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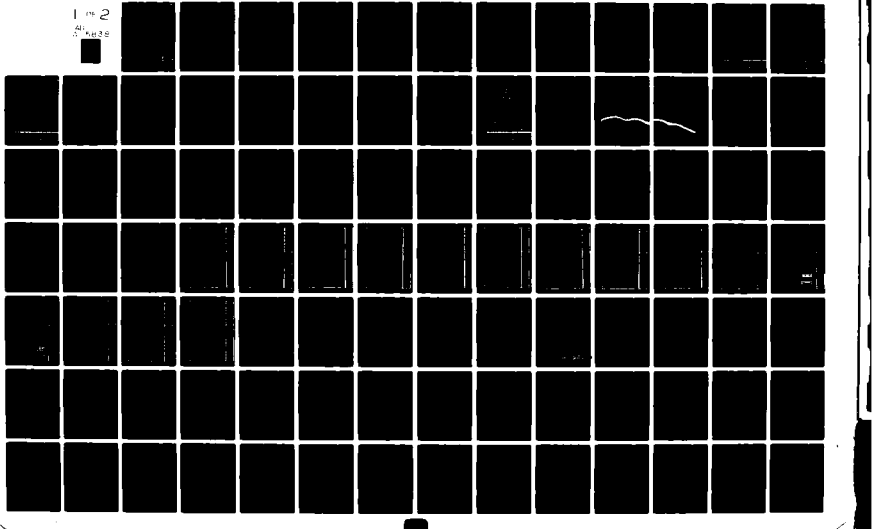

FINAL REPORT
AQUATIC BIOLOGICAL INVENTORY
HILLVIEW DRAINAGE AND LEVEE DISTRICT
GREENE AND SCOTT COUNTIES, ILLINOIS

Submitted to:

U.S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT

January 11, 1982

Submitted by:

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
St. Louis, Missouri

Contract No. DACW43-81-M3144

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This study describes aquatic habitats, aquatic biota and overall aquatic systems found in the Hillview Drainage and Levee District, located in Greene and Scott Counties, Illinois. Information presented in this report is based on four general sources: a field reconnaissance of streams, major ditches and lateral ditches; a qualitative and quantitive analysis of field samples of aquatic organisms; a review of published and unpublished reports; and

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consultation with acknowledged technical specialists in the region.

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ABSTRACT

This study describes aquatic habitats, aquatic biota and overall aquatic systems found in the Hillview Drainage and Levee District, located in Greene and Scott Counties, Illinois. Information presented in this report is based on four general sources: a field reconnaissance of streams, major ditches and lateral ditches; a qualitative and quantitative analysis of field samples of aquatic organisms; a review of published and unpublished reports; and consultation with acknowledged technical specialists in the region.

The aquatic systems of the Hillview Drainage and Levee District have a relatively low diversity of habitat and fauna. Aquatic habitats in the District have been extensively altered by man's activities (principally agriculture and flood control) by way of siltation and sedimentation, artificial and fluctuating hydrologic characteristics, soft substrates and water quality stresses. Lotic (flowing) waters are more abundant that lentic (standing) waters. Drainageways dominate the aquatic system and are comprised extensively of sluggish pool habitats, which are more abundant than riffles, chutes and shallow water habitats. Fine substrates (silts, sands, muds) are more abundant than firm substrates (rock, gravel).

Fish populations are dominated by gizzard shad (Dorosoma cepedianum) and sunfishes (Lepomis spp.). Phytoplankton populations are dominated by diatoms, and zooplankton populations by rotifers. Benthic macroinvertebrate populations are dominated by oligochaetes and chironomids.

1.0 INTRODUCTION

The objective of this study is to characterize the aquatic habitats, aquatic biota and overall aquatic systems found in the Hillview Drainage and Levee District, Greene and Scott Counties, Illinois. The major goal of the study is to be able to qualitatively describe the nature and value of aquatic systems in the District and support this description with data collected in the field and literature.

To this end, the project is divided into three major task areas:

* Habitat Classification and Mapping,
* Field Reconnaissance, and
* Field/Literature Data Collection.

In addition to describing present conditions and characteristics of the Hillview Drainage and Levee District, this report also addresses projected future conditions of aquatic habitats as well as observed problems and environmental needs in the District.

A proposed plan of levee improvement will provide increased flood protection to 13,070 acres of agricultural lands and the village of Hillview, Illinois. This inventory will provide environmental data to be used in the St. Louis District's planning documents for the Hillview Drainage and Levee District.

2.0 MATERIALS AND METHODS

2.1 LOCATION

Figure 2.1-1 shows the location of the Hillview Drainage and Levee District and indicates the levees and waterways found in the District. The District is located on the east bank of the Illinois River between River Miles 43.2 (mouth of Hurricane Creek) and 50.0 (mouth of Little Sandy Creek). The District is bounded by levees on the north, south and west sides and by Illinois Highway 743 on the east.

Figure 2.1-2 shows the location of the seven field data collection stations, and Figure 2.1-3 shows the sites visited and described during the field reconnaissance.

2.2 METHODS

2.2.1 HABITAT CLASSIFICATION/MAPPING

The following classification system for the identification and mapping of aquatic habitats was developed for use in this study:

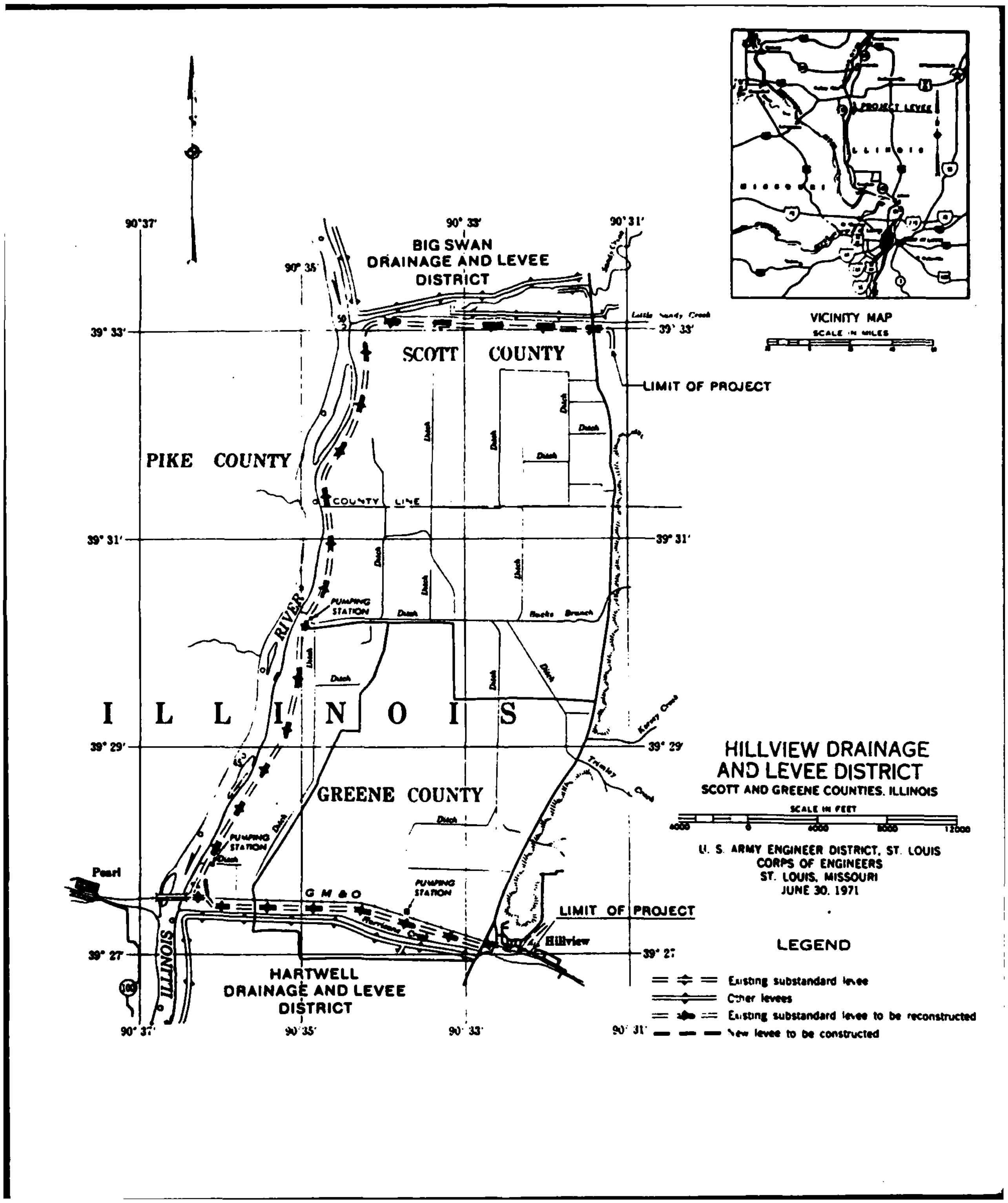
1. Riffle - shallow water passing over rocks or gravel, producing relatively fast-flowing and turbulent water.
2. Pool - an area of relatively deep, sluggish water generally overlaying soft (silt, mud) substrates; extends the full width of the waterway.
3. Shallows - water of moderate depth and current overlaying variable substrates; shallows are generally the full width of the waterway but with less depth and greater current than pools.
4. Chutes - narrow, moderately shallow segments of water flowing over generally gravel or sand substrates with moderate current.

To the degree possible, based on information gained from aerial photographs and site visits, the above aquatic habitats were differentiated and mapped on the habitat map accompanying this report. Any lentic (standing) waters of the site, such as ponds or oxbows, were also mapped, but these were not sampled during field data collection.

2.2.2 STATION SELECTION/FIELD RECONNAISSANCE

Prior to the initiation of field sampling efforts, ESE and COE personnel conducted a field reconnaissance of the Hillview Drainage and Levee District. The primary purposes of this reconnaissance were:

1. To identify aquatic habitats of the site and determine the applicability of the proposed habitat classification system; and
2. To visit and characterize a number of potential sampling areas from which seven were selected for subsequent sampling.



BIG SWAN
DRAINAGE AND LEVEE
DISTRICT
VICINITY MAP
SCALE IN MILES
PROJECT LEVEE
SCOTT COUNTY
LIMIT OF PROJECT
PIKE COUNTY
COUNTY LINE
PUMPING STATION
RIVER
I L L I N O I S
GREENE COUNTY
PUMPING STATION
Pearl
G M & O
PUMPING STATION
LIMIT OF PROJECT
Hillview
ILLINOIS
HARTWELL
DRAINAGE AND LEVEE
DISTRICT
90°37'
90°35'
90°33'
90°31'
39°33'
39°31'
39°29'
39°27'
Little Sandy Creek
Ditch
Bucks Branch
Hurricane Creek
HILLVIEW DRAINAGE
AND LEVEE DISTRICT
SCOTT AND GREENE COUNTIES, ILLINOIS
SCALE IN FEET
4000 0 4000 8000 12000
U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
JUNE 30, 1971
LEGEND
Existing substandard levee
Other levees
Existing substandard levee to be reconstructed
New levee to be constructed

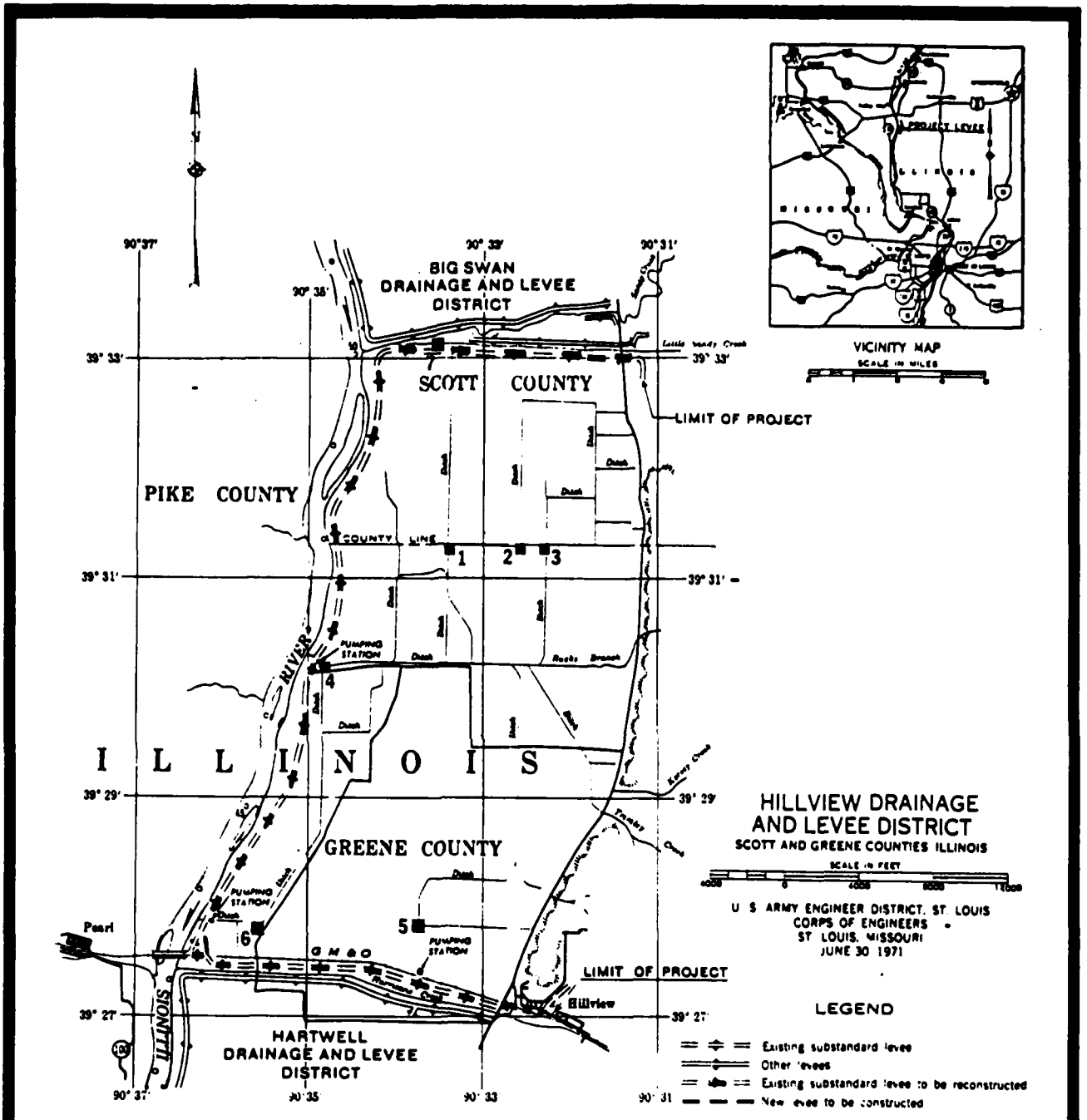
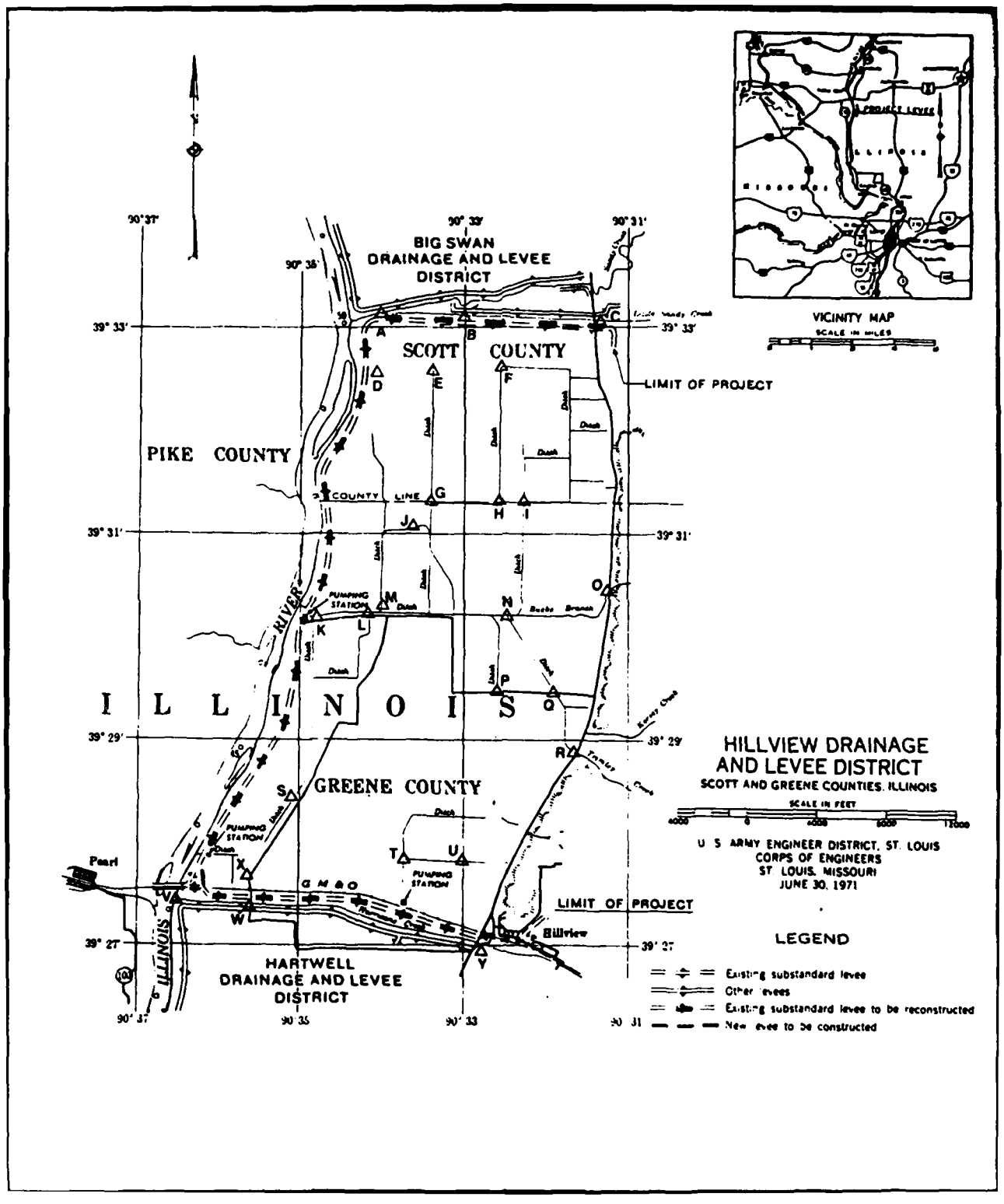


FIGURE 2.1-2 LOCATION OF AQUATIC BIOLOGICAL SAMPLING SITES AT THE HILLVIEW DRAINAGE AND LEVEE DISTRICT

HILLVIEW DRAINAGE AND LEVEE DISTRICT
ST. LOUIS C.O.E.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JUNE 30, 1971
LEGEND
Existing substandard levee
Other levees
Existing substandard levee to be reconstructed
New levee to be constructed

As a result of this trip, seven stations were designated for field data collection.

In addition to the seven sampling stations a number of additional sites were identified for field reconnaissance. Twenty-eight potential reconnaissance sites were initially identified. The actual number visited depended on flow and access conditions at the time of the site visit.

All sites visited during the field reconnaissance were characterized utilizing detailed field notes. Information collected included:

Average width,
Average depth,
Lowflow width and depth (estimated),
Range of width and depth,
Length,
Acreage,
Sinuosity,
Bottom type(s),
Estimated velocity,
Color and clarity,
Instream and streambank cover, and
Presence and height of highwater marks.

The overall objective of the field reconnaissance visits was to qualitatively describe the range of aquatic habitats present throughout the Hillview Drainage and Levee District and thereby provide a basis for evaluation of overall aquatic habitats and systems.

In addition to sampling the seven designated sampling areas, fish and benthos sampling were conducted at Reconnaissance Site 0 (Buck's Branch), as this was found to contain unusual habitats for the District. The results of this sampling are discussed in Sections 4.3 and 4.4; the resulting data are given in Appendix D.

2.2.3 BIOLOGICAL SAMPLING METHODS

PLANKTON

Zooplankton and phytoplankton samples were collected at each of the seven sampling sites. Zooplankton samples were collected by passing at least 30 liters (more if ESE personnel considered it advisable) of water through a No. 25 (64 micron mesh) plankton net. Zooplankton samples were preserved in 10 percent buffered neutral formalin. Phytoplankton samples were collected by concentrating 4 liters of water via the addition of 1 percent Lugol's solution. The 4-liter samples were collected either by hand grabs or with a VanDorn sampling bottle as

depths permitted. Cladocera and Copepoda were identified to species; Rotifera to genus; and other taxa, immature life stages and residue, to family. Phytoplankton were identified to genus. Appropriate subsampling techniques were used where numbers did not permit whole-sample analysis.

BENTHOS

Benthos samples were collected at each sampling site. Either a petite Ponar dredge or a Surber square-foot sampler (or a combination of the two) were used. The Ponar is more suited to soft substrates, whereas the Surber sampler more effectively samples rock or large-gravel riffles. To sample all available substrate types within the levee district, both Ponar and Surber samples were sometimes necessary, but a majority of the samples were collected with the Ponar. Five samples were taken at each sampling area, a sample being defined as one Ponar grab or one square-foot sample with the Surber. Samples were preserved in 10 percent buffered neutral formalin after field washing in a No. 30 sieve.

Identifications were to the lowest level possible, based on the life stages collected, available taxonomic keys and existing taxonomy.

FISHERIES

Both electrofishing and seining were used for fish collecting. A segment was blocked off with block seines. The segment contained all substrate and habitat types within that sampling area. The blocked segment was electrofished until returns diminished (at least 15 minutes of effort) then intensively seined until returns indicated a majority of fish present had been collected .

The seines utilized were a 50 x 6 foot, 1/4 inch mesh seine and a 20 x 4 foot, 1/8 inch mesh seine. Small kick seines were used where riffles or chutes were present.

The electrofishing unit was of variable controlled output. The unit can produce AC, DC or pulsed DC output and is most effective in the 110-240 volt and 10-15 amp ranges. This flexibility allowed ESE personnel to maximize effectiveness in each aquatic habitat. The most effective output was used in each sampling area but was generally found to be 180-220 volts, 7-10 amps, pulsed DC. All seven areas were sampled for fish. Larger fish were identifed, weighed and measured in the field.

Smaller fish were preserved in 10 percent buffered neutral formalin for processing in the laboratory. All fish were identified to species (or genus for fingerling or fry).

2.2.4 DATA ANALYSIS AND PRESENTATION

The emphasis on data presentation in this report is to provide, in tabular form, the taxonomic composition of the biotic communities plus key descriptors of abundance, density, biomass, standing crop, diversity, and evenness. Tables and figures are generally designed to summarize the data collected.

Figures are provided for indicating locations and overall data relationships, as well as for habitat mapping. A reduced-size habitat map is provided in the text. Appendices contain the full-size habitat map, detailed support data and other support information too voluminous to incorporate effectively in the text.

Two key indices are utilized in describing biotic populations--the diversity index and the evenness index. The diversity index utilized is that of Shannon and Weaver (Odum, 1971):

$$H = \left\{\left(\frac{ni}{2}\right) \text{Log}_2 \left(\frac{ni}{N}\right)\right.$$

where H = diversity
n = number of individuals per taxa, and
N = total number of individuals.

The following evenness index is utilized (Odum, 1971):

$$E = \frac{H}{\text{Log}_2 \text{ Number of taxa}}$$

where E = evenness
H = diversity index value.

In general, diversity values approaching or exceeding 3.00 and evenness values approaching 1.00 or more are interpreted (Hynes, 1970) as indicating healthy, stable populations relatively free of environmental stress and maximally utilizing available habitats. Conversely, values below 1.00 and 0.3-0.4 respectively would suggest significant environmental stresses or limitations due to habitat availability and quality.

3.0 LITERATURE REVIEW AND CONSULTATION

3.1 SOURCES

Overall, very little data specific to the Hillview Drainage and Levee District has been obtained via the literature review or consultations. This is probably due to several factors, including the relatively higher interest in the adjacent Illinois River and associated wetlands and the limited significant habitats (terrestrial or aquatic) present in the Illinois River Drainage and Levee Districts.

Three aquatic inventories have been recently conducted in drainage and levee districts near the Hillview District:

Thomerson and Myer, 1977--Eldred and Spankey Districts
Axtell and Humes, 1981--Nutwood District
WAPORA, Inc., 1981--Hartwell District.

Habitats sampled and methodologies utilized have been similar for all of the drainage and levee district inventories making data comparisons valid.

At least two sources of applicable data have been identified--Mr. George Zebrun, (IDOC) Fisheries Biologist formerly assigned to Greene County and Dr. Jamie Thomerson, Professor of Biology, SIU-Edwardsville. Mr. Zebrun has extensive familiarity with biota and habitats of the Hillview and adjacent Hartwell Drainage and Levee Districts.

Dr. Thomerson has collected in Districts near the Hillview Drainage and Levee District which support aquatic habitats very similar to those of the District.

The Illinois Natural History survey conducted a general aquatic survey at sites in west-central Illinois having habitats quite similar to those of the Hillview Drainage and Levee District (INHS, 1977). In addition, ESE conducted an assessment of aquatic and terrestrial habitats and biota in the same general area (ESE, 1979). Aquatic habitats sampled were sufficiently similar to allow valid review of this data for the District inventory.

The above sources include all applicable data which have been identified for the study to date. Extensive research effort has been expended upon the Illinois River and its associated habitats. Biotic surveys have been conducted by the Illinois Natural History Survey, St. Louis District Corps of Engineers and the Waterways Experiment Station. These have primarily been concerned with habitats and biota between the

levees. Little research has been done on lands and waters protected by the levees. Care must be taken in utilizing and interpreting this essentially big river data in relation to the present inventory.

The Illinois Department of Conservation has prepared a general survey of the surface water resources of Greene County (Lockart, 1971) and Scott County (Rogers, 1970). Although the report contains limited site specific information, it is useful for generalizing surface water resources of the Hillview Drainage and Levee District.

3.2 INFORMATION AND DATA

Table 3.2-1 contains a listing of fish species which based on literature information have the potential to occur in the Hillview Drainage and Levee District, but which were not collected during the study. This list contains the most likely potential species. Additional species could be added but would have lower probability of occurrence.

Similar lists for the plankton and benthos have not been developed due to the lack of a suitable literature base, the complex and exhaustive taxonomy and the lack of precise distribution on ranges for species of plankton and benthos.

Results of earlier drainage and levee district studies indicate that benthic communities are low in diversity, being heavily dominated by Oligochaeta and Chironomidae, but may exhibit high densities of organisms. Zooplankton and phytoplankton communities are variable in composition and dominance but are generally dominated by Rotifera and by green and blue-green algae. Benthos and plankton communities are usually indicative of eutrophic, semi-polluted habitats (Thomerson and Myer, 1977; Axtell and Humes, 1981; WAPORA, Inc., 1981).

No quantitative information on sport fishing was obtained. Mr. George Zebrun, (IDOC) and Mr. Joe Janecek, Field Supervisor, Carbondale Field Office, (USF&WS) both indicated that recreational fishing is fairly high, especially in the spring and early summer. Primary sport species are bass, sunfishes, carp and bullheads.

The drainage and levee districts contain at least isolated areas providing valuable spawning and nursery habitat for sport fishes, primarily the bass and sunfishes (Thomerson and Myer, 1977).

Several observations of recreational fishing were made during the study. Conversations with local residents indicate that recreational-fishing is common on the waterways, but primarily by local landowners on a casual basis. Information does not indicate a significant economic value or

Table 3.2-1. Fish Species Having the Potential to Occur in the Hillview Drainage and Levee District But Not Collected During the Study

Common Name	Scientific Name	Status*
Longnose gar	Lepisosteus osseus	C
Shortnose gar	L. platostomus	C
Bowfin	Amia calva	U
Grass pickerel	Esox americanus	U
Central stoneroller†	Campostoma anomalum	U
Goldfish	Carassius auratus	U
Silvery minnow	Hybognathus nuchalis	U
Hornyhead chub	Nocomis biguttatus	U
Redfin shiner	Notropis umbratilis	U
Bigmouth shiner	N. dorsalis	C
Sand shiner	N. stramineus	U
Suckermouth minnow	Phenacobius mirabilis	U
Bluntnose minnow	Pimephales notatus	C
Fathead minnow	P. promelas	C
Blacknose dace	Rhinichthys atratulus	U
Creek chub†	Semotilus atromaculatus	C
River carpsucker	Carpiodes carpio	U
Quillback	C. cyprinus	U
White sucker	Catostomus commersoni	U
Smallmouth buffalo	Ictiobus bubalus	U
Bigmouth buffalo	I. cyprinellus	U
Brown bullhead	Ictalurus nebulosus	U
Brook silversides	Labidesthes sicculus	U
Spotted bass	Micropterus punctulatus	U
Black crappie	Pomoxis nigromaculatus	U
Logperch	Percina caprodes	U
Blackside darter	P. maculata	U
Johnny darter	Etheostoma nigrum	U
Freshwater drum	Aplodinotus grunniens	U

* C-common;
U-Uncommon.

† Collected at Buck's Branch in the Hillview District (ESE 1981).

Sources: ESE, 1979;
Illinois Natural History Survey, 1977.
Thomerson and Myer, 1977.
Axtell and Humes, 1981.
WAPORA, Inc., 1981.

income from the recreational-fishing, but it does provide a local recreational opportunity. Appendix E contains the sport fishing user-day analysis conducted for this study.

Lockart (1971) indicated that the following are the dominant game species of Greene County: Largemouth bass, bluegill, crappie, bullhead, carp and channel catfish. He indicated average fishing pressure on Hurricane Creek and classified Hurricane as a fast-flowing stream, especially upstream of State Highway 743. Lockart (1971) also indicated that few significant water quality problems exist in Hurricane Creek, other than some degradation by agricultural inputs.

Lockart (1971) and Rogers (1970) provided the following physical description of several Hillview streams:

	Area (Acres)	Length (Miles)	Average Width (ft.)	Gradient (ft./mile)	Status
Hurricane Creek	18.5	11.5	13.3	13.5	Perennial
Sandy Creek	65.6	22.0	24.6	7.2	Perennial
Little Sandy Creek	25.1	14.0	15.0	11.7	Perennial

Figure 3.2-1 shows locations of natural areas, refuges and county conservation areas within a 15-mile radius of the Hillview Drainage and Levee District. This information was gained from the Illinois Natural Areas Inventory (IDOC) and miscellaneous maps and brochures of the IDOC.

There is no indication of any occurrence of threatened or endangered aquatic species in the Hillview Drainage and Levee District. None were collected during the study and a review of pertinent literature and consultations indicated no significant potential for their occurrence in the District (Thomerson and Myer, 1977; Axtell and Humes, 1981; WAPORA, Inc., 1981).

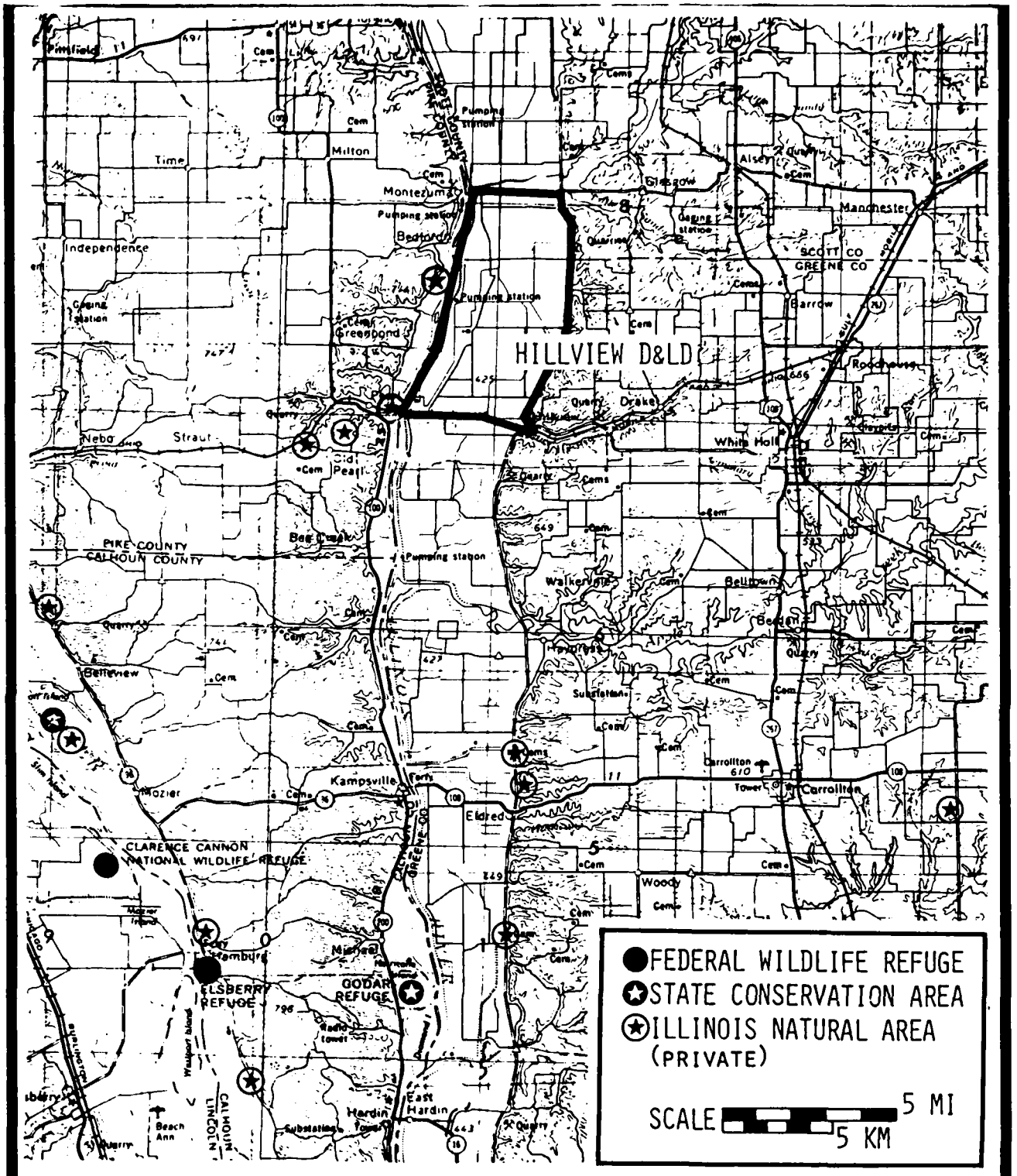


FIGURE 3.2-1
WILDLIFE REFUGES AND ILLINOIS NATURAL AREAS NEAR THE HILLVIEW DRAINAGE AND LEVEE DISTRICT

SOURCE: ESE, 1981, USGS, 1980

HILLVIEW DRAINAGE AND LEVEE DISTRICT
ST. LOUIS C.O.E.

4.0 RESULTS AND DISCUSSION

4.1 AQUATIC HABITAT EVALUATION

4.1.1 DESCRIPTION OF HABITAT TYPES

Five aquatic habitat types exist in and adjacent to the Hillview Drainage and Levee District. Pools, shallows, riffles and chutes are found in natural streams and artificial drainageways of the District; lentic waters are found in undrained low-lying areas, dammed streams and closed-off drainageways. Natural streams have alternating riffles and pools and a high degree of sinuosity. Artificial drainageways are shallow, have silt or clay substrates and little or no sinuosity.

Pools are deep areas with little flow and generally have a soft silt or clay substrate. Shallows are moderately deep and usually extend the width of the channel, but have more current and are shallower than pools. Riffles are areas with a fast current flowing over shallow rocky or gravelly substrates. Chutes are narrow areas of a stream or drainageway with moderate depth and current. Lentic waters have no flow and are created in undrained low-lying areas, dammed streams and closed-off drainageways.

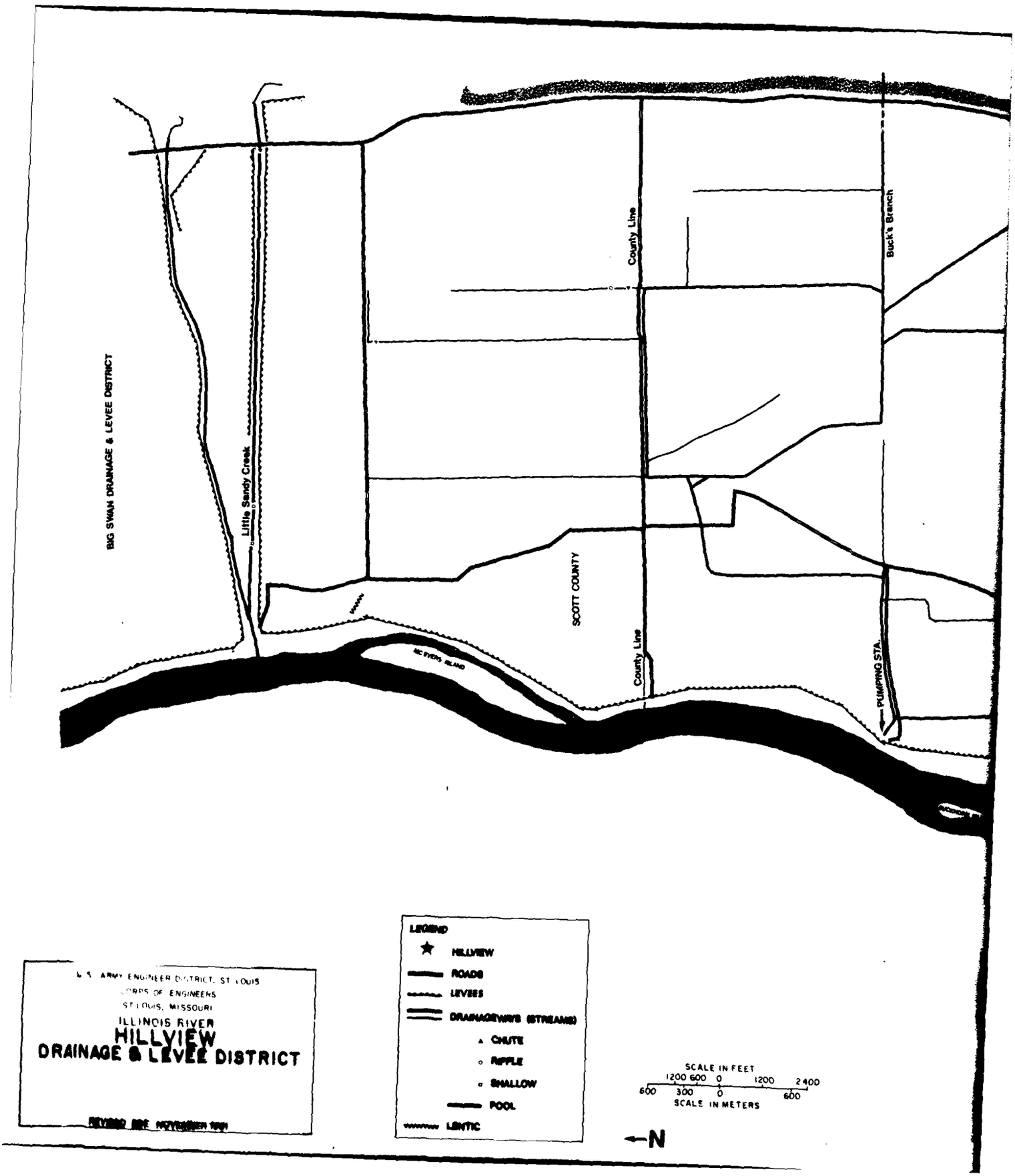
Figure 4.1-1 is a map of aquatic habitats in the Hillview Drainage and Levee District (full-size copy in Appendix A). Table 4.1-1 provides habitat acreages and percentages.

Most of the aquatic systems within or adjacent to the Hillview District are artificial drainageways. One natural stream, Buck's Branch, occurs within the site and two natural streams, Hurricane Creek and Sandy Creek, lie adjacent to the site along the flank levees. Parts of these latter two streams are channelized. Reconnaissance Site D is the only area which is classified as lentic water (Table 4.1-1). Pool habitats dominate over all other habitats, composing over 98 percent of total aquatic habitat.

4.1.2 DESCRIPTION OF SPECIFIC SITES

Seven sites within or adjacent to the Hillview Drainage and Levee District were chosen for intensive aquatic sampling. Benthos, zooplankton and phytoplankton were sampled. The fish community was sampled by blocking an area with seines, then electrofishing and/or seining intensively depending on access and water depth.

Twenty-five reconnaissance sites were chosen to more accurately describe aquatic habitats within the District. Reconnaissance sites were characterized by width, depth, sinuosity, substrate types, clarity, presence of riffles and pools, shading, instream cover and streambank cover.



U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
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ST. LOUIS, MISSOURI

ILLINOIS RIVER
HILLVIEW
DRAINAGE & LEVEE DISTRICT

REVISED DEC NOVEMBER 1981

LEGEND
- HILLVIEW
- ROADS
- LEVEES
- DRAINAGEWAYS (STREAMS)
  - CHUTE
  - RIFFLE
  - SHALLOW
  - POOL
- LENTIC

SCALE IN FEET
1200 600 0 1200 2400
600 300 0 600
SCALE IN METERS

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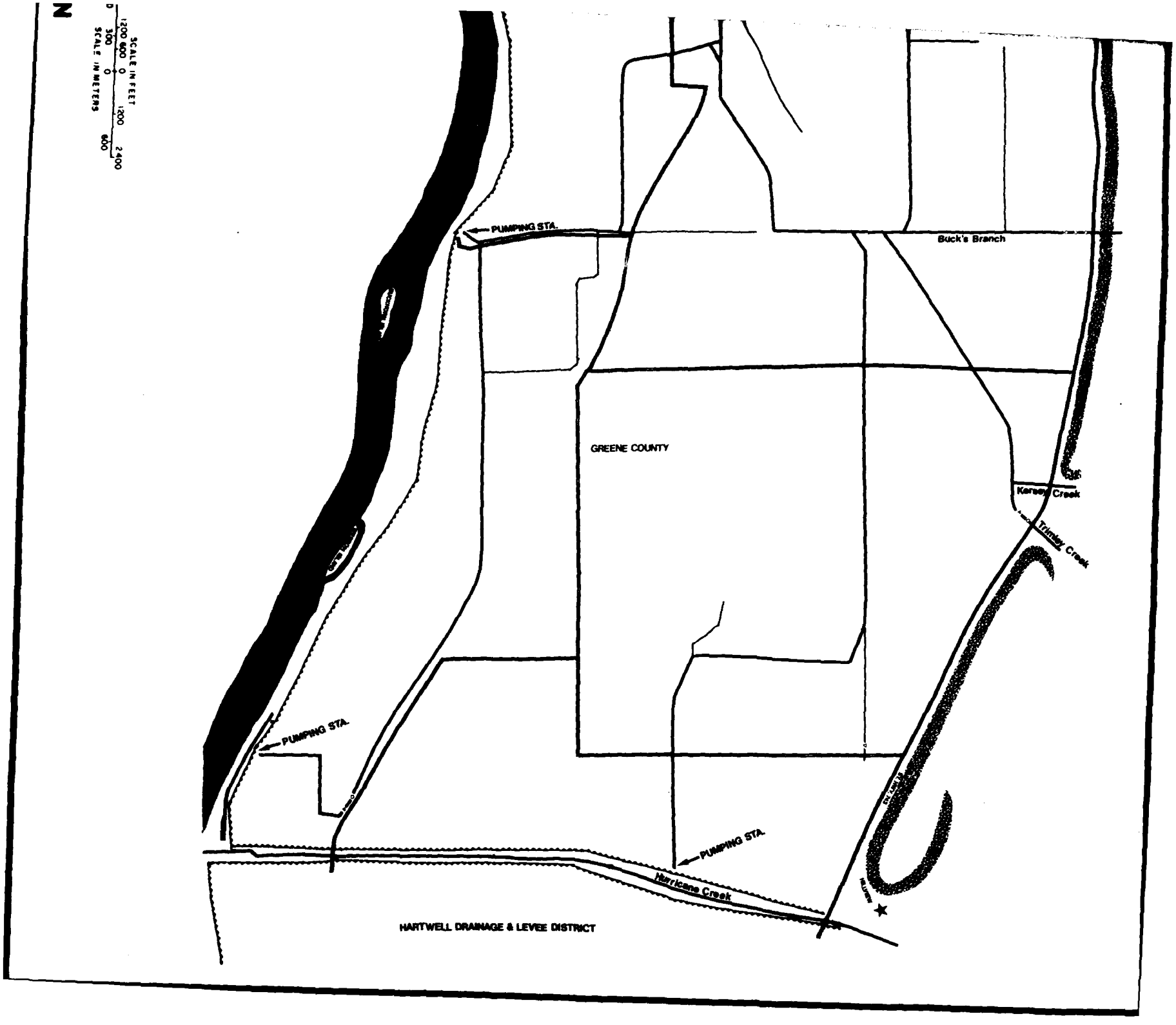
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SCALE IN METERS
300 0 600
PUMPING STA.
Buck's Branch
GREENE COUNTY
Kersey Creek
Trumby Creek
PUMPING STA.
PUMPING STA.
Hurricane Creek
HARTWELL DRAINAGE & LEVEE DISTRICT

Table 4.1-1. Acreage of Aquatic Habitat Types Within and Flanking the Hillview Drainage and Levee District

Habitat	Inside Levee	Percent	Flanking	Percent	Total	Percent
Pools	68.49	97.69	50.89	99.92	119.63	98.84
Shallows	0.81	1.16	0.03	0.06	0.84	0.69
Riffles	0.38	0.54	0	0	0.38	0.31
Chutes	0.02	0.03	0.01	0.02	0.03	0.02
Lentic	0.41	0.58	0	0	0.41	0.34
Total	70.11		50.93		121.04	

Source: ESE, 1981.

Sampling Areas

Station 1 is located at the confluence of two drainageways (Figure 2.1-2). The average width of the area is 40 feet, depth 2-3 feet. The substrate is composed of 2-3 feet of soft silt with some detritus. The streambanks are vegetated by annual herbaceous vegetation and early successional, bottomland, woody vegetation. Few trees are large enough to provide shading. Instream cover consists of fallen branches and a few overhanging branches. The water velocity is slow, approximately 0.2 ft./sec., therefore the water is relatively clear. The drainageway could be classified as a constant pool, being uniform in width and depth throughout the length of the area. One deeper and slower pool was identified at the confluence of the two ditches.

Station 2 is located on the drainageway paralleling a road about 1,000 yards upstream from Station 1, (Figure 2.1-2). The average width of the area is 50 feet, and the average depth is 3 feet. The substrate in this area is mainly silt and detritus with some gravel near the banks. The streambanks are about 90 percent vegetated with annual herbaceous vegetation. A few small trees do exist, but provide little shading. No instream cover is apparent. Again the drainageway can be classified as a constant pool, being uniform in width and depth with slightly sloping banks.

Station 3 is located at the confluence of two drainageways approximately 700 yards upstream from Station 2. The average width of the area is 40 feet, and the average depth is about 2.5 feet. The substrates in the area vary from deep silt in the mid-channel to silt, gravel and coarse sand near the banks. The streambanks are vegetated with mainly annual, herbaceous vegetation. A few trees are present on the eastern bank of the north-south drainageway; however, they provide little shading. No instream cover was present at the time of sampling. Again, the entire drainageway can be considered a sluggish pool, being uniform in depth and width and having no apparent riffles, chutes or shallows.

Station 4 is located upstream from the pumping station (Figure 2.1-2). The average width is approximately 50 feet, and the average depth is about 2 feet. The substrate varies from deep silt and some detritus near the banks to sand and detritus in the mid-channel. The velocity is extremely variable due to the pump station. When the station is not pumping, the water velocity is approxmately 0.25 ft/sec; however, when pumping, the water velocity increases substantially and the water depth drops to less than 1 foot. The pumping action accounts for the lack of silt in the mid-channel. The increased velocity essentially scours the channel of silt and detritus and leaves a hard sandy bottom. The streambanks are 100 percent vegetated. The south bank is primarily

small shrubby species with a few large trees. The north bank is primarily herbaceous vegetation with a few shrubs and trees. Some shading is provided by streambank vegetation during high water. No instream cover was apparent during sampling; however, two old concrete bridge abutments can provide some cover during high water stages. The entire drainageway can be considered a pool, being uniform in depth and width and having no apparent riffles, chutes or shallows. During pumping, the drainageway can be considered a shallow due to increased velocity and decreased depth. However, the great variability in depth and current provides little stable habitat for aquatic organisms.

Station 5 is approximately 40 feet wide and 2 feet deep. According to farmers in the area, at high water, roads and fields are flooded. The substrate type is primarily silt and clay. Both banks of the drainageway are bordered by row crops. The streambanks are vegetated primarily by grasses and other annual herbaceous vegetation. Some shrubby vegetation occurs providing little or no shading of the drainageway. There is some rip-rap by the culvert as the drainageway passes under the road. Instream cover is negligible. Scattered stumps and the rip-rap provide the only instream habitat diversity. No shallows, chutes or riffles occur within the area; therefore, the drainageway can also be classified as a continuous pool.

Station 6 is approximately 35 feet wide, with an average depth of about 6 inches. The substrate is primarily 2-3 feet of silt. Both streambanks are vegetated with pole size to mature woody vegetation, which shades approximately 50 percent of the drainageway. Instream cover is provided by Nitella spp., a genus of large, branched green algae which often form dense mats on stream bottoms. This cover extends 8 feet into the drainageway on both banks. Numerous fallen branches and logs also provide cover. The current in the sample area is negligible, allowing silt to settle. The clarity of this section of drainageway is therefore very good. This area can be classified as a shallow with little current.

Station 7 is located on Little Sandy Creek. The depth is approximately 1-2 feet. The substrate in the area varies from fine sand to clay and detritus in pools and chutes, with silt along the edges of the stream. The streambanks are vegetated with pole-size to mature bottomland trees which shade approximately 50 percent of the stream.

A small amount of instream cover is provided by brush piles and log jams. This portion of Little Sandy Creek appears to have been

channelized in the past. The creek has recovered as evidenced by a few small pools, riffles and chutes. The creek has also regained some degree of sinuosity.

Reconnaissance Sites

Most of the reconnaissance sites were classic drainageways. Some habitat is provided in these areas by streambank cover, or fallen logs. Most of the banks have at least some woody vegetation, and overhanging branches which provide shade and cover for aquatic organisms. The flow in most of the drainageways is less than 1 ft/sec. The banks are generally steep, and little diversity occurs within the channels. The substrates are deep silt resulting in part from erosion in surrounding fields. Reconnaissance sites included in this category are; E, G, H, I, J, K, L, M, N, P, Q, S, T, X and Y.

A few of the older drainageways have regained some sinuosity, which has resulted in small chutes and pools being reformed. These areas are generally less than 1 foot deep and contain a considerable amount of rooted aquatic vegetation, which provides habitat for minnows and other aquatic organisms. Reconnaissance Sites included in the category are; F, I (north of road), R, U and W.

One lentic habitat, Reconnaissance D, appears to be an old drainageway closed off from the drainage system. This area has an average depth of 1 foot and an average width of about 30 feet. The substrate is a thick silt. Numerous submerged logs and a surface cover of duckweed provide cover for aquatic organisms. The banks are lined with mature bottomland trees which shade approximately 50 percent of the pond.

Reconnaissance V appears to be an old oxbow or a dead ended drainageway. It connects with the Illinois River at high flow, but was not connected at the time of reconnaissance. The average depth of the area is 4 feet and the average width approximately 200 feet. The substrate is again a deep silt with some detritus. Streambank cover consists of mature bottomland trees which shades about 50 percent of the area. Instream cover consists of a few submerged logs and a small amount of duckweed.

Little Sandy Creek, Reconnaissance A, B and C, and Bucks Branch at Reconnaissance O are the only areas that can be considered natural streams. Before Little Sandy Creek enters the drainage district, Reconnaissance C, it appears to still be in a natural state. The substrate is sand and gravel. The streambank east of the State Highway 743 bridge is vegetated with pole-size willows which shade 80 percent of the stream. The water is clear, and a small riffle and pool

occur in the area. Old bridge pilings and fallen logs provide instream cover. West of the bridge the streambanks have been cleared and revegetated with grasses. Farther downstream, Reconnaissance B, some large bottomland trees along the streambanks shade approximately 50 percent of the stream. The depth remains about 1 foot and width about 40 feet. The stream continues to be slightly sinuous resulting in a few small pools. No riffles occur in this section, but there are a few chutes. The silt load in the area is slight, primarily due to the buffer zone of trees between the fields and the stream. At the confluence of Big Sandy and Little Sandy Creeks, Reconnaissance A, the creek widens to about 100 feet and increases in depth to about 5 feet. The silt load in this area increases, resulting in less water clarity and a deep silt substrate. Some large trees remain in the area shading approximately 20 percent of the stream. No riffles or pools occur in the area, even though the stream is still slightly sinuous. Some aquatic habitat is provided by fallen logs and overhanging vegetation.

Bucks Branch, Reconnaissance O, remains in its natural state upstream from the bridge on State Highway 743 and for approximately 700 yards downstream of the bridge. However, at Reconnaissance N, approximately 2,000 yards downstream, the creek has been completely altered to an artificial drainageway. At Reconnaissance O, Bucks Branch is approximately 10 feet wide and 6 inches deep. High water marks were visible 6 feet above the water level at the time of sampling. The stream is highly sinuous, creating several large alternating riffles and pools. The substrate in the area is sand and rock. The streambanks are 100 percent vegetated with large bottomland trees and grasses, resulting in only slight silt loads and excellent water clarity. Instream cover is provided by sedges, grasses and overhanging vegetation. The large trees along the bank shade approximately 75 percent of the stream. Due to the unique nature of the stream, the area was extensively seined and benthos sampled. Several species of minnows and darters were captured during the effort.

4.1.3 SUMMARY AND EVALUATION

The major habitat type within the Hillview Drainage and Levee District is the artificial drainageway. The aquatic habitat diversity provided by these drainageways is minimal. Streambank cover provides some habitat through shading, overhanging vegetation and fallen branches. Streambank vegetation which provides shade assists in maintaining water temperature and dissolved oxygen at tolerable levels for aquatic organisms. Overhanging vegetation provides cover for fingerling fish such as bluegill and green sunfish. Fallen branches and logs provide cover, and also divert flow to eventually create chutes and pools,

providing diversity within the system. Streambank cover also provides a buffer zone reducing the amount of silt and clay which enters the drainageways from surface runoffs.

Buck's Branch is a unique habitat in the Hillview Drainage and Levee District. This area supports several species of minnows and darters that were otherwise not found within the District. The area should remain natural as long as the buffer zone of trees is not disturbed and no straightening or channelization occurs.

The older drainageways within the Hillview Drainage and Levee District provide habitat for minnows and mosquito fish. However, these areas may eventually fill in with silt or be overgrown by vegetation.

The lentic habitat, Reconnaissance D, is now extremely eutrophic. This area was not sampled but probably supports a large, although not a very diverse, population of aquatic organisms. The area could be expected to silt in within a few years and become more of a wetland habitat.

The aquatic habitats available within the Hillview Drainage and Levee District are limited. The present habitat will remain if levees and streambanks remain vegetated and the vegetation is allowed to succeed to large bottomland trees. Diversity within the drainageways is minimal at present. Diversity could be created by allowing snags to remain in the drainageways or by installing structures to divert the flow, thereby allowing some sinuousity within the drainageways.

4.2 PLANKTON

4.2.1 PHYTOPLANKTON

The phytoplankton community is significant in aquatic systems for several reasons. It provides a food source for zooplankton organisms and is a lower trophic pathway for conversion of nutrients and organics to biomass useful to higher organisms. Phytoplankton sampling and analysis were conducted at each sampling site in the Hillview Drainage and Levee District to provide information on the taxonomic composition, species diversity and density of the phytoplankton community.

Table 4.2-1 presents the phytoplankton data collected during the study, the density (#/ml) of each taxa and their percent occurrence in the samples. As can be seen from this table, the Chlorophyta (Green algae) were most common from the standpoint of number of taxa collected. However, the Bacillariophyceae (Diatoms) usually dominated the samples in terms of density and percent occurrence. Dominance of the phytoplankton by diatoms is generally the case in midwestern lotic systems (Hynes, 1970). Inventories conducted on the Nutwood and

Table 4.2-1. Phytoplankton Taxa, Density, Relative Abundance, Diversity and Evenness in Samples Collected From the Hillview Drainage and Levee District, Fall 1981

Taxa	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7	
	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent
CYANOPHYTA														
Oscillatoria spp.	389	3.55	318	4.25	424	3.24					113	2.66	4	0.77
CHLOROPHYTA														
Ankistrodesmus	141	1.29	212	2.83	283	2.16	14	0.69	14	1.24	28	0.66		
Actinastrum	459	4.19	71	0.95	353	2.70	57	2.82						
Characium	283	2.58	106	1.42	212	1.72	57	2.82						
Chlamydomonas	565	5.16	177	2.34	212	1.62					240	5.64	76	14.62
Chlorogonium					71	0.54	42	2.08						
Crucigenia	424	3.87	106	1.42	707	5.41								
Dictyosphaerium	671	6.13	530	7.08	1,060	8.11					14	0.33		
Golenkinia					71	0.54					14	0.33		
Lagerheimia	35	0.32	177	2.36							14	0.33		
Micratinium	37	0.32									14	0.33		
Panderina							14	0.69						
Pteromonas											28	0.66		
Scenedesmus	141	1.29			141	1.08								
Selenastrum		0.32			212	1.62							4	0.77
Tetrastrum	35		35	0.47	71	0.54								
Trachelomonas											14	0.33		
Unidentified coccoids	954	8.71	318	4.25	1,201	9.19	71	3.51	113	10.01	43	1.01	13	2.50
Unidentified flagellates	318	2.90	177	2.36	71	0.54								
EUGLENOPHYTA														
Euglena	106	0.97	177	2.36	212	1.62	57	2.82			71	1.67	13	2.50
Lepocinclis									14	1.24				
Phacus			71	0.95					28	2.48				
CRYPTOPHYTA														
Chroomonas	1,236	11.29	1,166	15.57	1,625	12.43	113	5.59	42	3.72	28	0.66	4	0.77
Cryptomonas	1,130	10.32	1,978	26.41	3,109	23.78	212	10.48			14	0.33		

Table 4.2-1. Phytoplankton Taxa, Density, Relative Abundance, Diversity and Evenness in Samples Collected From the Hillview Drainage and Levee District, Fall 1981 (Continued, Page 2 of 2)

Taxa	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7	
	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent
CHRYSOPHYTO														
Mallomonas											28	0.66		
BACILLARIOPHYCEAE														
Achnanthes							57	2.82	14	1.24	71	1.67		
Cocconeis											57	1.34		
Cyclotella	2,614	23.87	1,160	22.16	1,837	14.05			71	6.29	452	10.63	17	3.27
Eunotia											14	0.33		
Fragilaria											71	1.67		
Gomphonema											28	0.66		
Gyrosigma							14	0.69	28	2.48				
Melosira spp											113	2.66		
Melosira granulata									14	1.24				
Navicula	106	0.97	71	0.95	212	1.62	480	23.74	141	12.49	622	14.62	85	16.35
Nitzschia spp	812	7.42	106	1.42	495	3.79	664	32.84	636	56.33	1,922	45.19	254	48.85
Nitzschia acicularis	318	2.90	35	0.47	424	3.24	170	8.41	14	1.24	198	4.66	42	8.08
Pinnularis											14	0.33		
Rhizosolenia	71	0.65												
Rhoicosphenis											14	0.33		
Synedra											14	0.33	4	0.77
PYRROPHYTA														
Glenodinium	106	0.97			71	0.54								
Total #/ml	10,949	99.99	7,491	100.02	13,074	99.98	2,022	100.00	1,129	100.00	4,253	100.02	520	100.02
Total Taxa	21		19		22		14		12		27		12	
Diversity	3.59		3.14		3.51		2.82		2.19		2.85		2.26	
Evenness	1.18		1.07		1.13		1.07		0.88		0.86		0.91	

Hartwell Drainage Districts indicated dominance by Cyanophyta and Chlorophyta, with periodic abundance of diatoms (Axtell and Humes, 1981; WAPORA, Inc., 1981).

The most common diatom taxa collected were the general Navicula, Nitzschia and Cyclotella. The most abundant green algae genera were Dictyosphaerium, Crucigenia, Chlamydomonas and Actinastrum as well as various unidentifiable coccoid taxa.

A total of 42 phytoplankton taxa were collected in the study. Samples from Station 6 contained the highest number taxa (27). Samples from Stations 5 and 7 contained the lowest number of taxa (12). The highest density (#/ml) was found at Station 3 (13,074) and the lowest at Station 7 (520). Densities were comparable to those collected in earlier studies of similar districts, as were the number of taxa collected in each sampling area (Axtell and Humes, 1981; WAPORA, Inc., 1981).

Station 7 exhibits the most natural habitat characteristics of any of the stations. It has not been recently altered and is not as influenced by man's activities; therefore, it has greater currents and is not as pooled as the other stations. This reduces its suitability for production of a diverse and abundant phytoplankton community.

Phytoplankton diversity values ranged from 2.19 at Station 5 to 3.51 at Station 3 and 3.59 at Station 1. Diversity values between 2.0 and 3.0 are grossly associated with moderate environmental stress, while diversity values of 3.0 or above are generally considered indicative of healthy populations experiencing little environmental stress (Hynes, 1970). The diversity value at Station 7 was 2.26. This lower diversity is in part due to relatively reduced habitat suitable for production of a diverse phytoplankton population.

Evenness values generally suggest ecological conditions and station comparisons similar to those discussed above for phytoplankton diversity. Evenness values approach or exceed 1.00 in all cases (0.86-1.18), suggesting that the total number of individuals is evenly distributed among the taxa. This suggests somewhat stable and suitable conditions for phytoplankton populations (Odum, 1971).

Ecological Features

A majority of phytoplankton taxa are widely distributed throughout the world. Certain taxa are, however, associated with specific water quality conditions such as alkalinity, acidity, temperature and salinity. The

phytoplankton taxa collected in the Hillview Drainage and Levee District are typical of midwestern waters, and the dominance by diatoms is characteristic of lotic habitats in this region (Hynes, 1970).

Several environmental factors influence phytoplankton composition and abundance, including turbidity, shading, temperature, nutrient (nitrogen and phosphorus) levels and toxic substances (primarily biocides).

Turbidity, nutrients and toxic substances may all be influencing the phytoplankton populations in the Hillview Drainage and Levee District. Turbidity and toxic substances can significantly reduce phytoplankton production. On the other hand, increased nutrient levels such as would be expected in the District generally increase phytoplankton production.

There is little information differentiating environmental sensitivities of phytoplankton species. In general, green algae taxa are more closely associated with pollution tolerance and often abundant in areas of organic pollution. Blue-green algae are generally considered indicative of elevated nutrient levels (nitrogen and phosphorus) and often become very abundant in eutrophic waters.

4.2.2 ZOOPLANKTON

The community of the zooplankton is primarily composed of Rotifera and microcrustacean organisms (Cladocera, Copepoda) all having motile characteristics and being unable to synthesize food material. Zooplankton serve as a food-web link between the phytoplankton and the fish/macroinvertebrate communities.

Table 4.2-2 presents the zooplankton data collected in this study. Thirty-eight taxa were collected during the study. Rotifers heavily dominated the species composition, with 25 rotifer taxa collected. Logically, the rotifers also dominated the samples in terms of density ($\#/m^3$) and percent occurrence. Dominant taxa during the study were Brachionus, Notamatta, Polyarthra and unidentified copepod nauplii. Rotifers usually dominate the zooplankton of rivers and streams in the midwest (Hynes, 1970).

The study of the Nutwood District (Axtell and Humes, 1981) found cladocerans and copepods dominating the zooplankton, with Senecella, Alona, Cyclops and Daphnia the major genera. WAPORA, Inc. (1981) found rotifers dominating the zooplankton of the Hartwell District, with dominant genera similar to those collected in this study. Rotifers were locally abundant at sampling areas in the Nutwood Districts.

Table 4.2-2. Taxa, Density, Relative Abundance, Diversity, and Evenness in Zooplankton Samples Collected From the Hillview Drainage and Levee District, Fall 1981

Taxa	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7	
	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent
NEMATODA							1,520	9.9	20	1.2	40	1.6	20	7.1
ROTIFERA														
Asplanchna sp.	640	1.0			1,120	2.5								
Brachionus angularis			320	0.3			80	0.5						
B. calyciflorus	6,720	10.3	6,080	5.1	6,240	14.0	1,520	9.9	80	4.8	200	7.9	20	7.1
B. rubens	320	0.5												
Brachionus sp.							240	1.6	120	7.2	20	0.8		
Cephalodella gibba	320	0.5			160	0.4	320	2.1	80	4.8	20	0.8	20	7.1
Euchlanis sp.			320	0.3										
Hexarthra sp.	4,800	7.4			1,120	2.5	240	1.6			40	2.4		
Keratella cochlearis									40	2.4				
Keratella sp.	320	0.5					160	1.0						
Lepadella acuminata													20	7.1
L. patella			320	0.3										
L. rhomboides											120	4.8	20	7.1
Lophocharis salpina	640	1.0												
Monostyla bulla					320	0.7								
M. closterocerca							80	0.5						
M. cornuta											20	0.8		
Notommatid sp.	2,880	4.4	9,280	7.8	5,760	12.9	800	5.2						
Platyias patulus											20	0.8		
P. quadricornis									20	1.2				
Polyarthra spp.	45,120	69.5	98,560	82.4	28,160	63.1	8,160	53.1	60	3.6	20	0.8		
Sp. A (contracted)											220	8.7		
Synchaeta spp.	960	1.5	640	0.5	480	1.1	80	0.5	580	34.9				
Trichocerca sp.			1,920	1.6							40	1.6	20	7.1
Trichotria sp.			320	0.3	480	1.1			40	2.4	20	0.8		

Table 4.2-2. Taxa, Density, Relative Abundance, Diversity, and Evenness in Zooplankton Samples Collected From the Hillview Drainage and Levee District, Fall 1981 (Continued, Page 2 of 2)

Taxa	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7	
	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent	#/m^3	Percent
CLADOCERA														
Alona sp.							80	0.5			60	2.4		
Chydorus sphaericus					320	0.7								
Diaphanosoma leuchtenbergianam							80	0.5						
Ilyocryptus spinifer									20	1.2				
Leydigia quadrangularis											20	0.8		
OSTRACODA							160	1.0			40	1.6		
Calanoid copepodite	320	0.5												
Copepod nauplii	1,920	3.0	1,920	1.6	480	1.1	1,200	7.8	580	34.9	1,460	57.9	140	50.0
Cylopidae copepodite							400	2.6	20	1.2	80	3.2		
AMPHIPODA											20	0.8		
INSECTA							240	1.6			60	2.4		
Chironomidae													20	7.1
Total #/m^3	64,960		119,680		44,640		15,360		1,660		2,520		280	
Total Taxa	12		10		11		17		12		19		8	
Diversity	1.65		1.03		1,75		2.45		2.42		2.42		2.33	
Evenness	0.66		0.45		0.73		0.86		0.97		0.82		1.12	

Source: ESE, 1981.

Station 6 supported the highest number of taxa, 19, while Station 7 supported the lowest number, 8. Station 2 supported the highest density (#/m^3) of zooplankton as compared to Stations 5, 6, and 7 which supported less than 5,000 zooplankters/m^3. Station 6 supported only 280 zooplankters/m^3. Densities were higher in the Nutwood and Hartwell studies (Axtell and Humes, 1981; WAPORA, Inc., 1981). Number of taxa collected in the studies was generally higher than those collected in the Hillview study.

As with the phytoplankton, Station 7 supported one of the lowest densities and numbers of taxa, primarily due to its more natural lotic conditions.

Zooplankton diversity values ranged from 1.03 at Station 2 to 2.42 at Stations 5 and 6 and 2.45 at Station 4. Station 7 exhibited a diversity of 2.33. Evenness values range from 0.45 to 1.12, with a majority of values well below 1.00. These diversity values are generally similar to those collected in the Nutwood and Hartwell Districts (Axtell and Humes, 1981; WAPORA, Inc., 1981).

The above values would suggest a moderate to high degree of stress (or ecological unsuitability) on zooplankton populations. This stress could include siltation and turbidity levels in the Hillview Drainage and Levee District aquatic habitats.

Lotic communities are less suitable for zooplankton production than are lentic communities (Pennak, 1978). This could be a contributing factor to the reduced diversity and evenness values. Also, zooplankton often exhibit very abrupt and significant population cycles. These changes may be exhibited by only a few species at any one time. Therefore, at any one sampling time one or two species or genera may heavily dominate the zooplankton thereby significantly reducing diversity and evenness.

Literature information reviewed does not indicate a significant taxonomic difference in sensitivity to environmental stresses. Toxic substances, turbidity, siltation and phytoplankton populations generally influence taxa more or less uniformly. Rotifers are more adaptable to lotic environments, whereas cladocerans and copepods are more prolific in lentic environments (Hynes, 1970; Pennak, 1978). This is generally due to factors of current and physical stress (Hynes, 1970).

Ecological Features

As with the phytoplankton, zooplankton are found in almost all bodies of water except where gross pollution is present. Taxa are generally widely distributed but not to the degree of the phytoplankton. The

Rotifera are especially cosmopolitan and are overall most tolerant of environmental stresses and a wide variety of conditions (Pennak, 1978). The taxa collected at the Hillview Drainage and Levee District are generally typical of midwestern lotic systems, and the dominance by the Rotifera in terms of number of taxa and density is typical of these systems (Hynes, 1970).

Zooplankters are sensitive to the same factors described for phytoplankton and experience similar stresses in the District. The zooplankton are perhaps more sensitive to turbidity levels, due to their locomotion and filter-feeding capabilities. They are also somewhat sensitive to reduced oxygen levels over prolonged periods.

The zooplankton and phytoplankton communities are closely interrelated since the primary zooplankton food source is phytoplankton. Population cycles in either community influence and are influenced by cycles in the other.

4.3 FISHERIES

Table 4.3-1 lists the fish species collected and their diversity in the Hillview Drainage and Levee District samples. Table 4.3-2 presents the species, number, biomass and projected standing crop of fish collected at each station.

Overall, electrofishing was the more successful method utilized. The very soft substrates and the large number of snags and debris encountered at most of the sampling stations made seining very ineffective compared to electrofishing. In some cases, seining was not effective due to these conditions. Electrofishing results were generally sufficient to collect and characterize the smaller fishes which would have been collected by effective seining.

The fish community in the Hillview Drainage and Levee District is dominated by gizzard shad (Dorosoma cepedianum), carp (Cyprinus carpio) and a diverse and abundant sunfish (Lepomis spp.) population. Red shiners (Notropis lutrensis) and golden shiners (Notemigonus chrysoleucas) dominate the forage base. Studies in nearby drainage districts have found the following fish to be dominant: sunfishes, gizzard shad, black bullhead (Ictalurus melas), white crappie (Pomoxis annularis), carp and fathead minnow (Pimephales promelas).

Table 4.3-1. Species, Occurrence and Abundance of Fish Collected in the Hillview Drainage and Levee District

Common Name	Scientific Name	Number Per Sampling Station							
		1	2	3	4	5	6	7	Total
Gizzard shad	Dorosoma cepedianum	180	9	274	62	--	--	--	525
Carp	Cyprinus carpio	20	13	10	14	1	--	--	58
Red shiner	Notropis lutrensis	--	--	--	--	13	--	1	14
Emerald shiner	N. atherinoides	--	--	--	--	--	--	8	8
Striped shiner	N. chrysocephalus	--	--	--	--	1	--	--	1
Golden shiner	Notemigonus crysoleucas	7	1	--	1	1	--	--	10
Bullhead minnow	Pimephales vigilax	--	--	--	--	--	--	1	1
Black bullhead	Ictalurus melas	6	--	--	2	--	--	--	8
Yellow bullhead	I. natalis	1	4	--	8	7	--	--	20
Blackstripe topminnow	Fundulus notatus	--	--	--	--	--	--	1	1
Mosquitofish	Gambusia affinis	--	--	--	--	--	72	--	72
Largemouth bass	Micropterus salmoides	9	1	1	--	1	--	--	12
Bluegill	Lepomis macrochirus	91	10	7	--	2	5	--	115
Green sunfish	L. cyanellus	39	6	3	--	18	--	--	66
Orangespotted sunfish	L. humilis	55	29	17	6	103	5	--	215
Green sunfish X Bluegill hybrid	L. macrochirus X L. cyanellus	--	--	1	--	1	--	--	2
Warmouth	L. gulosus	1	--	--	--	--	--	--	1
White crappie	Pomoxis annularis	20	3	7	--	--	--	--	30
	Total Number	429	76	320	93	148	84	11	1,159
Total species		11	9	7	6	10	3	4	18
Diversity		2.37	2.50	0.90	1.50	1.53	0.64	1.24	2.51
Total Biomass (lb/oz)		54/7	11/8.25	23/2	19/9	3/7	0/4.5	0.0.44	
Biomass/Acre (lb/acre)		247	117	269	190	43.3	11.7	0.23	
Number/Acre		1,950	775	3,720	903	1,873	3,417	92	
Sampling Station Length (meters)		91.4	30.0	29.0	27.4	25.0	10.0	47.5	

Source: ESE, 1981.

Table 4.3-2. Taxa, Number, Biomass and Projected Standing Crop of Fish Collected in the Hillview Drainage and Levee District, Fall 1981

Common Name	Scientific Name		Weight Per Sampling Station						
			1	2	3	4	5	6	7
Gizzard Shad	Dorosoma cepedianum	Total #	180	9	274	62	--	--	--
		Total wt.	14/5	0/13	11/1	4/6	--	--	--
		lbs/acre	65	8.3	129	42	--	--	--
Carp	Cyprinus carpio	Total #	20	13	10	14	1	--	--
		Total wt.	17/12	7/4	8/10	11/8	0/7	--	--
		lbs/acre	81	74	100	112	4.7	--	--
Golden Shiner	Notemigonus crysoleucas	Total #	7	1	--	1	1	--	--
		Total wt.	0/7	0/.25	0/1	0/.5	--	--	--
		lbs/acre	2	0.15	--	0.61	0.4	--	--
Bullhead minnow	Pimephales vigilax	Total #	--	--	--	--	--	--	1
		Total wt.	--	--	--	--	--	--	0.035
		lbs/acre	--	--	--	--	--	--	0.02
Red Shiner	Notropis lutrensis	Total #	--	--	--	--	13	--	1
		Total wt.	--	--	--	--	0/1.5	--	0/.035
		lbs/acre	--	--	--	--	1.2	--	0.02
Emerald Shiner	Notropis atherinoides	Total #	--	--	--	--	--	--	8
		Total wt.	--	--	--	--	--	--	0/.33
		lbs/acre	--	--	--	--	--	--	0.17

Table 4.3-2. Taxa, Number, Biomass and Projected Standing Crop of Fish Collected From the Hillview Drainage and Levee District, Fall 1981 (Continued, Page 2 of 3)

Common Name	Scientific Name		Weight Per Sampling Station 1	2	3	4	5	6	7
Striped shiner	Notropis chrysocephalus	Total #	--	--	--	--	1	--	--
		Total wt.	--	--	--	--	0/1	--	--
		lbs/acre	--	--	--	--	0.79	--	--
Yellow bullhead	Ictalurus natalis	Total #	1	4	--	8	7	--	--
		Total wt.	0/2	1/7	--	3/4	0/12	--	--
		lbs/acre	0.6	14	--	31.5	9.5	--	--
Black bullhead	Ictalurus melas	Total #	6	--	--	--	--	--	--
		Total wt.	1/5	--	--	--	--	--	--
		lbs/acre	6	--	--	--	--	--	--
Blackstripe topminnow	Fundulus notatus	Total #	--	--	--	--	--	--	1
		Total wt.	--	--	--	--	--	--	0/.035
		lbs/acre	--	--	--	--	--	--	0.02
Mosquitofish	Gambusia affinis	Total #	--	--	--	--	--	72	--
		Total wt.	--	--	--	--	--	0/3	--
		lbs/acre	--	--	--	--	--	7.8	--
Largemouth bass	Micropterus salmoides	Total #	9	1	1	--	1	--	--
		Total wt.	6/4	0/3	0/5	--	0/8	--	--
		lbs/acre	28	1.9	3.6	--	6.3	--	--
Warmouth	Lepomis gulosus	Total #	1	--	--	--	--	--	--
		Total wt.	0/2	--	--	--	--	--	--
		lbs/acre	0.6	--	--	--	--	--	--

Table 4.3-2. Taxa, Number, Biomass and Projected Standing Crop of Fish Collected From the Hillview Drainage and Levee District, Fall 1981 (Continued, Page 3 of 3)

Common Name	Scientific Name		Weight Per Sampling Station 1	2	3	4	5	6	7
Green sunfish	L. cyanellus	Total #	39	6	3	--	18	--	--
		Total wt.	2/1	0/6	0/2	--	0/7.5	--	--
		lbs/acre	9.4	3.8	1.5	--	5.9	--	--
Orangespotted sunfish	L. humilis	Total #	55	29	17	6	103	5	--
		Total wt.	2/1	0'7	0/6	0/2	0/15.75	0/1	--
		lbs/acre	9.4	4.5	4.4	1.2	12.5	2.6	--
Bluegill	Lepomis macrochirus	Total #	91	10	7	--	2	5	--
		Total wt.	5/12	0/12.5	0/6	--	0/1.5	0/.5	--
		lbs/acre	26	8.0	4.4	--	1.2	1.3	
Bluegill-green sunfish hybrid	L. macrochirus X L. cyanellus	Total #	--	--	1	--	1	--	--
		Total wt.	--	--	0/3	--	0/1	--	--
		lbs/acre	--	--	2.2	--	0.79	--	--
White crappie	Pomoxis annularis	Total #	20	3	7	--	--	--	--
		Total wt.	4/4	0/3.5	2/1	--	--	--	--
		lbs/acre	19	2.2	24	--	--	--	--
TOTAL		Total #	429	76	320	93	148	82	11
		Total wt.	54/7	11/8.25	23/2	19/9	3/7	0/4.5	0/0.44
		lbs/acre	245	117	269	190	43.3	11.7	0.23
		Acres Sampled	0.22	0.098	0.086	0.103	0.079	0.024	0.12

Source: ESE, 1981.

Overall, those stations having the largest volumes of water seem to support a more substantial and diverse fishery. This is logical in that the drainage and pumping cycles create some degree of instability in the aquatic systems present. The degree of instability is reduced in the larger waterways, where water level fluctuations may not be as great as in the small laterals and minor arterials. Also, the larger waterways seem to have the potential to provide more cover in the form of aquatic vegetation and debris, especially conducive to the sunfishes.

Figures 4.3-1 through 4.3-8 provide length frequency data for the major fish species collected during the study, combining data from all stations and collections. The distributions indicate not only length information, but the natural breaks may be used to approximate age classes in the populations.

As the figures indicate, the sport species collected were not of sufficient size to indicate a significant sport-fishery potential. Carp may reach satisfactory size to have recreational potential, but they are not commonly classed as sport fishes. Sunfish populations are generally small, with some indication of stunting.

Figures 4.3-9 through 4.3-15 provide weight-frequency distributions, which indicate the natural breaks and approximate age classes in the populations. The weight-frequency distributions indicate the overall stunted sizes, especially of the sunfishes, with many individuals weighing 2 ounces or less. Intervals used for the weight-frequency distributions correspond to the minimum and maximum weights of the length intervals utilized previously. These intervals represent the natural breaks in the existing populations. Overlapping of intervals and weights indicated by cross-hatching is the result of letting weight intervals be determined by the corresponding length intervals. For example, Figure 4.3-9 shows that the two specimens of carp that were in the 150 millimeter length class (see Figure 4.3-1) are in the 2 to 3 ounce weight interval.

A total of 18 species were collected during the study. The most species were collected at stations 1 (11) and 5 (10) and the fewest at Stations 6 (3) and 7 (3). The low number collected at certain station is due largely to limited habitat and the difficulty of sampling these habitats.

A total of 1,061 fish were collected. Station 1 yielded the most fish (453), while Station 7 yielded the fewest.

Station 1 also yielded the most biomass (54 lbs/7 oz), a reflection of the number of fish collected. Station 7 yielded the lowest biomass

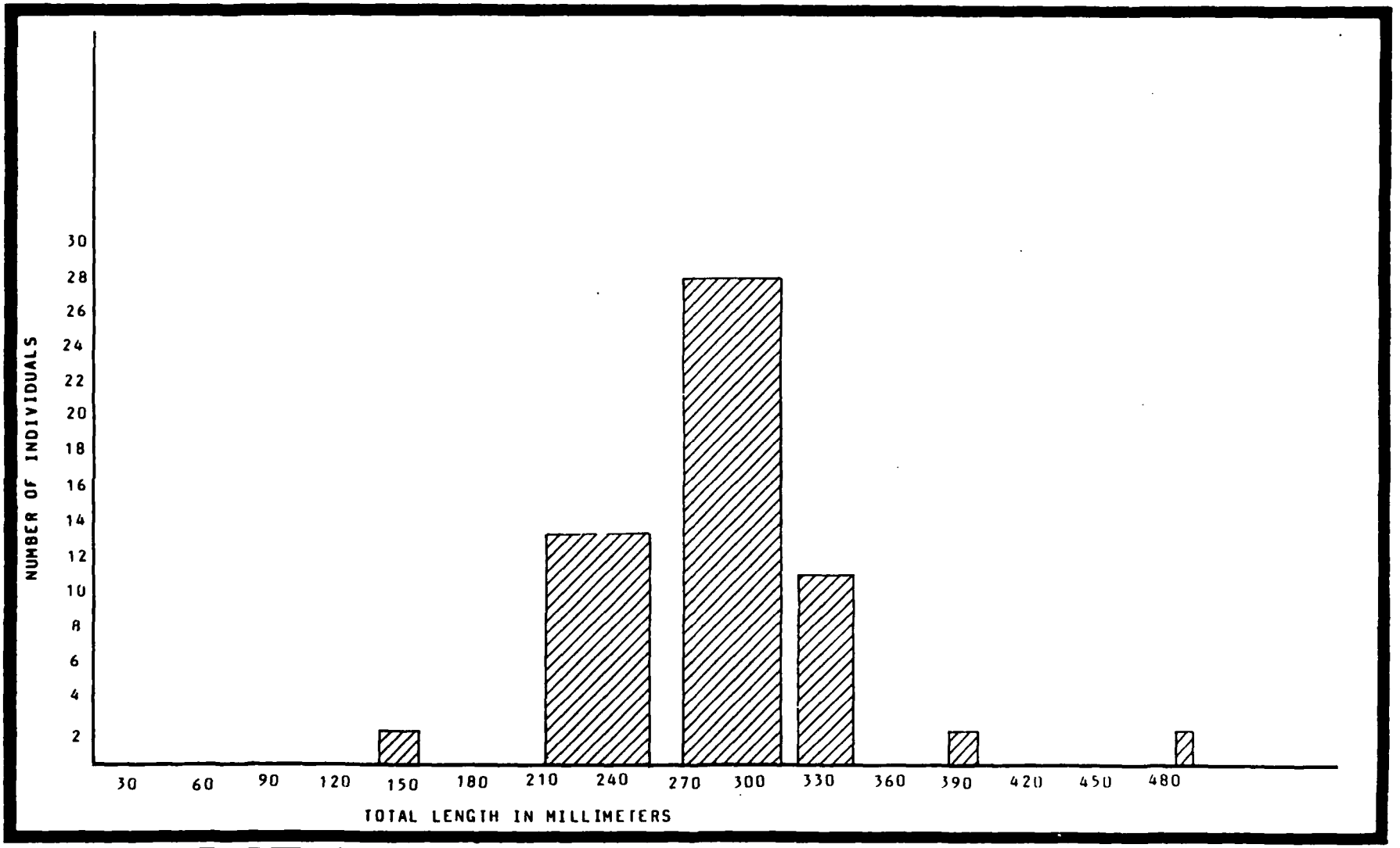

FIGURE 4.3-1 LENGTH - FREQUENCY DISTRIBUTION OF *CARP (CYPRINUS CARPIO) CAPTURED IN* THE HILLVIEW DRAINAGE AND LEVEE DISTRICT, FALL 1981

HILLVIEW DRAINAGE AND LEVEE DISTRICT

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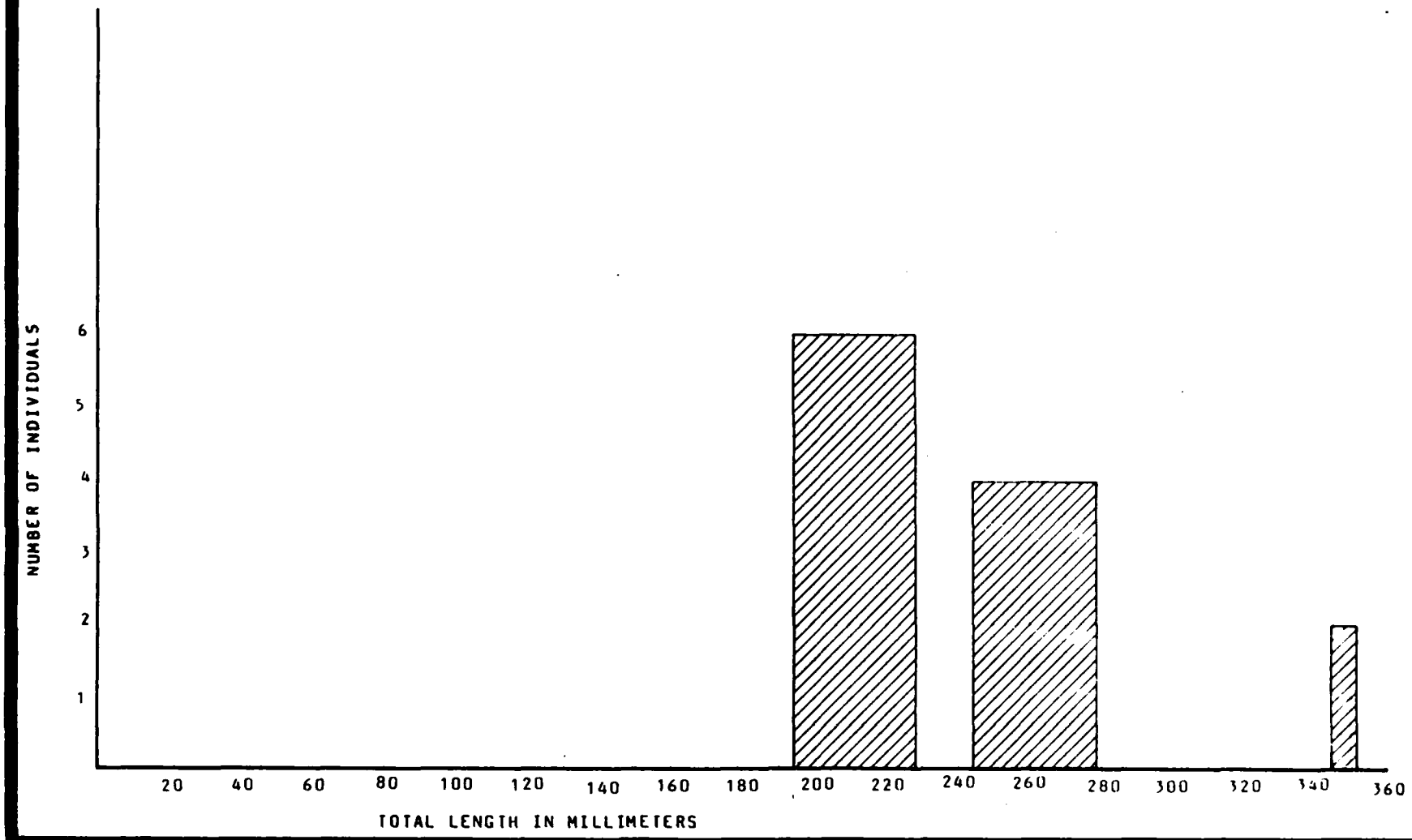

FIGURE 4.3-2 LENGTH - FREQUENCY DISTRIBUTION OF LARGEMOUTH BASS (MICROPTERUS SALMOIDES) CAPTURED IN THE HILLVIEW DRAINAGE AND LEVEE DISTRICT, FALL 1981

HILLVIEW DRAINAGE AND LEVEE DISTRICT

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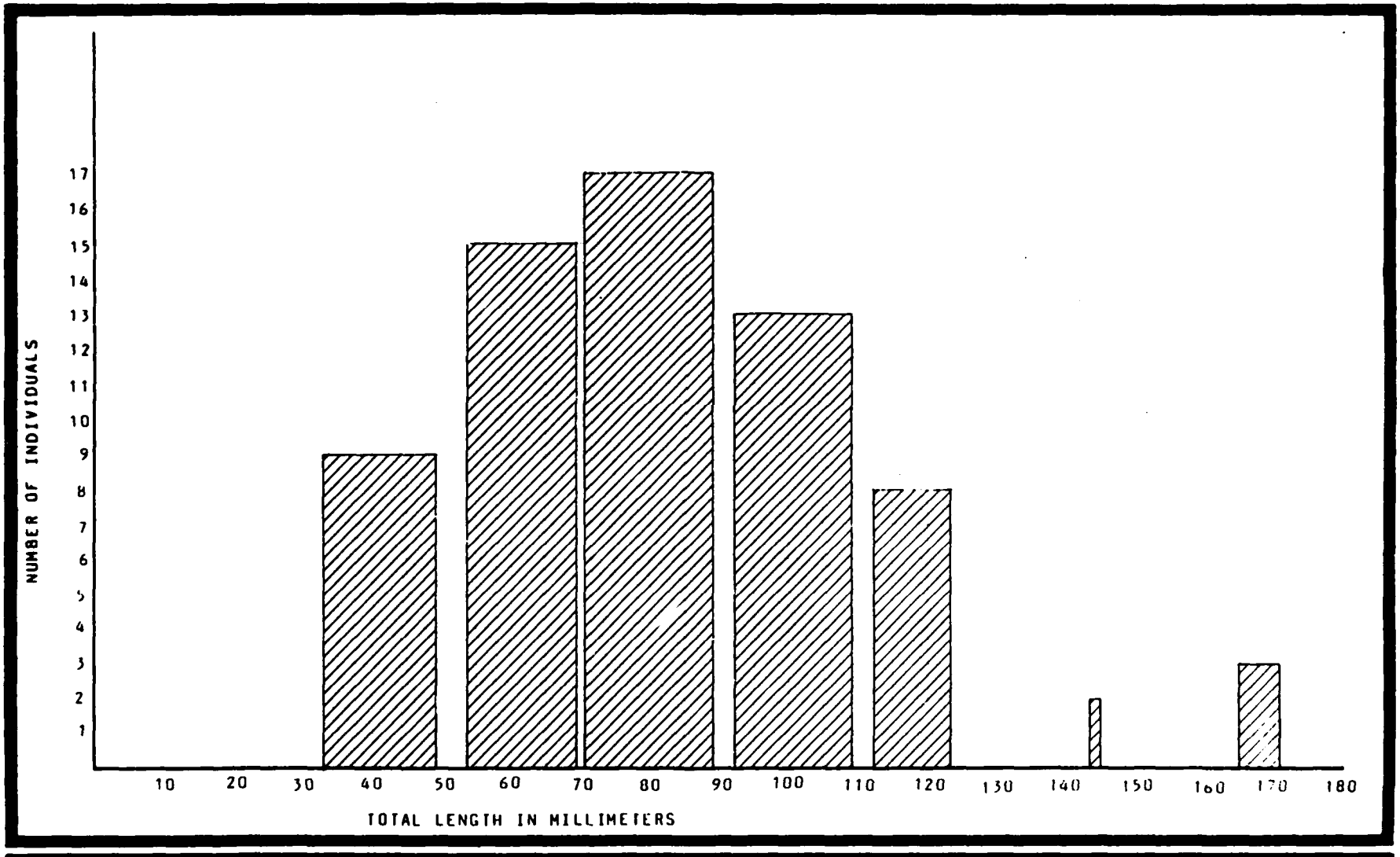

FIGURE 4.3-3 LENGTH - FREQUENCY DISTRIBUTION OF GREEN SUNFISH (LEPOMIS CYANELLUS) CAPTURED IN THE HILLVIEW DRAINAGE AND LEVEE DISTRICT, FALL 1981

HILLVIEW DRAINAGE AND LEVEE DISTRICT

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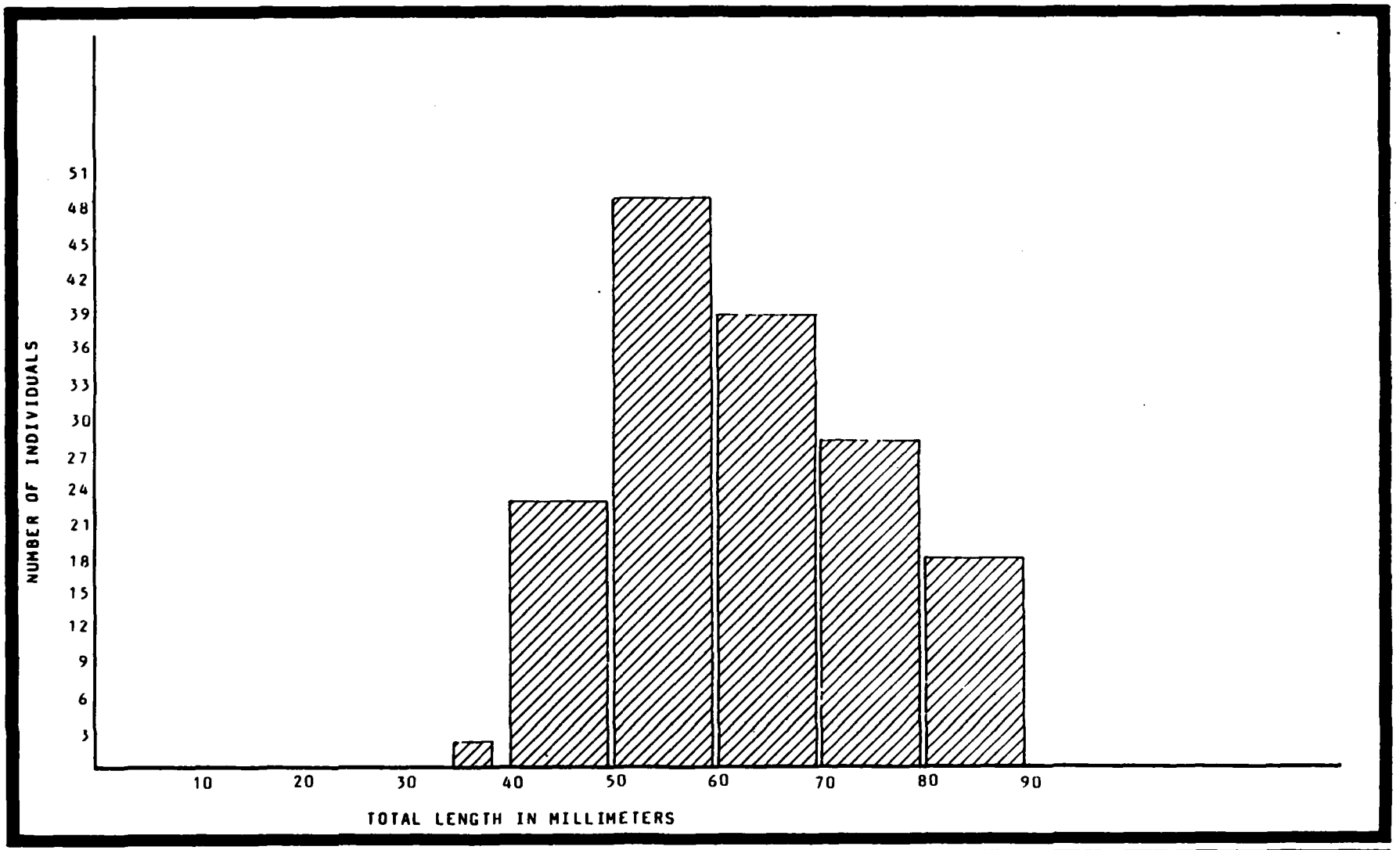

FIGURE 4.3-4 LENGTH - FREQUENCY DISTRIBUTION OF ORANGESPOTTED SUNFISH (LEPOMIS HUMILIS) CAPTURED IN THE HILLVIEW DRAINAGE AND LEVEE DISTRICT, FALL 1981

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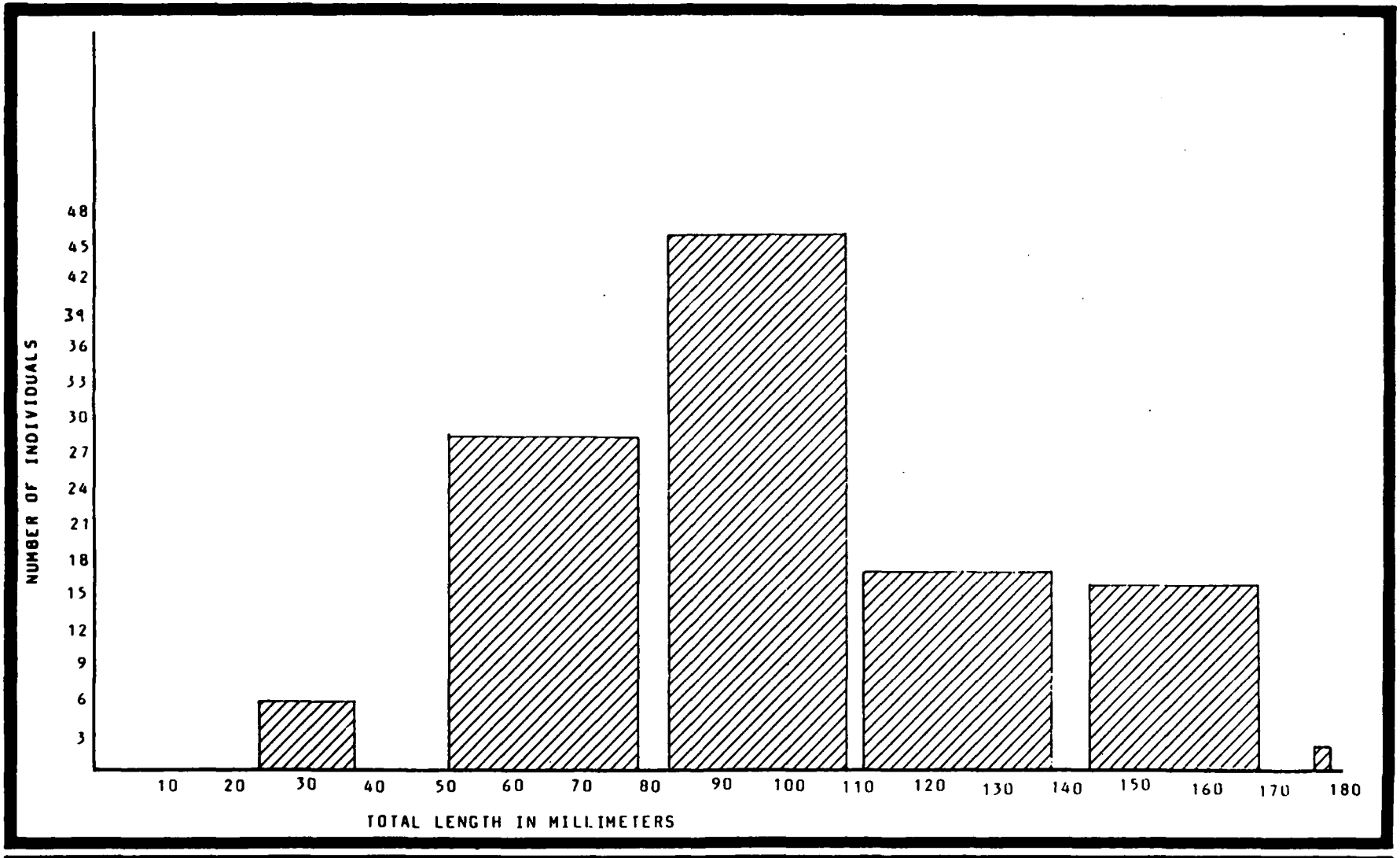

FIGURE 4.3-5 LENGTH - FREQUENCY DISTRIBUTION OF BLUEGILL (LEPOMIS MACROCHIRUS) CAPTURED IN THE HILLVIEW DRAINAGE AND LEVEE DISTRICT, FALL 1981

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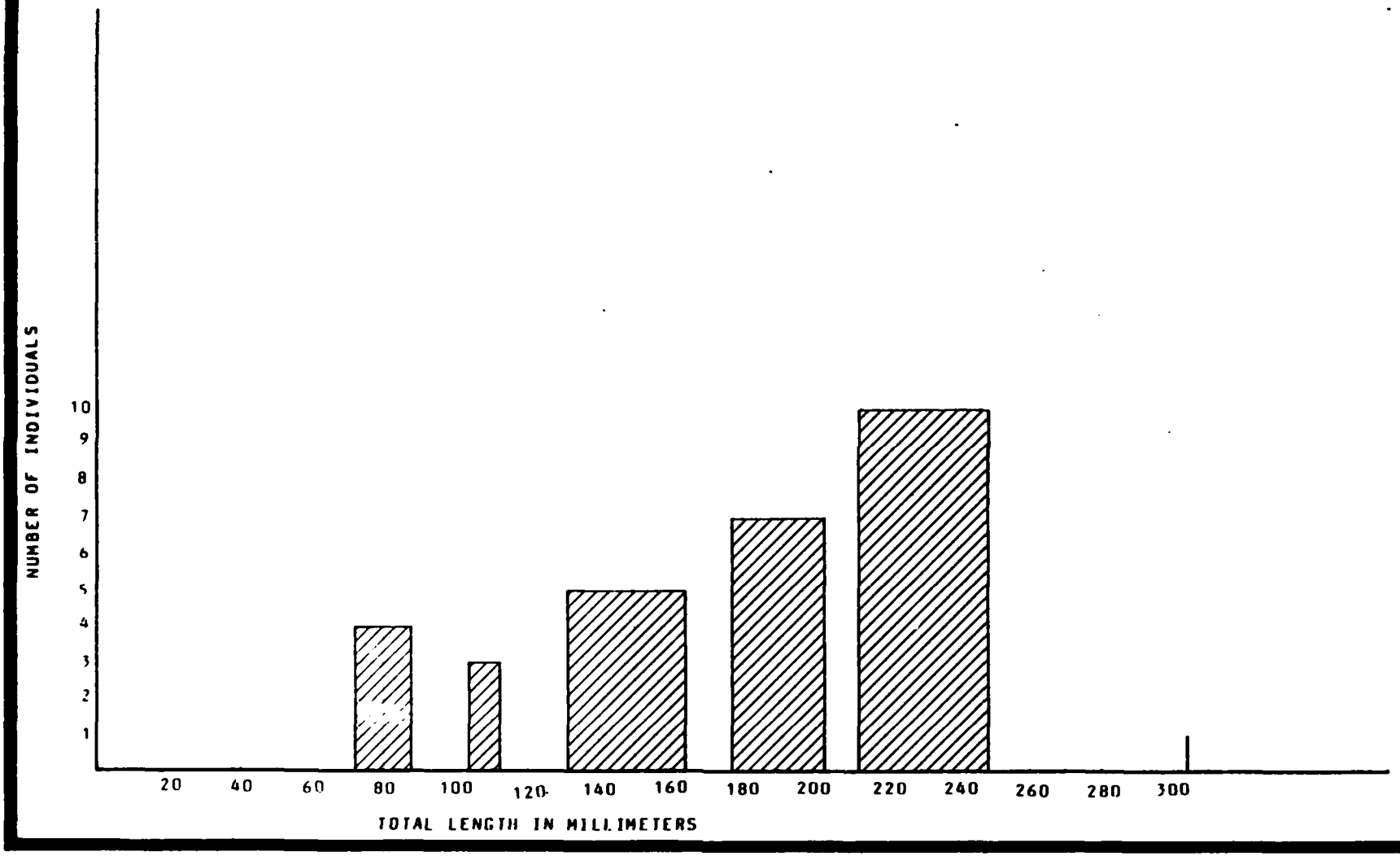

FIGURE 4.3-6 LENGTH - FREQUENCY DISTRIBUTION OF WHITE CRAPPIE (POMOXIS ANNULARIS) CAPTURED IN THE HILLVIEW DRAINAGE AND LEVEE DISTRICT, FALL 1981

HILLVIEW DRAINAGE AND LEVEE DISTRICT

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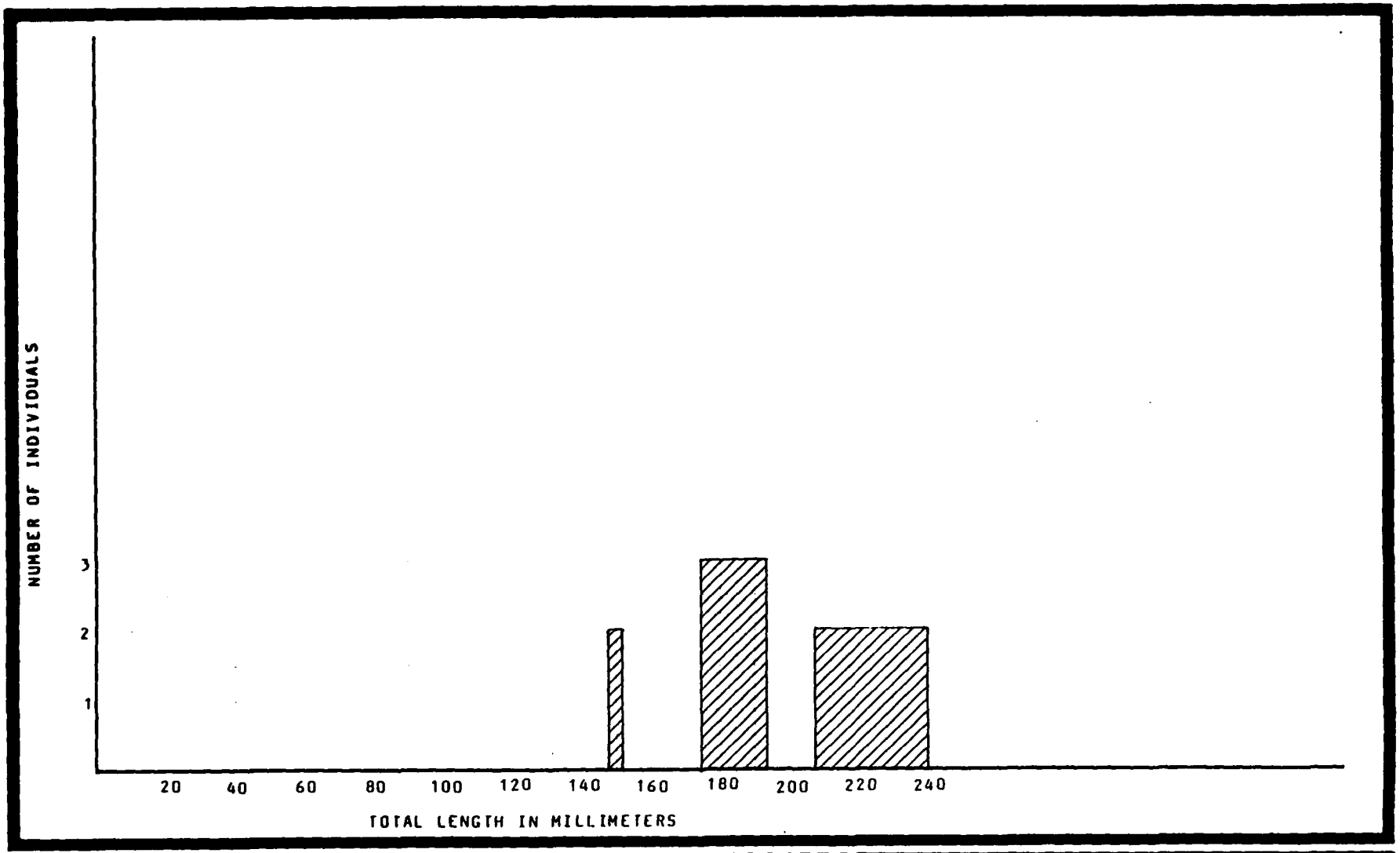

FIGURE 4.3-7 LENGTH - FREQUENCY DISTRIBUTION OF BLACK BULLHEAD (ICTALURUS MELAS) CAPTURED IN THE HILLVIEW DRAINAGE AND LEVEE DISTRICT, FALL 1981

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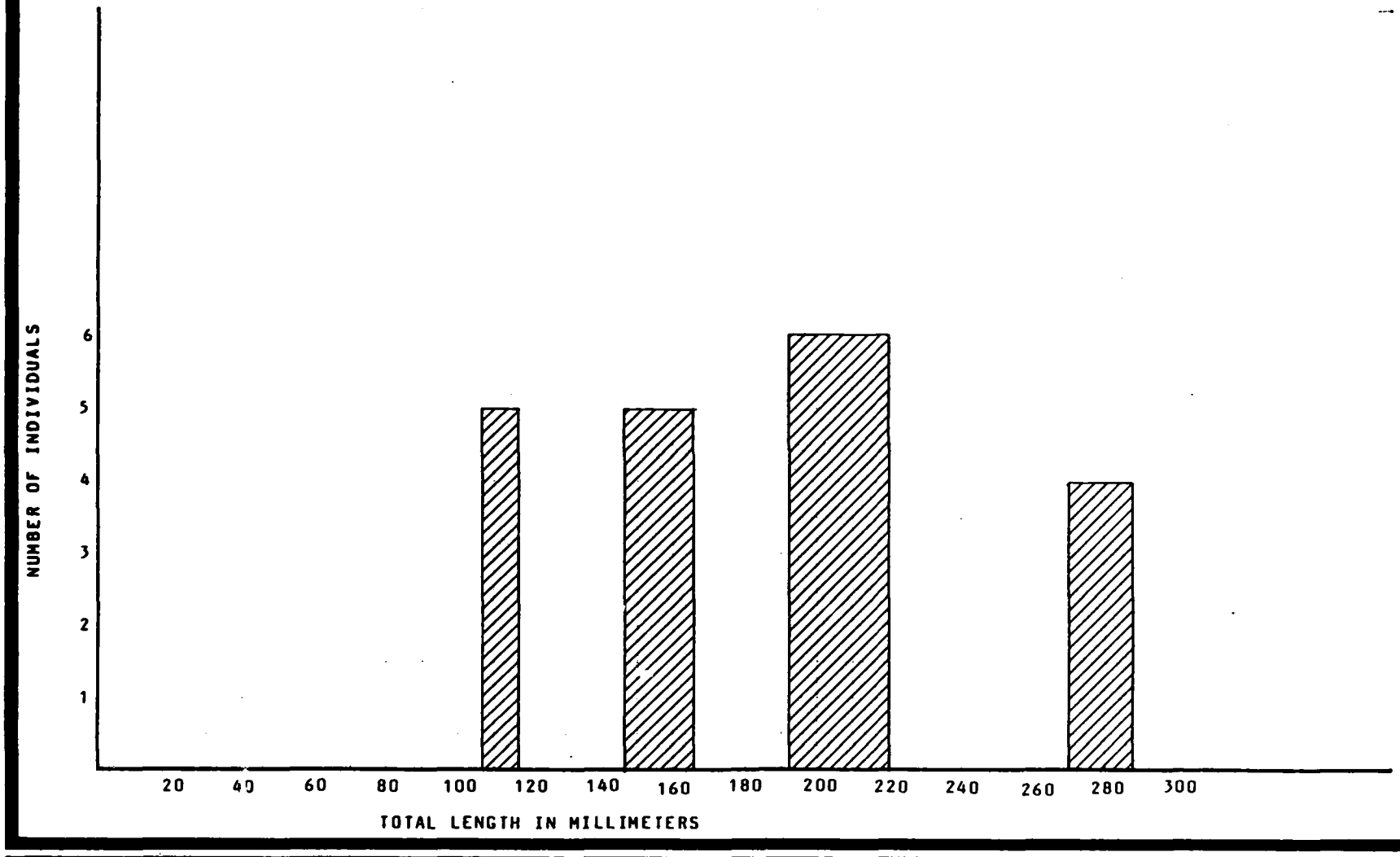

FIGURE 4.3-8 LENGTH - FREQUENCY DISTRIBUTION OF YELLOW BULLHEAD (ICTALURUS NATALIS) CAPTURED IN THE HILLVIEW DRAINAGE AND LEVEE DISTRICT, FALL 1981

HILLVIEW DRAINAGE AND LEVEE DISTRICT

ST. LOUIS C.O.E.

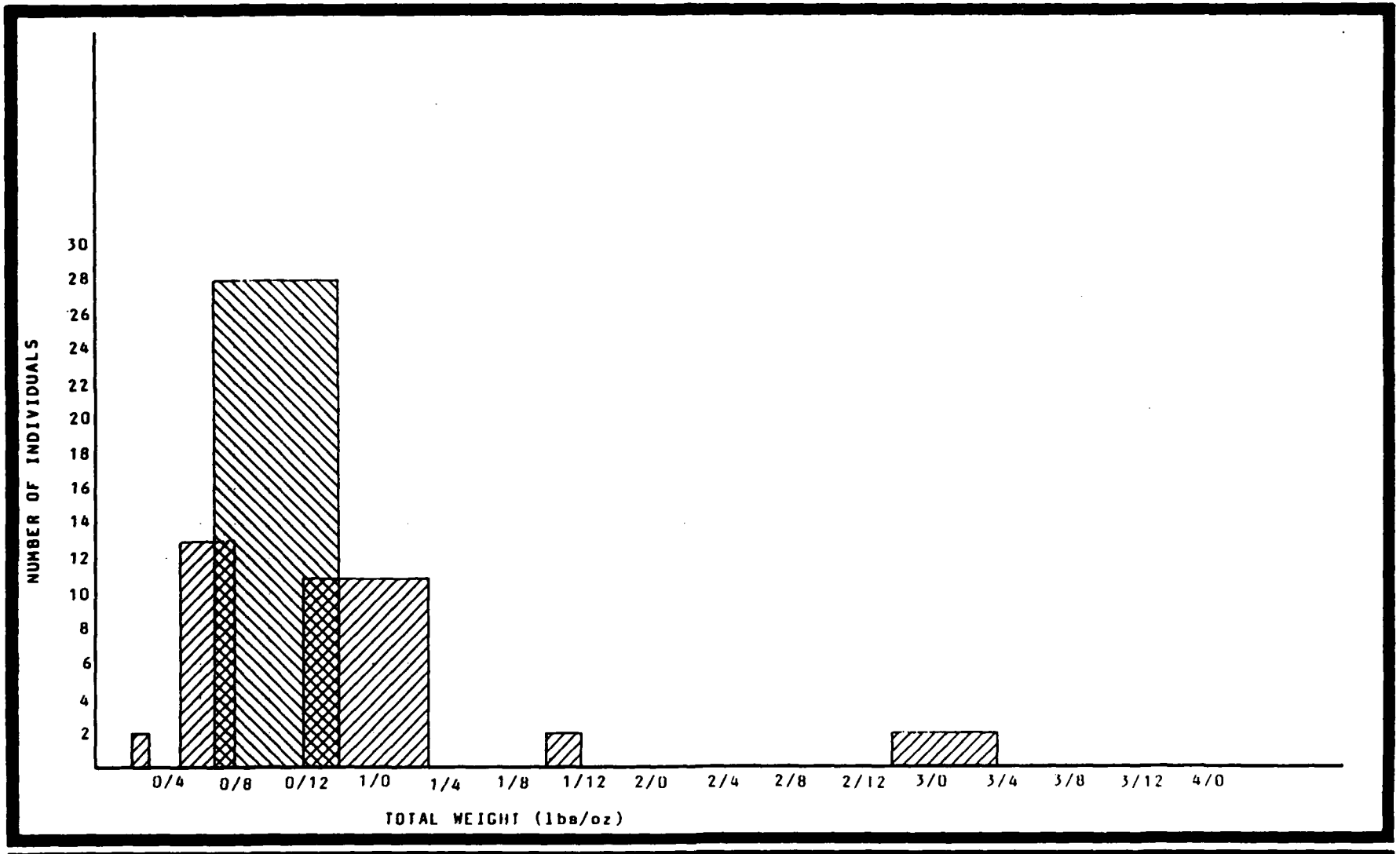

FIGURE 4.3-9 WEIGHT - FREQUENCY DISTRIBUTION OF CARP (CYPRINUS CARPIO) CAPTURED IN THE HILLVIEW DRAINAGE AND LEVEE DISTRICT, FALL 1981

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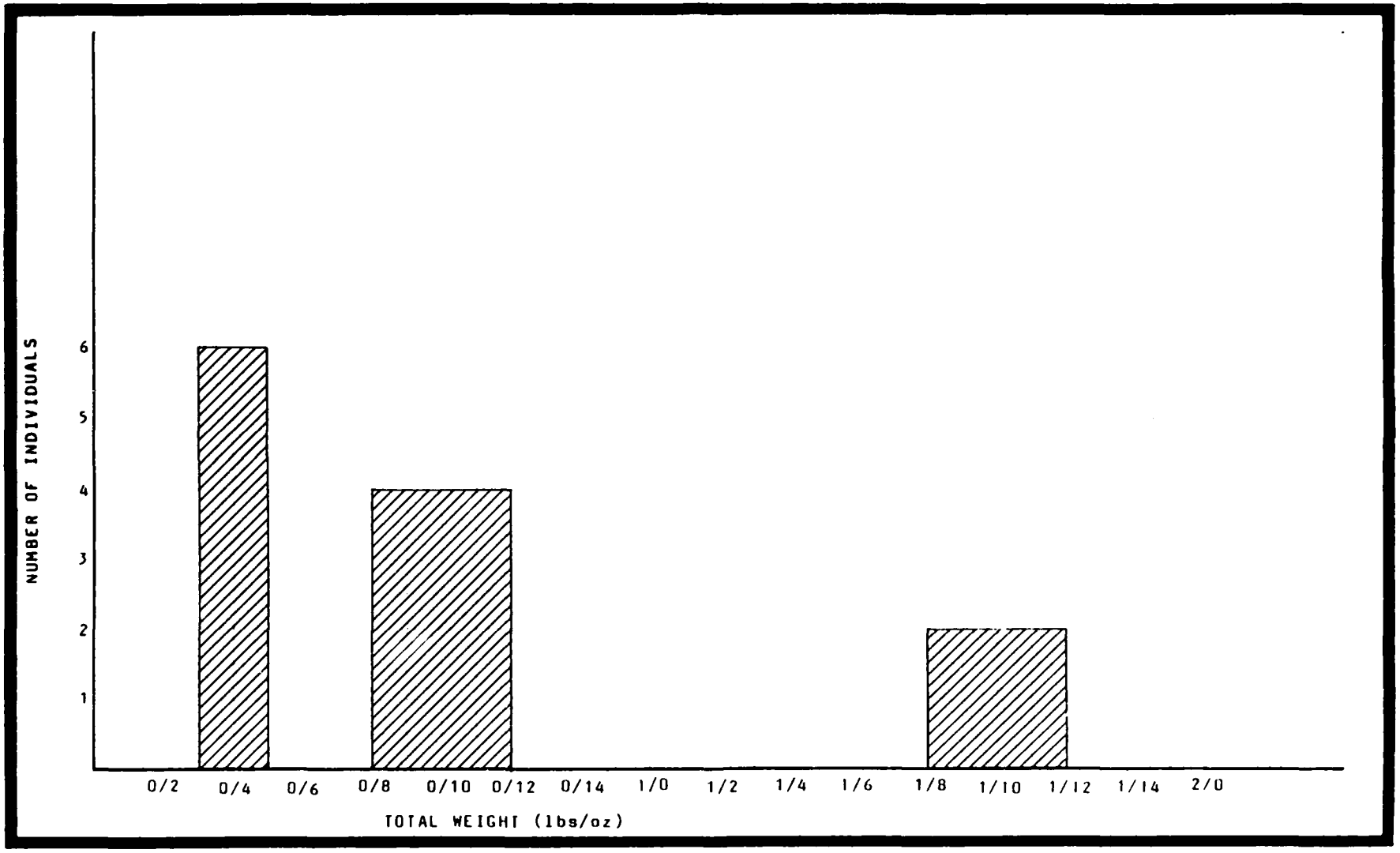

FIGURE 4.3-10 WEIGHT - FREQUENCY DISTRIBUTION OF LARGEMOUTH BASS (MICROPTERUS SALMOIDES) CAPTURED IN THE HILLVIEW DRAINAGE AND DISTRICT, FALL 1981

HILLVIEW DRAINAGE AND LEVEE DISTRICT

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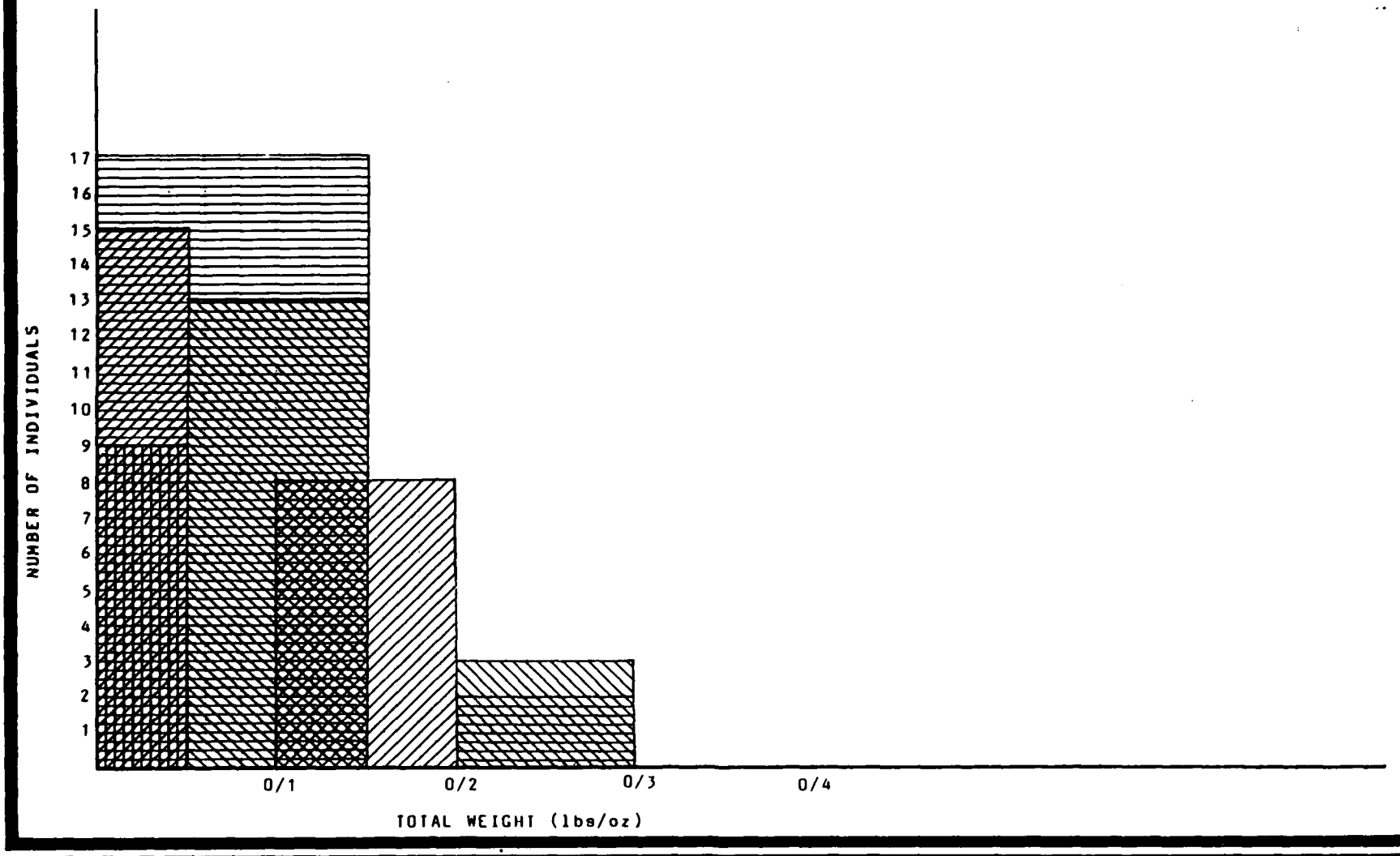

FIGURE 4.3-11 WEIGHT - FREQUENCY DISTRIBUTION OF GREEN SUNFISH (LEPOMIS CYANELLUS) CAPTURED IN THE HILLVIEW DRAINAGE AND LEVEE DISTRICT, FALL 1981

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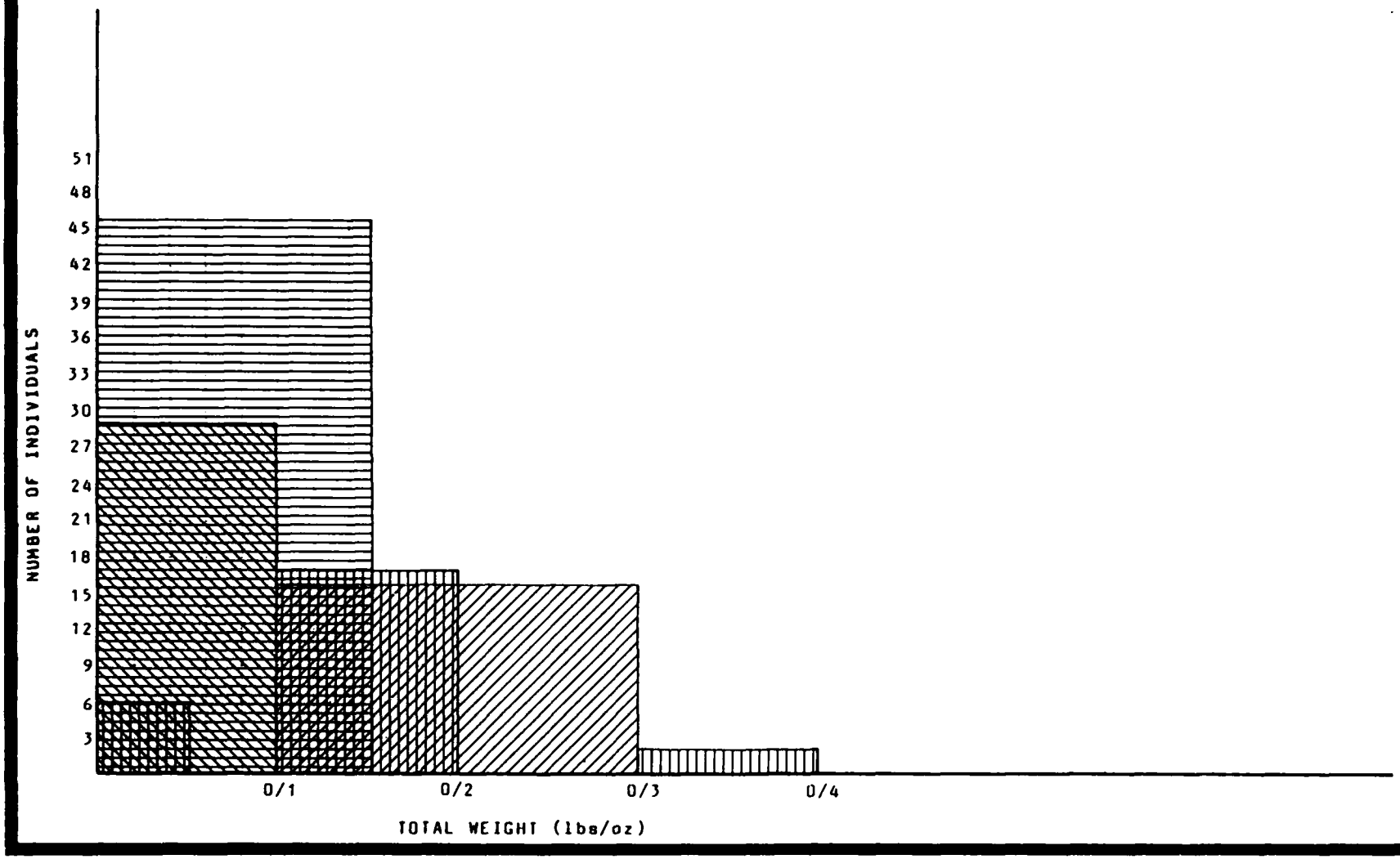

FIGURE 4.3-12 WEIGHT - FREQUENCY DISTRIBUTION OF BLUEGILL (LEPOMIS MACROCHIRUS) CAPTURED IN THE HILLVIEW DRAINAGE AND LEVEE DISTRICT, FALL 1981

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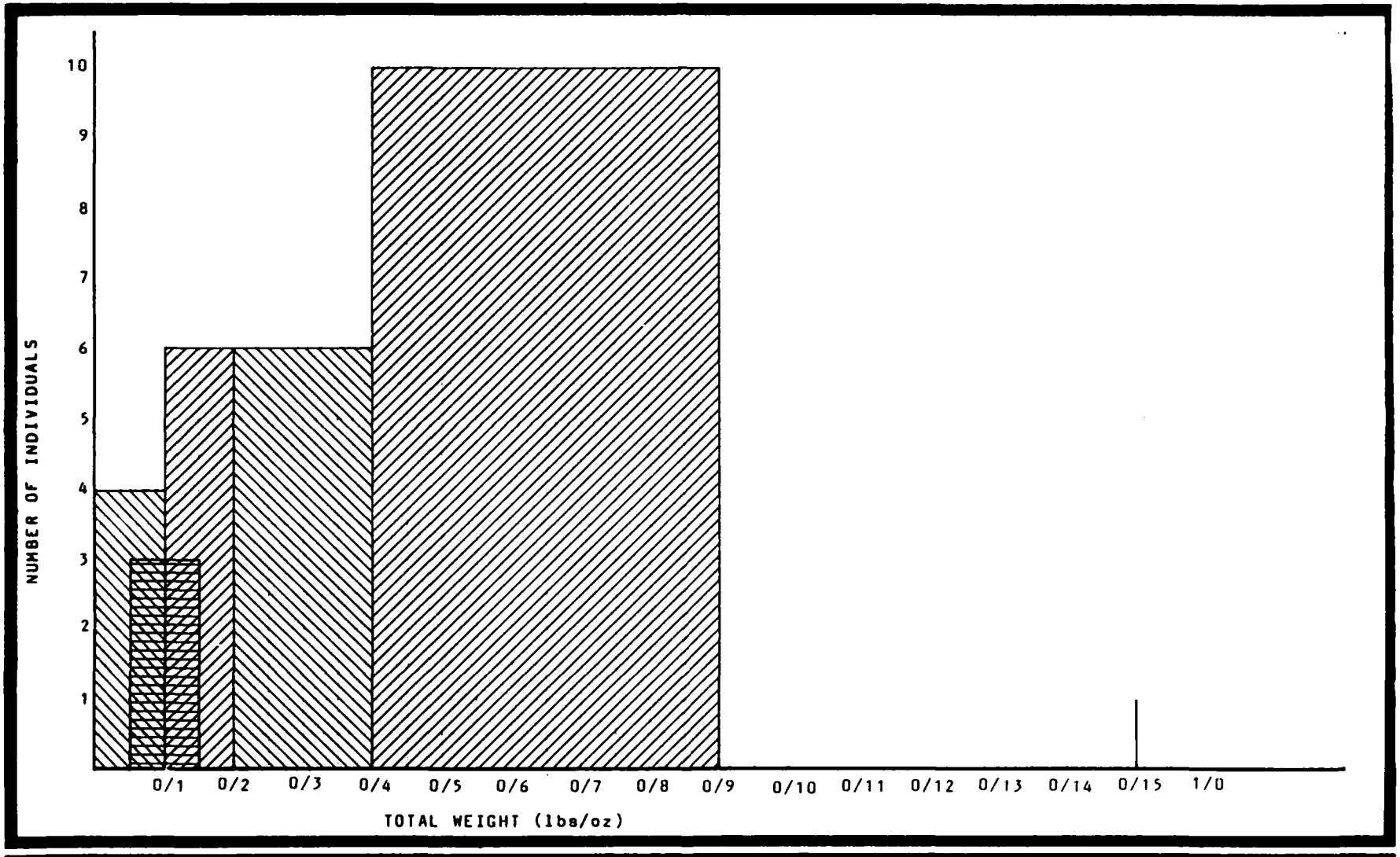

FIGURE 4.3-13 WEIGHT - FREQUENCY DISTRIBUTION OF WHITE CRAPPIE (POMOXIS ANNULARIS) CAPTURED IN THE HILLVIEW DRAINAGE AND LEVEE DISTRICT, FALL 1981

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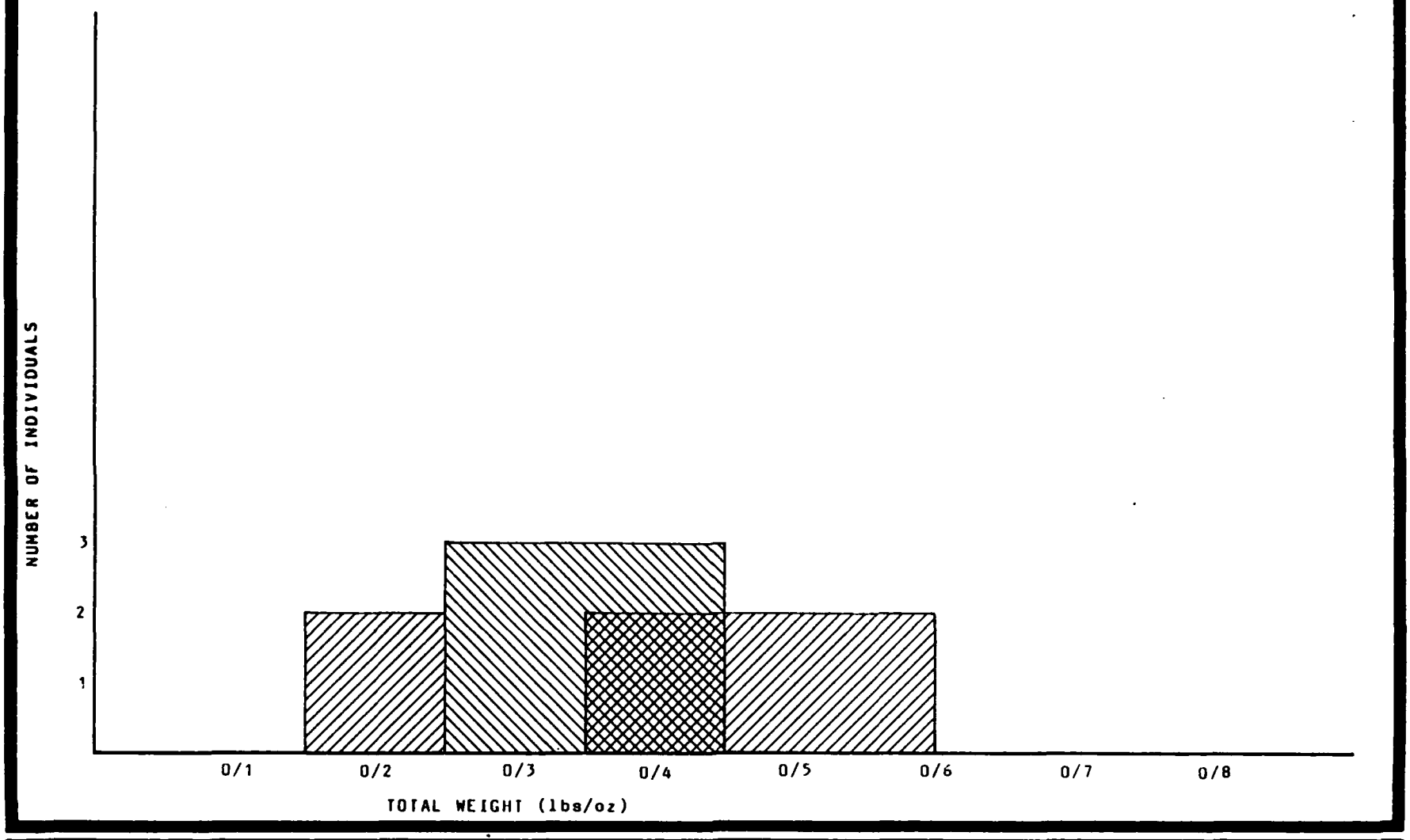

FIGURE 4.3-14 WEIGHT - FREQUENCY DISTRIBUTION OF BLACK BULLHEAD (ICTALURUS MELAS) CAPTURED IN THE HILLVIEW DRAINAGE AND LEVEE DISTRICT, FALL 1981

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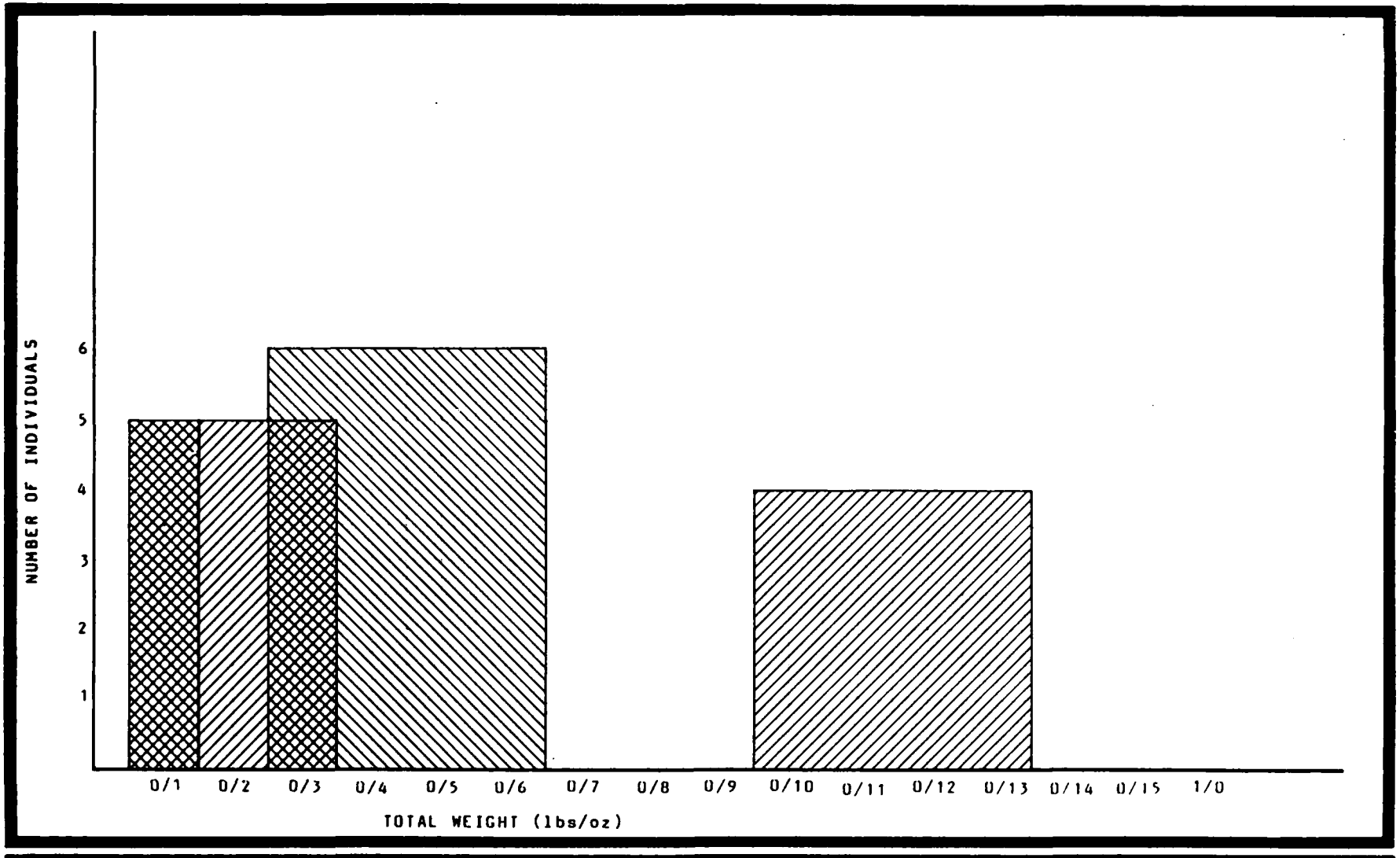

FIGURE 4.3-15 WEIGHT - FREQUENCY DISTRIBUTION OF YELLOW BULLHEAD (ICTALURUS NATALIS) CAPTURED IN THE HILLVIEW DRAINAGE AND LEVEE DISTRICT, FALL 1981

HILLVIEW DRAINAGE AND LEVEE DISTRICT

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(4 oz). Stations 1 and 3 are projected to support the highest standing crop (247 and 269 lb/acre respectively), while the projected standing crop for Station 6 is 11.7 lb/acre and for Station 7, 0.23 lb/acre based on collected data. Although standing crops were highly variable in both the Hartwell and Hillview studies, the range of standing crop values are similar (WAPORA, Inc. 1981). Standing crops determined in the Nutwood study were also quite comparable, although again highly variable (Axtell and Humes, 1981).

Recorded species diversity ranged from 0.64 at Station 6 to 2.50 at Station 2. Five of the seven stations yield diversity values less than 2.00. This would suggest the influence of environmental stresses on the fish community or the limitations imposed by low habitat diversity (probably a combination of the two). The range in diversity values is greater than that recorded for either the Nutwood or Hartwell Districts, with both the lowest and highest diversity being recorded at the Hillview Drainage and Levee District (Axtell and Humes, 1981; WAPORA, Inc., 1981).

The above comparisons must be used with caution. Sampling methods were not always maximally effective, and some yields were low. In addition, one-time sampling does not necessarily accurately describe long-term or general biotic conditions; several sampling periods must be utilized to adequately address these issues.

Ecological Features

The fish species collected in the Hillview Drainage and Levee District are common and widespread throughout the midwest and are generally considered moderately tolerant to tolerant of environmental stresses and a wide range of ecological conditions. No especially sensitive species were collected nor are expected to occur in the District.

The most environmentally sensitive species collected were the bass and sunfishes, and even these are found in a wide range of habitats and environmental conditions. Table 4.3-3 describes life history features and ecological relationships of fish families collected in the District.

4.4 BENTHIC MACROINVERTEBRATES

Benthic macroinvertebrate communities are significant in aquatic systems as they represent a direct food web link between the plankton and fish communities. Due to their limited mobility, benthic invertebrates are good indicators of both long term and short term water quality conditions.

Table 4.3-3. Life History Features and Ecological Relationships of Fish Families Collected or Potentially Occurring in the Hillview Drainage and Levee District

Family Name	Common Name	Habitat Requirements	Feeding Habit	Spawning Characteristics	Restrictions or Sensitivities
Lepisosteidae	Gars	Sluggish backwaters and river reaches, ponds, lakes	Piscivorous/ Carnivorous	Generally spawn late April in shallow riffle areas	Generally tolerant of reduced water quality; associated with sluggish waters.
Clupeidae	Shad Herring	Most abundant in larger rivers and lakes; primarily in quiet waters	Primarily Planktivorous	Spawn April-June, generally in shallow waters around submerged objects	Generally tolerant; associated with quiet waters of high productivity.
Cyprinidae	Minnows	Almost any aquatic habitat will support some species of minnow	Primarily omnivorous upon invertebrates, algae, plankton	In general begins in mid-spring, extending into mid-summer; variety of habitats	Generally tolerant group, although variable.
Castostomidae	Suckers	Generally associated with streams or rivers; moderately quiet waters for the most part; current in spawning habitats	Omnivorous; primarily bottom feeders	Generally spawn April-early summer; require riffles or some current	Moderately tolerant; moderately clear waters with some current generally required for spawning habitat.
Ictaluridae	Catfish	Found in most permanent water bodies; bullheads favor smaller, sluggish streams; catfish favor larger, low-gradient rivers	Omnivorous	Primarily May-July; usually spawn in or around submerged cover	Quite tolerant of reduced water quality; inhabit a wide variety of waters.

Table 4.3-3. Life History Features and Ecological Relationships of Fish Families Collected or Potentially Occurring at the Hillview Drainage and Levee District (Continued, Page 2 of 2)

Family Name	Common Name	Habitat Requirements	Feeding Habit	Spawning Characteristics	Restrictions or Sensitivities
Cyprino-dontidae	Top-minnows	Generally prefer sluggish waters with some vegetation	Surface feeders on invertebrates	Summer	Tolerant of a wide range of environmental conditions
Poeciliidae	Mosquito-fish	Generally prefer sluggish waters with some vegetation	Surface feeders on invertebrates	Summer	Tolerant of a wide range of environmental conditions
Centrarchidae	Sunfish, Bass	Lakes, ponds; quiet deeper areas of rivers; often associated with cover	*Piscivorous*/ Carnivorous	*Generally* in late spring and early summer; usually in shallow water with cover	Only moderately tolerant; prefer clearer water and clean substrates; vegetation or similar cover preferred.
Percidae	Perch	Walleye and Sauger--Deep open waters of lakes and rivers; Darters--clear, swift rocky streams	Piscivorous/ Carnivorous	Generally in spring and early summer, shallows over gravel, often in smaller streams	Generally low tolerance to water quality degradation; generally prefer clearer waters and firmer substrates.

Sources: Pflieger, 1975.
Smith, 1979.

Table 4.4-1 presents the macroinvertebrate data collected in this study, the density (#/m^2), and their percent occurrence in the sample collections. Forty-four taxa were collected during the study. Oligochaetes and chironomids dominated the species composition and density at all sampling locations. The dominance of these benthic organisms in soft substrates (mud, silt, detritus and sand) is typical of the lotic systems in the midwestern United States (Hynes, 1970).

Total macroinvertebrate sample densities ranged from 1802 per square meter (1802/m^2) at Station 4 to 41,291/m^2 at Station 6. In addition to supporting the highest density, Station 6 also supported the highest number of taxa (32) while Stations 4 and 7 supported the fewest taxa (11 and 15 respectively).

Station 1-5 supported similar macroinvertebrate assemblages being dominated almost exclusively by oligochaetes and chironomids.

Station 6, which produced the highest sample density and species richness, was dominated by Hyallella azteca, (an amphipod not collected at the other stations), oligochaetes and chironomids. The higher densities and richness are apparently due to the large amounts of Nitella sp. (a genus of large, branched green algae which often form dense mats on stream bottoms) growing at Station 6 but absent from the other sampling stations.

The Station 7 macroinvertebrate fauna was composed entirely of chironomids. This station exhibits a sand substrate, more natural characteristics and less siltation than the other stations. Therefore, those organisms adapted to soft substrate environments, such as oligochaetes, were not present in the samples.

Macroinvertebrate diversity values ranged from 0.50 at Station 4 to 3.03 at Station 7. Evenness values ranged from 0.21 at Stations 4 to 1.12 at Station 7.

The diversity and evenness values indicate a moderate degree of stress, ecological unsuitability, or limited habitat diversity for the macroinvertebrate community. Factors causing this stress may include habitat uniformity, siltation, and turbidity, as well as variable current velocities and water depth fluctuations.

Benthic macroinvertebrates were collected at Buck's Branch (Reconnaissance Site 0) with the use of a Surber sampler. The

Table 4.4-1. Benthic Invertebrate Density and Diversity in the Hillview Drainage and Levee District, Fall 1981

Taxa	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7	
	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent
Turbellaria														
Phagocata sp											43	0.10		
Hirudinea											172	0.42		
Oligochaeta	2,342	58.83	1,334	48.97	1,274	32.49	1,696	94.12	2,239	67.52	17,480	42.34		
Ostracoda											43	0.10		
Isopoda														
Asellus intermedius											172	0.42		
Amphipoda														
Hyalella azteca											18,514	44.84		
Ephemeroptera														
Callibaetis sp											258	0.62		
Caenis sp	17	0.43	9	0.33							43	0.10		
Odonata														
Coenagrionidae											990	2.40		
Argia sp					9	0.23								
Ischnura sp											177	0.42		
Hemiptera														
Corixidae	9	0.23									646	1.56		
Coleoptera														
Dubiraphia spp											172	0.42		

Table 4.4-1. Benthic Invertebrate Density and Diversity in the Hillview Drainage and Levee District, Fall 1981 (Continued, Page 2 of 4)

Taxa	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7	
	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent
Diptera														
Chironomidae	34	0.85	60	2.20	95	2.42			9	0.27	172	0.42	9	2.48
Tanypodinae	9	0.23	9	0.33	9	0.23								
Pentaneura sp											43	0.10		
P. monilops							9	0.48						
Procladius sp			26	0.95	26	0.66			43	1.30				
P. adumbratus	17	0.43	52	1.91	9	0.23	9	0.48	34	1.03	129	0.31		
Coelotanypodinae					9	0.23								
Coelotanypus concinnus											43	0.10		
Tendipidinae			9	0.33										
Chironomini	69	1.73	86	3.16	60	1.51			9	0.27			9	2.48
Chironomus sp	9	0.23	34	1.25	26	0.66			17	0.51	43	0.10	17	4.96
C. militaris	310	7.79	370	13.58	1,825	46.54	17	0.96	654	19.72	129	0.31	34	9.92
C. cristatus	611	15.35	138	5.07	26	0.66			9	0.27	43	0.10	138	39.77
Endochironomus tendens			17	0.62										
E. nigricans	9	0.23					9	0.48						
Limnochironomus sp			26	0.95									9	2.48
L. nodosus	112	2.81	52	1.91	34	0.87			17	0.51	86	0.21		
L. tenuicaudatus	26	0.65									129	0.31	34	9.92
Cryptochironomus sp	17	0.43	9	0.33	9	0.23	17	0.96					9	2.48
C. stylifera	95	2.39	146	5.36	95	2.42	9	0.48	60	1.81			9	2.48
Microspectra sp			9	0.33									9	2.48
Polypedilum sp			138	5.07	362	9.23			207	6.24			26	7.44
P. flavus	86	2.16	9	0.33	9	0.23					43	0.10		

Table 4.4-1. Benthic Invertebrate Density and Diversity in the Hillview Drainage and Levee District, Fall 1981 (Continued, Page 3 of 4)

Taxa	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7	
	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent
Glyptotendipes sp	121	3.04	26	0.95	9	0.23			9	0.27	43	0.10		
G. lobiferus											43	0.10		
G. senilis	9	0.23												
Dicrotendipes modestus											86	0.21		
Goeldichironomus loloprasinus					9	0.23					43	0.10		
Parachironomus sp	9	0.23	26	0.95	17	0.43								
Tribelos sp			26	0.95	9	0.23								
Phenospectra sp			9	0.33										
Tanytarsus dissimilis							9	0.48			215	0.52		
Rheotanytarsus sp	9	0.23									43	0.10	9	2.48
Cladotanytarsus sp			17	0.62							43	0.10		
Diamesa sp													9	2.48
Psilodiamesa fulva											43	0.10		
Orthocladius sp							9	0.48						
Trichocladius sp													17	4.96
Chaoborus sp							9	0.48	9	0.27				
Ceratopogonidae	9	0.23	69	2.53			9	0.48					9	2.48
Tipulidae			9	0.33										
Gastropoda														
Physa sp											473	1.15		
Gyraulus sp	9	0.23									689	1.67		
Ferrissia	43	1.08												

Table 4.4-1. Benthic Invertebrate Density and Diversity in the Hillview Drainage and Levee District, Fall 1981 (Continued, Page 4 of 4)

Taxa	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7	
	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent	#/m^2	Percent
Pelecypoda														
Sphaeriidae			9	0.33										
Total Density	3,981		2,724		3,921		1,802		3,316		41,291		347	
Shannon-Weaver	2.19		2.83		2.06		0.50		1.49		1.89		3.03	
Evenness	0.70		0.86		0.69		0.21		0.58		0.55		1.12	
No. of Taxa	23		27		20		11		13		32		15	

Source: ESE, 1981.

collections at this site were composed of epibenthic forms adapted to riffle areas.

Appendix Table D-2 presents the data from the collections made at Buck's Branch. Twenty-seven taxa, most of which were not collected at the other seven sampling locations, were collected. The macroinvertebrate density in the Buck's Branch samples was 4,101/m^2. Diversity and evenness were 2.67 and 0.81 respectively indicating moderate environmental stress.

Taxa collected at Buck's Branch included forms typically associated with riffle areas and rubble substrates including Baetis spp., Hydropsyche bettani, Cheumatopsyche spp. and Ectopria nervosa (Hynes, 1970).

The macroinvertebrate community at Buck's Branch is unique to the study area and is present due to the natural condition, rubble substrate, flowing water, low turbidity, and low siltation characteristics of the habitat.

Ecological Features

Benthic invertebrates are found in all permanent bodies of water even when gross pollution is present. Taxa common in the samples, with the exception of Buck's Branch, collected in the Hillview Drainage and Levee District (oligochaeta and chironomidae) are cosmopolitan in distribution. Most species in these groups are also highly tolerant of ecological stresses and can be found in a wide variety of conditions (Pennak, 1978).

A majority of taxa collected in the study area are classified by Weber (1973) as moderately tolerant to tolerant of ecological or environmental stresses. Notably tolerant and widely distributed and adaptable are the Diptera and Oligochaeta.

The most environmentally sensitive taxa collected would be the Ephemeroptera, Odonata and Amphipoda. These taxa are in general associated with cleaner waters and substrates. Even though these taxa are more environmentally sensitive than the Diptera and Oligochaeta, the genera collected in this study are widely distributed in the central and northern United States (Parrish, 1975; Keck, 1976; Williams, 1976; Hubbard and Peters, 1978). The most widely distributed genera in addition to those of the Diptera and Oligochaeta would be Caenis, Callibaetis, Asellus, and Hyallela.

Benthic macroinvertebrates display varying sensitivity to stresses experienced in the District. The high siltation and turbidity common at

Hillview do not affect embenthic organisms such as oligochaetes and many chironomids to the extent they would affect epibenthic organisms. Additionally, embenthic organisms are more tolerant than epibenthic organisms of low dissolved oxygen levels.

The dominance of embenthic invertebrates in the District, many of which are detritivores, indicate that the interrelationship between the plankton community and the benthic macroinvertebrate community is indirect. The low densities of epibenthic invertebrates may also limit the available fish food supply and may influence the fish population in the District.

4.5 STATE THREATENED AND ENDANGERED SPECIES

Table 4.5-1 lists and describes the current status of the state listed threatened and endangered fish species. None of these were collected during the field sampling nor are known to have been recently collected in the area. Their current range and habitat requirements suggest very little potential for occurrence in the Hillview Drainage and Levee District. (Thomerson and Myer, 1977; Axtell and Humes, 1981; WAPORA, Inc., 1981.)

Three species, the Cisco (Coregonus artedii), Alligator gar (Lepisosteus spatula), and Lake Sturgeon (Acipenser fulvescens) have a slight potential to occur in the Illinois River in the vicinity of the District. The blacknose shiner (Notropis heterolepis) could potentially occur in Buck's Branch, based on its known range and habitat requirements. (Smith, 1979).

Table 4.5-1. Status of State Endangered and Threatened Fishes Relative to the Hillview Drainage and Levee District

Common Name	Scientific Name	Classification*	Status
Bigeye chub	Hybopsis amplops	E	Possibly extirpated; not likely to occur in Illinois
Bluebreast darter	Etheostoma camurum	E	Vermilion County only
Bluehead shiner	Notropis hubbsi	E	Union County only
Harlequin darter	Etheostoma histrio	E	Cumberland and Jasper Counties only
Cisco	Coregonus artedii	T	Very slight potential to occur in Illinois River
Longnose sucker	Catostomus catostomus	T	Lake Michigan only
Alligator gar	Lepisosteus spatula	T	Very slight potential to occur in Illinois River
Pugnose shiner	Notropis anogenus	T	Lake County only
Blacknose shiner	Notropis heterolepis	T	Very slight potential to occur in Buck's Branch
Bantam sunfish	Lepomis symmetricus	T	Union County
Lake whitefish	Coregonus clupeaformis	T	Lake Michigan only
Lake sturgeon	Acipenser fulvescens	T	Very slight potential to occur in Illinois River

* E-Endangered; T-Threatened

Sources: IDOC, 1979;
Smith, 1979

5.0 PROJECTION OF FUTURE CONDITIONS

The Corps of Engineers is presently considering the possibility of raising the levees along the lower Illinois for increased flood protection capacity. This is one impetus behind the present Drainage and Levee District studies on the lower Illinois River. The proposed plan of improvement will provide flood protection to 13,070 acres of agricultural lands and the village of Hillview, Illinois.

It is not anticipated that this action, if taken, would produce significant changes in the existing aquatic habitats or biota in the Hillview Drainage and Levee District, provided that sound construction controls of surface runoff and siltation are employed. Present aquatic habitats should not be directly altered by the levee raising, and present hydrologic features, water quality, substrates and cover should not change significantly.

Without the project, there should not be significant changes in aquatic systems either. Over a long period of time (several decades) the present drainageways will begin to regain certain of the natural features present before modification. Habitat diversity will increase, and meanders will form within the channelized valley. Accretion of land via sedimentation will enhance cover along and within the drainageway.

6.0 PROBLEMS AND RECOMMENDATIONS

Several aquatic resource problems can be identified in the Hillview Drainage and Levee District and merit some discussion due to their potential impacts on aquatic habitats and biota. These problems include siltation and sedimentation, potential water quality contamination from agricultural chemicals (fertilizers, pesticides, herbicides), and variable water levels due to drainage and pumpage regimes.

Although each of these factors can have significant impacts on aquatic habitats and biota, it is difficult to establish adequate control measures without sacrificing a portion of the expressed function of the drainage systems and districts, that of quick removal of excess moisture from agricultural lands and intensive cultivation of former floodplain lands.

Water quality degradation from agricultural chemicals as well as the problem of siltation and sedimentation are directly linked with surface runoff input to the drainage canals. Surface runoff from agricultural lands is generally high in turbidity, solids and nutrients (notably phosphorus and nitrogen). Organics and pesticides adhere to soil particles and are thereby transported into receiving waters. Nutrient and pesticide levels are typically elevated in waters receiving runoff from agricultural lands. Runoff from areas of livestock production are also typically high in nutrients. Increased nutrient levels have the effect of enhancing productivity in receiving waters, notably in the phytoplankton and aquatic macrophytes. A major factor in controlling pesticide and nutrient inputs is the control of surface erosion and runoff into receiving waters (Jones et al., 1976; Omernik, 1976; Romkens and Nelson, 1974).

7.0 SUMMARY AND CONCLUSIONS

A number of conclusions and summary statements can be made based on field data and information collected during the study and from more extensive knowledge of similar regional and specific aquatic ecosystems.

1. The aquatic systems of the Hillview Drainage and Levee District are generally limited by low diversity of habitat and fauna.
2. Fish populations are dominated by gizzard shad (Dorosoma cepedianum) and sunfishes (Lepomis spp.); there is no significant sport or commercial fishery suggested by the available data and information.
3. Phytoplankton populations are dominated by diatoms; zooplankton populations are dominated by rotifers.
4. Benthic macroinvertebrate populations are dominated by oligochaetes and chironomids.
5. Factors thought to significantly influence biotic communities in the District include, siltation, sedimentation, artificial & fluctuating hydrologic charateristics, soft substrates, and water quality stresses.

HABITAT EVALUATION

As a whole the aquatic systems of the Hillview Drainage and Levee District can be characterized by the following statements:

1. Aquatic habitats extensively altered or strongly influenced by man's activities.
2. Preponderance of lotic waters, very limited lentic waters.
3. Preponderance of sluggish pool habitats over riffle, chute, and shallows habitats - with all being present on the site; overall low diversity in habitats.
4. Preponderance of fine substrates (silts, sands, muds) over firmer rock, gravel substrates.
5. Variable degrees of cover in the form of aquatic vegetation and debris.
6. Range of "successional age" in terms of regaining more natural characteristics.
7. Fishery dominated by non-sport or non-commercial species or by commercial and sport species having length and weight distributions generally too small to be of commercial or sport significance.
8. Diverse and productive fishery, relative to expectations based on low habitat diversity and man's influences especially in terms of sunfish (Lepomis spp.).

Buck's Branch is the single example of significantly different aquatic habitat in the Hillview Drainage and Levee District, being more typical

of natural aquatic habitats prior to development of the District. In comparison to the other aquatic systems in the District, Buck's Branch contains a high percent of firm (rock-sand-gravel) substrates, a generally faster flow, and overall clearer water. This is one of the only sites in the District which contains rocky riffles. Fish and benthic assemblages reflect these habitat parameters.

It is difficult to assess the value of aquatic systems, as several criteria (taken singularly or in combination) can be used to evaluate ecological value:

1. Diversity of habitats and biota;
2. Productivity of the system;
3. Degradations of and stresses upon the system;
4. Sport and commercial value of the biota;
5. Ecological sensitivity or uniqueness of the biota; and
6. Presence of or potential for threatened and endangered species (Federal and State listed).

Regarding the Hillview Drainage and Levee District, the following can be said in response to the above criteria:

1. Habitat diversity is generally low in the District with the dominant habitat being long sluggish pools occurring in artificial drainageways; biotic diversity is also moderate to low with the exception of a diverse phytoplankton community. Relative to overall habitats in the District, Buck's Branch represents the only unusual aquatic habitat and slightly enhances diversity on the site.
2. Biotic productivity is moderate in terms of numbers of organisms; low in terms of biomass of fish produced, and is generally moderate to high in production of planktonic and benthic organisms. This is relative to what would probably be found in more natural streams of west-central Illinois.
3. Potentially significant environmental stresses are present in the District. These include siltation and sedimentation, fluctuating water levels (often in the short-term) and potential water quality degradation from fertilizers, pesticides and herbicides.
4. Data collected and reviewed do not indicate the presence of or potential for a significant sport or commercial fishery in the District (within the levee), although the adjacent Illinois River does support a recreational and commercial fishery. The waterways within the District are fished but usually by local landowners on an occassional basis.
5. The fish, benthos and plankton collected during the study are typical of midwestern lotic habitats. There are no especially sensitive species. The most sensitive fauna was that found in Buck's Branch.

6. No state or federal threatened or endangered fishes are known to occur in the District. The potential for their occurrence is very low based on known range and habitat requirements.

Summation of these criteria responses strongly indicate that the aquatic systems within the Hillview Drainage and Levee District are of limited ecological value. This statement must be considered in comparison to natural aquatic systems as they are found in west-central Illinois and the potential these natural systems represent for biotic productivity and diversity.

The above statement is not meant to be judgemental regarding future impacts or activities on the Hillview Drainage and Levee District. It is a subjective evaluation, based on data and information about the biotic communities, of aquatic systems in the District.

BIBLIOGRAPHY

Axtell, C.B. and J.H. Humes. 1981. Aquatic Biological Inventory: Nutwood Drainage and Levee District. M.B. Corlew and Associates, Edwardsville, Illinois.

Environmental Science and Engineering, Inc. (ESE). 1979. Environmental Assessment for the Proposed Freeman United Coal Mining Company Industry Mine Site. ESE, Inc. St. Louis, Missouri.

Hubbard, M.D. and W.L. Peters. 1978. Environmental Requirements and Pollution Tolerance of Ephemeroptera. EPA-600/4-78-061. U.S. Environmental Protection Agency, Office of Research and Development, Cincinnati, Ohio.

Hynes, H.B.N. 1970. The Ecology of Running Waters. The University of Toronto Press.

Illinois Natural History Survey. 1977. Fisheries and Herpetological Assessment of the Coal Creek-Crane Creek Watershed, Schuyler County, Illinois. Urbana, Illinois.

Illinois Department of Consrvation. 1979. Endangered and Threatened Wildlife. Springfield, Illinois.

Jones, J.R., B.P. Borofka, and R.W. Bachmann. 1976. Factors affecting nutrient loads in some Iowa streams. Water Research 10:177-122.

Keck, R. 1976. Freshwater Planarians (Turbellaria) of North America. Water Poll. Control Res. Series 18050 ELD02/72. U.S. Environmental Protection Agency, Office of Research and Development, Cincinnati, Ohio.

Lockart, R. 1971. Greene County Surface Water Resources. Illinois Department of Conservation, Division of Fisheries. Springfield, Illinois.

Odum, E.P. 1971. Fundamentals of Ecology. 3rd Edition. W.B. Saunders Company, Philadelphia.

Omernik, J.M. 1976. The influence of land use of stream nutrient levels. U.S. Environmental Protection Agency. EPA-600/3-76-014.

Parrish, F.K. ed. 1975. Keys to Water Quality Indicative Organisms of the Southeastern United States. 2nd. edition. U.S. Environmental Protection Agency, Office of Research and Development, Cincinnati, Ohio.

Pennak, R.W. 1978. Fresh-Water Invertebrates of the United States. 2nd Edition. John Wiley & Sons, Inc. New York.

Rogers, R.A. 1970. Scott County Surface Water Resources. Illinois Department of Conservation, Division of Fisheries. Springfield, Illinois.

Romkens, M.J.M. and D.W. Nelson. 1974. Phosphorus Relationships in Runoff from Fertilized Soils. J. Environ. Qual. 3(1):10-13.

Smith, P.W. 1979. The Fishes of Illinois. Southern Illinois University Press, Carbondale, Illinois.

Thomerson, J.E. and D.G. Myer. 1977. Aquatic Inventory, Eldred and Spanky Drainage and Levee District, Illinois.

WAPORA, Inc. 1981. Aquatic Biological Inventory, Hartwell Drainage and Levee District, Greene County, Illinois. WAPORA, Inc., Earth City, Missouri.

Weber, C.I. ed. 1973. Biological Field and Laboratory Methods for Measuring the Quality of Surface Waters and Effluents. EPA-670/4-73-001. U.S. Environmental Protection Agency, Office of Research and Development, Cincinnati, Ohio.

Williams, W.D. 1976. Freshwater Isopods (Asellidae) of North America. Water Poll. Contr. Res. Serv. 18050 ELD05/72. U.S. Environmental Protection Agency, Office of Research and Development, Cincinnati, Ohio.

APPENDIX A
AQUATIC HABITAT MAP

Appendix B

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site A Date 30 October 1981

Observor HLD, LWM

Average Width 100'

Average Depth 10'

Lowflow Width and Depth 5-ft deep - 15 ft wide

Range Width and Depth 5-15 ft deep, 75-150 ft wide

Length

Acreage

Sinuosity slight

Bottom Type(s) silt

Estimated Velocity .43 FPS

Color and Clarity clear down 2', Brown color

Instream Cover:			Streambank Cover:		
Type	Fallen logs	% 1	Type	Woody	% 10
	overhanging	1		Herbaceous	25

Presence and Height of Highwater Marks 4+ ft

Length of Pools Continuous Length of Riffles None

Shading 20%

Habitat Characteristics Little instream cover, banks not heavily vegetated, some elms & maples.

General Notes

Picture Nos. 18

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site B Date 28 October 1981

Observor R&H, NLC

Average Width 30 ft

Average Depth 9"

Lowflow Width and Depth 6" deep 20-25 ft wide

Range Width and Depth 1'-3' deep 25-36 ft wide

Length

Acreage

Sinuosity Some

Bottom Type(s) Sand, some mud & sand/gravel near shore

Estimated Velocity 7 FPS

Color and Clarity clear to bottom; green tint

Instream Cover:

Type Brush % 5

Streambank Cover:

Type Trees % 10

Herbaceous <1

Presence and Height of Highwater Marks None

Length of Pools 20 ft Length of Riffles None

Shading 40-90%

Habitat Characteristics Maples, cottonwoods, elms on banks, little instream cover

General Notes No riffles; small pools; low habitat diversity, mud along shore, shallow sand bars

Picture Nos. Roll #2 F 4-7

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site C Date 20 October 1981

Observor R&H, HLD

Average Width 30-40'

Average Depth 6" - 1'

Lowflow Width and Depth 5" deep 10' wide

Range Width and Depth 30-50' wide, 6" - 3ft deep

Length

Acreage

Sinuosity slight

Bottom Type(s) Sand, with some silt & gravel

Estimated Velocity CANNOT DETERMINE

Color and Clarity clear to bottom, greenish tint

Instream Cover:			Streambank Cover:		
Type	Stumps	% 5	Type	Grasses	% 70

Presence and Height of Highwater Marks 4+ ft

Length of Pools Small (<30 ft) Length of Riffles Small (<10 ft) west of Bridge

Shading E of Bridge - 80%, West of Bridge 0%

Habitat Characteristics Banks grassed with some weed and brush. Old pilings and logs provide some cover East of bridge.

General Notes

Picture Nos. Roll 2 F 1,2,3

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site D Date 22 October 1981

Observor HLD, LWM

Average Width 30 ft

Average Depth 1 ft

Lowflow Width and Depth 6" deep, 20ft wide

Range Width and Depth 6"-1½' deep, 30-40ft wide

Length

Acreage

Sinuosity slight

Bottom Type(s) silt

Estimated Velocity NONE

Color and Clarity clear to bottom, heavy green with floating algae

Instream Cover:		Streambank Cover:	
Type logs	% 20	Type woody	% 80
duckweed, algae	100	Herbaceous	20

Presence and Height of Highwater Marks 2+ ft

Length of Pools continuous Length of Riffles None

Shading 50 %

Habitat Characteristics Good streambank cover - sycamores, maples, locust; moderate instream cover.

General Notes Lentic wetland in nature, a former channel now cutoff.

Picture Nos. Roll 2, F 4

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site E Date 22 October 1981

Observor HLD, LWM

Average Width 17 ft

Average Depth 2 ft

Lowflow Width and Depth 1 ft deep

Range Width and Depth 1-3 ft deep, 14-2 ft wide

Length

Acreage

Sinuosity None

Bottom Type(s) silt/clay

Estimated Velocity .29 FPS

Color and Clarity Moderately clear, green-brown color

Instream Cover:

Type Brush % 5

Streambank Cover:

Type Hardwood, woody % 100 (W) So (E)

Presence and Height of Highwater Marks 2-3 ft

Length of Pools Continuous Length of Riffles None

Shading 2070

Habitat Characteristics Limited instream cover, some mud/silt bars; streambank cover good - East is woody, west is hardwoods, elms, willows, oaks, hickories, weedy species

General Notes

Picture Nos. E 5, 6

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site F Date 22 October 1981

Observor HLD, LWM

Average Width 9 ft

Average Depth 4"

Lowflow Width and Depth CANNOT DETERMINE

Range Width and Depth 2"-1' deep, 6-10' wide

Length

Acreage

Sinuosity None

Bottom Type(s) S,Lt

Estimated Velocity .33 FPS

Color and Clarity clear to bottom, No Color

Instream Cover:		Streambank Cover:	
Type	%	Type	%
Aquatic Plants	80	Grasses	100
		Herbaceous	30

Presence and Height of Highwater Marks 1+ft

Length of Pools None Length of Riffles None

Shading 100%

Habitat Characteristics Primarily shallows, good aquatic plant and streambank cover

General Notes

Picture Nos. No 7a, b

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site G Date 20 October 1981

Observor RSH, HLD, LWM

Average Width 40'

Average Depth 2-3'

Lowflow Width and Depth 2' deep, 20-25' wide

Range Width and Depth 2-4' deep, 25-50' wide

Length

Acreage

Sinuosity Slight

Bottom Type(s) Slt/Md

Estimated Velocity CANNOT DETERMINE

Color and Clarity Moderate clarity; greenish tint

Instream Cover:

Type Logs % 15

Streambank Cover:

Type Herbaceous % 90 (west)

Woody 90 (east)

Presence and Height of Highwater Marks 2+ ft

Length of Pools Length of Riffles

Shading 10%

Habitat Characteristics Excellent streambank cover, limited instream cover; streambank cover includes multiflora rose, huckberry, goldenrod, sumac, dogwood, redbud, poison ivy, boxelder, greenbrier, weedy species.

General Notes Evidence of active fishing

Picture Nos. Roll 1, F 26, 27, 28

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site H Date 20 October 1981

Observor

Average Width 50'

Average Depth 3-4'

Lowflow Width and Depth Depth ? , 10' wide

Range Width and Depth Depth ? , 40-60' wide

Length

Acreage

Sinuosity Slight

Bottom Type(s) silt/sand/some Rock

Estimated Velocity CANNOT DETERMINE

Color and Clarity Moderate clarity; brown-green tint

Instream Cover:

Type NONE % ____

Streambank Cover:

Type Herbaceous % 90

woody 5

Presence and Height of Highwater Marks 2+ ft

Length of Pools ____ Length of Riffles ____

Shading 10%

Habitat Characteristics Very poor streambank cover and no instream cover, streambank cover primarily herbaceous (weedy species).

General Notes

Picture Nos. Roll 1 F 29, 30, 31

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site J Date October 1981

Observor

Average Width 27'

Average Depth 2-3 ft

Lowflow Width and Depth CANNOT DETERMINE

Range Width and Depth 2-6 ft deep, 20-40 ft wide

Length

Acreage

Sinuosity Slight

Bottom Type(s) SILT

Estimated Velocity CANNOT DETERMINE

Color and Clarity Moderate clarity; greenish tint

Instream Cover:

Type Logs % 1

Streambank Cover:

Type Woody % 90 (South)

Herbaceous 90 (North)

Presence and Height of Highwater Marks 6+ Ft, Recent 2-3+ ft mark

Length of Pools Length of Riffles

Shading 30% (mostly along south bank)

Habitat Characteristics Limited instream cover; excellent streambank cover - dogwood, sycamore, elm, hawthorne, locust, maples, grasses, woody species.

General Notes low habitat diversity

Picture Nos. Roll #1, F 24, 25

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site K Date 20 October 1981

Observor RLH, HLD

Average Width 50 ft

Average Depth 2 ft

Lowflow Width and Depth 1ft Depth, 20ft wide

Range Width and Depth 1-5ft Depth, 0-50ft wide

Length

Acreage

Sinuosity None

Bottom Type(s) Silt/mud

Estimated Velocity .26FPS (Highly Variable)

Color and Clarity low clarity; brown tint

Instream Cover:			Streambank Cover:		
Type	None	%	Type	Woody	% 40
				Herbaceous	60

Presence and Height of Highwater Marks 3+ ft

Length of Pools Continuous Length of Riffles None Identified

Shading

Habitat Characteristics Moderate bank cover - elm, sumac, maples, dogwood, ash, dense vines and brambles; no instream cover.

General Notes Some mud bars present; some potential for riffle development; deep silt/mud accumulations on bottom; significantly affected by pumping.

Picture Nos. Roll 1 11, 12

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site L Date 20 October 1981

Observor RH, HLD

Average Width 32'

Average Depth 4 ft

Lowflow Width and Depth 2 ft deep, 30' wide

Range Width and Depth 4-6' deep, 35-40' wide

Length

Acreage

Sinuosity NONE

Bottom Type(s) silt/mud

Estimated Velocity CANNOT DETERMINE

Color and Clarity Low clarity; Brown tint

Instream Cover:

Type NONE % ____

Streambank Cover:

*Type Highwater % 100

Average levels 50

Presence and Height of Highwater Marks 2-3+ ft

Length of Pools Continuous Length of Riffles NONE

Shading 1%

Habitat Characteristics No instream cover and limited streambank cover (little shading); streambank vegetation - maples, huckberry, locusts, Am. Elm, Greenbrier, weedy species

General Notes silt/mud bars present

Picture Nos. Roll #1, F 13-16

* Cover N-S Woody
E-W Herbaceous

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site M Date 20 October 1981

Observor

Average Width 25 ft

Average Depth 2-3 ft

Lowflow Width and Depth CANNOT BE DETERMINED

Range Width and Depth 2-5 ft deep, 20-50 ft wide

Length

Acreage

Sinuosity slight

Bottom Type(s) silt / mud

Estimated Velocity CANNOT DETERMINE

Color and Clarity Low clarity, turbid; brown tint

Instream Cover:

Type NONE % ____

Streambank Cover:

Type Woody Herbaceous % 90 (South) 90 (North)

Presence and Height of Highwater Marks 4+ ft

Length of Pools Continuous Length of Riffles NONE

Shading 10%

Habitat Characteristics No instream cover but good bank cover - elm, locust, sycamore, mulberry, blackberry, maples, willow, Dogwood, weed species.

General Notes Small areas of sinuosity, with bar formation, small creek enters main drainageway at this point.

Picture Nos. Roll #1 17-23

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site N Date 30 October 1981

Observor HLD, LWM

Average Width 6'

Average Depth 1'

Lowflow Width and Depth 1' deep, 6' wide

Range Width and Depth 1-7' deep, 6-20' wide

Length

Acreage

Sinuosity NONE

Bottom Type(s) silt

Estimated Velocity .43 FPS

Color and Clarity Clear to bottom; green tint

Instream Cover: Streambank Cover:

Type NONE % Type Grasses % 50

Weedy 35

Presence and Height of Highwater Marks 6+ ft

Length of Pools Continuous Length of Riffles NONE

Shading 10%

Habitat Characteristics No instream cover, low flow and bars and overhanging veg. at higher flows; Also, bays at higher flows, willows, elms, cottonwoods, weed species.

General Notes

Picture Nos.

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site O Date 30 October 1981

Observor HLD, LWM

Average Width 10'

Average Depth 6"

Lowflow Width and Depth 2" deep, 5' wide

Range Width and Depth 2"-1' deep, 2-20' wide

Length

Acreage

Sinuosity Good

Bottom Type(s) Sand / Rock

Estimated Velocity 3.9 FPS (Pool) 2.5 FPS (Riffle)

Color and Clarity clear to bottom; no color

Instream Cover:

Type Veg. % 20

Overhanging veg. 10

Streambank Cover:

Type Grass % 100

Woody 50

Presence and Height of Highwater Marks 6+ ft

Length of Pools 50 ft Length of Riffles 50 ft

Shading 75%

Habitat Characteristics Large alternating pools & riffles; iris, grasses, sycamore, huckberry; good detritus accumulations in stream.

General Notes

Picture Nos. 16

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site P Date 22 October 1981

Observor HLD, LWM

Average Width 20'

Average Depth 2'

Lowflow Width and Depth 2' deep, 10' wide

Range Width and Depth 1-3' deep, 3'-30' wide

Length

Acreage

Sinuosity None

Bottom Type(s) silt / detritus

Estimated Velocity None

Color and Clarity low clarity; green tint

Instream Cover:		Streambank Cover:	
Type Logs	% 50 (North)	Type Woody	% 50 (West)
"	5 (South)	Herbaceous	90 (East)

Presence and Height of Highwater Marks 2+ ft

Length of Pools Continuous Length of Riffles None

Shading 20%

Habitat Characteristics Good instream & streambank cover; dogwood, locust, cottonwood, sumac, elm, weedy species

General Notes Good detritus accumulations; site is clogged & partly dammed by logs

Picture Nos. 9A, 9B

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site Q Date 22 October 1981

Observor HLD, LWM

Average Width 15'

Average Depth 10"

Lowflow Width and Depth 6" deep, 10' wide

Range Width and Depth 6"-1' deep, 10-15' wide

Length

Acreage

Sinuosity Slight

Bottom Type(s) Sand/silt/some detritus & mud

Estimated Velocity .5 FPS

Color and Clarity clear to bottom; no color

Instream Cover:		Streambank Cover:	
Type None	%	Type Herbaceous	% 100

Presence and Height of Highwater Marks 3+ ft

Length of Pools Length of Riffles None

Shading 5%

Habitat Characteristics mud bars and mud shores, little instream cover and shading; weedy species in streambank cover.

General Notes

Picture Nos. 8A, 8B

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site R

Date [illegible] October 1981

Observor HLD, LWM

Average Width 10'

Average Depth 6"

Lowflow Width and Depth 3 - 1' deep [illegible]

Range Width and Depth [illegible]

Length

Acreage

Sinuosity Good [illegible]

Bottom Type(s) [illegible] rock

Estimated Velocity [illegible]

Color and Clarity clear to bottom [illegible]

Instream Cover:

Type Grass, brush %: [illegible]

Type Rock %: [illegible]

Streambank Cover:

Type [illegible] %: [illegible]

Presence and Height of Highwater Marks [illegible]

Length of Pools [illegible]

Length of Riffles [illegible]

Shading None

Habitat Characteristics [illegible] especially at low flow [illegible] pools and riffles [illegible]

General Notes [illegible]

Picture Nos. 12A, 12B

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site S Date 22 October 1981

Observor HLD LWM

Average Width 26'

Average Depth 2'

Lowflow Width and Depth 1' deep, 20' wide

Range Width and Depth 1-12' deep, 20-50' wide

Length

Acreage

Sinuosity None

Bottom Type(s) Sand/silt

Estimated Velocity .17 FPS

Color and Clarity Moderate clarity; brown tint

Instream Cover:

Type Logs % 1

Overhanging veg 5

Streambank Cover:

Type Woody % 50 (west)

" 10 (East

Grasses 50 (East)

Presence and Height of Highwater Marks ~1'

Length of Pools Continuous Length of Riffles None

Shading 20%

Habitat Characteristics Some sand bars present; good bank cover but little instream cover, silt on rocks, woody species.

General Notes

Picture Nos. 17H

AD-A115 838 ENVIRONMENTAL SCIENCE AND ENGINEERING INC ST LOUIS MO F/G 6/6
AQUATIC BIOLOGICAL INVENTORY, HILLVIEW DRAINAGE AND LEVEE DISTR--ETC(U)
JAN 82 K GOVRO, R HALL, H DUNN, N CONNOLLY DACW43-81-M-3144

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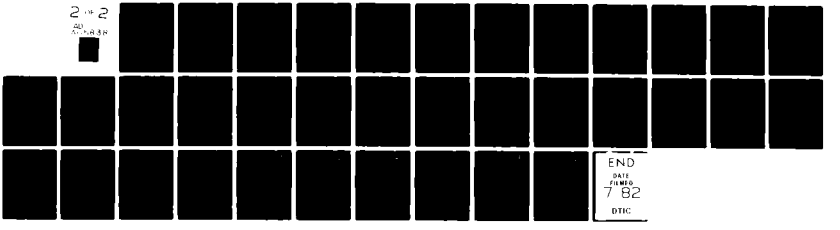

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FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site T Date 20 October 1981

Observor REH, HLD

Average Width 50'

Average Depth 2-3'

Lowflow Width and Depth 2-3' deep, 45' wide

Range Width and Depth ? Depth, 40-55' wide

Length

Acreage

Sinuosity None

Bottom Type(s) silt/mud

Estimated Velocity CANNOT BE DETERMINED

Color and Clarity moderate clarity; green-brown tint

Instream Cover:			Streambank Cover:		
Type	None	%	Type	Herbaceous	% 50
				woody	10

Presence and Height of Highwater Marks 2+ ft (with banks)

Length of Pools Continuous Length of Riffles None

Shading 1%

Habitat Characteristics Low habitat diversity; very little instream cover, with some bank cover; a few isolated stumps in water

General Notes Bank cover - huckberry, grasses, locust, small grains, milkweed, dense weed (cheeses), Am. elm, general forbs.

Picture Nos. Roll #2 F 1, 5, 6, 7

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site 4 Date 30 October 1981

Observor HLD, LWM

Average Width 3 Ft

Average Depth 6"

Lowflow Width and Depth 3' wide, 6" deep

Range Width and Depth 6"-4' deep, 3-10' wide

Length

Acreage

Sinuosity Slight

Bottom Type(s) silt/sand

Estimated Velocity .34 FPS

Color and Clarity clear to bottom; no color

Instream Cover:			Streambank Cover:		
Type	Grasses	% 30	Type	Woody	% 50
				Grasses	100

Presence and Height of Highwater Marks 3+ ft

Length of Pools None Length of Riffles 4Ft (Approach chute Mb

Shading 50%

Habitat Characteristics Moderate in-stream cover and good bank cover, riffle and shallows habitats.

General Notes Bank cover - sumac, elm, willows

Picture Nos. 19

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site V Date 30 October 1981

Observor HLD, LWM

Average Width 200 ft

Average Depth 3-5 ft

Lowflow Width and Depth 3' deep, 200' wide

Range Width and Depth 3-10' deep, 200-300' wide

Length

Acreage

Sinuosity NONE

Bottom Type(s) SILT

Estimated Velocity NONE

Color and Clarity High clarity; greenish tint

Instream Cover:		Streambank Cover:	
Type Logs	% 10	Type Woody	% 80
Dn Wood, Algae	5		

Presence and Height of Highwater Marks 4+ ft

Length of Pools Continuous Length of Riffles NONE

Shading 50%

Habitat Characteristics Dominant pool habitats, highly sluggish; low instream cover and good bank cover; bank cover with many large trees - maples, willows.

General Notes

Picture Nos. 20

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site W Date 22 October 1981

Observor HLD, LWM

Average Width 2'

Average Depth 2"

Lowflow Width and Depth 2' deep, 2' wide

Range Width and Depth ? deep, 2-0' wide

Length

Acreage

Sinuosity Moderate - Some gentle bends

Bottom Type(s) Silt / Sand

Estimated Velocity NONE

Color and Clarity Clear to bottom; No color

Instream Cover:		Streambank Cover:	
Type Grasses	% 40	Type Woody	% 10
		Grasses	100

Presence and Height of Highwater Marks 4+ ft

Length of Pools CONTINUOUS Length of Riffles NONE

Shading 5%

Habitat Characteristics Dominant shallow pool habitat; moderately good instream cover, good bank cover; channel varies frequently in width and depth.

General Notes Bank cover - elm, locust, weedy species.

Picture Nos. 17B, 18

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site X Date 22 October 1981

Observor HLD, LWM

Average Width 16'

Average Depth 2 1/2'

Lowflow Width and Depth 2' deep, 15' wide

Range Width and Depth 2-5' deep, 15-20' wide

Length

Acreage

Sinuosity NONE

Bottom Type(s) Silt

Estimated Velocity .43 FPS

Color and Clarity Clear to bottom; brown tint

Instream Cover: Type NONE % Streambank Cover: Type NONE %

Presence and Height of Highwater Marks 3+ ft

Length of Pools Continuous Length of Riffles NONE

Shading NONE

Habitat Characteristics No instream or bank cover; banks unvegetated until top of slope; deep silt accumulation on bottom

General Notes

Picture Nos. 20

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site Y Date 22 October 1981

Observor HLD, LWM

Average Width 26 ft

Average Depth 1 ft

Lowflow Width and Depth 1 ft deep, 24-26 ft wide

Range Width and Depth 1-2 ft deep, 20-30 ft wide

Length

Acreage

Sinuosity slight, 1 or 2 bends

Bottom Type(s) Silt / some sand-gravel

Estimated Velocity .67 FPS

Color and Clarity clear to bottom; brown-green tint

Instream Cover:

Type Trees % 1

Streambank Cover:

Type Weeds % 90 (North)

Grasses 100 (South)

Presence and Height of Highwater Marks 5+ ft

Length of Pools None Length of Riffles One 20 ft

Shading 90%

Habitat Characteristics Primarily shallows habitat, with a small riffle (20 ft); some sand bars; willows encroaching into water.

General Notes

Picture Nos. 15A, 15B

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site I (North Date 20 October 1981

Observor HLD, RSH

Average Width CANNOT DETERMINE

Average Depth 2-3 Ft

Lowflow Width and Depth 2ft deep, 20' wide

Range Width and Depth CANNOT DETERMINE

Length

Acreage

Sinuosity NONE

Bottom Type(s) Silt / with some detritus

Estimated Velocity CANNOT DETERMINE

Color and Clarity low clarity ; brown color

Instream Cover:			Streambank Cover:		
Type	logs	% 20	Type	woody	% 70
				Herbaceous	10

Presence and Height of Highwater Marks 2+ ft

Length of Pools Continuous Length of Riffles NONE

Shading 10%

Habitat Characteristics Marginal instream cover, good bank cover- elm, locust, maples, huckberry, weedy species.

General Notes Old channel at this site is much narrower and shallow with excellent shading and bank cover and regaining natural meanders and sinuosity

Picture Nos. 32-36

FIELD RECONNAISSANCE NOTES

HILLVIEW D&LD

Site I (South) Date 20 October 1981

Observor HLD, REH

Average Width 60'

Average Depth 2-3'

Lowflow Width and Depth Depth ?, 50' wide

Range Width and Depth Depth ?, 60' wide

Length

Acreage

Sinuosity None

Bottom Type(s) Silt / mud

Estimated Velocity CANNOT DETERMINE

Color and Clarity Moderate turbidity; green tint

Instream Cover:

Type None %

Streambank Cover:

Type Herbaceous % 70 (east)

Woody 90 (west)

20 (east)

Presence and Height of Highwater Marks 4+ ft

Length of Pools Continuous Length of Riffles None

Shading 5%

Habitat Characteristics No instream cover, good bank cover; Dominant pool habitat.

General Notes Streambank cover - Jumus, Locust, hackberry, Am. Elm, weedy species

Picture Nos. 35, 36

Appendix C

St. Louis COE
Hillview D & LD Study
81-822

TELEPHONE CONTACT REPORT

Person Completing Report: Keith Govro Date of Report: 11/16/81

Telephone Contact Date of Contact: 11/16/81

Person(s) Contacted: Title/Affiliation:

Joe Janecek USFWS - Carbondale Field Office

Address: Call In ____ Call Out X

Phone #: 618-457-3662

Summary of Discussion: The USFWS does not involve itself with state-endangered species; this information would have to come from IDOC. Statistics on sport fishing and game harvest would also come from IDOC, if they are available for the Hillview area. Dick Lutz of IDOC would be a good contact for getting this type of information. Joe is not aware of any field studies or research being done around Hillview area at this time.

Joe emphasized the importance of and the interest by the USFWS in preserving wetlands. He would like to see wetlands discussed in the report with recommendations for preserving wetlands. Joe also indicated that these districts often have considerable local sport fishing effort.

Distribution: [x] Govro [X] Gore [ ] ____
[X] Hall [ ] ____ [ ] ____

St. Louis COE
Hillview D & LD Study
81-822

TELEPHONE CONTACT REPORT

Person Completing Report: Keith Govro Date of Report: 11/19/81

Telephone Contact Date of Contact: 11/19/81

Person(s) Contacted: Title/Affiliation:

Jamie Thomerson Professor

SIU-Edwardsville

Address: Call In X Call Out

Phone #: 618-692-3368

Summary of Discussion: Dr. Thomerson has worked on Illinois River D&L Districts. He is not familiar with Hillview but can provide some data on nearby districts (within a week). He knows of no one presently or recently collecting in the Hillview area. WAPORA is doing Hartwell aquatic.

Suggested looking at the surface water resources report for Green County (IDOC).

Dr. Page of INHS may be able to provide information on T&E species and local fish collections in their file.

Distribution: [X] Govro [ ] [ ]
[X] Hall [ ] [ ]

C-2

St. Louis COE
Hillview D & LD Study
81-822

TELEPHONE CONTACT REPORT

Person Completing Report: Keith Govro Date of Report: 11/17/81

Telephone Contact Date of Contact: 11/17/81

Person(s) Contacted: Title/Affiliation:

Richard Sparks — Illinois Natural History Survey

Address: Havana Field Office Call In X Call Out

Phone #: 309-543-3950

Summary of Discussion: The Havana office has done considerable work on the Illinois River, but only within the dike --- dike reach, not inside the diked areas. They have no information on streams, biota or T&E species within the diked areas.

The survey did put together a literature review of recent changes in the lower Illinois River. Again, this does not encompass areas within dikes but may have some useful information. A number of other studies have been done on the lower Illinois, primarily for the COE.

The survey has no sport-fishing data for the Hillview area or lower Illinois. If available, this would come from the IDOC.

Distribution: [X] Govro [ ] _____ [ ] _____
[X] Hall [ ] _____ [ ] _____

St. Louis COE
Hillview D & LD Study
81-822

TELEPHONE CONTACT REPORT

Person Completing Report: Keith Govro Date of Report: 11/17/81

Telephone Contact Date of Contact: 11/17/81

Person(s) Contacted: Title/Affiliation:

Bill Boyd IDOC

Regional Fisheries Biologist

Address: Nashville, Illinois Call In X Call Out

Phone #: 618-594-3627

Summary of Discussion: Bill is not aware of any data specific to Hillview. He will check his files and send any data that he feels are pertinent.

George Zebrun of the IDOC was formerly the District Fisheries Biologist at Carrolton for many years. He recently transferred to the Petersburg office but should have information useful to us on Hillview and would be a good source of historical and local information.

Dave Harper (IDOC-Alton) may have some terrestrial biota data of the Hillview-Hartwell area.

Distribution: [X] Govro [X] Gore [ ] [ ] Hall [ ] [ ]

St. Louis COE
Hillview D & LD Study
81-822

TELEPHONE CONTACT REPORT

Person Completing Report: Keith Govro Date of Report: 11/20/81

Telephone Contact Date of Contact: 11/20/81

Person(s) Contacted: Title/Affiliation:

George Zebrun — District Fisheries Biologist

IDOC

Address: Petersburg, Illinois Call In ____ Call Out X

Phone #:

Summary of Discussion: Was previously the biolgoist for Greene County. He has file data on fisheries collections around Hillview area, which he will provide to ESE. His experience indicates that the drainage canals contain at some time, most of the fish occurring in the Illinois River. He is not aware of any T&E fish species occurring in the Hillview district. He is aware of considerable sport fishing during certain seasons on the districts. This primarily comes from local, and within 30 miles, but the districts do attract fishermen from as far as St. Louis. Mr. Zebrun feels that there are no significant water quality stresses affecting fishes on the districts. The vegetated waterways provide good habitat for fish as well as for waterfowl. George indicated that there was wonsiderable wetlands on the Hartwell and Hillview districts prior to the construction of dikes and drainage ways. Most of the wetlands were eliminated during this period or in subsequent years. There have been no recent changes in the wetlands, as few remained after the early period.

Distribution: [X] Govro [ ] _____ [ ] _____
[X] Hall [ ] _____ [ ] _____

Note: He will be a couple weeks in coming up with all the data; it will be incorporated into final report.

St. Louis COE
Hartwell Terrestrial Ecology
81-821

TELEPHONE CONTACT REPORT

Person Completing Report: J.A. Gore Date of Report: 11/13/81

Telephone Contact Date of Contact: 11/13/81

Person(s) Contacted: Title/Affiliation:

Dick Lutz — Impact Analysis Section Division of Planning

Address: Illinois Dept. of Conservation
605 Stratton Bldg.
Springfield, Il 62706

Call In ____ Call Out XX

Phone #: 217/782-3884

Summary of Discussion: Informed Mr. Lutz that ESE is performing surveys for the St. Louis Coe on Hartwell (Terrestrial) and Hillview (Aquatic) drainage and levee districts. I told him the general location; he felt he had a map of the areas.

I asked about information on stat T and 2 species, natural areas, hunting presuusre and fur resources (Hartwell), and fishery/invertebrate data and sport fishery resources (Hillview). Lutz felt the best information on hunting was Prens & Labisky's work; I said we have a copy of that report. He will talk to DOC fur biologist about fur values and take in the district. Will also discuss with DOC biologist state-listed T & E species that may be present in each district. Will send most recent map and data printout on state natural areas in Greene and Scott County.

Best aquatic data is probably in County water resource reports. Will check with DOC biologists to see if any site specific data has been collected recently and if any information is available on value of fisheries resource.

Distribution: [XX] Gore [XX] 81 821 file [XX] 81 822 file
[XX] Govro [ ] _____ [ ] _____

Appendix D

Table D-1. Fish Collected During Special Reconnaissance of Buck's Branch (Reconnaissance Site 0)

Common Name	Scientific Name	Number
Central stoneroller	Campostoma anomalum	51
Red shiner	Notropis lutrensis	60
Creek chub	Semotilus atromaculatus	70
Mosquitofish	Gambusia affinis	1
Green sunfish	Lepomis cyanellus	3
Orangespotted sunfish	L. humilis	1
Orangethroat darter	Etheostoma spectabile	7
Total #		193
Total Taxa		7
Diversity		1.85

Source: ESE, 1981.

Table D-2. Benthic Invertebrates Collected in Buck's Branch (Reconnaissance Site 0) Fall 1981

Taxa	#/m^2	Percent Comp.
Turbellaria		
Phagocata	19	0.46
Oligochaeta	178	4.34
Isopoda		
Asellus intermedius	944	23.02
Amphipoda		
Gammarus pseudolimnaeus	148	3.61
Ephemeroptera		
Baetis spp	210	5.12
Trichoptera		
Hydropsychidae	1,055	25.73
Hydropsyche bettani	97	2.37
Cheumatopsyche spp	1,097	26.75
Coleoptera	3	0.07
Ectopria nervosa	3	0.07
Steyelmis spp	8	0.20
Diptera		
Simulidae	67	1.63
Stegoptera mutata	6	0.14
Simuliam spp	204	4.97
Empididae	8	0.20
Tipuda spp	3	0.07
Chironomidae		
Chironomus militaris	13	0.32
Cryptochironomus stylifera	6	0.14
Pentaneura menolops	8	0.20
Endochironomus spp	3	0.07
Tanypodinae spp	3	0.07
Coelotanypus concinnus	3	0.07
Diamesinae sp	3	0.07
Diamesa spp	3	0.07
Psilodiamesa fulua	3	0.07
Limnochironomus modestus	3	0.07
Gastropoda		
Physa spp	3	0.07
Total Density	4,101	
No. Taxa	27	
Diversity	2.67	
Evenness	0.81	

Source: ESE, 1981.

APPENDIX E

FISHERMAN USER - DAY ANALYSIS

APPENDIX E

FISHERMAN USER DAY ANALYSIS

A fisherman user day analysis was undertaken for Greene and Scott counties in the Hillview Drainage and Levee District. Annual license (fisherman and sportsman - combination hunting and fishing) sale data for each county for the period from 1970 through 1980 were obtained from the Illinois Department of Conservation. The assumptions and formulae used in the analysis are presented in Sections E.1 and E.2.

E.1 USER DAY ANALYSIS FORMULAE

The basic reference resources utilized are the IDOC Special Fisheries Report No. 50, May 1980, compiled by Mr. Richard A. Rogers, Staff Fisheries Resource Analyst and consultation with the IDOC.

1. The first assumption is the limits or boundaries of the aquatic system. How much aquatic habitat is available in the study area which would support recreational fishing? These should be defined by name and type (i.e., river, stream, lake, borrow pit lakes) as it appears on the current U.S.G.S. topographic map and/or state or county highway maps and number of acres. If names are not available from these sources, list by types (e.g., ditches, ponds, sloughs, streams, etc.).
2. Conduct field reconnaissance of areas and assess existing habitat conditions and potential as a fishing resource based on professional judgement by visual inspection or by examination of aquatic and water quality sampling data.
3. Discuss any areas disqualified from consideration and the reason for disqualification.

4. The original data to be obtained from IDOC for the user analysis will be restricted to licensed fishermen within the appropriate counties. The rationale for this restriction is that the resource is of limited quality and would not be likely to draw fishermen from surrounding counties. The number of licensed fishermen is multiplied by 0.453 (percent of unlicensed fishermen in Illinois) to approximate total fishermen.

   Total fishermen = number of licensed fishermen + estimated number of unlicensed fishermen.

   Total fisherman days/year = total number of fishermen x 25 (average number of fishing trips/year in Illinois)

   Total fisherman days/year/acre (by type) = total fisherman days/year ÷ acres of aquatic habitat (by type) for county.

   Since only a portion or percentage of fishermen in the county utilize this resource, a correction factor is applied to determine actual fisherman days/year/acre (by type).

   Actual fisherman days/year/acre = total fisherman days/year/acre x correction factor developed from Table b, page 11, Special Fisheries Report No. 50, IDOC, May 1980. The correction factor utilized in this analysis was 8.1%. This value represents the proportion of time fishermen in the Hillview Drainage and Levee District and surrounding areas fish in small streams (streams, creeks, and drainageways).

   Adjusted actual fisherman days/year/acre = actual fisherman days/year/acre x the factor for the amount of fishing (based upon available fishing habitat) projected to occur specifically within the District. This value is 9.7 percent for Greene County and 5.05 percent for Scott County.

5. Dollar value of recreational fishing = acres of probable fisheries resources within the study area by type (not including the Illinois River) x adjusted actual fisherman days/year/acre x $4.10 per fisherman day.

E.2 USER DAY ANALYSIS ASSUMPTIONS

A user day analysis for sport fishing, in the Hillview Drainage and Levee District, was determined for each aquatic habitat type capable of supporting a sport fishery. Habitat types known to occur within the District are pools, chutes, riffles, shallows, and lentic areas. The only areas known to support sport fish populations and deep enough to maintain these populations throughout most of the year are the stream and pool (drainageway) habitats within the district.

The stream habitat in the District is restricted to Hurricane, Little Sandy, Big Sandy, Bucks Branch, Trimley, and Kersey creeks. For purposes of the user day analysis, only Hurricane and Big Sandy creeks were considered. The remaining creeks within the District support diverse aquatic communities, but are shallow and not likely to support sport fish communities.

The pooled habitat in the District is the dominant habitat in the area. This habitat is composed of numerous drainage ditches. For purposes of the user day analysis the small arterial and portions of the primary drainageways were excluded from consideration. These areas were considered too shallow to support a sustained sport fish community. The pooled habitat utilized for the user day analysis was therefore limited to the primary drainageway habitats known to support sport fish populations and sufficiently deep to maintain them throughout the year.

It was assumed that fishing within the district is limited to local residents. Therefore a factor based upon the ratio of the total amount of available fishable stream and drainageway habitat within Greene County compared to that which exists in the Greene County portion of the Hillview Drainage and Levee District was determined. This factor was designed to limit the calculated user day values to those individuals

living within the district. Without this factor the calculations would suggest that all fishing residents of the county that fish in streams (streams and drainageways) would limit their fishing to the Hillview Drainage and Levee District. The utilization of this factor limits fishing pressure to local Hillview Drainage and Levee District fishermen, based upon uniform distribution of fishing pressure on stream habitats (streams and drainageways) throughout the county. Total stream acreages within Greene and Scott counties were taken from Greene County Surface Water Resources and Scott County Surface Water Resources (Lockhart, 1971). Total fishable drainageway acreage was estimated (Table E-3). The total stream and drainage acreage for Greene County (just stream acreage for Scott County) as well as for the Hillview Drainage and Levee District were determined. The percentage of this acreage within the district (9.70 percent) was then applied to the fisherman days/year/acre to compensate for local fishing pressure only.

E.3 RESULTS AND DISCUSSION

The data collected indicate that the number of annual licensed fishermen varied between 1,236 and 2,732 in Greene county and 339 and 712 in Scott County during the 1970 through 1980 period. Utilization of all fishable water bodies in each county within the District varied between 0.9 and 0.4 fisherman days per year per acre (user days) in Greene County and 0.4 and 0.2 user days in Scott County during the ten-year period. The dollar value of the sport fishery is estimated to range from $3,287 to $1,461 in Greene County and from $22 to $11 in Scott County within the District (Tables E-1 and E-2).

User-day and dollar values for the specific habitat types within the District at each county indicate the importance of the drainageway (pool) and stream habitat as the major habitat of recreational importance within the District. This importance is reflected in

abundance of these habitats in the District (Table 4.1-1). The remaining habitats are insignificant in terms of fisherman utilization as a recreational source.

The data also reflect the larger importance and diversity of the habitat types within Greene County as a fishing resource than those in Scott County within the District. The user day differences between the two counties within the District is directly related to the amount of aquatic habitat within the proportions of the District in the two counties (Table E-3).

E.4 CALCULATIONS

Fisherman user day values were calculated based upon the preceeding formulae and assumptions. An example of these calculations is presented here for clarification (Table E-2). In 1970, 603 fishing licenses were sold in Scott County. The total number of fishermen was determined to be 876 (603 x 0.453 = 273 unlicensed fishermen + 603 licensed fishermen = 876). The total number of fishermen was then multiplied by 25 (average number of fishing trips per year) to yield the total fisherman days per year (21,900). The total fisherman days/year was then divided by 261.6 acres (the amount of fishable habitat within Scott County, which in this case is limited to stream habitat) to yield 83.7 fisherman days/year/acre. The 83.7 fisherman days/year/acre was then multiplied by 8.1 percent (correction factor for streams from Table b, page 11, Special Fisheries Report No., 50, IDOC, May 1980). This produced 6.8 actual fisherman days/year/acre, which represents the amount of fishing taking place within streams throughout Scott County. The 6.8 actual fisherman days/year/acre was then converted to user days (adjusted actual fisherman days/year/acre).

This was accomplished by multiplying 6.8 x 5.05 percent (Table E-3) yielding a user day value of 0.3. This value (0.3) represents the projected fishing on the Hillview Drainage and Levee District fishable streams within Scott County by local fishermen. Local fishing is considered to constitute the major fishing within the area. Therefore, Scott County residents outside of the Hillview Drainage and Levee District will likely fish at streams closer to home. This factor was applied which accounts for local fishing pressure only. The user day value (0.3) was then multiplied by the acres of probable fisheries resources in the study area by type (13.22 acres). This value was then multiplied by $4.10 per fisherman day to represent a dollar value of recreational fishing for the area.

Table E-1. Fisherman User-Day Analysis for the Hillview Drainage and Levee District in Greene County, Illinois

Year	License Sales	Fisherman days/year	Fisherman days/year/acre	Actual Fisherman days/year/acre	USER-DAY VALUES: Total Water Area* User Days	Total Water Area* $	Drainage Ways** User Days	Drainage Ways** $	Streams** User Days	Streams** $
1970	2,527	91,800	103.1	8.4	0.8	2,921	0.68	2,503	0.11	418
1971	2,667	96,875	108.8	8.8	0.8	2,921	0.68	2,503	0.11	418
1972	2,732	99,250	111.4	9.0	0.9	3,287	0.77	2,817	0.13	470
1973	2,459	89,325	100.3	8.1	0.8	2,921	0.68	2,503	0.11	418
1974	2,442	88,700	99.6	8.1	0.8	2,921	0.68	2,503	0.11	418
1975	2,438	88,550	99.4	8.0	0.8	2,921	0.68	2,503	0.11	418
1976	2,088	75,850	85.2	6.9	0.7	2,556	0.60	2,190	0.10	366
1977	1,880	68,300	76.7	6.2	0.6	2,191	0.51	1,878	0.08	313
1978	1,862	67,625	75.9	6.1	0.6	2,191	0.51	1,878	0.08	313
1979	1,236	44,900	50.4	4.1	0.4	1,461	0.34	1,252	0.06	209
1980	1,239	45,000	50.5	4.1	0.4	1,461	0.34	1,252	0.06	209

* User Days = adusted actual fisherman days/year/acre
This value represents the actual fisherman days/year/acre x 9.7 percent to yield the actual number of user days within Greene County at the Hillview Drainage and Levee District.

** Based on 85.7 percent of the fishable water in the Hillview Drainage and Levee District being drainageway acreage and 14.3 percent being stream acreage.

Source: ESE, 1981.

Table E-2. Fisherman User-Day Analysis for the Hillview Drainage and Levee District in Scott County, Illinois

Year	License Sales	Fisherman days/year	Fisherman days/year/acre	Actual Fisherman Days/year/acre	User Day Values Streams**	
					User* Days	$
1970	603	21,900	83.7	6.8	0.3	16
1971	563	20,450	78.2	6.3	0.3	16
1972	638	23,175	88.6	7.2	0.4	22
1973	506	18,375	70.2	5.7	0.3	16
1974	606	22,000	84.1	6.8	0.3	16
1975	712	25,850	98.8	8.0	0.4	22
1976	666	24,200	92.5	7.5	0.4	22
1977	537	19,500	74.5	6.0	0.3	16
1978	569	20,675	79.0	6.4	0.3	16
1979	339	12,325	47.1	3.8	0.2	11
1980	343	12,450	47.6	3.8	0.2	11

* User days = adjusted actual fisherman days/year/acre
This value represents the actual fisherman days/year/acre x 5.05 percent to yield the actual number of user days within Scott County at the Hillview Drainage and Levee District.

** All of the fishable water in the Hillview Drainage and Levee District within Scott County is stream habitat.

Source: ESE, 1981.

Table E-3. Stream Acreages in the Hillview Drainage and Levee District Capable of Supporting a Sport Fishery.

	Greene County		Scott County	
	Total	Hillview	Total	Hillview
Stream acreage**	440.30	12.35	261.6	13.22
Drainageway acreage*	450.43	74.04	--	0
Stream + Drainageway acreage	890.73	86.39	261.6	13.22
Percentage Stream & Drainageway in Hillview D&LD		9.70%		5.05%

* Drainageway acreage = The acreage of Fishable drainageways in Greene County. This was determined based on the concept that the great majority of drainageways in Greene county are located west of route 100. This area, approximately 57,344 acres, is expected to contain a uniform distribution of drainageways. Therefore, if Hillview Drainage and Levee District (9,426 acres in Greene County) contains 74.04 acres of fishable drainageways, the entire acreage of fishable drainageways in Greene County is approximately 450.43.

** Source: Greene County and Scott County Surface Water Resources (Lockhart, 1971).

APPENDIX F

PROJECT ORGANIZATION

Project Manager: Keith Govro
Field Leader: Richard Hall
Field Team Members:
Heidi Dunn
Noreen Connolly
Lawrence McConnell
Jeffery A. Gore
Laboratory Technician: Robert Mosher

ESE
PROFESSIONAL RESUME

KEITH C. GOVRO, M.S.
Senior Associate Scientist/Ecology

SPECIALIZATION

Limnology, Aquatic Toxicology, Water Quality Analyses and Interpretation, Aquatic Biota Assessments

RECENT EXPERIENCE

Characterization of Aquatic Habitats of the Mississippi River Between Saverton, Missouri and Cairo, Illinois, Project Manager--Project involves extensive year-long sampling program, identification and classification of aquatic habitats, and the preparation of work products useful in river resource management.

Site-Selection and Licensing Studies for Two Illinois Electrical Utilities, Project Scientist--Project involved extensive data collection in the field and from previous reports, evaluation of potential sites, interaction with regulatory and resource agency personnel and the preparation of environmental assessments and permit applications.

Biological Inventory of 375,000 Acres of Federal Coal Resources Area in Southeast Oklahoma, Subproject Manager--Project involved extensive literature review and collection of field data on water quality, fisheries, and benthic organisms. Project completed for Bureau of Land Management.

Bioassays Study on the Effects of Coastal Dredge Spoil on Marine Organisms, Project Scientist--Assisted in the preparation, maintenance and monitoring of flow-through and static bioassays using selected marine organisms for test purposes. Project completed for the Jacksonville District Army Corps of Engineers.

EDUCATION

M.S.	1977	Fisheries Biology	Iowa State University
B.S.	1975	Fisheries and Wildlife Biology	Iowa State University

PUBLICATIONS

Publications on the effect of sewage effluent (including ammonia rich municipal sewage) on aquatic organisms.

AFFILIATIONS

American Fisheries Society

ESE
PROFESSIONAL RESUME

RICHARD E. HALL
Associate Scientist

SPECIALIZATION

Aquatic Ecology; Taxonomy of adult and larval fish, benthic macroinvertebrates, amphibians, reptiles and small mammals; Lakes management.

RECENT EXPERIENCE

Management--Managed field office responsible for baseline 316(a) and 316(b) studies for a proposed power plant on the Missouri River. Managed seven projects dealing with biological and thermal investigations.

Project Experience--Habitat characterization study on Mississippi River (GREAT III). Defined habitats according to physical and hydrographic characteristics. Conducted quarterly field surveys of fisheries and benthos communities from representative habitats at four locations within the 300 mile study area (Saverton, Missouri to Cairo, Illinois).

Involved in aquatic research programs on the Ohio River, Mississippi River, Missouri River, Wabash River and Kaskaskia River. These programs included baseline, environmental assessment, impingement, entrainment and thermal effects studies for both private industry and government agencies.

Fisheries research experience has included primarily the collection, taxonomic identification and analysis of adult and larval samples. Larval fish experience has included the identification of icthyoplankton in over 2,000 samples.

Biological and thermal investigation of Duck Creek Reservoir. This study was conducted to assess the fishery resources and to model existing and future thermal conditions. Recommendations were made regarding plant operating conditions and increasing unit size in conjunction with fishery management recommendations to enhance and maintain a quality reservoir fishery.

EDUCATION

M.S.	1977	Environmental Biology	Eastern Illinois University
B.S.	1975	Environmental Biology	Eastern Illinois University

ASSOCIATIONS

American Fisheries Society
Endangered Species Committee (1979-1981)-AFS
American Society of Icthyologists and Herpetologists
Phi Sigma Society (Biological Honorary)
Illinois State Academy of Science

MKRESIP-S.1/REH-2
9/4/81

ESE

PROFESSIONAL RESUME

HEIDI LORENTZEN DUNN, B.S.
Aquatic Biologist

SPECIALIZATION
Freshwater and Terrestrial Biology, Sampling and Analysis

EXPERIENCE
Aquatic Technician, Ecology Division, Environmental Science and Engineering, Inc., January 1981 to present.

Conducted field sampling of fish, benthos, ichthyoplankton and freshwater mussels for an aquatic biology study of the GREAT III section of the Mississippi River.

Collected, processed and identified samples of benthos, plankton, periphyton and mussels on the Illinois, Wabash, and Kaskaskia Rivers in support of an EIS for a proposed 650-megawatt power plant in Illinois.

Biological Technician, U.S. Fish and Wildlife Service, Ecological Services, Bloomington, Indiana, May 1979 to August 1979.

Inventoried vegetation, mammals, birds, and fish at sights of highway bridge projects. Wrote letters describing possible environmental impacts and recommended possible mitigative measures.

Reviewed an environmental assessment for an airport expansion project.

Assisted biologists with field work for Section 10 and 404 permits.

Biological Technician, U.S. Fish and Wildlife Service, Ecological Services, Rock Island, Illinois, June 1978 to August 1978.

Assisted with field work for Section 10 and 404 permits. Wrot recommendations for mitigative measures for highway bridge projects.

Wrote environmental assessment for a flood control project.

Assisted with GREAT II sampling at Burnt Pocket on the Mississippi River, hoop nets, gill nets, and plankton tows. Assisted with benthos grabs and electrogishing for various projects.

EDUCATION

B.S.	1979	Wildlife Science	Purdue University

PROFESSIONAL ORGANIZATIONS
American Fisheries Society
The Wildlife Society
Phi Kappa Phi
Xi Sigma Pi
Association for the Advancement of Science
Audobon Society

ESE
PROFESSIONAL RESUME

NOREEN L. CONNOLLY
Aquatic Biologist

SPECIALIZATION

Aquatic Ecology, Population Ecology, Sampling and Analysis

RECENT EXPERIENCE

Compressed Air Energy Storage System Siting Study for Illinois Electric Utility--Conducted aerial photo interpretations, habitat determinations and mapping of alternative sites. Assisted in biological evaluation of potential sites through analysis of field data and computation of acreage requirements. Assisted with recommendations of prime sites.

Environmental Analysis Report for a Coal-Fired Electric Generating Facility--Assisted in analyzing field data, aerial surveys and mapping of sites, and computing prime sites for recommendation in licensing study for plant facility.

Characterization of Aquatic Habitats of the Mississippi River Between Saverton, Missouri and Cairo, Illinois-GREAT III--Collection of samples and analyses of fish, benthos, and icthyoplankton. Conducted laboratory analyses including sample sorting and identification of benthos, primarily macroinvertebrates and zooplankton. Used dissecting and binocular microscopes. Assisted with data entry and computer analysis.

EDUCATION

M.S.	1981	Biology	Loyola University of Chicago
B.S.	1976	Biology	Loyola University of Chicago

MEMBERSHIPS

Instrument Society of America
Numerical Control Society

MKRESIP-S.2/NLC.1
11/24/81

ESE

PROFESSIONAL RESUME

LAWRENCE W. McCONNELL
Aquatic Biologist

SPECIALIZATION

Aquatic Ecology and Taxonomy, Water Quality Analysis, Field Sampling

EXPERIENCE

Aquatic Biologist, Environmental Science and Engineering, Inc., February 1980 to present.

GREAT III Ecological Inventory--Responsible for field data collection including benthos, aquatic invertebrates and fish on a 300-mile reach of the Mississippi River.

Atlantic City Electric Company--Responsible for benthic invertebrate taxonomy, data reduction and research for the baseline environmental assessment for a fossil fueled power plant in southern New Jersey.

Florida Power Corporation--Responsible for taxonomy of benthic macroinvertebrate as part of a baseline study for the site selection of a fossil fueled power plant in Gulf County, Florida. Field sampling includes benthic, epifaunal, macrophytes, zooplankton, phytoplankton samples, water quality analysis.

Halifax Harbor Marina Project--Performed benthic macroinvertebrate taxonomy to assess the effect of dredging. Also performed preliminary sediment analysis.

Diaz, Seckinger and Associates, Field Biologist--Performed benthic macroinvertebrate taxonomy for the baseline study for the 49th Street Bridge project over Tampa Bay in Pinellas County, Florida.

Mauseth and Associates, Field Biologist--Responsible for benthic invertebrate taxonomy in the Bering Sea for a Department of Commerce marine mammal study.

EDUCATION

B.S.	1979	Biology	University of Tampa
A.S.	1976	Biology	Southeastern Community College West Burlington, Iowa

MKRESIP-S.2/LWM-2
11/10/81

ESE

PROFESSIONAL RESUME

JEFFERY A GORE
Terrestrial Biologist

SPECIALIZATION

Wildlife Ecology, Land Use Impacts Upon Wildlife, Plant Ecology, Habitat Mapping

RECENT EXPERIENCE

Corridor Selection Study for 345 KV Transmission Line, Project Manager--Selection and evaluation of potential transmission line corridors. Determination of preferred corridor based upon environmental sensitivity.

Selection and Evaluation of Proposed Sites for Coal-Fired Power Plant in Illinois, Terrestrial Ecology Subproject Manager--Statewide selection study for three potential plant sites. One year evaluation of terrestrial biota at each site. Preparation of environmental analysis for preferred site; assessment of impacts to wintering bald eagles.

Evaluation of Proposed Site for Power Plant in Central Florida, Project Scientist--Evaluation of wildlife resources at proposed site. Included intensive investigation of endangered red-cockaded woodpecker.

Selection of Potential Sites in Illinois for Locating Synthetic Fuel Plants, Terrestrial Ecologist--Survey of the southern half of the state for areas where synthetic fuel facilities could be located with minimal environmental impact Evaluation and ranking of selected sites with regard to ecological resources.

Selection and Evaluation of Proposed Sites in Southern Illinois, Southwestern Indiana, and Western Kentucky for Locating a Coal-Fired Power Plant, Terrestrial Ecologist--Siting survey for environmentally favorable sites. Evaluation and ranking of proposed sites.

Evaluation of Vegetation and Wildlife Resources on 370,000 Acre Federal Coal Reserve Area in Southeastern Oklahoma, Terrestrial Ecology Subproject Manager--One year study of wildlife and vegetation. Included field investigations, mapping of habitats, and preparation of environmental assessment.

EDUCATION

M.A.	1978	Zoology	Southern Illinois University
B.A.	1976	Biology	University of Evansville

PROFESSIONAL REGISTRATIONS

The Wildlife Society
American Society of Mammalogists
American Ornithologists Union

CERTIFICATION

Associate Wildlife Biologist, The Wildlife Society

ESE
PROFESSIONAL RESUME

ROBERT G. MOSHER, M.S.
Aquatic Biologist

SPECIALIZATION

Fisheries Biology, Aquatic Ecology, Stream Surveys, Fish and Macroinvertebrate Taxonomy

EXPERIENCE

Aquatic Biologist, Environmental Science and Engineering, Inc., 1980 to present.

Project Scientist, site selection and licensing studies for Soyland Electric Power Cooperative. Responsible for field sampling and taxonomy of aquatic vertebrates and macroinvertebrates at three potential coal-fired power plant sites in Illinois.

Project Scientist, ecological profile of stream habitats at the proposed General Motors assembly plant in St. Charles County, Missouri. Responsible for collection and taxonomy of fishes and benthic invertebrates, and water quality field sampling.

Aquatic Biologist, Aquatic Biology Section, WAPORA, Inc., Charleston, Illinois, 1978 to 1979.

Participated in sampling and analysis for adult fish studies and assisted in entrainment/impingement studies in Illinois and Indiana.

Fisheries Technician, Fisheries Section, NALCO Environmental Sciences (not Hazelton Env. Sc.), Northbrook, Illinois, 1977.

Assisted in entrainment/impingement studies at Dresden Power STation in Illinois. Also participated in adult fish sampling at various locations off Zion Power Station in Illinois.

EDUCATION

M.S.	1979	Zoology	Eastern Illinois University
B.S.	1977	Zoology and Environmental Biology	Eastern Illinois University

ASSOCIATIONS

American Fisheries Society

MKRESIP-S.2/RQM-2
11/10/81


DATE
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