-02

Sept. 11, 1989

EXPANSION PROPOSAL

The Air Force recently conducted public scoping meetings on the proposed expansion of Saylor Creek Bombing Range. The purpose of the scoping meetings were three fold. The first purpose of the meetings were to explain the National Environmental Policy Act (NEPA) process as it applies to the Mountain Home Air Force Base realignment. The second purpose was to present the Air Force's initial proposal to expand the Saylor Creek Bombing Range, and finally, the scoping meetings gave the public an opportunity to voice their concerns and address what needs to be looked at in the draft Environmental Impact Statement (EIS).

Five years before base realignment, the Air Force realized a need to expand Saylor Creek Range to meet the needs of increasing

-more-

training requirements. The current Saylor Creek Range impact area, where only training bombs are dropped, consists of just over 12,000 acres. The current range is one of the smallest in Tactical Air Command (TAC) and its size severly restricts the way we train. Also, live ordnance is not used at the current range because it cannot be delivered safely.

Deputy Assistant Secretary of the Air Force for Environment, Safety and Health, Mr. Gary Vest, asked TAC to look at Air Force long range plans and needs for Saylor Creek. We also examined emerging weapons systems, the need to conduct supersonic flight, future aircraft beddown locations and current training requirements.

A draft range concept draft was presented to the TAC commander in December 1988. He approved the proposal and directed the TAC staff to develop a plan to expand Saylor Creek Range.

Under the original plan, we were to present the extended range proposal to the puolic next month and have the range available in 1994. But a month after the concept was approved, in January 1989, the recommendations of the Base Realignment and Closure Commission were announced. The commission recommended closing George Air Force Base, Calif., and moving all of their F-4 aircraft to Mountain Home.

This recommendation did two things to our Saylor Creek Range Expansion plan. First, it forced us to re-examine range

requirements for the arriving aircraft and secondly it accelerated the range expansion schedule. Instead of 1994, we now need the range to be available by late 1991.

The base realignment will bring 94 F-4 E and G type aircraft to Mountain Home, while 35 F-111A's currently stationed here will leave. Twenty-three EF-111A's will remain here to bring the total number of aircraft to 117 wnen the F-4s arrive. This is an increase of just over double the current number of 58 aircraft stationed at Mountain Home Air Force Base.

With a large increase in aircraft the current range must expand to meet the increased training requirements.

Last year the range provided approximately 6,000 effective range periods. Range periods are broken into 30 minute blocks, which means the range provided 3,000 effective hours of range time last year. Based upon the projected increase in aircraft and air crews to be trained at the range in the future, approximately 13,000 - 16,000 range periods will be required each year. This is just over double the current capability of the range.

In addition to the increase in range periods, the expanded range must be able to support all of the training requirements of Mountain Home Air Force Base after realignment. To cost effectively operate and train the F-4 aircrews the range needs to be located within 150 miles of Mt. Home AFB because of the F-4's smaller fuel capacity compared to the F-111A. Tne expanded range

must also allow our air crews to train as they plan to fight, with an electronic warfare threat array that will fully test their onboard equipment and skill.

Due to the secondary air-to-air combat role of the F-4s, the range and military operating areas (MOAs) must permit supersonic flight almost on a daily basis to allow our air crews to practice the tactics they will use in combat.

The Air Force wants to minimize the cost of the range and limit the impacts to private land owners and users, while allowing the greatest possible use of public land. The Air Force's goal is to have a multiple use plan that will meet our training requirements and leave most of the public unaffected.

The Air Force feels the range should be located to avoid environmentally sensitive areas and limit the impact of the airspace.

The Air Force proposal for expansion briefed at the public scoping meetings is just that, a proposal. Nothing is written in stone about range boundries or impact area locations. The Air Force has brought a concept or an idea to the public of what the range could look like. In the current concept there are five candidate target areas of which some would be designed for dropping live ordnance.

The majority of the weapons we would use are inert, or training bombs, as we currently use on the range. The areas designated for dropping training bombs only, would be operated in

much the same manner as the current operation of Saylor Creek Range. The areas used for live ordnance would be for exclusive use by the Air Force only and people would not be permitted for obvious reasons.

Under the current concept, the candidate target areas would consist of about 250,000 acres out of the proposed 1.4 million acres for the range complex. The areas outside of the impact or candidate target areas are needed for safety. Air crews can only arm live ordnance once they have reached the safety areas of the range.

An estimate of the total proposed range expansion is about 1.4 million acres which includes the current Saylor Creek Range.

Under the current concept, 1.16 million acres of public land (BLM) would be withdrawn, approximately 74,000 acres of state land would be transfered or leased, and about 10,000 acres of private land would be purchased.

With the proposal to expand the range, the military operating areas (MOA's) will continue to be joint use airspace. There is no restriction to general aviation or other aircraft from entering those areas. Restricted areas will still exist as they currently do in the areas where weapons deliveries are made. With the range expansion proposal, the MOA that lies over Nevada, what we call the Paradise MOA, changes to a small degree. The floor of that area is presently at 14,500 feet above sea level and we propose to lower the floor to 10,000 feet above sea level.

This will give us a little more space to provide a greater number of areas for air-to-air training.

The Air Force will look at any alternate proposal for the range from the public. Many comments and inputs were given during the public scoping meetings and written comments will be accepted until October 26, 1989 to be considered in the draft Environmental Impact Statement. Comment forms can be obtained by contacting the Mountain Home Air Force Base Public Affairs Office at (208)828-0800.

All written comments should be mailed to: Captain Cassidy, HQ TAC/DEEV, Langley AFB, Va. 23665.

The scoping meetings were only the first step in obtaining the concerns and ideas from the public. The Air Force has received numerous concerns and alternate ideas to the expansion of the range. They will all be considered. Public involvement in this important process is necessary.

News Release

United States Air Force

Public Affairs Office 366th Tactical Fighter Wing (Tactical Air Command)
Mountain Home Air Force Base, Idaho 83648-5428 (208) 828-6800 AUTOVON 857-6800

RELEASE NO. 89-09-08

Aug. 31, 1989

PUBLIC SCOPING MEETINGS

Air Force officials and the Bureau of Land Management are working together on the expansion to the Saylor Creek Bombing Range. They are enthusiastic about several recently submitted alternatives to modify the proposed Air Force range expansion. These recent inputs indicate the public is interested and already actively participating in the Environmental Impact Statement process. Most of the alternatives are aimed at improving the multiple use land concept and minimizing impact on public, commercial and recreational use, while still allowing the Air Force to accomplish its mission.

One citizen-rancher bombing range alternative looks at 600,000 acres in the Southwest corner of Idaho, West of the Duck Valley Indian Reservation which includes the Owyhee Canyon and the Dickshooter Ridge area.

-more-

ADD 2/2/2/2 PUBLIC SCOPING MEETINGS

A BLM alternative adds 275,000 acres to the West of the current Saylor Creek Bombing Range for the expansion. A Committee for Idaho High Desert Alternative requests the Air Force avoid 2.5 million acres in Idaho, Nevada, and Oregon that include scenic canyons and natural desert in a concept known as the Owyhee National Park.

The current Air Force proposal purposely avoids the Bruneau Jarbridge Canyon area to ensure public recreation use is not impacted. The Air Force goal in the expansion is to minimize public restrictions, maximize public safety, and develop a m[illegible]l public multiple land use program.

Each public proposal, alternative, or concern will be evaluated for its ability to meet a portion or all of the Air Forces requirements for bombing range target areas within existing environmental standards, as a way to limit impact on area residents.

The Air Force and the BLM encourage the public to attend the four scheduled scoping meetings Sept. 5-11 which is the first formal public participation point in the EIS scoping process for the range expansion. This is the best opportunity for the interested citizens to learn about Air Force requirements for the expanded range and to formally submit their suggestions and concerns.

-more-

ADD 3/3/3/3 PUBLIC SCOPING MEETINGS

Public scoping meetings will be held at:

Boise City Hall, Sept. 5 at 7:30 p.m.

Twin Falls, College of Southern Idaho, Sept. 6 at 7:30 p.m.

Glenns Ferry Medical Center, Sept. 7 at 7:30 p.m.

Grand View, Rimrock High School, Sept. 11 at 7:30 p.m.

Public oral testimony will be recorded for the record at these meetings. Written comments are encouraged. They may be submitted at the meetings or mailed into the Air Force within two weeks of the meetings. Comments should be mailed to: Captain Cassidy, HQ TAC/DEEV, Langley AFB, Va. 23665.

Information sheets and comment forms will be distributed at the meetings or can be obtained by contacting the Mountain Home AFB Public Affairs Office at (208) 828-6800.

-30-

MOUNTAIN HOME AIR FORCE BASE REALIGNMENT STUDY
SPEAKER'S REQUEST/COMMENT FORM

Name: _____

Organization/Agency: _____

Please check type of organization:

Federal Agency []; State Agency []; Local Group []; Individual[]

Mailing address: _____

_____ Telephone: _____

Check here if you wish to speak: []

Date: _____ Location: _____

Check here if you would like a copy of the draft Environmental Impact Statement: []

You may use the space below to provide a written comment. You may turn your comment in at the close of the meeting or send it to the address at the bottom of this sheet.

_____

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Mail to: HQ TAC/DEEV
Attn: Captain Wilfred T. Cassidy
Langley Air Force Base, Virginia 23665-5001

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 366TH TACTICAL FIGHTER WING (TAC)
MOUNTAIN HOME AIR FORCE BASE, ID 83648-5000

- 3 NOV 1993

Dear Concerned Citizens,

Recently, the Air Force met with a number of Idahoans regarding the proposal to expand the range capability at Mountain Home Air Force Base. The meetings included Governor Andrus, the Idaho Congressional delegation, state and local officials, the Idaho Cattlemen's Association, environmental organizations, businessmen, and representatives of the Bureau of Land Management. As a result of public input during these recent meetings and the scoping process for the Environmental Impact Statement (EIS), the Air Force, with the BLM, has adjusted the environmental impact analysis process for implementing realignment actions at Mountain Home Air Force Base and the accompanying proposal to expand the Saylor Creek Range. The purpose of this letter is to tell you about those changes. The attachment to this letter details the environmental impact analysis process for this effort.

Several points deserve special emphasis. The proposal to expand Saylor Creek Range is just that--a proposal. The process to evaluate proposals and alternatives for range capability will involve two EISs and multiple opportunities for public involvement. No decisions have been made and there cannot be any decisions until the environmental impact analysis process is complete. Even then, expansion could occur only if Congress supports it and passes laws appropriating funds and making public land available.

The F-4 aircraft assigned to George Air Force Base, California, will be sent to Mountain Home Air Force Base no matter what happens to the range proposal because the movement is required by public law. In fact, the proposal to expand range capability in southwestern Idaho is not solely for the purpose of accommodating the F-4 move. Rather, it is the culmination of an expansion initiative started by the Mountain Home based 366th Tactical Fighter Wing in 1984 because of the Saylor Creek Range's limited size and capability. The transfer of the 94 F-4s to Mountain Home Air Force Base intensifies this previously identified shortfall. In addition, intermediate Air Force requirements through the end of the 1990s and long-term requirements into the 21st century, necessitate consideration of expansion and modernization of the range capability to accommodate future Air Force needs. Because of the base closure and realignment schedules, the Tier One, or the first EIS, needs to be published soon in order to support construction of new facilities at the base. By contrast, Tier Two or the second EIS, which will analyze various approaches for expanding the range, can proceed at a more deliberate pace.

The main message from scoping was "slow down." The Air Force, with the BLM which is a cooperating federal agency, has changed the EIS process to accommodate that concern. The Air Force is heeding the predominant theme, which clearly asked for more time for Idahoans to consider and react to the Air Force's range requirements. Thus, Tier One will contain information specifically related to the movement of the aircraft and people and will establish the baseline to evaluate range capability or alternatives, including expanding the range, but it will not be used to make any decisions regarding the expansion of Saylor Creek Range. In the Tier Two EIS, specific environmental impacts will be evaluated in great detail. No range expansion decisions will be made until after completion of the Tier Two EIS.

It is essential to integrate concepts like multiple use and mitigation by avoidance into any proposals affecting land. Meeting defense needs must be done without sacrificing other important values. We pledge to participate with Idahoans in the coming months to complete a process by which everyone can fully understand the proposals, alternatives, and potential impacts. In light of this commitment, we have agreed and made public, our intentions to participate in an Idaho working group to address Saylor Creek Range issues and to assure the public is included in the proposed range expansion at every level.

We request your support of and participation in this process so that an informed decision can be made.

VICTOR C. ANDREWS
Colonel, USAF
Commander
366th Tactical Fighter Wing

MR. DELMAR D. VAIL
Idaho State Director Bureau
of Land Management

1 Atch
Environmental Impact Analysis

ENVIRONMENTAL IMPACT ANALYSIS OF THE SAYLOR CREEK RANGE PROPOSAL

The Air Force must evaluate not only the impacts of the movement of aircraft to Mountain Home Air Force Base but also the potential impacts of other associated, planned, or reasonably foreseeable activities. Such activities include the possible expansion of the Saylor Creek Range. Therefore, the Environmental Impact Statement (EIS) for the realignment of aircraft to Mountain Home Air Force Base and the Saylor Creek Range proposal must be analyzed together. To accommodate this, the EIS will be done in two tiers. "Tiering", in this case, means dealing with broad or general issues regarding the range proposal in the EIS supporting the aircraft movement (first tier), and doing another EIS (second tier) to address the specifics of range expansion.

The first tier EIS, "Tier One", in addition to evaluating the impacts of realignment actions, will identify and evaluate in general terms the potential expansion of range capability in Idaho and any reasonable alternatives available to meet training requirements. An example of other possible actions to meet training needs would be to use air-to-air refueling missions to fly the aircraft to other locations for training sorties. Air Force short term, intermediate, and long term requirements will be identified during the Tier One EIS. Tier One will contribute to a decision to either proceed with detailed studies and analysis for a range capability expansion in Idaho, or select other alternatives to meet training requirements. The Tier One EIS will also provide the initial framework (operational criteria, environmental attributes for the area, and description of environmental impacts associated with ranges) for use in the Tier Two EIS if the decision is made to pursue a range expansion option.

Thus, the Tier One EIS will:

1. Assess the impact of realignment actions on the Mountain Home Air Force Base and surrounding community,

2. Describe a set of criteria and operational requirments to be used in developing range site(s). These requirements will be stated in terms of short, intermediate, and long term training needs,

3. Assess the impact of other reasonable alternatives to the proposed range expansion (for example, air refueling missions to other ranges, temporary duty, etc),

4. Describe the existing environmental baseline and characterize the sensitivities of all areas to current land uses and proposed range activities,

5. Develop a baseline of potential environmental impacts of range operations (eg; aircraft noise, munitions effects, land use compatibility, etc),

6. Identify and assess proposals for revisions to existing Special Use Airspace, and for supersonic operations above the 5000 feet (above ground level).

The Tier One EIS will conclude with a Record of Decision. In addition to addressing the impacts of relocating the 94 F-4E/G aircraft from George AFB, a subsequent decision will be made as whether or not to proceed further with range expansion studies in a second tier.

If a decision is made to continue the process, the Tier Two EIS will include proposals and alternatives developed with inputs from all affected parties. These alternatives and proposals will be made available to the public at large at least thirty days before scoping meetings. The Air Force will participate in a citizen/government work group being developed by the BLM. This work group will help identify alternatives and ensure all public concerns are addressed. Such site specific alternatives would be evaluated during the Tier Two EIS. The subjects to be evaluated in Tier Two will evolve through a public process. The main objective of that process will be to determine how the needs and requirements of all parties can be accommodated.

The Tier One EIS will be completed in June 1990. The Air Force plans to start preparation of the Tier Two EIS in the spring of 1990. The working group process will be conducted in parallel to Tier One and will develop proposals and alternatives to be evaluated in Tier Two to meet short, intermediate, and long term Air Force requirements.

Tier Two will be a complete EIS process. It will include a Notice of Intent, Public Scoping, public review and comment on a Draft EIS, and a filing of a Final EIS with the EPA, followed by a Record of Decision.

The Air Force needs public comment, participation, and cooperation. The Air Force is sensitive to the full spectrum of land users, be they cattlemen, sportsmen, recreational interests, or concerned citizens. The Air Force, while desirous of meeting its training needs, is committed to maximum compatible uses of these national resources.

Appendix D

ISSUES RAISED DURING SCOPING MEETINGS

Appendix D

LIST AND TALLY OF ISSUES RAISED AT SCOPING MEETINGS

	Issue	Scoping Meeting				
		Boise 9/5/89	Twin Falls 9/6/89	Glens Ferry 9/7/89	Grand View 9/11/89	Total
1	Impacts from Supersonic Aircraft	22	9	12	8	51
2	Impacts on Recreation (quality, quantity)	19	10	5	7	41
3	Size of Expansion	16	10	7	8	41
4	Impacts to Ranching and Cattle Grazing	19	13	3	5	40
5	AF Scoping Procedure (hiding info, tardiness)	22	9	1	3	35
6	Impacts on Wildlife	14	10	5	4	33
7	Live Ordnance (physical destruction)	12	10	4	6	32
8	Incompatible with Multiple Use Objectives	9	5		12	26
9	EIS Schedule	15	3	2	3	23
10	Fire Hazard	7	5	6	5	23
11	Quality of Life	12	3	6	2	23
12	Use of Existing Bombing Ranges Alternative	8	5	5	3	21
13	Support Defence Program / Need for Expansion	7	9		2	18
14	Impacts from Low-level Aircraft	6	4	4	1	15
15	Public Safety (radiation, lasers, health)	6	5	3	1	15
16	Negative Political Opinions	5	5	4		14
17	Direct Involvement of BLM, Fish & Game in EIS	10			3	13
18	Tax Base / Fiscal Impacts			2	11	13
19	Compensation to Ranchers	3	2	1	6	12
20	Public Airspace Impacts / FAA Involvement	8	3	1		12
21	Impact on Hunting & Fishing (access)	7	2	2		11
22	Water Resources / Water Rights	5	4		2	11
23	Following NEPA Procedure	3	5			8
24	Impact on Visual Resources	5		1	1	7
25	Impacts on Geology (canyons)		3	1	2	6
26	Impacts on Tourism / Land Values	2	3	1		6
27	Impacts on Agriculture and Croplands		3	1	1	5
28	Impacts on Transportation		2	1	2	5
29	Positive Comments Toward Project		2	2	1	5
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Appendix E

LAND WITHDRAWAL PROCESS

Appendix E

Land Withdrawal Process

Land Withdrawal

Any major expansion of the Saylor Creek Range (SCR) would require public land presently managed by the Bureau of Land Management (BLM). After suitable zones are identified in the Tier 2 environmental impact statement (EIS), the Air Force would proceed with actions to withdraw the required public lands. The principal laws applicable to land withdrawal are the Federal Land Policy and Management Act of 1976 (FLPMA) (43 USC 1701 et seq.) and the Engle Act (43 USC 155 et seq.). The Engle Act requires an Act of Congress to withdraw more than 5,000 total acres for any one project planned by the Department of Defense (DOD).

The Air Force would submit its application to BLM to withdraw all the public land required for range expansion. In accordance with FLPMA and the Engle Act, the withdrawal application would include a description of the required lands based on site-specific surveys of the lands required initially and a general description of all other land requirements based on information from tentative site locations plotted on maps with appropriate scales. The Idaho State Director of BLM would evaluate the withdrawal application and provide recommendations to the Director of BLM in accordance with 43 CFR 2300. The Director would submit his recommendations to the Secretary of the Interior. A notice of the filing of an application would be published in the *Federal Register* within 30 days of receipt of the withdrawal application by BLM. The notice would identify the public lands the Air Force has requested for withdrawal. At the time the application is filed, these public lands may be segregated from settlement, sale, location, or entry under the public land laws, including the general mining and mineral leasing laws, until final action on the withdrawal application is taken. Segregation of the land cannot exceed two years. The withdrawal application does not authorize use of any public land by the Air Force before the necessary legislation is enacted and use is authorized by BLM. All leases, permits, and other existing uses authorized by the BLM would continue in effect during the period of segregation. Upon notice in the *Federal Register*, the withdrawal application would be available for public comment. At the completion of the public comment period, BLM would prepare required reports with recommendations and forward the application through the Director, BLM, to the Secretary of the Interior. The Secretary would submit the application and the withdrawal legislation through the Office of Management and Budget to Congress. A land-use management plan with withdrawn lands and other public land within the deployment area(s) would accompany the proposed legislation.

The proposed legislation, if enacted, would withdraw public land required for the system. The legislation would also authorize sequential releases of withdrawn land by the Department of the Interior for the balance of the project as site-specific field analysis is completed (tiered decision). The proposed legislation would acknowledge that the withdrawal would be subject to change after detailed site-specific surveys are completed. This enabling legislation would grant the DOI the authority to alter site locations within the suitable zones described in the EIS. It is also intended to authorize the Secretary of the Interior to issue public land orders immediately for initial land requirements. The balance of the land would be released incrementally, as it is identified, during tiered decisionmaking, described in section 1.1.3. This withdrawal legislation would define the process to be used to identify and withdraw subsequent parcels of public land together with the terms and conditions necessary to implement the project.

Following enactment of the necessary legislation, the Secretary of the Interior will issue incremental public land orders, defined during the tiering process, to support the schedule.

Rights-of-Way

In addition to the public land withdrawn for exclusive Air Force use, some public land would be required for rights-of-way. Permanent rights-of-way are required for wells, roads, utilities, and communication lines; temporary rights-of-way are required for construction camps, road construction, storage areas, and other temporary uses supporting project construction; and free use permits for construction-material sites. Small portions of rights-of-way, such as power substations, may be fenced. To the extent practical, the Air Force would locate roads, communication lines, and utilities within the same right-of-way corridor. All system rights-of-way would be identified and shown on maps filed at the same time the land withdrawal application is filed with the BLM. Initial rights-of-way would be granted by the BLM when the withdrawal is approved by Congress. Subsequent rights-of-way would be granted as they are located and evaluated in the decision tier of that portion of the system to which they are linked. The sites would be analyzed to determine potential mitigations for any adverse environmental impacts and for practical construction considerations. The use authorizations would be granted by the Idaho office of the BLM using existing procedures. Use authorizations would be granted only after enactment of the withdrawal legislation described above.

Rights-of-way would also be required to provide motor vehicle access between the SCR and existing railroads, power lines, and highways. These rights-of-way may be new or modifications to existing ones. Some of these rights-of-way may be obtained by power companies or states for power and defense activities.

Land Acquisition

The Air Force may also acquire private and state-owned property rights, as necessary to meet deployment requirements.[1] If so, the estimated acquisition cost for such lands will be included in the appropriate fiscal year military construction program, as required by construction phases. Subsequent to the enactment of the Military Construction Authorization and Appropriation Acts, the Air Force would direct the Army Corps of Engineers, as the agent of the Air Force, to acquire the necessary private property. Land acquisition would be accomplished according to current laws and regulations.

Policies and procedures for acquiring real property are contained in Air Force Regulation 87-1 and the Corps of Engineers pamphlet 405-1-2. Title searches would be made to determine who owns and has rights in the land. Legal descriptions and maps reflecting the extent of the acquisition would be completed for each ownership in the study area. Appraisals estimating the value of compensable interest in both public and private lands would be prepared by qualified staff or contract real estate/mineral appraisers familiar with the local area and market conditions.

Every effort would be made to acquire privately owned lands and rights therein as well as valid private interests in the public lands through negotiated settlement. The appraised value of each individual tract would be the basis for the government's initial offer to the owner. If an agreement is reached, a deed or other conveyancing document is executed, recorded, and the owner is paid. If negotiated agreement cannot be reached or if clear title cannot be conveyed, the Department of Justice may file an eminent domain action in the federal court having jurisdiction over the area. The Air Force would request the court to grant immediate possession of the property when required to support scheduled construction. The title to the land interest is acquired by the government on the date of filing and concurrent deposit of a check in the amount of the appraised value in the federal court. The landowner may, with the permission of the court (which is normally granted), withdraw most or all of the deposit and use the money. When a final determination of compensation is made, a judgment is signed by the court and the remainder of the compensation, if any, is paid to the owner, together with interest on amounts over and above the deposit.

When public domain land is available, the Air Force would avoid the use of private property to the extent possible. Private property that is required would be selected and used so as to mitigate environmental impacts. Moreover, the selection of specific siting would be accomplished to minimize impacts on adjacent land uses.

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1. For more detailed information on the land acquisition process, see "A Procedural Guide for the Acquisition of Real Property by Government Agencies," Department of Justice.

The acquisition of private property would be judged by the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646; 84 Stat. 1894; 42 USC 4610 et seq.). Some of these are:

- The fair market value of the acquired real estate would be developed by a qualified professional appraiser. The owner or his designated representative would be given an opportunity to accompany the appraiser during his inspection of the property.

- Every reasonable effort would be made to acquire privately owned real property expeditiously by negotiation.

- The owner would be offered the full amount established as just compensation. In no event would this amount be less than the Government's approved, appraised market value of the property. The owner would be provided with a written statement of the amount established as just compensation and a summary of the basis for establishing it.

- The owner of real property would be paid the agreed purchase price, or a deposit of the full appraised value would be made with the court for his benefit, before the Government would take possession of the property.

- The date of possession by the Government would be scheduled to the greatest extent practical to give the owner at least 90 days advance written notice to move.

- If the acquisition of a portion of an ownership would leave the owner with an uneconomic remnant, an offer would be made to acquire the entire ownership.

For those ownerships to be acquired where relocation would be required, relocation assistance is available in accordance with Title II of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. This law provides for uniform and equitable treatment of persons displaced from their homes, businesses, or farms. All persons to be displaced would be fully advised as to the relocation benefits. These benefits are intended to reduce hardships and are entirely separate from, and in addition to, the price paid for the property acquired. In general, the law seeks to reimburse all persons displaced from dwellings, businesses, or farms for reasonable moving expenses and to provide them with housing at least equal to that which they were required to vacate.

Qualified owners and tenants displaced from their homes are entitled to reimbursements for reasonable expenses in moving to replacement housing. Supplemental housing payments to tenants and owners are authorized to secure adequate leased or purchased replacement housing. Payments of

incidental expenses to purchase replacement housing is also authorized. In general, the law seeks to provide displaced persons with housing at least equal to that which they are required to vacate. Persons living in substandard housing would be assisted in moving into housing meeting minimum standards with respect to decency, safety, and sanitation.

Business owners, including farmers and ranchers, are entitled to reimbursement of expenses incurred in searching for and moving to replacement location. In lieu of actual reasonable moving and related expenses, an owner may elect to receive a payment equalling the overall net annual business earnings. In addition, individuals and organizations that have incurred costs as a result of improvements will be reimbursed based on a formal valuation of the improvements.

Appendix F

IMPACTS OF AIRCRAFT NOISE ON PEOPLE

Appendix F - Impacts of Aircraft Noise on People

The impacts of aircraft noise on human health were summarized in an EIS prepared by the Air Force regarding the proposed beddown of F-15E aircraft at Seymour Johnson AFB, North Carolina (USAF 1988). The following discussion is excerpted from that EIS.

The effect of noise on human health can generally be divided into three categories: physiological, behavioral, and subjective. The primary physiological concern with noise is hearing loss. Other physiological concerns have been included as nonauditory effects. Table F-1 lists the common noise-related terms and definitions.

1.0 HEARING LOSS

Considerable data on hearing loss have been collected and analyzed. It has been well established that continuous exposure to high noise levels will damage human hearing (EPA 1978). Hearing loss is generally interpreted as the shifting of a higher sound level of the ear's sensitivity or acuity to perceive sound. This change can either be temporary (TTS -- temporary threshold shift) or permanent (PTS -- permanent threshold shift) (Newman and Beattie 1985).

The EPA has set 75 dBA for an 8-hour exposure and 70 dBA for a 24-hour exposure as the average noise level standard requisite to protect 96 percent of the population from greater than a 5-dB PTS (Science Applications, Inc. 1980). While these standards have relevancy for planning, they in themselves are not necessarily appropriate land use planning criteria for controlling noise sources because they do not consider cost, feasibility, or the development needs of the community. The results of the three known studies on community hearing loss from exposure to aircraft flyovers near airports showed that there is no danger (under normal circumstances) of hearing loss due to aircraft noise (Newman and Beattie 1985). Individuals in two of the tests were exposed to a maximum level of 111 dBA over 6-hour periods at a flyover rate of 40 events per hour.

2.0 NONAUDITORY EFFECTS

Studies have been produced to determine whether correlations exist between noise exposure and cardiovascular problems, achievement scores, birth weight, mortality rates, and psychiatric admissions. The nonauditory effect on humans of noise is not as easily proven as the effect on hearing. The results of studies done in the United States primarily concentrating on cardiovascular response to noise have been contradictory (USAF 1985).

Table F-1

DEFINITION OF NOISE-RELATED TERMS

Term	*Definition of Noise-Related Terms*
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Sound Exposure Level (SEL)	A single-event measure of the amount of noise energy from a source, normalized to one second of time. SEL measurements tend to be higher than single peak measurements because the energy is compressed into the one second time period.[1]
Day-night noise level (L_{dn})	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 2200 and 0700 hours. In general, an L_{dn} value of 65 dB is the noise level at which residential land use compatibility becomes questionable for structures with average or below average acoustic insulation.
L_{dnmr}	The onset-rate adjusted monthly day-night average A-weighted sound level. This metric was developed by the Armstrong Aerospace Medical Research Laboratory.
Equivalent noise level (L_{eq})	The average A-weighted noise level during (dBA) a 24-hour day, obtained after addition of 5 decibels to levels in the evening from 1900 to 2200 hours and after addition of 10 decibels to sound levels in the night between 2200 and 0700 hours.
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.

Note: 1. In general, SEL values diminish with increased altitude of an aircraft. However, with increasing horizontal distance from flight centerline, a noise receptor may experience lower SEL values from aircraft f[illegible]t lower altitudes, due to the greater attenuation of the noise energy. Thus, for more distant flights, noise im[illegible]acts may actually increase as flight altitude is increased.

Cantrell (1976) concluded that the results of human and animal experiments show that average or intrusive noise can act as a stress-provoking stimulus. Prolonged stress is known to be a contributor to a number of health disorders. Kryter (1980) states, "It is more likely that noise-related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body. The psychological stresses may cause a physiological stress reaction that could result in impaired health."

The National Institute for Occupational Safety and Health and the EPA commissioned the Committee on Hearing, Bioacoustics, and Biomechanics (CHABA) to study the question of whether established noise standards were adequate to protect against health disorders other than hearing defects. CHABA's conclusion was that "evidence from available research reports is suggestive, but it does not provide definitive answers to the question of health effects, other than to the auditory system, of long-term exposure to noise. It seems prudent, therefore, in the absence of adequate knowledge as to whether or not noise can produce effects upon health other than damage to the auditory system, either directly or mediated through stress, that insofar as feasible, an attempt should be made to obtain more critical evidence." CHABA also reported that "many of the available foreign studies could be criticized on a methodological basis (studies were not adequately controlled for other known risk factors)."

3.0 SPEECH INTERFERENCE

One of the most obvious effects of aircraft noise intrusion is speech interference. The disruption of leisure activities such as listening to the radio, television, music, and conversation is a primary source of annoyance, giving rise to frustration and irritation. In some situations, a high degree of intelligibility is essential to safety.

The frequency spectrum of speech covers the range from 100 to 6,000 Hz. The intensity level variation of successive sounds is equal to 30 dB. Speech is an acoustic signal characterized by rapid fluctuations in sound level and frequency pattern. It is essential for optimum speech intelligibility to recognize these continually shifting sound patterns. Not only does noise diminish the ability to perceive the auditory signal, but it also reduces a listener's ability to follow the pattern of signal fluctuation.

4.0 SLEEP INTERFERENCE

Sleep is not a continuous, uniform condition but a complex series of states through which the brain progresses in a cyclical pattern. There are basically five stages of sleep. Arousal from sleep is a function of a number of factors that include (1) age, (2) sex, (3) sleep stage, (4) noise level, (5) frequency of noise occurrences, (6) noise quality, and (7) presleep activity. Since there are extreme

differences in the physiology, behavior, habitation, and adaptation to noise of individuals, few studies have attempted to establish noise criterion levels for sleep disturbance.

Some conclusions on the major determinants of human sleep response to noise drawn by [illegible]as (1972) include:

1. Children 5 to 8 years of age are generally unaffected by noise during sleep.

2. Older people are more sensitive to sleep disturbance than younger people.

3. Women are more sensitive to noise than men.

4. Within their own age group, there is a wide variation in the sensitivity of individuals to noise.

5. Sleep arousal is directly proportional to the sound intensity of aircraft flyover.

While there have been several investigations done to assess the effect of aircraft noise on sleep, none has produced quantitative dose-response relationships in terms of noise exposure level, L_{dn}, and sleep disturbance. Noise-sleep disturbance relationships have been developed based on single-event noise exposure.

The FAA has concluded from its research that "... the physiological annoyance from the effects of sleep interference due to aircraft noise is probably more significant than the direct physiological consequences..." (Newman and Beattie 1985). The effects of noise on sleep are not completely understood. There have been few studies done on the short- and long-term after-effects such as psychological and physiological disorders or task performance degradation during periods following sleep disturbance. Reasonable quality sleep is a requisite for good health.

5.0 PERFORMANCE EFFECTS

The effect of noise on the performance of activities or tasks has been the subject of many studies. Some of these studies have established links between continuous high noise levels and performance loss. Noise-induced performance losses are most frequently reported in those studies employing noise levels in excess of 85 dBA. Little change has been found in low-noise cases. It has been cited that moderate noise levels appear to act as a stressor for more sensitive individuals performing a difficult psychomotor task.

The general effect of noise on performance is just beginning to be suggested from research studies (USAF 1985). The results have yet to yield definitive criteria with respect to the effect of periodic aircraft noise on performance. Several general trends that have developed are:

- o A periodic intermittent noise is more likely to disrupt performance than a steady-state continuous noise of the same level. Flyover noise, due to its intermittent nature, might be more likely to disrupt performance than a steady-state noise of equal level.
- o Noise is more inclined to affect the quality than the quantity of work.
- o Noise is more likely to impair the performance of tasks that place extreme demands on the worker.

Annoyance is the primary consequence of aircraft noise. The subjective impression of noise and the disturbance of activities are believed to contribute significantly to the general annoyance response. The feeling of annoyance is a complex response and when considered on an individual basis displays a wide availability for a given noise level. Research studies have found greater correlation by examining aggregate community annoyance to noise (Newman and Beattie 1985).

A number of nonacoustic factors have been identified that may influence the annoyance response of an individual. Newman and Beattie (1985) divided these factors into emotional and physical variables:

Emotional Variables

- o Feelings about the necessity or preventability of the noise.
- o Judgment of the importance and value of the activity that is producing the noise.
- o Activity at the time an individual hears the noise.
- o Attitude about the environment.
- o General sensitivity to noise.
- o Belief about the effect of noise on health.
- o Feeling of fear associated with the noise.

Physical Variables

- o Type of neighborhood.

- o Time of day.
- o Season.
- o Predictability of noise.
- o Control over the noise source.
- o Length of time an individual is exposed to a noise.

Most of the existing measures of community response to aircraft noise are based on the premise that the degree of annoyance experienced by a community as a whole can be adequately predicted by acoustic models. It has been found that in any community there will be a given percentage of the population highly annoyed, a given percentage mildly annoyed, and some who will not be annoyed at all (Newman and Beattie 1985). "The underlying assumption is that noise-exposed populations will experience similar reactions of annoyance when exposed to equivalent levels of noise" (SAIC 1985).

6.0 SONIC BOOMS

Sonic booms generated by supersonic flight activity at or above 5,000 feet AGL would typically result in peak overpressure on the ground in the range of 0.5 psf to 2.0 psf. The probability of structural damage from overpressures of this magnitude is described in Table F-2.

Table F-2

Structural Damage Caused by Sonic Booms from Mid-Altitude (>5,000 feet AGL) Aircraft
(Overpressures Range from 0.5 psf to 2.0 psf)

Structural Element	*Failure Pattern*
Windows	Probability of failure in the range from 0.5 percent to 10^{-8} percent; glass is rarely shattered; occasional extension of existing cracks in glass.
Ceiling plaster	Probability of failure in the range from 10 percent to 10^{-6} percent; damage usually consists of extension of existing hairline cracks.
Outside walls and roof	Probability of failure for free-standing brick walls in the range of 0.1 percent.

Appendix G

INITIAL BACKGROUND DATA FOR A CLASS I CULTURAL RESOURCES OVERVIEW AND INITIAL DEVELOPMENT OF A PROGRAMMATIC AGREEMENT

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1.0 INTRODUCTION

This cultural resources appendix serves three purposes: (1) to support and augment data and analyses described in sections M3.5, M4.5, S3.5 and M4.5 of the EIS; (2) to form the preliminary foundation for a Class I cultural resources overview for the portions of southwestern Idaho considered in the EIS; and (3) to provide an initial outline of the tasks, processes, and stipulations expected to be incorporated into the Programmatic Agreement (PA) and Cultural Resources Management Plan (CRMP) that will guide mitigation of impacts resulting from base realignment and the proposed expanded range capability. By fulfilling these objectives, this appendix represents an important initial step toward completing tasks that would be required for the Tier 2 EIS site-specific studies.

The appendix consists of two major sections. The first provides a preliminary outline of a Class I overview for the study areas. Although Gehr et al. (1982) completed an overview that encompassed the study areas, substantially more information on the nature and distribution of cultural resources is currently available. The second major section of the appendix describes the PA and CRMP in greater detail than offered in sections M4.5 and S4.5.

2.0 CLASS I OVERVIEW

2.1 STUDY ORIENTATION

2.1.1 Study Area

The study areas considered in this overview include most of southwestern Idaho as well as portions of southeastern Oregon, and northwestern Nevada. However, the study focuses on the ROIs defined for MHAFB realignment and the proposed expanded range capability (see sections M3.5.2 and S3.5.2). These ROIs encompass most of Owyhee County and a small portion of Elmore County. The primary MHAFB study area contains approximately 18,000 acres, whereas the primary study area for the proposed expanded range capability includes roughly 3.5 million acres.

2.1.2 Definition of Resource

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts and other evidence of human use. These resources can be divided into four major categories: prehistoric archaeological resources, historic resources, architectural resources, and Native American resources. Section M3.5.1 in the body of the EIS thoroughly describes these resource categories.

2.1.3 Data Sources

The primary data sources used in the preparation of this study consist of reports, records and maps housed at the Idaho State Historic Presevation Office and Idaho Historical Society in Boise, and those records maintained by the BLM, Boise District. Examination of these data sources focused on four goals: (1) to identify the location and extent of cultural resource surveys and investigations within the study areas; (2) to determine the distribution and nature of cultural resources within these areas; (3) to identify documented architectural and Native American resources within the study areas; and (4) to review the available reports and monographs pertinent to the cultural resources within the study areas. In addition, researchers knowledgeable about the cultural resources of the area were consulted to augment and refine the data derived from the sources described above. Interviews with Patty McGrath of the Elmore County Historical Foundation; Margeret Wyatt, Frank Jenks, and Jack Young of the Boise District BLM; and Dale Gray, Owyhee County Historical Preservation Officer also yielded useful data.

2.2 REGIONAL PREHISTORY

Archaeologists (Aikens et al. 1977; Butler 1978) have attempted to apply broad chronologies developed in surrounding areas to southwestern Idaho; none satisfactorily link temporal changes in technology or subsistence and settlement patterns to the available evidence from the region (cf. Meatte 1989; Gehr et al. 1982). In contrast, Plew (1980), Meatte (1989), and Gehr et al. (1982) used data from southwestern Idaho to propose regionally specific cultural sequences, each developed from a different theoretical perspective. Additionally, each chronology employs different sources of data, but most data derive from surface characterizations of sites. As Ames (1982) suggests, the lack of site excavation in the area requires that these chronologies be considered preliminary. Because none of these chronologies is more "correct," the following briefly presents all three in order to provide a general framework for regional prehistory. Figure G-1 depicts the three chronologies described below.

Based on an extensive survey, but limited excavation in the Owyhee Uplands, Plew (1980) defined four phases (Camas Creek I-IV) spanning the period from 6000 B.P. to historic contact. This chronological scheme was developed by correlating projectile point types recovered from sites in the Owyhee Uplands to types recovered from radiocarbon-dated contexts in the Great Basin and from Nahas Cave, located in the Owyhee Uplands. The phases identified by Plew denote changes in projectile point morphology accompanied by the addition of new tool types (e.g., groundstone) in archaeological assemblages. This chronology for the Owyhee Uplands suggests that a basic Archaic hunting and gathering subsistence system operated throughout the past 6,000 years.

No sites in the area yielded evidence of occupations predating 6000 B.P.; this lack of evidence potentially reflects the paucity of archaeological excavations rather than limits on the antiquity of

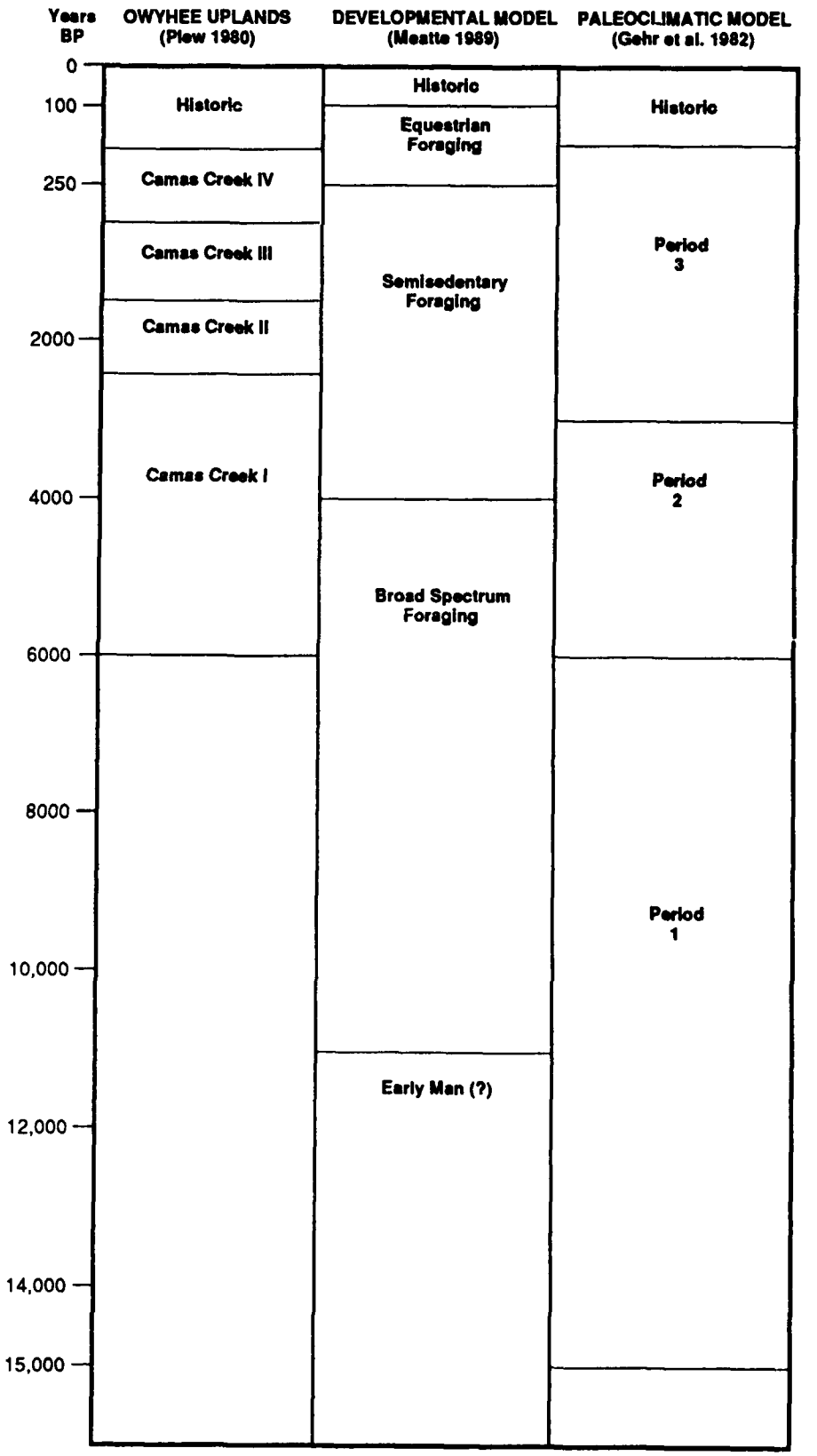


Figure G-1

CULTURAL CHRONOLOGIES

prehistoric use of the area. For the remainder of this chronological sequence, Plew (1980) posited low-intensity use of the area for hunting during the Camas Creek I phase. The dominance of small lithic scatters and the lack of campsites in this phase suggest that short-duration resource (i.e., game) procurement formed the primary activity conducted in the area. Although low-intensity use and hunting activities also characterized the Camas Creek II phase, limited numbers of tools indicative of other activities (i.e., plant food processing, tool manufacture and maintenance) reflect increased duration of site use and the development of temporary camps. A tentative correlation between such sites and water sources potentially implies a greater need to support groups for longer periods of time. Intensification and diversification of resource exploitation and settlement marked the Camas Creek III phase. Intense seasonal use of smaller drainages for resource procurement, represented by a broad range of site types, indicates a florescence of settlement and subsistence during this phase. Artifacts at the sites reflect a balanced economy of hunting and plant food gathering. Winter campsites, located in major drainages, imply longer duration use of the area and possibly a semi-sedentary settlement system. The Camas Creek IV phase is characterized by settlement and subsistence patterns similar to those noted for the previous phase, although there appears to have been a significant reduction in the use of the area.

Meatte (1989), using a model first developed by Schalk and Cleveland (1983), offers a three-stage chronology for the region based on changes in settlement and subsistence defined through archaeological investigations. In this chronology, Meatte contends that the first evidence of use of the region dates to 11,500 B.P. From this point to approximately 4200 B.P., small, mobile groups defined as *broad spectrum foragers* occupied the region using a small range of tools to exploit diverse food resources. For the period spanning 4200 to 250 B.P., Meatte identifies a settlement and subsistence system characterized by *semisedentary foraging*. During this stage, larger groups occupied riverine villages during the winter months, relying on stored foods collected throughout the remainder of the year. Diverse tool assemblages, semisubterranean dwellings (i.e., pithouses), and a greater reliance on salmon represent the indicators of this period. As its designation implies, the last period defined as *equestrian foraging*, involved intensive use of horses, permitting a dramatic increase in the efficiency and range of resource procurement activities.

Gehr et al. (1982), in an overview of the cultural resources in an area encompassing most of southwestern Idaho, used changes in projectile point styles coupled with climatic patterns to define three broad chronological periods. The three periods in this chronology corresponds directly to paleoclimatic episodes (see Figure G-2) adopted for the region by Gehr et al. (1982). Derived from Antev's (1948) model and supported by more recent studies (Mehringer 1977), the episodes reflect general climatic trends as compared to present conditions. Although this model provides broad climatic trends for a large region, great variation in local climatic conditions and microenvironments undoubtedly occurred and, in turn, resulted in an array of human behavioral responses. Cooler and moister conditions characterized most of Period 1, which corresponds to the Anathermal climatic

	YEARS BP	CLIMATE RELATIVE TO PRESENT	DOMINANT FLORA	DOMINANT FAUNA
ANATHERMAL	15,000 - 10,500	cool, moist	Steppe shrub	Large Mammals camel musk ox sloth bison deer sheep antelope
	10,500 - 7000	warm, moist	coniferous forest grassland prairie	
ALTITHERMAL	7000 - 3000	warm, dry	steppe shrub	Small Mammals & bison antelope deer sheep
	Mazama Eruption			
MEDITHERMAL	3000 - 1000	cool, moist	grassland prairie	Small Mammals & bison antelope deer sheep
	1000 - 700	warm, dry	steppe shrub	
	700 - 400	cool, moist	grassland prairie	
	400 - present	warm, dry	steppe shrub	

Source: from Gehr et al. 1982

Figure G-2

PROPOSED PALEOCLIMATIC SEQUENCE FOR THE LATE PLEISTOCENE AND HOLOCENE

episode. An the outset of this period, a periglacial environment covered most of the study area. Gehr et al. (1982) postulate that very small, mobile groups occupied the area, hunting large game. These groups left very limited evidence of their presence and some doubts exist regarding human occupation in southwestern Idaho before 12,000 B.P. In the latter portion of Period 1 (post-10,000 B.P.), Gehr et al. (1982) posit a gradual warming and drying trend that coincided with the extinction of many large game species. Although still composed of small, mobile groups, the population of the area began to exploit a wider range of resources and to use different environmental settings.

Warmer and probably drier climatic conditions (Altithermal episode) characterized Period 2, according to Gehr et al. (1982). From the available information, these researchers infer that such conditions required the human inhabitants of the region to focus settlement and subsistence activities around stable or predictable water sources, especially along the rivers. Larger campsites dating to this period occur in these locations. In contrast, the uplands and broad plains received use as resource exploitation locales. Site assemblages during this period reflect use of diverse resources, possibly as a result of the effects of the climatic conditions.

Period 3, associated with a climate (Medithermal episode) similar to the present, was characterized by development of a semi-sedentary settlement pattern with larger habitation sites along major rivers and specialized resource procurement sites in the uplands.

2.3 ETHNOGRAPHY

In 1811, when the first Euroamericans traveled through southwestern Idaho, the Western Shoshone and Northern Paiutes occupied the region. By this time, horses, acquired from aboriginal groups in contact with the Spanish in the southwestern United States, had been present in Idaho since 1700 A.D. Some researchers (Gehr et al. 1982; Young 1984) contend that the first explorers and trappers in the region observed and reported an aboriginal culture unaffected by the introduction of the horse. However, the Euroamericans observed only a small segment of the cultural system, resulting in biased sketches of aboriginal life. Trained ethnographers such as Steward and Stewart conducted rigorous and systematic inquiries, but performed their studies in the 1930s and 1940s using informants whose culture had been dramatically altered for more than 50 years. Therefore, the available ethnographic data provides a limited and biased understanding of aboriginal culture in the region

The Western Shoshone and Northern Paiutes represent two distinct linguistic populations, not tribes or political entities (Meatte 1989; Gehr et al. 1982; Young 1984). Although each spoke a different language, both groups belong to the larger Numic language family. The data suggest that the territories of these two groups overlapped in southwestern Idaho, with the territory of the Western Shoshone extending westward and that of the Northern Paiute extending eastward.

Despite these differences, the Western Shoshone and Northern Paiute employed similar tool assemblages, sociopolitical organization, religious practices and subsistence systems. Gehr et al. (1982) provide a comprehensive discussion of the ethnographic information on subsistence and settlement systems. Table G-1 briefly summarizes this information.

2.4 REGIONAL HISTORY

The historic period for the region began in 1811 when members of Astor's "Pacific Fur Company" followed the Snake River to the west. Although the expedition remained close to the Snake River, a small party reportedly camped at an unknown location along Canyon Creek, which flows approximately 2.5 miles west of MHAFB (Moe et al. 1980).

The Astor expedition ushered in the era of fur trapping that continued in the region until 1839. During this period, parties led by McKenzie (1817 to 1821), Ross (1824), and Ogden (1825) trapped within the region centered around the Snake. Notably, Ross trapped the Salmon Falls-Hagerman Valley area located 50 miles east of MHAFB (Moe et al. 1980). In 1832 and 1833, Wyeth also traveled along the Snake River en route to the Columbia River. He established a supply post at Fort Hall, located near Pocatello. Captain Bonneville, leading a trapping and exploring expedition in 1833, possibly crossed through the SCR en route to the Bruneau River. By the end of the 1830s, competition among fur companies had resulted in a severe decline in the beaver population and a concomitant reduction in trapping. Accounts of the expeditions suggest that the trappers concentrated most of their efforts along and near the Snake River, and in areas well away from the ROI. While the trappers possibly ventured along tributaries of the river, no accounts or remains document use of the ROI during this period.

In 1836, the Whitman-Spalding missionary party followed the same route along the Snake River as the earlier trappers, ushering in the era of westward migration (Hutchison and Jones 1989). By 1843, this route along the north and south sides of the river had become firmly established as the Oregon Trail. Throughout the remainder of the 1840s and into the 1850s, thousands of wagons and pioneers used this trail. Despite intensive use of the trail, little settlement had occurred within the region.

Discovery of gold in the Owyhees and Boise Basin in the 1860s provided the stimulus for settlement. This discovery spurred a rapid population increase and development of boom towns such as Centerville, Ruby City, and Silver City. It also promoted the growth of Boise as a major urban center along the Oregon Trail. Population growth and settlement centered around the mines in the Owyhees and Boise Basin, although miners undoubtedly explored and prospected in new territory. Freight roads and stage lines, linking southwestern Idaho to California, Nevada, and the Plains, were developed during the mining era. This era continued through the 1870s, providing the foundations for Idaho's statehood in 1890.

Table G-1

SUMMARY OF ETHNOGRAPHIC SUBSISTENCE AND SETTLEMENT SYSTEMS

Season	*Subsistence Activity/Location*	*Settlement Characteristics*
Winter	Limited hunting/Snake River and main tributaries	Villages with small populations along major rivers
	Use of stored foods/Snake River and main tributaries	Villages with small populations along major rivers
Spring	Plant food collecting/Snake River and main tributaries; low hills and valleys of uplands	Small family groups out of village or small groups at temporary camps for more remote resources
	Salmon fishing/Snake River and main tributaries	Multifamily groups out of villages or at temporary fishing camps
	Limited hunting/Snake River and main tributaries, nearby uplands	Small task groups out of villages or temporary camps
Summer	Plant food collecting/upland valleys and plains	Small family groups out of temporary camps
	Salmon fishing/Snake River and main tributaries	Same as in Spring
	Limited hunting/associated with location of family or task group	Same as in Spring
Fall	Hunting/uplands valleys, plains, and drainages	Small task groups out of temporary camps
	Salmon fishing/Snake River and main tributaries	Same as in Spring

To provide food to the mining communities, sheep and cattle ranching as well as agriculture developed in the region. Most of the ranching and farming operations clustered in the more fertile, well-watered locations, but the upland plains provided extensive grazing areas. As the need for food increased with the population of the mining areas, ranching operations grew and extended into more remote portions of the southwestern Idaho. The need to link the farms and ranches to the mines stimulated creation of a network of roads in the region.

Initially, Native Americans in the region responded to the influx of population and growth of settlements by retreating to more remote portions of southwestern Idaho, or clustering around and trading with the settlements (Gehr et al. 1982). Although isolated attacks on emigrants occurred in the late 1840s through the 1850s, hostilities were limited. However, the settlement and expansion stimulated by mining, forced groups of Native Americans to occupy areas with marginal resources. This factor engendered hostilities, culminating in the Snake Indian War (1866-1868). This war consisted of a series of raids and skirmishes, centered around the mining areas. In 1878, another series of skirmishes, known as the Bannock War, occurred in southwestern Idaho. The Bannock War represented the last major effort by Native Americans to resist settlement of the region.

After the end of hostilities, farming and ranching burgeoned. Although mining continued as a major activity in the region through the 1880s, the economic emphasis of the region shifted to farming and ranching. Increased settlement, in turn, necessitated development of better transportation routes, including a railroad. Construction of the Oregon Short Line Railroad began in 1882 and was completed in 1884; the railroad linked the main settlements in the region to the rest of the country.

The city of Mountain Home developed as a result of the railroad. Originally a stage stop located near the hills to the north, the townsite was moved south to its present location in 1881 in anticipation of the planned railroad. The town was well-established by 1883, with five buildings along Main Street adjacent to the railroad tracks. The town continued to develop as a political and commercial center throughout the 1880s, but the years from 1890 to 1915 marked a major period of expansion and growth (personal communication, P. McGrath 1989). As an urban center, the town provided goods and services in support of the farming and ranching activities in the surrounding area. The town (and now, city) of Mountain Home has continued in this role to the present time.

Outside the major towns, most of the region was used for ranching and farming from the 1880s onward. By the 1890s, cattle ranchers and sheepherders, especially Basques, began to utilize the broad plains and deserts south of the Snake River for grazing. The ranchers and herders, along with homesteaders, settled in well-watered locations, although population density in this part of the region was, and remains, low.

2.5 MHAFB HISTORY

Originally designated Army Air Base, Mountain Home, the base was established in 1942 and officially opened in 1943. At that time, the northwest-southeast and east-west runways were constructed (Corbyn 1988). In addition, the Army acquired 420,000 acres south of the Snake River to establish the Saylor Creek Bombing Range.

Throughout World War II, various bombardment groups and wings were stationed at the base and used the range. Bomber training (i.e., B-17s, B-24s) predominated during this period, although some pursuit training (in P-38s and P-63s) also occurred. At the end of the war, the base was deactivated.

MHAFB was reactivated as a SAC base in 1949. Reactivation involved refurbishment of buildings, roads, and facilities as well as construction of new utilities (e.g., water mains). Between 1949 and 1959, the base housed reconnaissance squadrons, Military Air Transport Service wings, and bombardment wings. Extensive construction of housing, warehouses, barracks, utilities, and runways also occurred during this period. Many of the base buildings and facilities date to this period.

In 1960, SAC constructed three Titan missile complexes off-base and placed them under the control of a strategic missile squadron; the missile complexes were deactivated in 1965.

The Tactical Air Command (TAC) assumed control of the base and range in 1966. Throughout the 1970s, TAC used the base for reconnaissance and tactical fighter training. Additionally, the SCR was reduced to its present size (110,000 acres). Further on-base construction occurred during this decade.

2.6 PREVIOUS RESEARCH

2.6.1 Prehistory

2.6.1.1 MHAFB Study Area

Only a small portion (i.e., 2 percent, 412 acres) of the MHAFB study area has been surveyed, so little information on the precise nature and location of cultural resources within the area is available. No cultural resource surveys have been conducted on MHAFB, and only 150 acres in the southern portion of the Small Arms Range have been examined (Petersen and Geer 1987). Corbyn (1988) cursorily assessed the cultural resource sensitivity of both areas, suggesting that the Small Arms Range was more archaeologically sensitive and both areas required systematic inspection. As part of the present study, a brief reconnaissance of MHAFB was conducted to identify archaeologically sensitive areas. The Deputy SHPO from Idaho performed a similar assessment in October 1989 (personal communication, T. Green 1989). Within the city of Mountain Home, Dames & Moore (1988)

conducted limited reconnaissance of a cable route along the existing railroad right-of-way. Similarly, only 250 acres within the Highway 67 corridor has been the subject of a systematic, but nonintensive survey (Petersen and Geer 1987). Combined, these surveys within the study area identified a single prehistoric artifact.

However, seven surveys have inspected surrounding areas, especially to the north and west. Six of the surveys examined a total of 50 acres and found no cultural resources. In contrast, the most extensive survey near the study area examined 84,430 acres within the Idaho National Guard Training Area (Addington 1987), located approximately 5 miles northwest of MHAFB. In the training area, archaeologists examined 81,000 acres using transects spaced at 200-meter intervals and a 7-percent sample of an additional 49,000 acres. Rather than systematically surveying the area, the transects and sample units were judgmentally selected, emphasizing locations (e.g., drainages, playas) considered likely to contain cultural resources.

Based on the results, Addington (1987) concluded that the survey identified 80 percent of the resources in the 84,430 acres examined. From these data, he estimated that the National Guard Training Area contained a low density of prehistoric and historic cultural resources (Addington 1987). However, two factors suggest that the methods used in this survey underestimated the true density and distribution of cultural resources within the training area. First, by walking transects separated by 200-meter intervals, the archaeologists physically inspected only 33 percent of the total acreage considered in the survey. A recent study by the Idaho State Historical Society demonstrated that surveys employing 200-meter transect intervals miss up to 50 percent of the sites within an area and generally fail to identify certain types of sites (personal communication, T. Green 1989). Second, the survey focused solely on locations considered likely to contain cultural resources. Although data from throughout the region suggest that the surveyed locations may contain a higher density of sites, the lack of systematically collected, comparable information from the other contexts reduces the reliability of conclusions about site density throughout the training area. Therefore, caution must be used when applying the patterns identified in the Training Area survey to predict the archaeological sensitivity of MHAFB and its vicinity.

2.6.1.2 Proposed Expanded Range Capability Study Area

Cultural Resource Overviews

Two cultural resources overviews have been completed for the region encompassing the proposed range expansion study area. The first (Gehr et al. 1982) consists of an overview of the Boise and Shoshone BLM districts that summarized existing information (as of 1982) about the extent of cultural resource investigations and the documented cultural resources within the districts.

According to this overview, Owyhee County, which includes 98 percent of the area within the study area, contained 83 percent (2,653) of the prehistoric sites documented on Boise district lands as of 1982. Elmore County, in contrast, reportedly contained 5 percent (153) of the sites. The distribution of total sites between the two counties may reflect differences in the amounts of BLM lands in each county, in the amount of land surveyed, or in prehistoric use patterns. However, the overview includes no data on site density per acre or on the amount of BLM lands surveyed within each county.

Citing the limited systematic data on site distributions relative to physiographic areas (e.g., plains, upland valleys, river canyons), Gehr et al. (1982) provide only tenuous predictions regarding site patterning. They posit a low overall site density in the area encompassing the study area. Lithic scatters, representing temporary hunting sites and stone tool manufacturing locations, should be the most abundant site type. In contrast to the desert plains and uplands, Gehr et al. (1982) contend that the major river drainages are likely to contain more abundant and more diverse prehistoric sites (including fishing camps and small villages).

The overview (Gehr et al. 1982) reached four important conclusions pertinent to the present study:

1. The quality of the data on cultural resources was quite uneven.

2. Very few of the recorded sites had undergone test excavations and even fewer had been evaluated for eligibility for inclusion in the National Register.

3. Cultural resource surveys conducted in the region generally focused on major drainages, not the areas between drainages.

4. Available models for predicting site density and distribution according to physiographic and environmental units were restricted to specific portions of the Boise district (i.e., Owyhee Uplands), and therefore, lacked applicability to the district as a whole.

A more recent overview (Meatte 1989) examined the status of knowledge about the prehistory of the Western Snake River Basin. Although it focused on academic research issues rather than cultural resource management concerns, this study revealed limitations in the archaeological data base similar to those presented by Gehr et al. (1982). Most importantly, this overview demonstrated that, despite several extensive surveys, the lack of systematically collected, detailed data on archaeological sites limits development of expectations about the nature, density and distribution of sites in the study area.

Cultural Resource Surveys

Within the defined study area, a total of 180 cultural resource surveys have been conducted since the late 1930s. These consist of 54 major and 126 small surveys that inspected approximately 509,000 acres (14 percent of the total study area) within the study area. Conducted primarily as BLM cultural resource compliance efforts, the major surveys examined areas ranging from 400 to 147,000 acres (see Table G-2). Figure G-3 depicts the locations of the major surveys within or extending into the study area. The small surveys examined limited areas (1 to 100 acres) associated with BLM range development projects; these surveys inspected a total of only 3,623 acres.

The major surveys within the study area can be classified according to two variables: survey method and survey intensity. Survey method refers to the techniques used by archaeologists to inspect a particular area. For systematic surveys, archaeologists use standardized intervals to examine a project area; thus, all portions of the area have an equal probability of being inspected. In nonsystematic or intuitive surveys, the archaeologists define the portions of the project area most likely to contain sites and inspect only those locations. The quality of results derived from nonsystematic surveys primarily depends on three factors: the archaeologist's level of experience; the archaeologist's familiarity with the area; and the quality of the data used by the archaeologist to decide where to survey. Nonsystematic surveys can be excellent for identifying certain types of sites in particular contexts, but they offer no information on the nature and distribution of sites in other portions of a project area.

Intensity refers to the extent of coverage provided by a survey. Recent studies performed within the SCR revealed that surveys in which archaeologists walk parallel transects spaced no more than 30 meters apart generally identify the full range of cultural resources present within the inspected area; at this interval, only isolates and small scatters are missed (personal communication, T. Green 1989). Using 50-meter transect intervals, archaeologists fail to locate approximately 15 percent of the sites, especially smaller scatters. With 100- to 200-meter transect intervals, surveys miss up to 56 percent of the sites and generally identify only certain site types. Based on these data, intensive surveys are classified as those using transect intervals no greater than 30 meters; nonintensive surveys consist of those employing intervals greater than 30 meters.

Figure G-4 summarizes the classification of the surveys for the study area. Thirty-eight of the major surveys conducted within the proposed expanded range capability employed systematic, but nonintensive techniques. Most of these represent fire rehabilitation surveys that used generally systematic transects spaced at 200-meter intervals; the other systematic, nonintensive surveys employed up to 100- to 200-meter transect intervals. By using these wide intervals, the archaeologists probably identified most of the large sites, yet actually inspected a 33-percent sample (110,653 acres) of the total acres (338,313 acres) within the areas slated for reseeding. Although this level of intensity met the needs of the reseeding project and the standards of the time (personal communication, M. Wyatt

Table G-2

MAJOR SURVEYS IN THE PROPOSED EXPANDED RANGE CAPABILITY STUDY AREA
(page 1 of 2)

Survey	Author/Date	Acres Surveyed w/in ROI	Type
Middle Butte Reseeding	Young and Jenks/83	3,600	Systematic/nonintensive
Garat Fire Rehab	Polk/85b	3,900	Systematic/nonintensive
Heil Well Fire Rehab	Petersen/85b	925	Systematic/nonintensive
Milepost 41 Fire Rehab	Geer and Petersen/85	700	Systematic/nonintensive
Sheepshead Fire Rehab	Petersen/85a	2,400	Systematic/nonintensive
West Clover Fire Rehab	Druss/85a	8,000	Systematic/nonintensive
Wild West Fire Rehab	Druss/85c	1,600	Systematic/nonintensive
Poison Creek/Middle Butte Seeding	Young and Jones/85	2,800	Systematic/nonintensive
Black Butte/Cedar Draw Fire Rehab	Petersen/86a	3,720	Systematic/nonintensive
Crow's Nest A Fire Rehab	Druss/85b	9,600	Systematic/nonintensive
Big Lake Fire Rehab	Palmgren/87	4,575	Systematic/nonintensive
AEC Well Fire Rehab	Plew/86a	1,900	Systematic/nonintensive
Coonskin Fire Rehab	Petersen/86b	3,200	Systematic/nonintensive
Crossroads Fire Rehab	Petersen/86c	635	Systematic/nonintensive
Crows Nest C Fire Rehab	Druss/86a	14,590	Systematic/nonintensive
Crows Nest D Fire Rehab	Harrison/86	12,160	Systematic/nonintensive
Three Creek Well Fire Rehab	Polk/85c	14,700	Systematic/nonintensive
West Juniper Fire Rehab	Petersen/86d	1,423	Systematic/nonintensive
Wickahoney Fire Rehab	Druss/86b	3,400	Systematic/nonintensive
Diamond A Prescribed Burn	Young/87b	1,110	Systematic/nonintensive
Pothole Reservoir Fire Rehab	Plew and Gould/87	3,300	Systematic/nonintensive
S. Mountain Land Exchange	Jenks/86	19,000	Systematic/nonintensive
Salls Crossing Fire Rehab	Young/86	400	Systematic/nonintensive
Riddle Land Exchange	Plew/86b	5,000	Systematic/nonintensive
Crows Nest B Fire Rehab	Polk/85a	13,760	Systematic/nonintensive
Broken Wagon Fire Rehab	Plew and Gould/88	2,810	Systematic/nonintensive
Horse Hill Fire Rehab	Petersen and Geer/88	805	Systematic/nonintensive
Tuanna DLE	Murphey/77a	5,600	Systematic/nonintensive

Table G-2

MAJOR SURVEYS IN THE PROPOSED EXPANDED RANGE CAPABILITY STUDY AREA
(page 2 of 2)

Survey	Author/Date	Acres Surveyed w/in ROI	Type
Saylor Creek Fire Rehab	Wyatt/80a	1,200	Systematic/nonintensive
Saylor Creek Fire Rehab	Wyatt/80b	1,100	Systematic/nonintensive
Bruneau Sand Dunes R&PP	Williams/82	480	Systematic/nonintensive
Diamond A Fire Rehab	Wyatt/79b	5,400	Systematic/nonintensive
Riddle Land Exchange	Wyatt/87	13,320	Systematic/nonintensive
West Bruneau Fire Rehab	Wyatt/79a	6,000	Systematic/nonintensive
Indian Springs Fire Rehab	Wyatt/80c	4,000	Systematic/nonintensive
Rosevear Gulch Fire Rehab	Wyatt/80d	10,000	Systematic/nonintensive
Devil Creek Butte Fire Rehab	Wyatt/79c	1,000	Systematic/nonintensive
Class II Inventory	Young/84	147,200	Systematic/nonintensive
Gerald Tews Land Exchange	Young/87a	2,624	Systematic/intensive
Kinyan Road Green-stripping	Willig/88	255	Systematic/intensive
Jarbidge Green-stripping	Polk/89	220	Systematic/intensive
Devil's Creek Inventory	Murphey/77b	73	Systematic/intensive
Bruneau Canyon	Pavesic and Hill/73	8,000	Systematic/intensive
SW Idaho/N. Nevada	Tuohy/63	900	Nonsystematic/intensive
E&S forks Owyhee River	Plew and Woods/82	5,000	Nonsystematic/intensive
Owyhee Uplands	Plew /80	14,000	Nonsystematic/intensive
Saylor Creek Unit I	Bucy/71	12,800	Nonsystematic/nonintensive
Bruneau Canyon	Olsen/37	8,000	Nonsystematic/nonintensive
Deadman Flat	Pavesic and Moore/73	60,000	Nonsystematic/nonintensive
Bicentennial +1 Fire Rehab	Geer/77	17,000	Nonsystematic/nonintensive
Bicentennial Burn Fire Rehab	Reubelmann/76	30,000	Nonsystematic/nonintensive
Crows Nest Fire Rehab	Wyatt/79d	5,000	Nonsystematic/nonintensive
Pothole Butte Fire Rehab	Reubelmann/75a	3,600	Nonsystematic/nonintensive
Brown's Gulch Fire Rehab	Reubelmann/75b	2,000	Nonsystematic/nonintensive

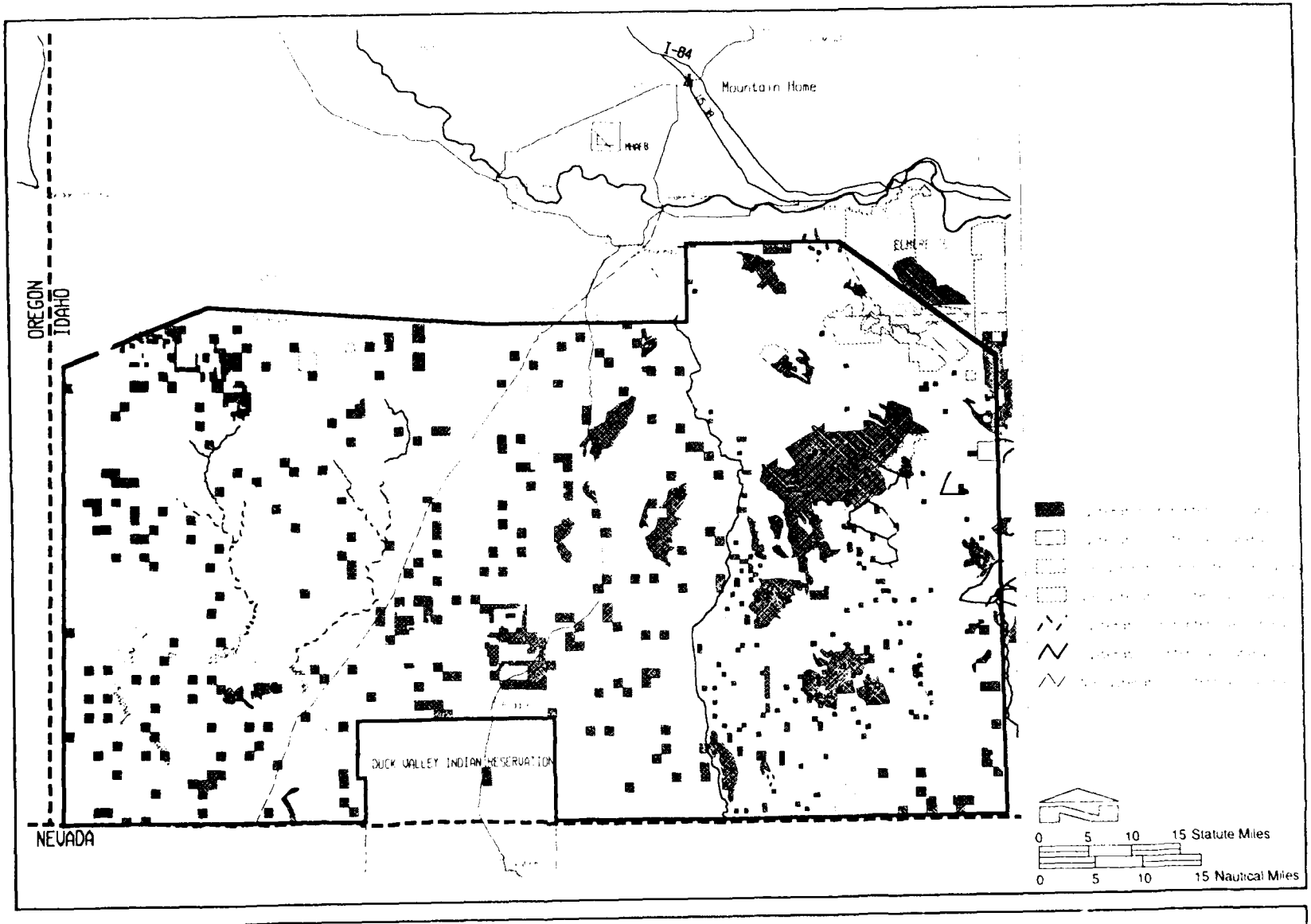


Figure G-3

MAJOR SURVEYS IN THE PROPOSED EXPANDED RANGE CAPABILITY

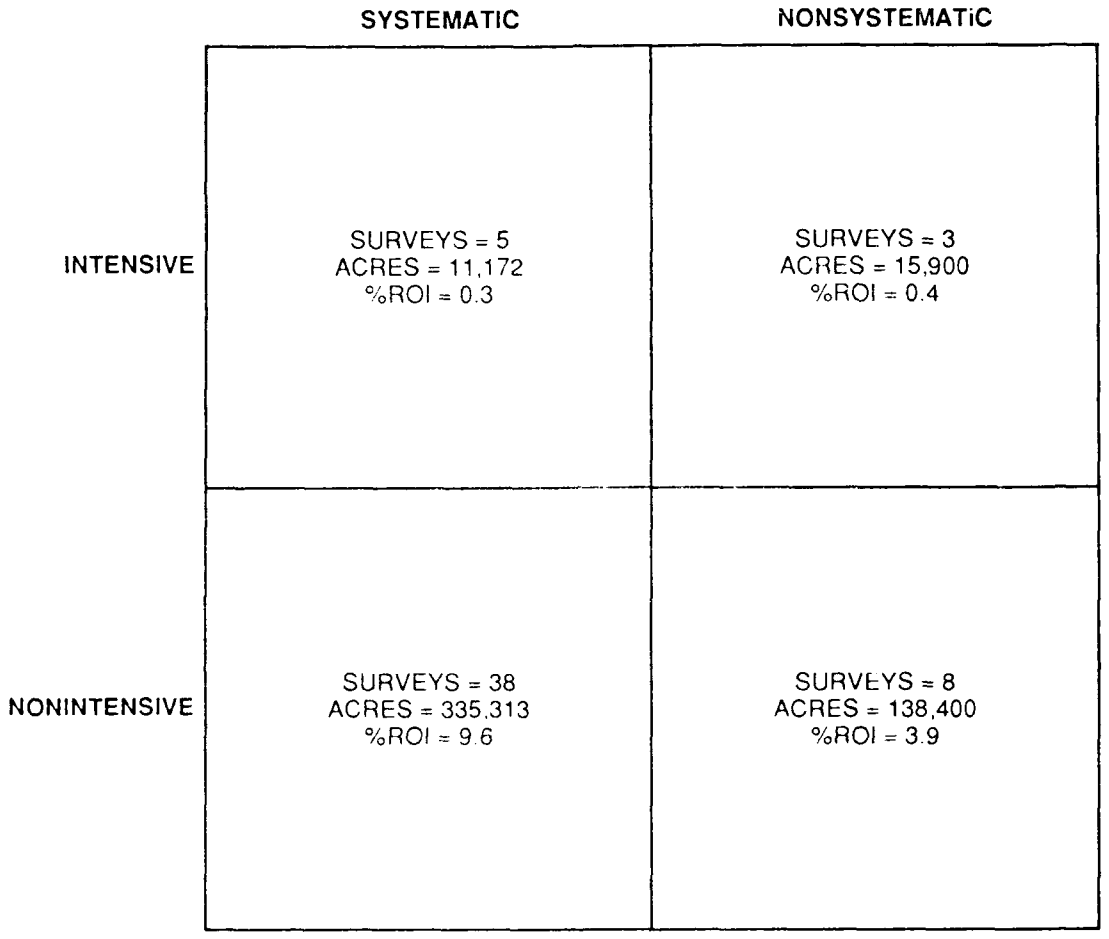


FIGURE G-4

SURVEY CLASSIFICATIONS FOR THE STUDY AREA

1989), the analysis of survey methods discussed above suggests that it is insufficient to establish the density, distribution, and diversity of cultural resources within the surveyed areas (personal communication, T. Green 1989; Corbyn 1988).

A Class II sample inventory (Young 1984) represents the most extensive systematic, nonintensive survey in the study area. Conducted throughout the BLM's Jarbidge, Bruneau, and Owyhee resource areas, this inventory inspected a sample of each resource area to develop expectations about the distribution, density, and diversity of cultural resources within the nonsampled portions of the areas. In the Owyhee Resource Area (ORA), which covers the western third of the area, Young defined five strata based on environmental and physiographic criteria. However, the sampling percentage differed for each stratum based on his assessment that certain strata were more likely than others to contain cultural resources. Sampling percentages within the area ranged from 19 to 3 percent.

For the Bruneau Resource Area (BRA), which encompasses roughly the central portion of the study area, Young (1984) defined five sampling strata based on elevation, slope, and the proximity to a perennial water source. Within each stratum, a 7.3-percent sample of randomly selected sections (640 acres) was surveyed.

The results of the BRA sample survey prompted Young to refine the sampling strata for the Jarbidge Resource Area (JRA), which covers the eastern third of the study area, by defining three strata based on elevation and a water source substratum (within each stratum) that included springs, marshes, playas, and confluences. Young (1984) excluded the Saylor Creek Unit from consideration because he concluded that previous inventories (i.e., mostly fire rehab surveys) had been sufficient to identify the cultural resources it contained. The excluded area encompassed much of the northeastern portion of the study area. Using quarter sections (160 acres) as sampling units, all sampling units in the water source substratum were surveyed along with a 1.7-percent sample in each of the other three strata.

The Class II inventory examined 147,200 acres within the study area. The report for this study states that the transect intervals conformed to the contours of the particular area being surveyed and implies the use of 30-meter spacing (Young 1984). However, other data suggest that the archaeologists used wider transect intervals, possibly up to 100 meters (personal communication, M. Wyatt 1989). Use of wide transect intervals requires classification of this survey as systematic, but nonintensive. In addition, the sampling strategy used for the ORA reflects a bias toward settings considered more likely to contain sites. This approach may have merely reaffirmed the existing, but not necessarily correct, understanding of the distribution, density, and diversity of cultural resources in the area. The patterning of sites noted for the BRA also potentially suffers from this bias because the results of the survey in the ORA formed the basis for stratifying the Bruneau.

The inventory yielded a total of 867 cultural resources consisting of 605 prehistoric archaeological sites, 228 isolates, and 34 historic resources. Young (1984) indicated that most of the historic resources (especially structures) in the region lie within private lands, thereby preventing their documentation during the inventory.

The five systematic, intensive surveys examined a total of 11,172 acres. All but one (Young 1987a) involved narrow canyons or linear corridors. The largest of the surveys focused on the Bruneau River Canyon and the adjacent rim. In this survey, Pavesic and Hill (1973) reexamined the areas first inspected by Olsen in 1937. The more recent survey inspected approximately 8,000 acres and identified 178 sites, establishing the Bruneau River Canyon as an archaeologically significant and sensitive locale. Although an important contribution, this study offered little information about the nature and distribution of cultural resources beyond the canyon rim. Similarly, Murphey (1977b) intensively surveyed the Devil's Creek drainage located on the eastern margin of the study area. Murphey identified 217 prehistoric sites in the drainage and along its rim, but only a short segment (ca. 2 miles) containing 7 prehistoric sites lies within the study area. Despite the comprehensive coverage provided by these surveys, their linear configuration and their emphasis on major drainage limit the broad applicability of the results.

Three nonsystematic, intensive surveys have been conducted in the area. From 1975 through 1979, Plew (1980) conducted an investigation in the Owyhee Uplands. This research project involved intensive (15- to 20-meter transects) survey of Camas, Pole, Battle, Big Springs Current, Camel, Deep, Hurry Back, and Nickel creeks located in the northwestern portion of the range expansion study area. Plew's survey focused almost solely on creek drainages and their margins. The broad open areas between the creeks received less intensive inspection using one-mile wide, arbitrarily selected transects (Plew 1980). This investigation recorded 449 prehistoric archaeological sites along the drainages in the Owyhee Uplands. Plew (1980) defined a settlement and subsistence pattern centered on the creek drainages; areas beyond the drainages received use primarily for hunting and procurement of stone for manufacturing tools.

Plew and Woods (1982) employed similar methods to investigate segments of the East and South forks of the Owyhee River. This intensive survey focused on the drainages but also examined adjacent areas beyond the canyon rim. The patterning of the 19 prehistoric sites identified in this survey corresponded well with that defined by Plew in the Camas and Pole Creek area.

Tuohy (1963) also performed a non-systematic, intensive survey -- one of the first surveys in the area. He inspected a 26-foot wide pipeline right-of-way that crossed roughly 60 miles of the area within the study area. While this narrow linear sample crosscut a wide range of environmental and physiographic contexts and provided an opportunity to identify variability in types of archaeological sites, it yielded

unrepresentative data on the distribution and density of sites for the surrounding area (Goodyear 1977; Woodman et al. 1986).

Conducted mostly in the mid-1970s, eight nonsystematic, nonintensive surveys examined more than 138,000 acres within the area. Although these surveys employed varied goals, strategies and methods, they all relied heavily on intuitive selection of survey areas, emphasizing contexts considered more likely to contain cultural resources. While this approach identifies many sites, it provides neither comprehensive nor systematic coverage of the entire survey area or all contexts within it.

In summary, the major surveys examining lands within the study area have employed strategies and methods that satisfied specific research or compliance requirements. However, they suffer from two fundamental limitations with regard to predicting the density, diversity, and distribution of prehistoric archaeological resources within the study area:

1. Use of transect intervals that are too wide to ensure a complete inventory of the cultural resources within the surveyed areas.

2. A general emphasis on surveying sampling units or judgmentally selected locations containing contexts considered "likely" to contain cultural resources; a lack of intensive, systematic examination of areas (e.g., desert plains) perceived to possess a low potential to contain cultural resources.

Despite the number of surveys performed, a relatively small proportion of the study area has been examined. Moreover, 94 percent of the area surveyed was inspected using nonintensive field methods. Only a portion of some of the major drainages have been thoroughly examined. Combined, these factors suggest that the level of knowledge about prehistoric cultural resources for much of the area remains limited at this time.

2.6.2 History

2.6.2.1 MHAFB Study Area

As noted above, only a limited portion of the MHAFB study area has been surveyed. Although no inventory of potentially historic structures has been compiled for the base, available records indicate that the Idaho State Historical Society identified and documented significant historic buildings within the city of Mountain Home in 1972 and in subsequent years. This effort also included evaluation of the historic and architectural characteristics of the buildings according to National Register criteria.

2.6.2.2 Proposed Expanded Range Capability Study Area

No studies specifically focusing on historic or architectural resources have been conducted within the proposed range expansion study area, although the Owyhee County Historical Society identified numerous structures while conducting oral history interviews (personal communication, Morton 1989). All data on these resources derive from the general cultural resource surveys described in section 2.6.1.2.

Corbyn (1988) suggests that, prior to 1983, most of the surveys conducted in the area did not consistently record historic resources. According to Corbyn, less prominent sites such as sheepherder camps and dumps were infrequently documented, whereas structures and similar features were recorded more commonly. Additionally, many historic resources may be located on private property (cf. Young 1984) and, as a consequence, have not been recorded. If correct, these assertions indicate that the data base for historic and architectural resources dramatically underestimates the number of sites in the area. Furthermore, it provides a biased understanding of the density and distribution of certain types of historic resources. Although the effect of these factors cannot be quantified, they warrant consideration in the assessment of the nature and patterning of historic and architectural resources.

2.7 CULTURAL RESOURCE INVENTORY

2.7.1 Prehistoric Cultural Resources

2.7.1.1 MHAFB Study Area

The available data sources revealed one documented prehistoric archaeological resource within the study area: a single flake located within the Highway 67 corridor. Within the immediate vicinity of the area, the prehistoric archaeological resources consist of only a small (150 m^2) lithic scatter and an isolate; both are located more than 3 miles northwest of the Small Arms Range. However, the absence of known prehistoric resources within the study area and vicinity partially reflects the paucity of surveys rather than prehistoric land-use patterns.

Although possibly biased (see above), data from the nearby and similar Idaho National Guard Training Area perhaps offer the best perspective on the potential nature, density, and distribution of prehistoric resources within the MHAFB study area. Within the training area, Addington (1987) identified 30 sites and 11 isolates. Site types included lithic scatters (25), possible temporary camps in lava tubes (4), and a rock alignment tentatively defined as an antelope trap. Estimated prehistoric site density averaged about one site per 2,800 acres. However, a proportion of the sites possibly was missed due to the use

of 200-meter transect intervals. Therefore, actual site density may be 56 percent higher, or one site per 1,242 acres.

Cultural resources occurred in six different physiographic settings: playa, vantage point (hill/ridge top), hill slope, intermittent drainage, cave (lava tube), and other. The patterning of these resources reflects associations between water sources and lithic scatters; sheltered locations (i.e., lava tubes) and temporary camps; and isolates and open areas. Of course, the distribution of cultural resources also may reflect settings emphasized in the survey. Since other settings received less extensive and rigorous scrutiny, the reliability of the defined distribution cannot be verified, without additional survey.

Nevertheless, the patterns noted in the training area provide a foundation, albeit tenuous, from which to assess the archaeological sensitivity of the study area. Using only Addington's (1987) site density per acre, the ROI (ca. 18,175 acres) might include six prehistoric sites. If actual site density is 56 percent greater than Addington's estimate, the area might contain up to 14 sites.

However, structures, roads, parking lots, and other modern developments cover approximately 40 percent (ca. 7,270 acres) of the study area. For MHAFB, the recent SAIC reconnaissance defined three areas that remain relatively undisturbed: (1) portions of the periphery of the base extending from the outer edge of housing and facilities to the perimeter fence; (2) open spaces between and near the runways; and (3) a few, small (less than 10 acres) open spaces within the core of the base. However, the periphery of MHAFB also includes several large, disturbed areas such as the bomb dump in the north, extensive rubble piles along the eastern perimeter, and landfills in the southwest corner. Similarly, urban development covers all but the margins of the city of Mountain Home. The corridor along Highway 67 and the northern portion of the Small Arms Range form the least disturbed portions of the study area.

Elimination of the disturbed portions of the MHAFB study area reduces the area potentially containing sites to 10,905 acres. Using density estimates from the Idaho National Guard Training Area (Addington 1987) survey and the adjusted estimates, the number of presently unidentified prehistoric sites within the undisturbed portions of the area might range from four to nine. However, the study area contains few physiographic settings that previous studies have considered archaeologically sensitive. These settings consist of minor intermittent drainages with limited catchments, two playas, and basaltic dikes; most of these settings occur in the northern portion of the Small Arms Range. MHAFB includes only three short segments of very small intermittent drainages.

Based on the patterning derived from the Idaho National Guard Training Area study, the prehistoric cultural resources most likely to be located at the settings within the MHAFB study area consist of lithic scatters and isolates. These resource types (especially isolates) tend to lack the characteristics necessary to warrant designation as significant cultural resources.

As indicated by the previous discussion, three factors indicate that the MHAFB study area possesses a low potential to contain significant cultural resources:

- o Historic and modern development has disturbed large portions of the area;
- o The area contains few settings considered archaeologically sensitive; and
- o The types of cultural resources likely to occur within the area often fail to meet NRHP significance criteria.

Outside the primary study area, recreation areas likely to receive increased use due to population growth stemming from the realignment contain abundant and significant cultural resources. These areas include diverse prehistoric and historic resources. The Snake River canyon south, southeast, and west of MHAFB represents the most prominent of these recreation areas. This stretch of the river canyon, which contains hundreds of cultural resources, including the Guffey Butte/Black Butte National Register District and segments of the Oregon Trail, offers both developed and primitive recreation opportunities. Other recreation areas within a 2-hour drive from MHAFB that contain or provide access to locales rich with cultural resources include Murphy Hot Springs, Silver City, Anderson Dam, and the Owyhee Front. In addition, the public lands within 2-hours of MHAFB receives extensive use for hunting, fishing, rafting, hiking, and ORV activities. Many locations favored for these recreational pursuits also contain abundant, significant or potentially significant cultural resources. For example, the Camas Creek and Pole Creek National Register Archaeological District is within an area used heavily by hunters. The major river canyons (i.e., Bruneau, Jarbidge, Owyhee), which contain abundant and often important cultural resources, also form the focus for a range of recreational activities.

2.7.1.2 Proposed Expanded Range Capability Study Area

Site and Isolate Types

Despite the above-mentioned limitations, previous studies have established that the study area represents an area rich with prehistoric cultural resources. Data derived from Idaho State Historical Society maps and records indicate that the area contains 2,489 documented prehistoric cultural resources consisting of 1,986 sites and 503 isolates. Although few of these resources have been radiocarbon dated, temporally diagnostic artifacts (e.g., projectile points) found at many sites imply use of the area from approximately 12,000 years B.P. to the historic period.

Lithic scatters -- the residues of stone tool manufacturing and maintenance -- represent the most abundant site type. The 1,193 lithic scatters within the area vary in size from 1 to 175,000 m^2, although

most measure less than 5,000 m^2. Artifact density within the scatters also varies but sparse density characterizes most of the sites. Lithic scatters commonly reflect brief use of a locale for limited activities, although some scatters exhibit evidence of reuse. A lack of diverse tool types and the absence of features (e.g., hearths) generally limits the level of information recoverable from lithic scatters and concomitantly limits their potential significance. Within the study area and especially on the broad, open plains between drainages, lithic scatters rarely contain subsurface artifact deposits. Wind erosion and deflation often affect lithic scatters in the open settings, resulting in unstratified, mixed deposits. Such mixing tends to reduce the site's potential to yield significant information.

Rockshelters and caves (260) and campsites (228) are the next most abundant site types defined in the study area. Similar to the lithic scatters, rockshelters and campsites exhibit variability in terms of size, artifact density and content. Because rockshelters and caves provided protection from the weather, they often were occupied repeatedly and for longer periods of time. Many rockshelters and caves in the area manifest evidence of such occupations in the form of stratified (i.e., layered) cultural deposits. For example, Nahas Cave, located in the Owyhee Uplands, manifests stratified cultural deposits indicative of numerous occupations dating as early as 6,000 B.P. The enclosed context of the rockshelter or cave protects these deposits from natural disturbances, providing relatively complete and intact evidence of prehistoric activities at the site. For this reason, rockshelters and caves represent an important source of information on the prehistory of the region. These same characteristics also attract a high degree of artifact theft and vandalism; thus, the number of undisturbed documented rockshelters and caves within the study area is low (BLM 1989).

Campsites represent the residues of habitation ranging from brief occupations at resource procurement areas to seasonally occupied "villages." They generally contain a wide range of artifacts (e.g., stone tools, flakes, bone, pottery fragments, fire-cracked rock) indicating that the site's inhabitants performed many different activities (e.g., stone tool maintenance, plant food processing, hide preparation, etc.). However, research in the region (cf. Plew 1980) suggests that the nature and content of campsites changed through time in response to different settlement and subsistence systems. Like rockshelters, campsites often were occupied repeatedly and for longer durations. Evidence of longer duration use of campsites consists of remains of dwellings and features (e.g., hearths) (cf. Tuohy 1963), accumulations of food debris (mostly bone), and more complex organization of activities. Prehistoric camps include surface sites and a smaller proportion with subsurface cultural deposits. Settings likely to receive sedimentation (e.g., river or creek terrace) possess a greater potential to contain campsites with subsurface, complex cultural deposits. Overall, campsites tend to possess the characteristics for eligibility to the National Register.

The remainder of the prehistoric sites in the study area consist of rock cairns and alignments (219), rock art localities (84), and "buffalo jump" complexes (2). In addition, the records for 46 sites (not included in total) in the area lack sufficient information to permit classification according to site type.

Researchers (cf. Plew 1980) in the region consider most of the rock alignments to have been used as hunting blinds; associated scatters of stone tool manufacturing debris support this inference. However, the context and configuration of some alignments suggests their use as traps or drivelines for antelope or other animals. Function notwithstanding, construction and use of these alignments reflect the aboriginal hunter's comprehensive knowledge of the landscape, animal behavior, and, possibly, sophisticated cooperative hunting techniques. That they possess the potential to yield information on hunting practices and cooperative behavior suggests that rock alignments represent potentially significant cultural resources.

Rock cairns constitute a problematic resource type. Different functions, ranging from the practical to the spiritual, have been used to describe cairns. Because many occur with rock alignments, researchers often link cairns with hunting complexes. However, abundant cairns occur as isolates, unassociated with other cultural remains. Understanding the function of these rock piles is further limited by an inability to date them.

The two sites defined as buffalo jump complexes possibly represent the most unique sites in the study area. Located near the center of the area, these complexes consist of large areas (ca. 200 acres) in which prehistoric hunters used a combination of rock alignments and natural features to gather and drive buffalo over a cliff or into a narrow defile where hunters awaited them (Agenbroad 1976). Such complexes reflect very sophisticated, cooperative hunting practices. Plew (1987), in a reassessment of the sites, concludes that they represent communal deer or antelope hunting facilities, not bison jumps. A lack of bison bone supports this contention. Nevertheless, the size, complexity and antiquity (6000 B.P. to historic) of these sites demonstrate their significance.

The 84 rock art localities within the study area include pictographs and petroglyphs on exposed basalt bedrock. The size, number of panels, and motifs vary among the localities. Geometric, anthropomorphic, and zoomorphic motifs form the three major categories of rock art styles. Some localities are isolated, whereas others are associated with caves, campsites, and lithic scatters. In the Owyhee Uplands, rock art localities with geometric motifs tend to occur in isolated contexts distributed widely throughout the area (Plew 1980). Other motifs, especially zoomorphic, tend to be associated with campsites, rockshelters, or caves. Although represented by relatively few sites in the study area, the rock art localities constitute important cultural resources both for their information and their meaning to contemporary Native Americans.

Projectile points and projectile point fragments account for more than half of the isolated artifacts recorded within the study area. The remainder consist of a variety of stone tools or tool-making debris (i.e., flakes). Although isolates offer only limited information on prehistoric use of the area, the projectile points provide data on the antiquity of that use. For example, an isolate recovered from within the study area possesses the unique stylistic and technological attributes of a Clovis point. Since

Clovis points date from 10,500 to 12,000 B.P., it can be inferred that the isolate also dates to that period. Additionally, isolated artifacts potentially represent the single visible element of a larger scatter obscured by wind deposited sediment. Wind erosion and deposition commonly cover and uncover sites, especially in the open desert plains (personal communication, M. Wyatt 1989).

Archaeological Districts, ACECs, and Site Complexes

Despite the abundance of prehistoric archaeological resources documented in the study area, relatively few have been formally evaluated for significance according to National Register criteria. The Camas Creek and Pole Creek National Register Archaeological District (see Figure G-5) contains 442 prehistoric archaeological sites. Located in the northwestern portion of the study area, this large district formally establishes the significance of the sites it includes.

Only seven other prehistoric sites within the study area have been formally evaluated as eligible for the NRHP. Dispersed near the center of the area, these sites include lithic scatters, a rock art locality, and a campsite. Since hundreds of other recorded sites within the study area possess characteristics similar to the seven eligible sites, it appears probable that they too would meet NRHP eligibility criteria.

Although none has been formally designated (personal communication, Wyatt 1989), the BLM has recognized the importance of certain cultural resources or groups of resources by proposing 12 archaeological districts and ACECs within the study area (BLM 1979, 1985a). The Dry Lakes/Bruneau River proposed archaeological district perhaps represents the best known of the areas. Consisting of a complex of 65 sites, this proposed district extends for 22 miles along the river canyon and beyond the canyon rim to include a series of small playas. In an earlier document (BLM 1979), the BLM proposed an 84,111-acre ACEC for cultural resources that encompassed Bruneau, Jarbidge, and Arch canyons.

Assessments by the BLM led to the identification of six archaeological complexes as candidates for special protection. The Devil's Creek complex consists of 217 sites distributed along Devil's Creek, a small (ca. 2-mile) segment of which crosses the extreme eastern boundary of the study area. Containing fewer sites and including fewer acres, the other five areas consisted of:

- Pothole Creek Complex -- two large, dense sites reflecting early occupation of the region.
- Dove Springs Complex -- four sites with the potential for diverse, early Holocene deposits.
- Juniper Ranch Complex -- four sites including a stratified campsite.

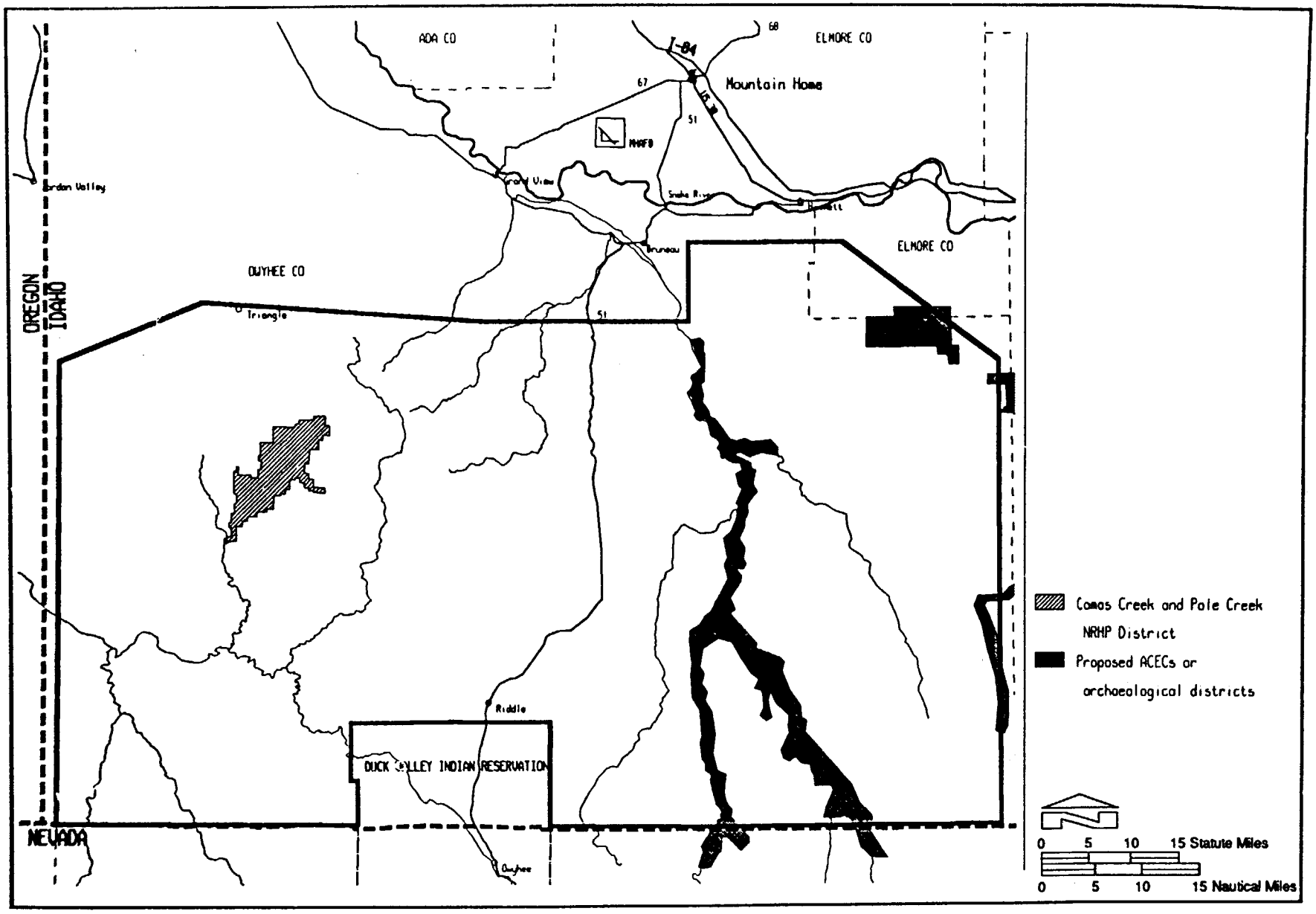


Figure G-5

MAJOR DESIGNATED OR PROPOSED AREAS FOR PROTECTION OF CULTURAL RESOURCES

- o Clover Creek Complex -- three hunting blinds associated with a large campsite containing a range of stone tools.

- o Post Office (Poison Creek) Complex -- a large open lithic scatter surrounding an historic structure; the BLM considers the structure eligible for the NRHP.

Additionally, the BLM (1979) identified four proposed archaeological districts located along the northwestern margin of the study area: Saylor Creek, Grindstone Butte, Deadman Creek, and Small Butte. The BLM tentatively considers all four of the districts potentially eligible for the National Register, but all require further documentation and investigation.

The Camas Creek and Pole Creek District as well as the 12 areas described above clearly contain significant prehistoric cultural resources. Such areas represent highly sensitive locales within the proposed range expansion study area. Although more than 1,000 prehistoric sites remain unevaluated, available evidence suggests that a large proportion probably meet the significance criteria.

Prehistoric Resource Distribution and Sensitivity Assessment

The following briefly discusses the observable distribution of resources as a means to identify general zones of archaeological sensitivity within the proposed expanded range capability study area. Density of prehistoric resources provides the best means to measure patterning and sensitivity. To derive density measures, the analysis used existing data (from SHPO files) on the number of various prehistoric resource types relative to the extent of survey (i.e., number of acres) within a given area. The geographical areas defined by each USGS 7.5 minute quadrangle map encompassed by the study area formed the units for which resource density was measured because the SHPO's records follow this format. Although density represents a simple measure of resources per acre, potential biases arising from major variations (i.e., 0 to 92 percent) in the amount of area surveyed in the quadrangles required consideration. For example, if 92 percent of a quadrangle has been surveyed, the confidence in the density measure is much greater than for a quadrangle in which only 8 percent has been examined. To account for this factor, density was calculated relative to the total acres surveyed within each quadrangle, then adjusted according to the percentage of the quadrangle surveyed.

Since systematic, nonintensive methods were used to examine over 90 percent of the surveyed portions of the study area, the density measures did not account for potential underestimates of site abundance. Such underestimates would be relatively consistent throughout the area. Additionally, this stage of the analysis excluded consideration of physiographic and environmental features that might correlate to higher resource densities. Therefore, the densities and sensitivities discussed below reflect general patterning requiring further refinement through additional survey, data collection, and analysis.

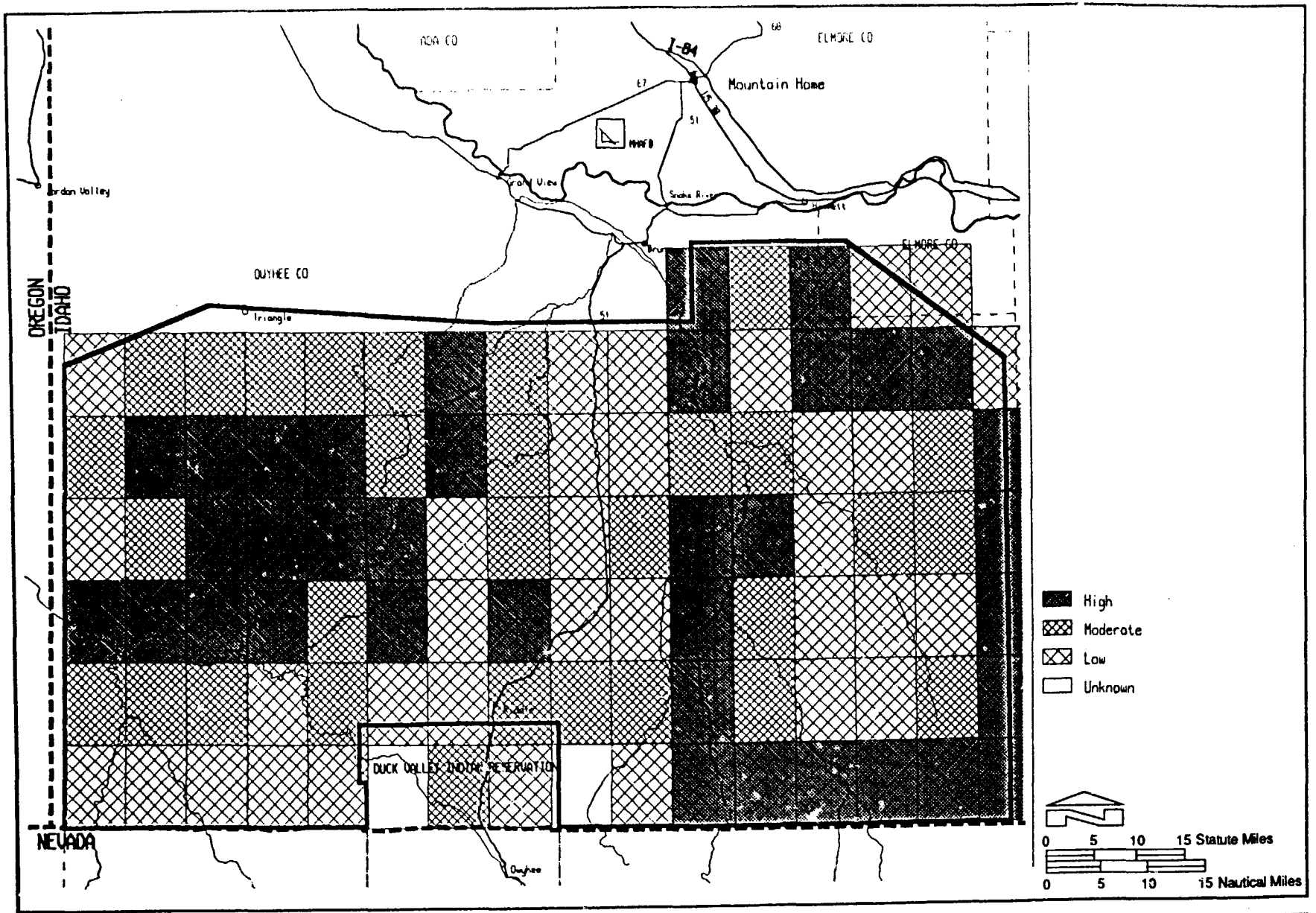


Figure G-6

ESTIMATED PREHISTORIC ARCHAEOLOGICAL RESOURCE DENSITY AND SENSITIVITY

The analysis resulted in definition of four basic categories of estimated prehistoric resource density and potential sensitivity: high, moderate, low, and unknown. As depicted in Figure G-6, 38 quadrangles received designation as high density areas. In this category, the area surveyed varied from 29 to 1 percent, with 18 quadrangles at levels below 10 percent. Despite the relatively limited amount of survey within these quadrangles, they generally contain high frequencies (up to 305) of prehistoric resources. Available data indicate that all 38 quadrangles exhibit densities equal to or greater than 1 site per 160 acres.

The patterning of the estimated high-density quadrangles generally corresponds to the major drainages. Along the eastern edge of the study area, the quadrangles exhibiting high densities of prehistoric resources encompass the Devil's Creek drainage and its tributaries. In the northeast corner of the study area, Sailor Creek apparently forms the drainage associated with high resource densities. Other archaeologically sensitive areas correspond to the quadrangles including portions of the Jarbidge and Bruneau rivers as well as Sheep Creek. In the western half of the study area, the large area reflecting high resource density encompasses the Pole Creek and Camas Creek National Register Archaeological District; many other drainages in this area also contain abundant sites.

Thirty quadrangles are estimated to include moderate densities of prehistoric resources. Estimated densities range from 1 site per 175 acres to 1 site per 614 acres. The area surveyed within the quadrangles varies from 2 to 27 percent, with 10 quadrangles at levels below 10 percent. In contrast to the high density areas, the quadrangles contain between 28 and 2 documented sites. The moderate density quadrangles also exhibit a broader distribution within the study area. Although many encompass segments of major drainages, the patterning of these quadrangles reflects no obvious correlations with major physiographic or environmental features.

Relatively large amounts of surveyed area characterize the 33 quadrangles tentatively classified as low density. More than 50 percent of the area in four quadrangles has been examined, with 23 quadrangles at levels above 10 percent. Prehistoric resource densities in the quadrangles range from 1 per 700 acres to 1 per 5,000 acres. Quadrangles estimated to contain low densities of prehistoric resources occur throughout the study area, although few encompass major drainages and several include expanses of broad, desert plains.

Because no portion of two quadrangles had been surveyed, both were classified as unknown density. However, these quadrangles primarily cover the Duck Valley Indian Reservation, an area excluded from consideration for a proposed expanded range capability.

The patterning of prehistoric resource density approximates the distribution of archaeologically sensitive areas. Quadrangles with higher estimated densities tend to encompass the most sensitive

areas. Conversely, quadrangles classified as low density potentially represent less sensitive areas. However, the densities and sensitivities presented herein should be considered general and preliminary.

To gain better insight into the types of contexts likely to contain higher densities of potentially significant resources, a second stage of analysis was performed. Because water represented an essential resource to the prehistoric inhabitants of the area, this analysis focused on the relationship of the various site types to water sources. The results of Young's (1984) Class II inventory revealed associations between sites and three basic types of water sources. These included perennial drainages and their confluences, playas, and springs. Young concluded that areas containing playas most frequently contained sites; springs showed the lowest level of association with sites. However, three factors limit the utility of the conclusions for defining sensitivities in the study area: (1) the strength of these associations were not based on the density of sites near the particular water source; (2) Young did not examine the distribution of different site types relative to the water sources; and (3) areas not including one of the water sources received only minimal consideration.

The analysis for the study area used four water source categories: perennial drainage; playa; spring; and major intermittent drainage. Preliminary review of the data indicated that the latter category exhibited a strong association with many site types. USGS 7.5 minute maps provided the information on the types and locations of water sources. To determine the relationship of a site to a water source, a series of circles were circumscribed around the site location as plotted on the quadrangle map. The circles corresponded to distances of 0.25, 0.5, 1, and 1.5 miles from the site. Therefore, the site's relationship to the nearest water source was classified according to one of five distance categories: $\leq$ 0.25 mile; >0.25 mile $\leq$ 0.5 mile; > 0.5 mile $\leq$ 1 mile; > 1 mile $\leq$ 1.5 miles; and > 1.5 miles.

Data from a sample of 25 quadrangles within the study area formed the basis for this analysis; these areas contained 663 prehistoric sites and 110 isolates. After completing analysis of this sample, data from an additional 54 quadrangles (851 sites and 282 isolates) were scanned for comparison.

As Figure G-7 establishes, almost 70 percent of the prehistoric sites within the 25 sampled quadrangles occur within 0.25 miles of a water source. Site frequency dramatically decreases between 0.25 and 0.5 miles. The next zone, 0.5 to 1 mile from a water source, contains a similar percentage of the sites, although it encompasses more than four times the area. Beyond 1 mile, site frequency and density decreases to very low levels. That the zones from 1 to 1.5 miles and beyond 1.5 miles contain similar percentages of sites suggests that areas farther than 1 mile from a water source received similar low levels of use prehistorically. In contrast, 96 percent of the recorded sites lie within 1 mile of a water source, implying intensive use of this zone. Based on these data, areas that include higher densities of perennial drainages, major intermittent drainages, playas and springs possess a greater potential to contain abundant, clustered prehistoric sites. A brief examination of topographic maps of the study

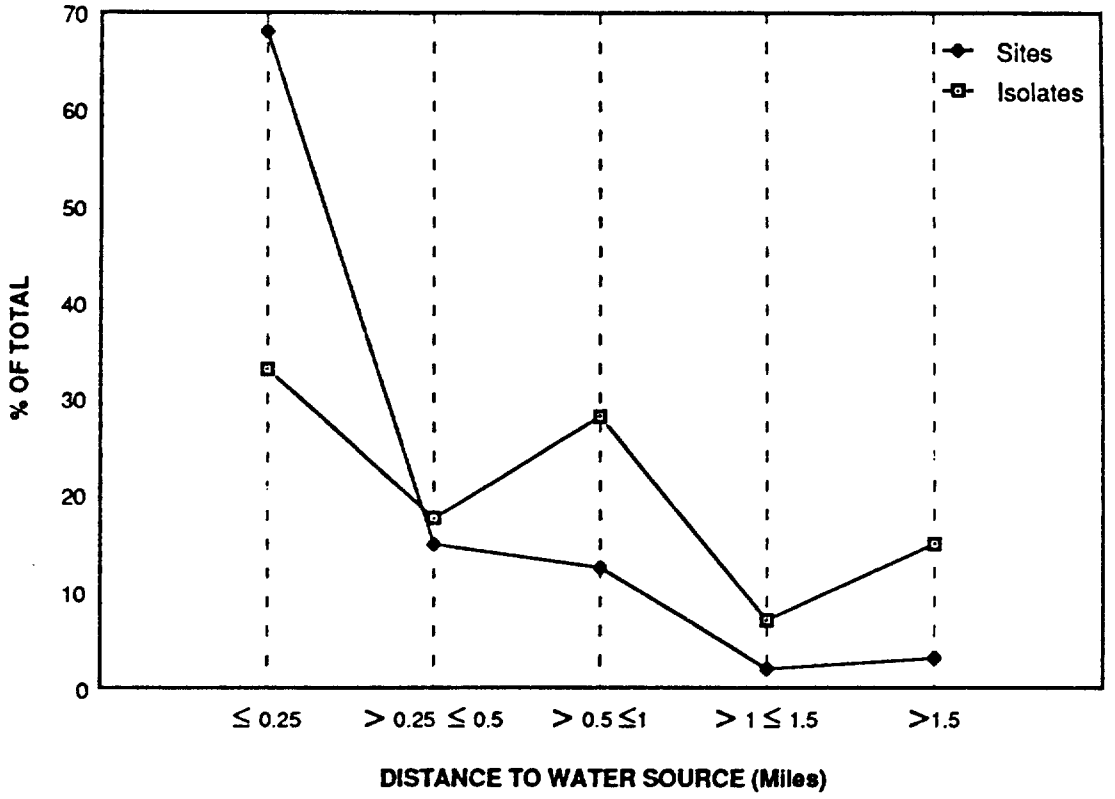


Figure G-7

DISTRIBUTION OF PREHISTORIC SITES AND ISOLATES RELATIVE TO WATER SOURCE

area suggests that the western half includes more of these water sources (except playas) than the eastern half.

Data from the 54 additional quadrangles manifests very similar patterning. These data, however, revealed roughly equal percentages of sites in the < 0.25-mile and the > 0.25 to $\leq$ 0.5-mile zones.

Isolated artifacts from both samples displayed similar distributions (see Figure G-7), with moderate variation from zone to zone. The patterning indicates that a higher percentage and density of isolates occur close to water sources, but more distant zones also contain moderate percentages of isolates.

Table G-3 presents the distribution of prehistoric site types relative to the defined water sources within the 25 sampled quadrangles. However, a lack of quantitative data on the amount of acreage associated with each type of water source and the amount of acres surveyed necessitate cautious interpretation of these data. As noted above, the emphasis of many surveys on drainages potentially biases the identified distribution.

These data suggest that the highest frequencies of sites and isolates occur in proximity to perennial and major intermittent drainages. Areas surrounding springs also contain relatively high numbers of sites, whereas the fewest sites have been documented near playas. Evidence from the additional sample of 54 quadrangles reflects similar distributions relative to the two drainage types, but manifests a reversal of the pattern noted for playas and springs. Differential distribution of these water sources may account for the reversal; playas are more prevalent in the eastern portion of the study area and springs predominate in the western half.

The distribution of site types relative to the defined water sources provides further means to assess the sensitivity of portions of the study area. As described above, different site types characteristically contain different artifact assemblages and cultural deposits. Thus, the types also differ in terms of their likelihood to yield significant information. For example, rockshelters and caves that often include stratified and diverse cultural deposits tend to be more significant than surface lithic scatters. Therefore, specific types of settings (e.g., perennial drainages) that contain high proportions of sites with a greater potential to be deemed significant (e.g., rockshelters) also possess greater archaeological sensitivity.

Data from the 25 sampled quadrangles (see Table G-2) indicate that site types most likely to meet federal significance criteria - rockshelters, caves and rock art localities - predominantly occur within or near the canyons of perennial drainages. These site types also exhibit a moderate association with major intermittent drainages.

Table G-3

DISTRIBUTION OF PREHISTORIC CULTURAL RESOURCES WITHIN 1.5 MILES OF A WATER SOURCE

	Perennial Drainage	*Playa*	*Spring*	*Intermittent Major Drainage*	*Beyond 1.5 Miles*
Lithic scatter	163/49%[a]	9/3%	46/14%	105/32%	7/2%
Rockshelters and caves	33/56%	0/0%	4/7%	22/37%	0/0%
Campsites	13/27%	1/2%	11/22%	22/45%	2/4%
Rock alignments and cairns	78/49%	0/0%	23/14%	54/34%	4/3%
Rock art	44/70%	1/1.5%	2/3%	15/24%	1/1.5%
Isolates	24/22%	7/6%	12/11%	54/49%	16/12%

Note: a = percentage within resource type.

In contrast, the distribution of campsites favors settings in proximity to major intermittent drainages, although moderately high proportions of campsites occur near perennial drainages and springs. Campsites generally possess the potential to yield significant information, yet this potential varies with the content and complexity of the sites. Trends for the region suggest that campsites located in perennial and major intermittent drainages tend to contain more diverse and extensive deposits. Lithic scatters, rock alignments and cairns -- sites with a generally lower potential for significance -- reflect a distributional pattern similar to that of rockshelters and caves.

The foregoing analyses reveal information, albeit preliminary, about the prehistoric archaeological sensitivity of the proposed range expansion study area. Available data suggest that the areas encompassed by 38 of 101 quadrangles potentially contain high densities of prehistoric cultural resources indicative of high archaeological sensitivity. These quadrangles cluster in four portions of the study area: the eastern edge, the northeastern corner, and the center of both the eastern and western half of the area. Additionally, these clusters of quadrangles characteristically encompass segments of perennial and major intermittent drainages. Whereas these data provide broad indications of sensitivity, the second stage of analysis suggests that specific settings within the quadrangles accounted for this sensitivity. These settings are located within 1 to 1.5 miles of water sources. Of these water sources, perennial and major intermittent drainages generally reflect a higher probability of containing significant prehistoric resources.

The patterning described above and the inferences drawn from it should, however, be considered preliminary. This caveat stems from the limited nature of the existing data base for prehistoric cultural resources as well as biases in the methods used to collect the data. These limitations and biases include:

1. Only 15 percent of the study area has been surveyed and most of the surveys used nonintensive techniques which often fail to identify the full complement of cultural resources in an area.

2. The most intensive surveys in the study area have focused on major drainages; other contexts have received lesser degrees of scrutiny.

3. The density measures apply to broad areas, many of which contain varied physiographic and environmental features. Such variation generally engenders differences in the nature and density of sites within the broad areas, and, in turn, creates a fine-grained mosaic of archaeological sensitivities.

2.7.2 Historic and Architectural Resources

2.7.2.1 MHAFB Study Area

A single documented historic site lies within the limits of MHAFB study area. This site consists of a small can scatter located on the plain in the eastern portion of the Small Arms Range. Available records and site patterning for the vicinity of the study area suggest that cattle and sheep grazing formed the primary activities conducted historically in the area outside the city of Mountain Home. These activities generally produced small, ephemeral sites such as sheepherder camps. Such camps, dating from the 1880s to the 1950s, represented the dominant type of historic site located by Addington (1987) in the survey of the nearby Idaho National Guard Training Area. As with prehistoric resources, this survey revealed a low density of historic sites (1 site per 2,550 acres).

Closer to the study area, a total of 22 historic sites have been documented less than 5 miles west of MHAFB. The sites include a structure, seven can scatters, six dumps, rock cairns, and a possible recent grave. Artifacts at the sites suggest use of the area from the 1880s (i.e., when the town of Mountain Home was founded) through the 1940s. The historic sites, including the structure, reflect temporary use of the area surrounding the base, Small Arms Range, and Highway 67 corridor. The can scatters and dumps probably represent the remains of sheepherder or cowboy camps.

Although partially reflecting the limited amount of survey, the patterning of sites indicates more concentrated historic activity west of the study area. This area includes a large intermittent drainage (Canyon Creek) and exhibits more topographic relief than the MHAFB study area. Possibly the creek and broken terrain provided water and sheltered locations needed by the sheepherders or cowboys. In addition, many of these sites cluster in the vicinity of Highway 67, which represents an historic road.

The absence of large creeks and broken terrain within MHAFB, the Small Arms Range, and the highway corridor suggest that these areas may have received limited use historically. This factor, combined with the low density of historic sites in surveyed areas east of the base, indicates that these portions of the study area possess a low potential to contain significant historic resources. The highway corridor may include a slightly higher density of historic sites, but they are likely to consist of dumps or can scatters that rarely meet significance criteria.

Even though they do not meet the age criteria (50 years old) for eligibility to the National Register, World War II-era buildings may represent important historic or architectural resources. MHAFB, founded in 1942, contains 19 buildings dating to the World War II era; these include five hangars, nine warehouses, a chapel, and four general-purpose buildings. Although none of the buildings has been formally evaluated, a brief inspection led the Deputy SHPO to conclude that the hangars and possibly

the chapel represent potentially significant resources. However, realignment plans involve no modification or demolition of the World War II buildings.

The city of Mountain Home contains nine historically and architecturally significant structures listed on the National Register (see Figure G-8). These structures include the Mountain Home Carnegie Library (1908); the Mountain Home Hotel (1910); the Pedro Anchustegui Pelota Court (1908); St. James Episcopal Church (1895); the Turner Hotel (1899), the F. P. Ake Building (1916); the Father Lobell House (1921); Elmore County Courthouse; and the Mountain Home Baptist Church (1908). Located in the southwestern and older portion of the city centered around the railroad tracks, these structures represent the surviving examples of specific architectural and construction styles in the region. Many are linked to events or people important to the history of the city. For example, W. J. Turner, one of the founders of Mountain Home, built the Turner Hotel. The Mountain Home Hotel and the Pedro Anchustegui Pelota Court reflect the importance of Basque immigrants to the development of the city. In addition, the city contains numerous other houses and structures (e.g., barns, railroad underpass) that possess potentially important historic and architectural characteristics.

Because its development dates back to the 1880s, the city may include other unidentified historic and architectural resources. However, in the absence of comprehensive survey and inventory data, only the following tentative predictions concerning the nature and location of such resources can be formulated. Historic and architectural resources are likely to be more concentrated near the original core of the city within a few blocks of the railroad tracks. The portions of the city beyond this core would tend to contain more recent resources and modern developments, although outward expansion of the city may have resulted in development of modern neighborhoods around formerly isolated farmhouses. The city, especially the core area, may also contain historic archaeological sites covered by modern structures. Main Street appears a likely location for buried historic resources since several fires burned much of this area in the past, and newer structures may cover the remnants of the older buildings.

Many recreation areas in the vicinity of the study area contain significant historic resources. The nearest and most prominent is the Snake River BOPA, which includes several structures and sites listed on the National Register. Silver City includes a National Register Historic District with numerous structures and features. Additionally, many areas used for primitive recreation (e.g, Camas and Pole creeks) contain potentially significant historic resources.

2.7.2.2 Proposed Expanded Range Capability Study Area

The 333 historic and architectural resources documented within the study area include standing structures, campsites, dumps, rock cairns, isolated artifacts, and a range of other historic features. These resources range in age from the late 19th century to the present (see Table G-4). Historic structures are the most prominent and potentially significant type of historic and architectural

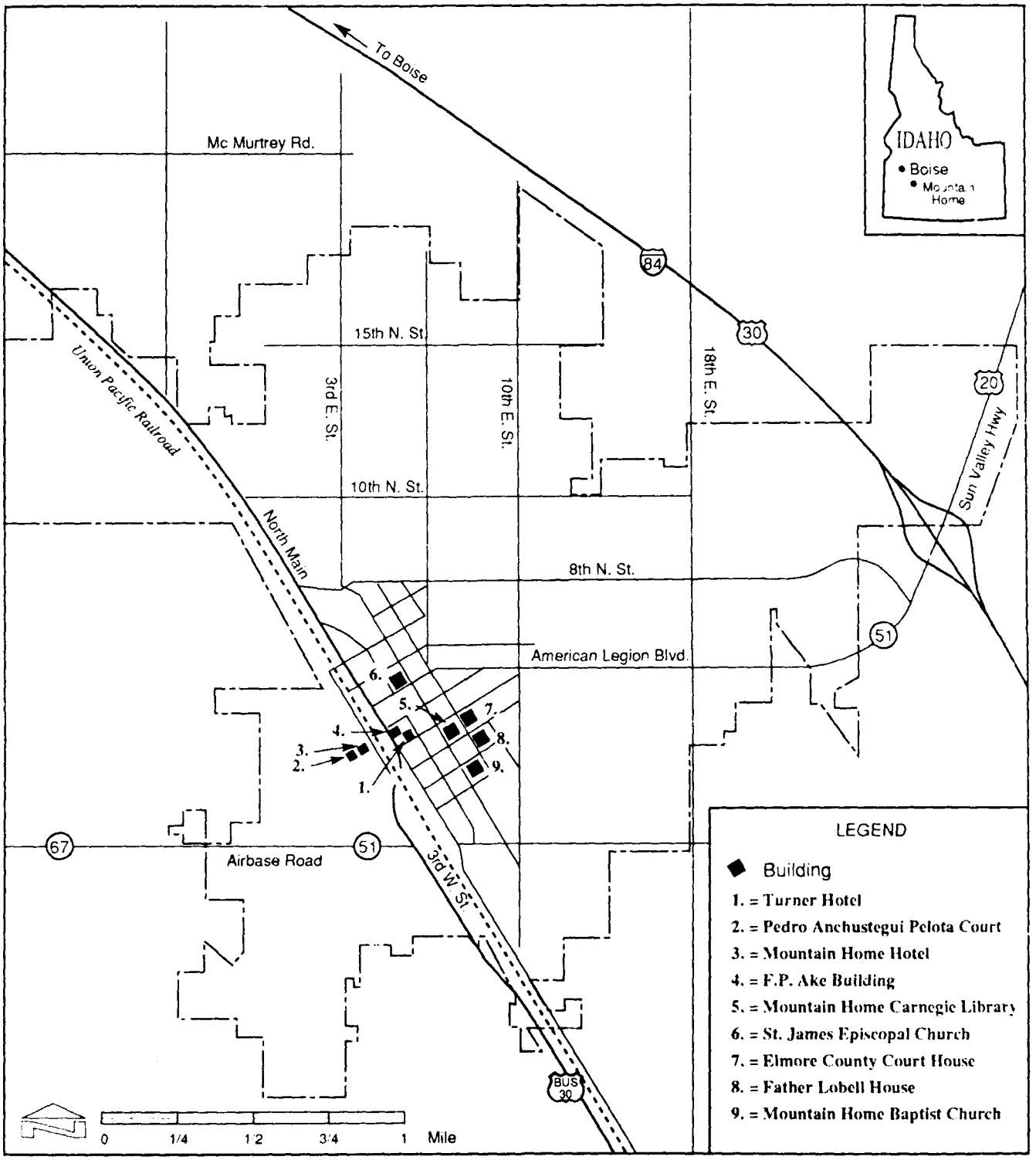


Figure G-8

HISTORIC AND ARCHITECTURAL RESOURCES LISTED ON THE NATIONAL REGISTER CITY OF MOUNTAIN HOME

Table G-4

HISTORIC AND ARCHITECTURAL RESOURCES IN THE PROPOSED EXPANDED RANGE CAPABILITY STUDY AREA

	< 1900	*1900-1910*	*1911-1920*	*1921-1930*	*> 1930*	*Unknown*	*Total*
Structure	8	14	12	8	8	19	69
Campsite		16	24	15	24	62	141
Dump	1	2	15	4	9	35	66
Rock Cairn						19	19
Isolate		2	4	1		8	15
Other	3	3		2	6	9	23
TOTAL	12	37	55	30	47	152	333

resources documented within the area. The 69 historic structures consist of houses, barns, schools, post offices, shacks, cabins and other shelters. However, the study area undoubtedly includes many more historic structures that remain unrecorded at this time. Many of the recorded structures cluster within areas originally developed as homesteads, most of which occupy areas near reliable water sources -- major creeks, rivers and springs. Structures and groups of structures also cluster along roads, near road intersections, and at stream crossings. Although specific information on the characteristics of the historic structures is limited, available evidence indicates that milled wood, logs, and basalt cobbles represent the types of materials used in the construction of the structures. Most of the datable historic structures tend to have been constructed prior to the 1920s (see Table G-4).

The study area contains 147 recorded historic campsites consisting of a diverse assortment of domestic debris (bones, cans, bottles, tools), but lacking standing structures. The contents and settings of campsites suggest that they probably are associated with either sheepherding or cattlegrazing. Corbyn (1988) noted that sheep camps often occurred in association with rock cairns and alignments, and commonly occupy upland knolls with good visibility and drainages. Surveys to the north found that larger and more intensively used camps occurred next to drainages. In the study area, most campsites have not been dated, although all dated sites are assigned to periods after the emigration of Basque sheepherders into the area (ca. 1890s). Because the campsites vary dramatically in terms of size, content, and diversity, their potential significance varies as well.

The 66 dumps identified within the study area primarily consist of surface debris (cans, bottles, metal fragments, etc.) that lack diversity and evidence of temporary or long-term habitation. Some sites identified as "dumps" may actually be short-term campsites, whereas others are associated with nearby residences. Historic dumps in the region most commonly lie near roads (Druss 1986), but those in the study area are found primarily near intermittent streams. Most dumps have not been dated, but of the datable ones, 58 percent dated between 1890 and 1920. In general, dumps tend to possess a limited potential for significance.

The remaining classes of historic resources are rock cairns, isolates, and an eclectic group of historic features ("other"). Archaeologists have documented 19 historic cairns within the area. Because these resources cannot be dated, the age of the cairns has been inferred from their association with datable sites or artifacts. Historically, cairns generally formed markers for property lines, roads or trails, although many within the study area occur in association with sheepherder camps. Since cairns possess a limited potential to yield important information, they rarely constitute significant resources.

The 15 historic isolates identified within the study area include single finds of bottles, glass fragments, and jars. In the western half of the study area, Tuohy (1963) reportedly collected a badly weathered rifle that possibly dates to the 1830s. As this case indicates, the area undoubtedly contains hundreds of

undocumented historic isolates. Nevertheless, these artifacts characteristically lack the potential to yield significant information.

Twenty-three historic resources were classified as "other." This assortment of resources included two Civilian Conservation Corps dams, the Duck Valley Indian Reservation (1877), a Snake War Battleground (1864), fences and corrals (1890s-1950s), loading docks, a wagon (1940s) and the wreckage of an F-111. As this abbreviated list indicates, these resources vary in age and potential significance. Undoubtedly the battleground and the reservation represent significant historic resources. In contrast, the more recent sites such as the F-111 and the wagon lack significance.

Similar to the prehistoric resources, few of the historic and architectural resources have been formally evaluated for significance. Twelve sites are listed on the NRHP, including Camp Three Forks, the Wickahoney Post Office and Stage Station, and 10 sites within the Camas Creek and Pole Creek National Register Archaeological District. Located at the extreme northwestern margin of the study area, Camp Three Forks consists of the remnants of an 1866 U.S. Army outpost. Although only one of the original buildings remains standing, others have been preserved on a nearby ranch. The Wickahoney Post Office and Stage Station, situated in a remote setting in the northcentral portion of the study area, dates to 1895 and includes the burnt remnants of several lava rock and wood frame structures. The 10 sites within the National Register district consist of cabins, sheep camps, rock alignments, and historic petroglyphs. Although not formally evaluated, the BLM and the SHPO consider most of the other identified historic structures potentially eligible for the National Register.

Figure G-9 presents a gross indication of the distribution of historic and architectural resources within the study area. These resources occur throughout the study area, but the majority of the quadrangles containing architectural resources encompass major drainages. These distributional data, however, represent only a preliminary and restricted picture of the patterning of historic and architectural resources. Inconsistent documentation (prior to ca. 1983) coupled with limited access to many sites on private lands have resulted in an unrepresentative inventory of historic and architectural resources. No quantitative estimates are possible, but it is likely that the number of significant historic and architectural resources within the study area is considerably higher than current information indicates.

2.7.3 Native American Resources

2.7.3.1 Contemporary Native American Groups

Contemporary Native Americans with historical ties to the project area live throughout southwestern Idaho but are concentrated on and near the Duck Valley Indian Reservation, nearly 300,000 acres of land set aside for Western Shoshone and Northern Paiute groups from parts of Nevada, Idaho, Oregon, and Utah. Traditionally, these groups consisted of small bands that fished, hunted, and

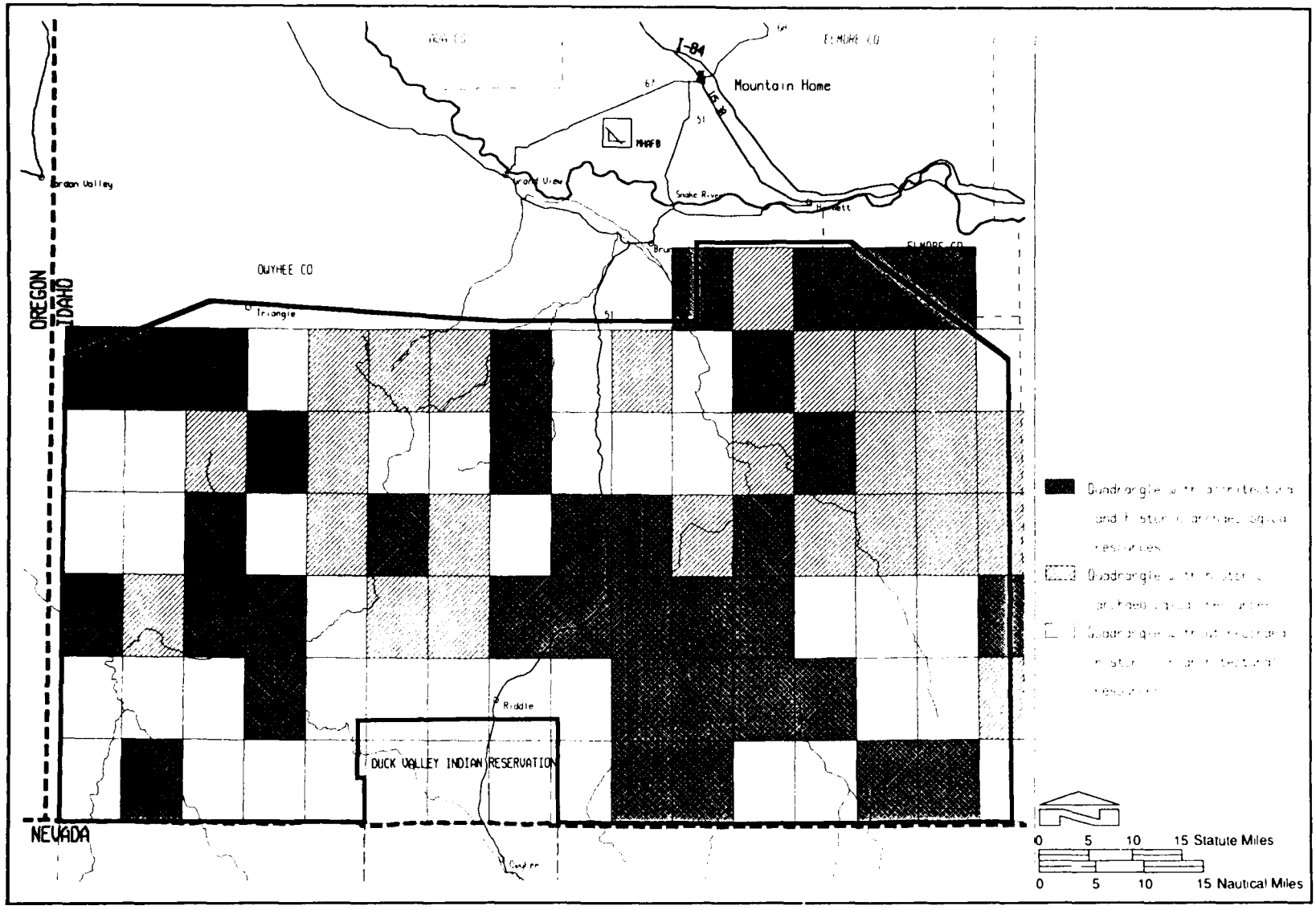


Figure G-9

DISTRIBUTION OF HISTORIC ARCHAEOLOGICAL AND ARCHITECTURAL RESOURCES BY USGS QUADRANGLE

harvested plants as they moved systematically from area to area in response to changes in the distributions of seasonally available resources. The horse was introduced into the region about 1700 A.D., but the extent of its effect on native lifeways remains a subject of debate among researchers. Extensive European contact occurred first in the 1820s as trappers began exploiting game resources needed for Native American subsistence. By the 1840s and the beginning of the great westward emigration, much of the game in the region had been depleted and Native American economies crashed. As a result of these conditions, early historic accounts document extreme poverty among the Shoshone and Paiute.

In the 1863 Treaty of Ruby Valley, the United States granted extensive lands to the Shoshone. These lands included much of the range expansion study area, extending from inside Nevada to the Snake River. However, these lands have been claimed by the United States, and, for the most part, managed by the BLM for many years. Native Americans initiated several legal actions recently (1950s to present) contesting the federal government's ownership of these lands. A 1979 court decision awarded $26 million in recompense for the taking of Western Shoshone lands in Nevada. However many Shoshones protested the award and continue to assert ownership of the lands. Similarly, ownership of lands within southern Idaho, including a portion of the study area, continues to be questioned by Native Americans in the region, based on their interpretation of the 1863 Treaty.

In the 1870s, Captain Sam, a charismatic leader, suggested to a federal Indian agent that the traditional territory used by the Western Shoshone would be an ideal reservation because it had good potential for agriculture, fishing, hunting, and timber production and was located far from areas used by whites. Captain Sam's wish was realized on April 16, 1877 when the President of the United States signed an Executive Order establishing the Duck Valley Reservation. Soon a number of Western Shoshone and Northern Paiute bands moved to the reservation and began to take up ranching and farming, all without the help of the federal government. Whites and Native Americans alike thought of the reservation as a place where the bands could attain self-sufficiency, and historic documents indicate the Shoshone and Paiute spared no effort to do so. When federal agents finally arrived to provide assistance, they found the Native Americans had already constructed a diversion dam along the Owyhee River and built irrigation canals to provide water to farming plots throughout Duck Valley. In the 1880s the Shoshone and Paiute bands continued to develop their economic base through construction of a new flour mill and additional irrigation ditches.

This period also saw the first of many attempts to guarantee enough water to sustain economic growth and continued livelihood. Water was necessary for successful crop production due to a short growing season, and as early as 1889 it became apparent that homesteaders upstream of the reservation were diverting water necessary for Native American use. In 1915, after numerous requests and years of struggle and economic hardship on the reservation, the federal government decided that the Duck Valley Reservation had prior rights to water from the Owyhee River. This proved to be a hollow

victory, since the construction of a reservoir needed to impound the water was not constructed for more than 20 years. During this delay, the reservation was hit hard by severe drought, and additional encroachments by non-Indians continued to reduce the already dwindling water supply. Whole areas of the reservation were abandoned due to lack of water. Finally, in 1929, the government began to plan the construction of a dam on the Owyhee River. As part of this action, Ray Cramton, special attorney to the Secretary of the Interior, prepared a comprehensive study of the rights of the Duck Valley Shoshone-Paiutes. Swayed by Cramton's authoritative analysis, Wildhorse Reservoir was constructed between 1936 and 1937.

Today, the Duck Valley Reservation again faces a threat to its water supply. Use of the reservoir by recreationists has spawned legal and political efforts by special interest groups to preempt rights of the Native Americans so the reservoir could be used expressly for fishing, boating, and tourism. The issue currently remains unresolved, but it is clear that access to water and productive land has played a key role in the success and cultural persistence of the Shoshone-Paiute groups from Duck Valley.

The cultural and religious values of these Native Americans as they relate to specific cultural resources are only now beginning to be documented. Such a study has been commissioned by the Bureau of Indian Affairs (BIA) as part of an action to adjudicate water rights to the Snake River (personal communication, Pavesic 1989). Unfortunately, data collection for this large project has not yet begun in earnest, and a draft report is not expected until August 1990. Native American informants indicated that the general study area contains more than 100 sites important to contemporary Native Americans. The informants have yet to divulge the locations of these sites. However, it is possible to derive useful information on several types of sites important to Native Americans from a massive study of Shoshone, Paiute, and other related groups occupying areas immediately south of Duck Valley. This report (HDR 1981) focused on the culture, society, and economy of Shoshones, Paiutes, and all other Native Americans with historic and contemporary concerns in the Great Basin. Based as it is on extensive interviews with and fieldwork among these and other groups, in addition to a thorough literature review, this study is used below to provide information on the general types and significance of cultural resources likely to be important to the Shoshone-Paiute people now residing on and near the Duck Valley Reservation. These resources can be grouped roughly into ancestral/sacred areas and traditional hunting, fishing, and gathering areas.

2.7.3.2 Ancestral/Sacred Areas

In the religions of the Shoshone, Paiute, Ute, and other related groups, the concept of sacredness is associated with supernatural power derived from the spirit-world. The religions of the Shoshone, Paiute, and related groups reckon sacred time in a horizontal rather than a chronological fashion. That is, the path from current to primordial times is regularly traversed in dreams and visions; distinctions

between past and present are irrelevant or nonexistent. The ancient spirit-world is alive and ubiquitous.

For Native Americans, sacred space is wherever spiritual energy resides. Space may be deemed sacred on a temporary as well as a permanent basis. For example, sites used for rituals in which communication with the spirit-world takes place are considered sacred only for the duration of the ceremony. Sacredness may also attach itself to the vehicles of communication with the spirit-world. Plants such as native tobacco, peyote, or Jimson weed may be so regarded. Similarly, curing wands and the entire inventory of shamanistic paraphernalia are sacred objects imbued with supernatural power due to their use in soliciting the aid of animal-spirits. In the broadest sense, the entire ancestral territory of each tribal group is sacred, since the physiographic features of the environment were created during mystic times and contain the spirits of creator figures and their descendants. Some spirits range freely within this territory and cannot be identified with particular sites. Others make their homes at specific locations, such as mountain peaks, caves, rock outcroppings, or springs. These areas, when revealed by Native Americans, can be mapped as permanent sacred sites. Resources in this group include prehistoric and historic settlement sites; burial grounds; historic event sites such as battlegrounds, massacre locations, and birth and death places of important tribal personages; rock art; ceremonial/ritual sites; special caves; trails; water sources; and selected physiographic features that are accorded significance in traditional cosmologies. Brief discussions of some of these resources are provided below.

Archaeological Sites and Burial Grounds

Archaeological sites can be important to Native Americans as tangible links to their past and evidence of cultural continuity. Archaeological data suggest that perennial drainages in southwestern Idaho have the highest concentrations of prehistoric habitation sites, but the mobile lifestyle that characterized traditional adaptations in the area suggests that small residential camps are probably distributed more widely.

Burial sites are regarded as extremely sacred. The typical Shoshonean burial custom was to dress the deceased in his finest clothing and take him to the mountains. Preferred interment areas were caves, the entrances to which were blocked with stones. Rock cairns were also utilized, preferably in the area of rock slides, talus slopes, or soft dirt. In historic times, burials often included animal and even human sacrifice. For example, in a 1963 interview, Pawonto, a 104-year-old elder from the Duck Valley Reservation, recalled a burial in the Owyhee Desert that included the warrior's horse.

Caves were not the only areas selected for interment, however. Some historic groups adopted the Plains Indian tradition of placing the dead in a special burial lodge, which was then abandoned by survivors. Displaced Native American groups often settled near non-white ranches and buried their

dead in valley floor locations. Although ethnographic data emphasize general areas preferred for burial, it can be assumed that skeletal remains of scores of generations are distributed widely at sites no longer recalled by living people.

Traditional notions about the dead and their spirits or ghosts are tremendously persistent among contemporary Native Americans. One persistent belief is that jealous or vengeful spirits of the dead can return to harm the living. Disturbance of these burials may anger these ghosts and motivate them to seek vengeance on contemporary Native Americans.

Rock Art

Petroglyphs and pictographs played an important role in prehistoric Native American societies and continue to play an important role in the religious beliefs of contemporary Native Americans. Rock art is an ancient tradition in the region. In the nearby Great Basin, the oldest rock art tentatively dates to 7000 to 5000 B.P. and the most recent forms from 1000 to 500 B.P. Game animals and hunting scenes are familiar motifs as are anthropomorphic and decorated human figures that scholars associate with ceremonies or rituals. Rock art is often located near game trails and narrow draws leading to water sources frequented by game. As a result, it is widely accepted that rock art sites were originally associated with hunting rituals.

Even though the production of rock art ceased centuries ago, ethnographic data indicate that the sacred nature of rock art was maintained in modified form into historic times. Although shamans seem not to have visited these areas for performance of hunting rituals (a decline that may be due to the decimation of game by others), caves and rock outcroppings with petroglyphs and pictographs were visited by incumbent shamans on vision quests and by ordinary people seeking to acquire spiritual aid.

Assessing the significance of rock art to modern Native American groups is complicated because most deny any association with these sites, even though evidence clearly indicates at least some rock art can be attributed directly to the ancestors of contemporary groups. Some Native Americans even deny the presence of rock art that demonstrably occurs in their local area. These contradictions can be explained by the general reluctance of Native Americans to discuss sacred matters with others. Such discussions, indeed all public ritual and oratory, were generally halted in the face of political subordination by whites, the loss of sovereignty over sacred lands, and religious intolerance expressed by many outsiders, including the federal government. To survive as a culture, a strategy based on reticence and the clandestine persistence of traditional knowledge and ritual was quickly developed. This strategy, widespread as it is throughout contemporary Native American societies, often hinders the identification of sacred sites. Even though we lack data on the significance of specific rock art sites to contemporary Native Americans, local groups undoubtedly place a high value on their protection. Importantly, pictographs and petroglyphs are associated with all curing rocks and most of the sacred

caves and rockshelters found in the Great Basin. A similar pattern almost certainly occurs throughout southern Idaho.

Caves, Rocks, and Mountains

Caves and mountains are noted in myth and legend as residences of spirit-animals or anthropomorphic creatures. These places are regarded as especially powerful and dangerous, particularly where the dead are buried. Unusual rocks or outcroppings are often considered to be sources of curative powers. The ROI includes few mountains but contain abundant caves and rockshelters as well as rock art localities (BLM 1985a, 1985b). As noted above, most if not all sacred caves, rock shelters, mountains, and curing rocks utilized by historic Great Basin Indians for visions and prayer are associated with rock art. There is every reason to believe these types of resources are considered highly sensitive by the Shoshone and Paiute people of southern Idaho.

Water Sources

Native American religions attach special significance to springs, lakes, and rivers. The most important link between water and the sacred domain were spirit-animals or anthropomorphic creatures that were believed to inhabit all springs, lakes, and streams. Prominent in this respect is the Water Baby, a source of supernatural power that can be deliberately solicited by humans. During a 1963 interview and field trip, Pawonto, an 104-year-old elder from the Duck Valley Reservation, demonstrated an impressive knowledge of water sources hidden in the Owyhee Desert.

Historic Event Sites

Native Americans, like most people, accord special significance to locations of important historical events. The Paiute camping place Sihwiyo, "Willows All in a Row," is one such example. A Paiute campsite located at a spring-fed slough in the rugged Owyhee Desert, Sihwiyo was the scene of an attempted massacre by U.S Cavalry volunteers. The Paiute made a successful stand, drew the attackers into an ambush, and forced the Cavalry to retreat. Remnants of the battle still exist (*Idaho Free Press*, September 14, 1963) and Sihwiyo is undoubtedly considered sacred by contemporary Native Americans. Sihwiyo lies along Battle Creek within the study area. Several battles and skirmishes between the Shoshone and the U.S. Army took place during the 1860s, so other battle sites probably are present within the region.

Trails

The ecological adaptation of Shoshone and related groups in prehistoric and early historic times required a high degree of mobility throughout much of the year. Movements for subsistence and ritual

activities typically occurred along routes that were widely known and utilized by numerous generations. Sacred sites are often associated with rock art located along deer and animal trails that may have been sacred due to shamanistic activities surrounding the hunt. Major trails were regarded (and may still be regarded) not only as highways for travel but as sacred pathways that symbolized the cultural continuity of ancient and modern peoples.

2.7.3.3 Traditional Use Areas

Specific hunting, fishing, and gathering areas traditionally used by the residents of the Duck Valley Reservation (and other Native American groups) will be recorded as part of the BIA adjudication of water rights to the Snake River (personal communication, Pavesic 1989). Although these areas cannot be identified at the present time, general patterns of concern for native flora and fauna can be described.

The intimate relationship of Shoshone and Paiutes with native flora and fauna is an ancient and persistent pattern, even though farming and ranching are dominant economic activities. Plants and animals continue to be used for food, medicine, and as a source of materials for the production of ritual objects. Some plants are used by Native American artisans, an activity that provides supplemental income. In addition to these utilitarian benefits, the collection and traditional use of these plants and animals serves to affirm their cultural identity and relationship with their ancestors. Because hunting, gathering, and fishing areas were also used by ancestral groups, traditional use areas are often considered sacred.

2.7.3.4 Summary

Native Americans living on or associated with the Duck Valley Reservation are likely to be concerned about a wide variety of archaeological, historical, and environmental resources within southern Idaho. Although detailed supporting data are not yet available, the western portion of the proposed range expansion capability study area probably contains the highest density of sensitive resources. This area is well-watered, contains exceptionally high densities of prehistoric sites, rock art, caves and rockshelters, and is located in immediate territory of Native Americans residing on and near the reservation. In addition, the eastern half of the study area, especially the major drainages, has the potential to contain numerous resources and localities important to contemporary Native Americans.

3.0 PA AND CRMP

3.1 PURPOSE AND APPLICABILITY OF PA AND CRMP

Specific mitigation measures for cultural resources will be identified in a Programmatic Agreement (PA) signed by the Air Force, ACHP, the SHPO, and the BLM. This brief, legally binding document will carefully outline the basic processes that will be used to consider the effects on cultural resources resulting from realignment of MHAFB and the proposed expanded range capability. The PA will define the extent of its applicability, identify the parties to the agreement, and stipulate the essential processes and procedures involved in the identification and treatment of cultural resources throughout the proposed range expansion program. The processes of a PA mirror those required by Section 106 of the National Historic Preservation Act, but the PA permits the involved parties to tailor those processes to the needs of a particular program. A description of some of these processes and other provisions that will be included in the PA are presented in section 3.2.

The PA will not, however, define the specific methods and procedures to be used in the cultural resource studies conducted for the program. Rather, for description of the methods and procedures, the PA will reference an associated document: the Cultural Resource Management Plan (CRMP). In this way, the PA and CRMP are linked documents. The CRMP is a detailed description of the strategies and methods for the entire cultural resource program. It will present the strategies and techniques for inventory, evaluation, and data recovery; it will justify the techniques and strategies in the context of existing knowledge of the history and prehistory of the region; and it will demonstrate that the cultural resource investigations meet federal and professional standards. Like the PA, the CRMP is a legally binding document.

By signing the PA, the Air Force agrees to adhere to the processes, methods, and procedures throughout base realignment and proposed expanded range capability programs. Similarly, by signing the PA the SHPO, BLM and ACHP agree that the standards and requirements of the PA and CRMP will fulfill the Air Force's responsibilities with regard to cultural resources. When executed, the PA will conclude the Section 106 process; the PA will provide the guidance for considering the impacts to cultural resources in lieu of the step-by-step Section 106 process. In the standard Section 106 process, the Air Force would be required to consult with the ACHP to consider the effects on cultural resources resulting from each individual action (e.g., construction of each building or road). Alternatively, the PA and CRMP will provide a set of processes and procedures, approved by the ACHP, SHPO and BLM, that apply throughout the life of the program. Because the PA will satisfy the need for additional consultation with the ACHP, it will allow the cultural resource studies to proceed uninterrupted by potentially lengthy consultation and ensure timely consideration of all cultural resource issues. An additional advantage to a PA and CRMP is that they will clearly identify what the

Air Force is required to do with regard to cultural resources. Also, the PA and CRMP will result in a more stable, consistent, and cost-effective cultural resource program. Stability and consistency also ensure that scientific and historical data will not be lost as a result of hasty, poorly planned cultural resource studies. Additionally, a PA permits public involvement to ensure that the concerns of the community are considered.

Based on the criteria in 36 CFR 800.13, a PA and CRMP are appropriate for this large, complex, multiyear program. The SHPO, BLM, and ACHP support development and implementation of a PA and CRMP for the base realignment and the proposed expanded range capability.

3.2 BASIC TASKS, PROCESSES, AND STIPULATIONS OF PA AND CRMP

The following presents a preliminary outline of the tasks, processes, and stipulations expected to be included in the PA and CRMP. The program defined in the PA and CRMP will be further refined in consultation with the SHPO, BLM, and appropriate Native American groups.

Identify cultural resources that could be directly affected by base realignment

The Air Force and SHPO have agreed that an intensive Class III (i.e., 100 percent coverage, 30-meter transects) survey will be conducted for all areas that will be directly affected by realignment. This will require the identification and survey of all relatively undisturbed portions of the base slated for development. However, examination of all other undisturbed on-base areas would fulfill the Air Force's requirements under Section 110 of the National Historic Preservation Act and provide baseline data for future planning. Based on a visit to MHAFB, the Idaho SHPO estimates about 1,000 to 1,500 acres of the base would require survey (personal communication, Green 1989).

Similarly, a brief "windshield" survey of architectural resources on base would ensure identification of important structures that may have the potential to become significant. This effort would aid compliance with the Memorandum Agreement between the Air Force and the National Conference of SHPOs regarding treatment of military buildings.

Collect additional data on the nature, density, and distribution of cultural resources in the proposed range expansion study area to assist the USAF in minimizing impacts during project design

As described in section 1.3 of the EIS, the development of the proposed expanded range capability will take place in a tiered fashion. The present EIS represents the first tier of environmental analysis. It provides data on the general sensitivities of the study area. A subsequent Tier 2 EIS (and specific cultural resource studies) will be prepared to support site-specific decisions relating to the the size, configuration, and location of a proposed expanded range. To help identify sensitive locations that

should be considered during the siting process, additional cultural resource data will be collected from three sources: (1) site records and any maps of previously recorded sites; (2) new data collected during a 2 to 5 percent Class II sample survey of areas potentially subject to impacts; and (3) Native Americans with ties to the study area. The CRMP will specify how these data will be collected, analyzed, and reported.

Identify cultural resources that could be directly affected by the proposed expanded range capability

The Air Force, SHPO, and BLM have agreed that an intensive Class III survey will be conducted for all areas that will be directly affected by the proposed expanded range capability. Definition of the areas requiring survey will be determined in consultation with the SHPO and BLM.

Evaluate the significance of all resources that could be directly affected by base realignment and the proposed expanded range capability

Evaluation of archaeological, historical, and architectural resources will be made in terms of established criteria for listing a property on the National Register of Historic Places, as amended, (36 CFR 60.4), as specified in AFR 126-7. Methods used to gather data for resource evaluation would include testing (e.g., test excavations, surface collection), additional documentation, and analysis. Evaluations of the significance of Native American resources would be conducted in consultation with representatives of the Duck Valley Reservation and related groups. These consultations will form the basis for determining the significance of such resources and their allocation to an appropriate category for management and treatment. Significance will be determined with criteria derived from the American Indian Religious Freedom Act of 1978, 36 CFR 60.4, and draft ACHP *Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review*.

Mitigate direct impacts to significant cultural resources

It is Air Force policy to avoid, where practical and possible, adverse impacts on significant cultural resources. Consequently, at the earliest possible point in designing a particular element of base realignment (e.g., construction of new housing) or of a proposed expanded range, information gained from resource identification and evaluation will be used. If feasible and cost-effective, the project would be redesigned to avoid significant resources.

Circumstances may arise in which impact avoidance is not feasible. In such instances, the PA will require adoption of one or more mitigation measures to lessen damage to significant cultural resources. Mitigation could take several forms: stabilization, preservation in place, rehabilitation, and data recovery. Mitigations required by the PA and described in the CRMP will be consistent with *"Recovery of Scientific, Prehistoric, Historic, and Archaeological Data: Methods, Standards, and*

Reporting Requirements" (36 CFR 66); the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 CFR 190); Standards for Historic Preservation Projects (36 CFR 68); Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings; *"Treatment of Archaeological Properties: A Handbook"* (ACHP 1980); and *"Preparing Agreement Documents"* (ACHP 1988).

In the case of Native American resources, the PA will require and the CRMP will describe how mitigation planning and execution will involve consultation with appropriate representatives of the Duck Valley Indian Reservation (and other relevant Native American groups) to arrive at a resource management plan. When potential conflicts arise between treatment of a modern Native American resource under the National Historic Preservation Act of 1966 and treatment under the American Indian Religious Freedom Act of 1978, resolution would be sought through negotiations among concerned parties (e.g., the Air Force, SHPO, ACHP, and tribal representatives).

Monitor and mitigate indirect impacts

Realignment-induced population growth and increased access from a proposed expanded range capability is expected to result in an increase in indirect impacts to cultural resources. Reducing these impacts to an insignificant level will require the development and implementation of a long-term monitoring and mitigation program defined by the PA and outlined in the CRMP. The program should identify areas and resources requiring monitoring for evidence of vandalism, pot-hunting, and other forms of indirect impact; specify monitoring methods; and establish guidelines for determining when evaluation and mitigation (treatment) actions are necessary. The program should also specify manpower needs, funding channels, funding levels, and criteria to determining program duration. Evaluation and mitigation procedures would conform to those used in evaluating and mitigating sites affected directly.

Currently, the BLM conducts a monitoring program at the Idaho Air National Guard training area. Such a program, especially the interaction of the BLM and the military, could provide a template for monitoring efforts stemming from the realignment.

As a step toward identifying potential indirect impacts to architectural and other cultural resources in the city of Mountain Home, the Air Force could provide basic assistance to the Elmore County Historical Foundation. Assistance might involve identification of funding sources (e.g., grants) for studies (e.g., architectural survey), and limited technical support. This program of assistance, if implemented early in the realignment process, would be likely to ensure adequate evaluation and, if necessary, treatment of identified cultural resources.

Field and Analytical Methods

The PA and CRMP will specify the basic field (i.e., survey and excavation) and analytical strategies and methods to be used in this program. Overall, these strategies and methods will meet the requirements established in the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* (48 CFR 190) and 36 CFR 66. In addition, these methods will be developed in consultation with the BLM and the SHPO.

Native American Involvement

The PA will describe procedures for consulting with and considering comments and concerns of Native Americans during implementation of the CRMP.

Treatment of Burials

The PA will define the treatment of human skeletal remains encountered during archaeological investigations. The PA will require these procedures to conform to a plan developed prior to any construction with the potential to affect burials. This plan will be prepared in consultation with the Duck Valley Indian Reservation, related groups, the BLM, and the Idaho SHPO.

Reporting Procedures

The PA will require that all cultural resource reports will be consistent with contemporary professional standards and relevant portions of the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 CFR 190) and *"Recovery of Scientific, Prehistoric, Historic, and Archaeological Data: Methods, Standards, and Reporting Requirements"* (36 CFR 66). The PA will also describe how and to whom reports will be disseminated.

Qualifications of Personnel

The PA will require that all historic preservation work will be carried out by or under the direct supervision of a person or persons meeting at a minimum the Secretary of the Interior's *"Professional Qualification Standards"* (48 CFR 190).

Review of PA and CRMP Implementation

The PA will specify how the BLM, Idaho SHPO, and the Advisory Council on Historic Preservation will monitor activities carried out pursuant to the PA and CRMP. The PA will specify the nature and periodicity of review, procedures for revising the PA and CRMP if necessary, procedures for

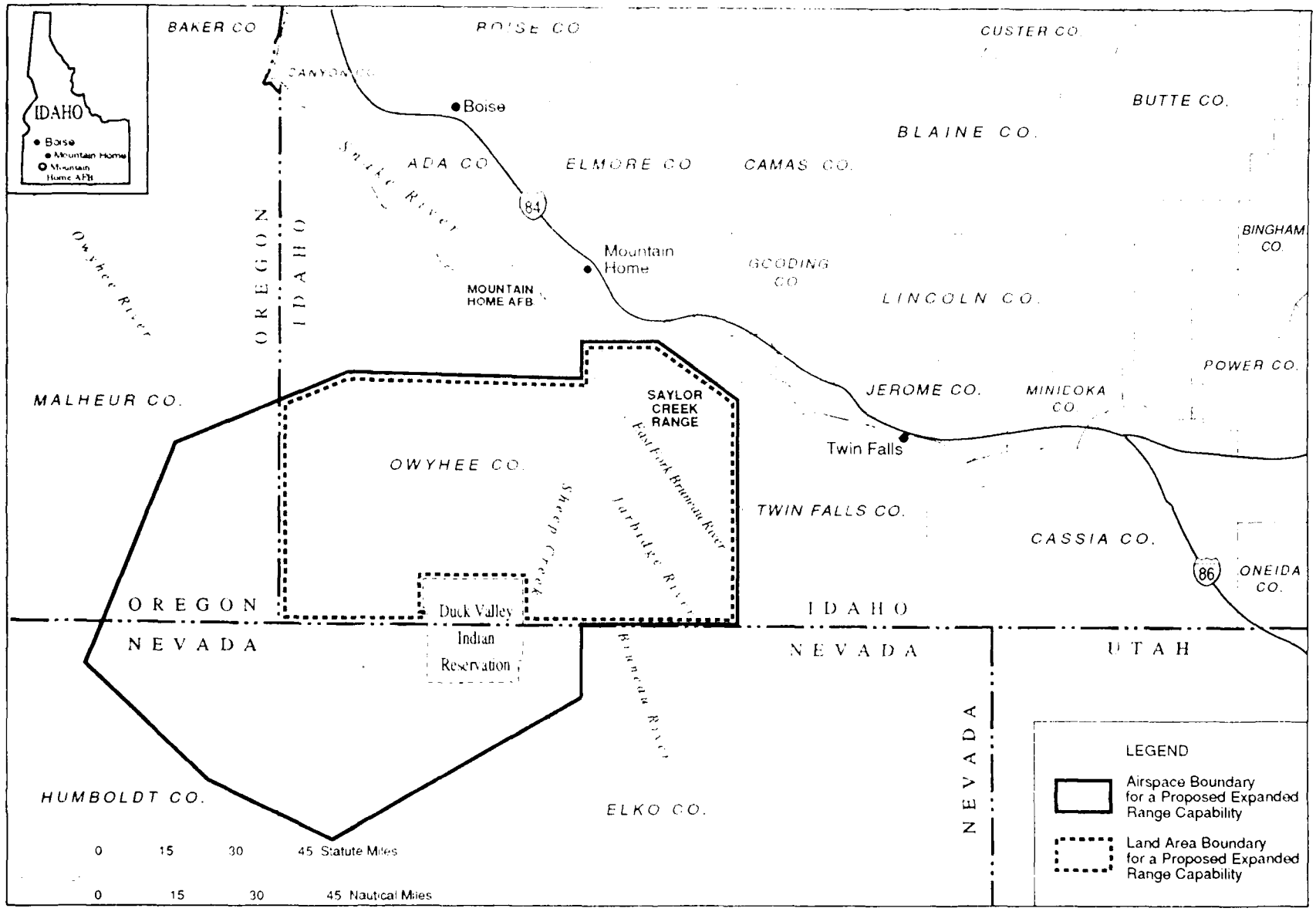
terminating the PA and CRMP if necessary, and similar actions concerned with ensuring the effectiveness of the PA and CRMP.

Dispute Resolution

The PA will identify procedures to resolve disputes between signatory agencies.

Agency Responsibilities

The PA will specify the roles and responsibilities of all signatory agencies.



STUDY AREA FOR A PROPOSED EXPANDED RANGE CAPABILITY