Salt Lake County Water Quality & Pollution Control

Wetland Resources of Salt Lake County

SALT LAKE COUNTY DIVISION OF

WATER QUALITY & POLLUTION CONTROL

WETLAND RESOURCES OF SALT LAKE COUNTY

JANUARY, 1981

ACKNOWLEDGEMENTS

WATER QUALITY STAFF

Gerald H. Kinghorn	Director
Steven F. Jensen	Assistant Director Associate Author
Nancy T. Bartel	Administrative Assistant
Terry G. Way	Water Quality Specialist
Peter S. Borromeo	Hazardous Waste Specialist
William Snarr	Urban Runoff Treatment Specialist
Paul W. West	Water Quality Planner Associate Author
Linda Weir	Clerk-Typist
Lee Armstrong	Water Quality Technician
Gilbert Heal	Water Quality Technician
Steven Mitckes	Water Quality Technician
Ben Santisteven	Water Quality Technician

CONSULTING AGENCIES

U.S. Corps of Engineers	Tom Skordal
U.S. Fish & Wildlife Service	Bob Freeman
Utah State Division of Parks and Recreation	Nolan Hansen
Salt Lake County Flood Control	Al Sorenson
Salt Lake County Recreation	Charles Baugh
Murray City Corporation	Charles Clay - Engineering Lynn Pett - Recreation Dennis Hamblin - Planning
U.S. Environmental Protection Agency Region VIII, Denver, Colorado	Dale Vodehnall
U.S. Army Corps of Engineers, Grand Junction, Colorado	Norm Sanders
Salt Lake County Soil Conservation District	Gaylard Robb

Cover photograph courtesy of Gaylord Robb. Wetland photographs in report narrative courtesy of Peter Borromeo.

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

I. INTRODUCTION

Section 404 of the 1977 Clean Water Act, as amended (see Appendix A) provides for the administration of a permit program through the U. S. Army Corps of Engineers or individual states for the protection of the Nation's wetlands.[1] In Executive Order 11990, May 24, 1977, (See Appendix B) President Jimmy Carter stated:

> The Nation's coastal and inland wetlands are vital natural resources of critical importance to the people of this country. Wetlands are areas of great natural productivity, hydrological utility, and environmental diversity, providing natural flood control, improved water quality, recharge of aquifers, flow stabilization of streams and rivers, and habitat for the production of agricultural products and timber, and provide recreational, scientific, and aesthetic resources of national interest.
>
> The unwise use and development of wetlands will destroy many of their special qualities and important natural functions. Recent estimates indicate that the United States has already lost over 40 percent of our 120 million acres of wetlands inventoried in the 1950's. This piecemeal alteration and destruction of wetlands through draining, dredging, filling, and other means has had an adverse cumulative impact on our natural resources and on the quality of human life.
>
> The problem of loss of wetlands arises mainly from unwise land use practices. The Federal Government can be responsible for or can influence these practices in the construction of projects, in the management of its own properties, and in the provisions of financial or technical assistance.

> In order to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practical alternative, I have issued an Executive Order on the protection of wetlands.[2]

The U. S. Council on Environmental Quality summarizes the Corps functions in wetland preservation in its 1978 Interagency Task Force Report:

> The Corps of Engineers has responsibility for the maintenance of the nation's water and related land resources, including construction and operation of projects for navigation, flood control, shore and beach restoration and protection, hurricane and flood protection, hydroelectric power and production, water supply, water quality control, fish and wildlife conservation and enhancement, and outdoor recreation.
>
> Research - In its Dredged Material Program, the Corps conducts research on methods of reducing the adverse environmental impacts associated with dredging and on beneficial uses for dredged material.
>
> Regulatory Functions - Corps' permission is required for any construction activities in navigable waters, including coastal waters up to their mean high tide line (about 40 percent of U. S. coastal wetlands). The Corps also has permit authority to regulate activities involving discharges of dredged or fill material in all "waters of the United States," including all adjacent wetlands.[3]

Assisting the Corps of Engineers in the protection of wetlands are several other Federal agencies including:[3] (See Table 1)

TABLE : GOVERNMENTAL AGENCIES ASSISTING IN THE PROTECTION OF WETLANDS

FEDERAL	STATE	LOCAL
Department of Defense Army Corps of Engineers Department of Agriculture Forest Service Soil Conservation Service Department of Commerce Environmental Protection Agency Department of Interior Fish and Wildlife Service Heritage Conservation and Recreation Service National Park Service Bureau of Land Management Office of Water Research and Technology Bureau of Reclamation Geological Survey	Resource Development and Coordinating Committee Division of Environmental Health Bureau of Water Quality Department of Natural Resources Division of Wildlife Resources Division of Water Resources Division of Water Rights-State Engineer	Department of Public Works Division of Water Quality and Pollution Control

DEPARTMENT OF AGRICULTURE

Forest Service

Research and Management - The Forest Service is concerned and active with wetland management, maintenance, and improvement in relation to wildlife, timber management, range resources, water yield, and water quality. Programs are ongoing with state and private forestry, National Forest administration, and research. Substantial research on bog hydrology has originated from a project in Laramie, Wyoming, including water yield and water quality aspects. A project in Juneau, Alaska, is involved with coastal wetland research. Studies are being launched on shoreline habitat requirements of harbor seals and the potential of activities associated with logging to influence habitat quality and the ecology of coastal plant communities, with reference to productivity of waterfowl, shorebirds, and other birds or mammals. The Southeastern Forest Experiment Station at Charleston, South Carolina, has done research on the coastal plains.

Soil Conservation Service

Technical Assistance Programs - The mission of the SCS is to assist in the conservation, development, and productive use of the nation's soil, water, and related resources. SCS offers technical assistance on many aspects of resource conservation to individuals, organizations, local and state agencies, and federal agencies. Resource data and interpretive assistance offered through the National Cooperative Soil Survey, Small Watershed Program, Water Bank Program, and others help local people make workable long-term decisions about wetlands. SCS participation in activities that alter wetlands is limited by technical constraints, mainly soil potential, and by policy constraints as contained in its revised wetlands conservation policy of May 1975.

DEPARTMENT OF COMMERCE

National Marine Fisheries Service (National Oceanic and Atmospheric Administration)

Administrative Management, and Regulatory Functions - The NMFS has a responsibility to protect and conserve the marine, estuarine, and anadromous fish environment. More than 20 federal laws mandate NMFS involvement in fish habitat protection. The NMFS analyzes and comments on construction proposals and applications for dredge and fill permits issued by the Corps of Engineers, on National Pollutant Discharge Elimination System and ocean dumping permits issued by the Environmental Protection Agency, on bridge and causway permits issued by the Coast Guard, and on license applications submitted to the Federal Power Commission and Nuclear Regulatory Commission. Any proposed federal construction affecting living marine resources requires analyses and comments from NMFS. Programs are directed toward protection and enhancement of fish habitats and resources. The NMFS is concerned with establishing sanctuaries and reserves to protect critical fish habitats and with disseminating information on fish habitat conservation to other agencies and the public. Activities relating to preservation of wetlands are closely tied to management of fishery resources.

ENVIRONMENTAL PROTECTION AGENCY

Grant Programs - EPA has an extensive program of grants to assist state and local governments in developing plans for comprehensive protection of water resources, including wetlands, under Section 208 of the Federal Water Pollution Control Act. Under Title 1 of this Act, EPA is funding research projects specifically designed to advance understanding of freshwater and coastal wetlands and to predict the effects of pollution from industrial and municipal sources and from discharge of dredged or fill material. In cooperation with the Corps of Engineers, EPA has issued 5 grants to develop information that should allow further refinements in describing the upper boundaries of wetlands for regulatory purposes.

Regulatory Functions - EPA controls discharges of pollutants in all waters of the United States, including wetlands. Under Section 402 of the Federal Water Pollution Control Act Amendments, EPA also administers a permit program to regulate discharges from industrial and municipal sources. Although some discharge programs are administered by the states, EPA has authority to resind state programs. Under Section 311, EPA and the Coast Guard regulate spills of oil and hazardous substances. Guidelines developed by EPA in conjunction with the Corps of Engineers provide the framework for reviewing proposed discharges of dredged or fill materials to evaluate their physical effects and potential for chemical contamination. EPA may deny or restrict such discharges that will have an unacceptable adverse effect on the aquatic environment.

DEPARTMENT OF THE INTERIOR

U.S. Fish and Wildlife Service

Consultative Responsibilities - Under the Fish and Wildlife Coordination Act, the FWS assesses the impacts on fish and wildlife of all water and related land resource development projects which are federally funded or are constructed under a federal permit or license and provides reports to federal construction or regulatory agencies and to permit applicants. Many of the projects involved occur in or affect wetland areas. Federal permits for water-related development are reviewed by FWS to encourage avoidance of adverse impacts on fish and wildlife and their habitat, particularly in wetland areas.

Acquisition - The U. S. Fish and Wildlife Service uses two funding systems to acquire wetlands. The first is the Migratory Bird Conservation Account, used to acquire significant migratory waterfowl habitat by direct purchase or perpetual easement. Funds come from the sale of "Duck Stamps" required of all waterfowl hunters 16 years and older. The Land and Water Conservation Account, is used to acquire habitat for endangered species, recreation and wilderness areas, and other lands designated by legislation. Acquisitions become part of the National Wildlife Refuge System.

Research - A national inventory of wetlands, limnological studies of prairie wetlands, and research on wetland habitat for fish and wildlife are presently being conducted.

Heritage Conservation and Recreation Service

Acquisition - The Service administers the Land and Water Conservation Fund for wetland and other natural resource acquisition by federal and state agencies.

National Park Service

Acquisition and Management - The Park Service preserves outstanding examples of our natural resources through management of the National Park System and by administration of the Natural Landmarks Program. Significant examples of wetlands are often involved.

Research - The research program is geared to recognize and inventory wetlands worthy of park or landmark status and to better manage wetlands within the Park System.

Bureau of Land Management

Administrative and Management Functions - BLM prepares management plans to suggest optimum use of wetland areas within its jurisdiction.

Office of Water Research and Technology

Research - Allotment and matching grants are made available to state and local institutions and universities. Examples of present wetland studies include: Prediction of pesticide effects in salt marshes, evaluation of marsh ecosystem response to nutrients contained in agricultural runoff, and effects of sewage effluents on freshwater tidal marsh ecosystems.

Bureau of Reclamation

Administrative and Management Function - Wetlands important to waterfowl in the western states which lie on or adjacent to reclamation projects come under this authority.

U. S. Geological Survey

Research - USGS is involved in topographic, geologic, and hydrologic mapping, with recent emphasis on coastal and flood-prone areas. Projects include studies of the hydrology of wetlands and classification mapping of wetlands using high altitude and satellite remote sensing.

In Salt Lake County the Division of Water Quality and Flood Control takes an active role in reviewing Corps of Engineer's 404 Permit applications as they relate to wetlands in Salt Lake County and has provided staff and technical support to both applicant and Corps personnel.

It is the policy of the Corps of Engineers to coordinate the review of all 404 Permit applications with the local, state and federal governmental agencies involved. The Division of Water Quality is asked to participate due to it's concern for water quality and the effects wetlands can have in this regard, particularly in regard to future needs for comprehensive stormwater quality management.

II. PLANNING APPROACH TO WETLAND INVENTORY

To facilitate wetlands identification the Division of Water Quality was requested by the Environmental Protection Agency to include a wetlands inventory in it's 1981 Work Plan.

Priorities for Wetland Inventory

The U.S. Fish and Wildlife Service has identified three priority areas of wetlands to be inventoried.

1. Northwest portion of the county - Extensive wetland habitat exists north of North Temple and west of Redwood Road. The area is part of a nationally recognized wetland complex bordering the Great Salt Lake. Any development adversely affecting those wetland values must be scrutinized in the context of international treaty implications dealing with migratory waterfowl.

2. Riverine wetlands adjacent to Jordan River tributaries - These riparian corridors illustrate a diversity of wetland types and wildlife species and many enhance fishery values within the stream channel.

3. Select areas along the Jordan River - Those wetlands identified in the Corps of Engineers wetland inventory are the more important wetland areas along the Jordan River. That area from 3900 South to the County's southern border supports the largest extent and most important wetland habitat along the Jordan River. As mentioned above, surrounding land use affects on-site wetland values. If Jordan River wetlands are to be protected, the county should establish buffer zones or select blocks of habitat where development will be avoided.[4]

Due to the importance of the valley tributaries of the Jordan River with respect to urban stormwater runoff treatment, (being demonstrated by the Salt Lake County National Urban Runoff Program) the Division of Water Quality revised the priority list as follows:

1. Valley Tributaries
2. North West Quadrant
3. Canyon Tributaries
4. Jordan River (previously inventoried by U.S. Corps of Engineers)

Past Inventory Efforts

The U.S. Army Corps of Engineers generally defines "wetlands" as:

> those areas that are inundated by surface or ground water with a frequency sufficient to

2. Common Marsh Plants of the United States and Canada. U.S. Department of Interior, Fish and Wildlife Service, 1970

3. Classification of Natural Ponds and Lakes in the Glaciated Prarie Region. U.S. Department of Interior, Fish and Wildlife Service, 1971

4. Preliminary Guide to Wetlands of the West Coast States. Department of the Army, Waterways Experiment Stations, Corps of Engineers, 1978.

Generally speaking, the existence of varied sedges, rushes, and other hydrophytes within the rangesite narrative point to increased probability that they exist in sufficient community to constitute a wetland. Due to the fact that the extent of these communities is directly influenced by the extent of fluctuation of surface and subsurface water, hydrology becomes an important variable. The mapping units described within the subject rangesites all have fluctuating properties but are still best defined through field inspection.

The following narrative has been extracted from the Salt Lake Soil Survey and are descriptions of the pertinent rangesites in the county in which wetlands may be located:

o Wet Meadow Rangesite

The site is on flood plains of the Jordan River in the wet and semiwet climatic zone. It consists of soils in the Magna series. Slopes range from 0 to 3 percent. These soils are deep and very poorly drained. The surface layer is mainly silty clay and is high in organic-matter content. The underlying layer is dominantly silty clay. In most places the water table is within 20 inches of the surface at least part of the time. Intake rate is slow, and the hazard of erosion is slight. The available water holding capacity is about 14 inches.

> support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.[2]

Using this definition as a guideline, the first objective was to determine more precisely where the County's wetlands were most likely to occur. To assist in this effort the "Soil Survey of the Salt Lake Area" published by the Soil Conservation Service (SCS) was consulted. The SCS groups soil mapping units into range sites possessing similar habitat characteristics, particularly in terms of native vegetation. The use of range sites and their constituent soil mapping units provides a fairly definitive method of locating general areas that may be designated as wetlands.[5]

> A range site is a distinctive kind of rangeland that differs from other kinds of rangeland in its potential to produce native plants. It is the product of all environmental factors responsible for its development. In the absence of abnormal disturbance and physical site deterioration, a range site supports a plant community characterized by an association of species that are different from those of other range sites in terms of kinds or proportions of species in total yield.[6]
>
> The significant aspect to utilizing rangesite data is that it provides a source of locating native vegetation communities around different geographical areas in the County.
>
> Only three of thirteen total rangesites were identified as potential wetland hosts. These three rangesites, wet meadow, semi-wet meadow and alkali bottoms were found to accomodate limited wetland plant species. Four sources were consulted regarding wetland plant species:
>
> 1. Lois A. Arnow, Beverly J. Albee, and Ann M. Wyckhoff, Flora of the Central Wasatch Front, Utah. University of Utah, Salt Lake City 1980

The potential native vegetation consists mainly of water-tolerant grasses and grasslike plants. Important decreaser grasses are slender wheatgrass, tall native bluegrass, tufted hairgrass, redtop, and alkali sacaton. Increaser grasses and grasslike plants are sedges, rushes, saltgrass, Kentucky bluegrass, foxtail, wiregrass, squirreltail, western wheatgrass, Great Basin wildrye, cattail, arrowgrass, and horsetail.

The important forbs are varrow, dandelion, plantain, black medic, cinquefoil, curly dock, and native clovers. Shrubs are willows, wild rose, dogwood, hawthorn, cottonwood and river birch.

Plants that are dominant if the site is in poor condition are largely rushes, sedges, salt grass, rubber rabbitbrush, and annual weeds.

On this site, total annual production of air-dry herbage ranges from 4,500 pounds in years of favorable rainfall to 3,000 pounds in years of unfavorable rainfall.

o Semiwet Meadow Rangesite

This site is on the smooth to undulating, low flood plains of perennial streams that are subject to occasional flooding. It consists of mixed alluvial land and sandy alluvial land. These land types are somewhat poorly drained, stratified, mixed alluvium that has textures ranging from loamy sand to clay. They commonly contain gravel or sand below a depth of 3 feet and are very stony or very cobbly in places. The water table is at or near the surface during the period of peak runoff but recedes when runoff subsides.

The potential native vegetation consists mainly of perennial grasses, but there is a small percentage of forbs, shrubs, and overstory trees.

Important decreaser grasses are tufted hairgrass, native bluegrasses, alkali sacton, redtop, slender Wheatgrass , and timothy. Increaser grasses and grasslike plants are saltgrass, Kentucky bluegrass, squirreltail. Sandberg bluegrass, sedges, baltic rush, western wheatgrass and Great Basin wildrye.

Important forbs are aster, false Solomon's seal; groundsel, native clovers, dandelion, curly dock, Dutch clover, and yarrow. Shrubs and overstory trees are wildrose, willows, hawthorn, cottonwood, river birch and boxelder.

Plants that are dominant if this site is in poor condition are rubber rabbitbrush, aster, curly dock, gumweed, povertyweed, Canada thistle, foxtail, and bullthistle.

On this site, total annual production of air-dry herbage ranges from 3,000 pounds per acre in years of favorable rainfall to 2,000 pounds per acre in years of unfavorable rainfall.

o Alkali Bottoms Rangesite

This site is on low lake terraces, lake plains, and flood plains in the wet and semiwet climatic zone. It consists of soils in the Bramwell, Bramwell hardpan variant, Chipman, Decker, Jordan, Lasil, Leland, and Terminal series. Slopes range from 0 to 3 percent. Most of these soils are deep or moderately deep and somewhat poorly drained to very poorly drained. Most are moderately or strongly affected by salt and alkali. The surface layer ranges from fine sandy loam to silty clay loam and the subsoil or underlying layer ranges from sandy clay loam to silty clay. The terminal soil has a hardpan at a depth of less than 20 inches.

Intake rate is moderate to slow, and permeablility is moderate to very slow. Runoff is slow or very slow, and the hazard of erosion is slight to moderate. In most places the water table is at a depth of 20 to 40 inches. The available water holding capacity is 4 to 14 inches to a depth of 5 feet or to the hardpan. The amount of water available to plants is greatly reduced because of the salt in the soils.

The potential native vegetation consists of 80 to 90 percent perennial grasses, as much as 20 percent shrubs, and less than 5 percent forbs. All of these are tolerant of salts and alkali and a fluctuating water table. Important decreaser grassess are alkali bulegrass, alkali cordgrass, alkali sacton, Great Basin wildrye, creeping wildrye, native bluegrass, and needle-and-thread. Important increaser grasses are

saltgrass, foxtail, and squirreltail. Sedges and rushes also are important increasers. Important shrubs are Nuttal saltbush, four-wing saltbrush, bud sagebrush, Gardner saltbush, and winterfat. Forbs are native clover, globemallow, bassia, pickleweed, and annual kochia.

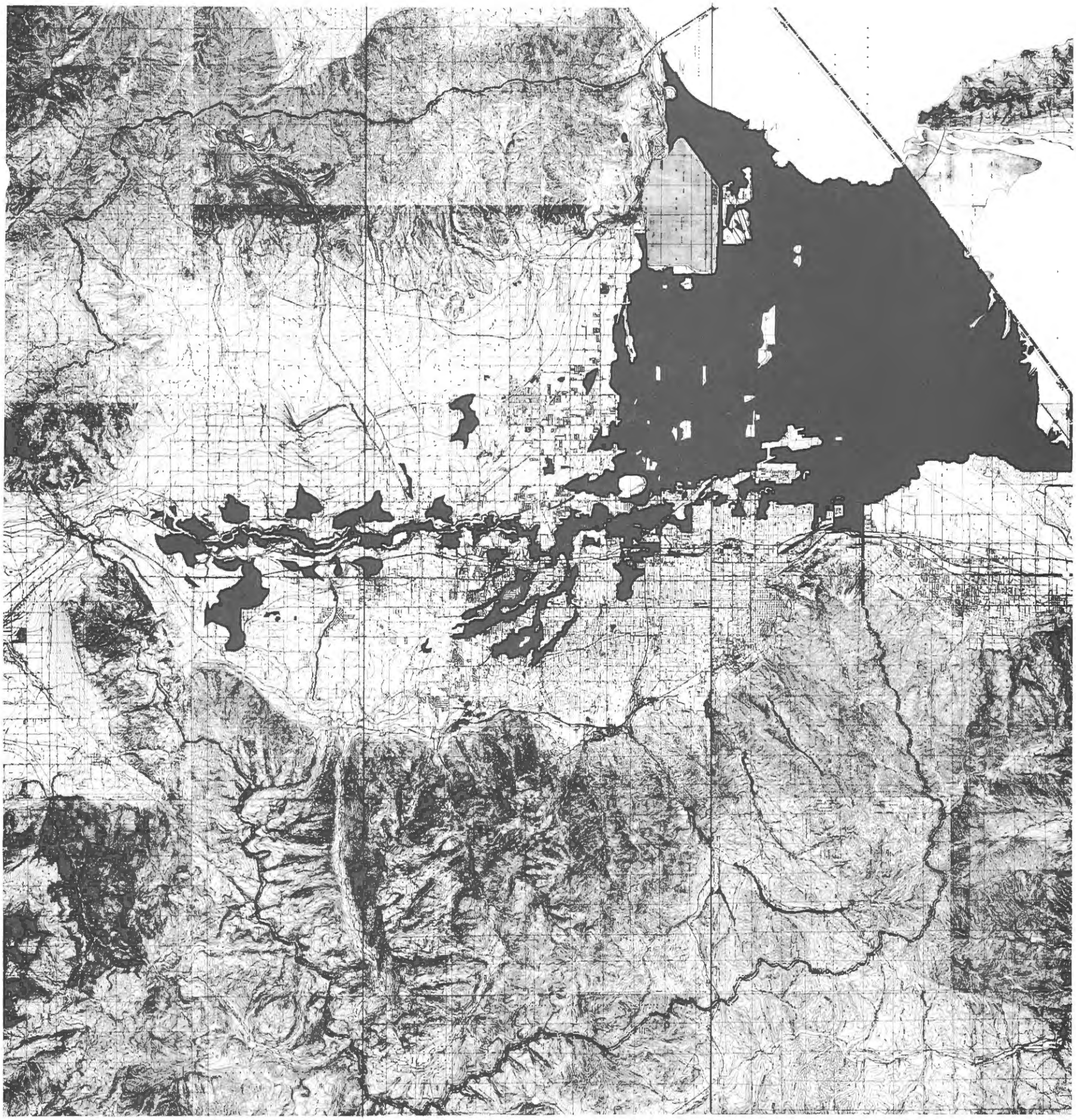
Plants that are dominant if the site is in poor condition are greasewood, rubber rabbitbrush, iodinebush, cheatgrass, big sagebrush, and annual weeds.

In areas where irrigation water is available, clearing and seeding to tall wheatgrass is profitable.

On this site, total annual production of air-dry herabage ranges from 1,800 pounds per acre in years of favorable rainfall to 1,000 pounds per acre in years of unfavorable rainfall.

Each rangesite describes several soil series which in turn translate into soil mapping symbols. Each soil symbol was then located on a base map. Even though the identification of wetland types via range site identification is general, it lays the groundwork for future detailed field examinations to be conducted by the Division of Water Quality. Figure 1 shows the general wetland inventory produced with Soil Rangesite Data.

Other governmental agencies have conducted inventories, of the County's wetlands. However, they have concentrated primarily on those incident to the Jordan River. In 1977 the U.S. Army Corps of Engineers conducted an aerial photo survey of the Jordan River's wetlands followed by a brief field check. Using color aerial photos at a scale of 1" = 500' personnel of the Corps District office in Sacramento, California, examined the Jordan River for areas that appeared to be wetlands. About two weeks were spent outlining suspected wetlands on the photos. This work was subsequently transfered to 7.5 minute topographic maps acquired from the U.S. Geological Survey. Once this information was compiled, Corps personnel devoted four days during the summer of 1978 to "ground proof" the wetland



Salt Lake County Water Quality and Pollution Control

Wetland Soil Types

Compiled from Soil Conservation Service data, April 1974.

NORTH

0 20,000'

scale

Financed Under the Federal Clean Water Act of 1977, as Amended

FIGURE 1

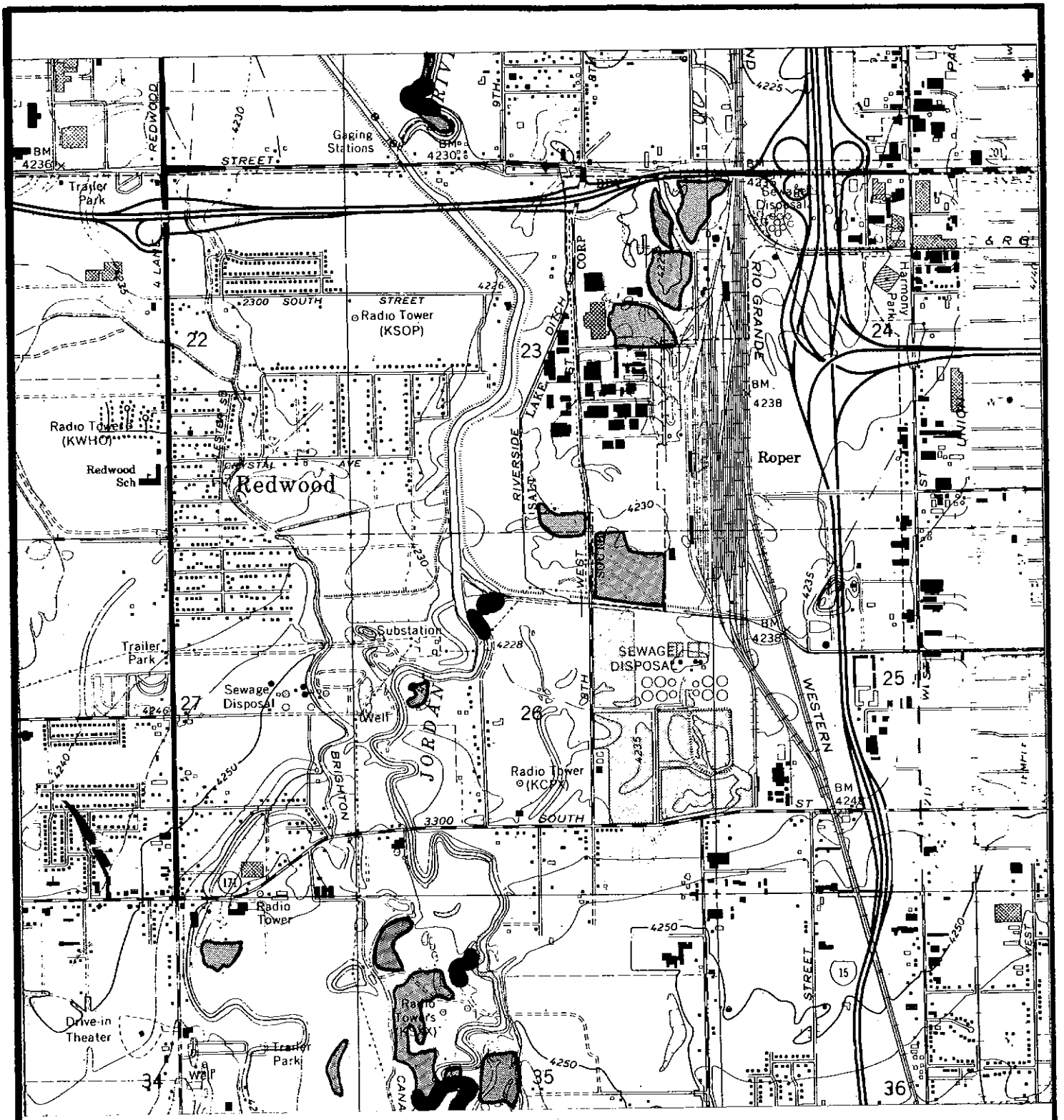
boundaries. This effort constituted a cursory examination of the Jordan River's wetlands at best. The results of this inventory define wetland boundaries for purposes of the Corps' regulatory jurisdiction, but do not serve as a substitute for subsequent investigations for specific 404 permits. Figures 2 a-g display the wetlands identified in this effort.

Another effort to map Jordan River wetlands was conducted by Lockheed Electronics Company, Inc., Remote Sensing Laboratory in Las Vegas, Nevada under contract from the U.S. Environmental Protection Agency. The effort was to aid the Water Division of EPA Region VIII, Denver, in locating nonpoint water pollution sources in selected portions of Salt Lake County. During this project, non-forested wetlands were outlined as areas of special interest to the EPA. Again, aerial photos were utilized. The photos were "stereoscopically studied using photographic image characteristics of shape, size, tone, pattern, texture and association to identify land cover and cultural features." [7] No attempt to ground proof the resultant maps was made. Therefore the results of the survey are again general and ground proofing may well result in additions or changes in the actual wetland boundaries. Figures 2 a-g also display the additions to the Corps' identification from the EPA effort.

It should be noted that all past surveys (Range site survey, Corps of Engineers' survey, and EPA's survey) have a high degree of correlation and therefore can be considered as good guidelines to determining actual wetland areas.

Present Inventory Efforts

With consideration of the priorities , determined by the U.S. Fish and Wildlife Service, the Division of Water Quality began a detailed inventory of the valley tributaries in the summer of 1980.



Division of Water Quality & Pollution Control

Jordan River Wetlands

NORTH

Wetlands Identified by the Corps of Engineers

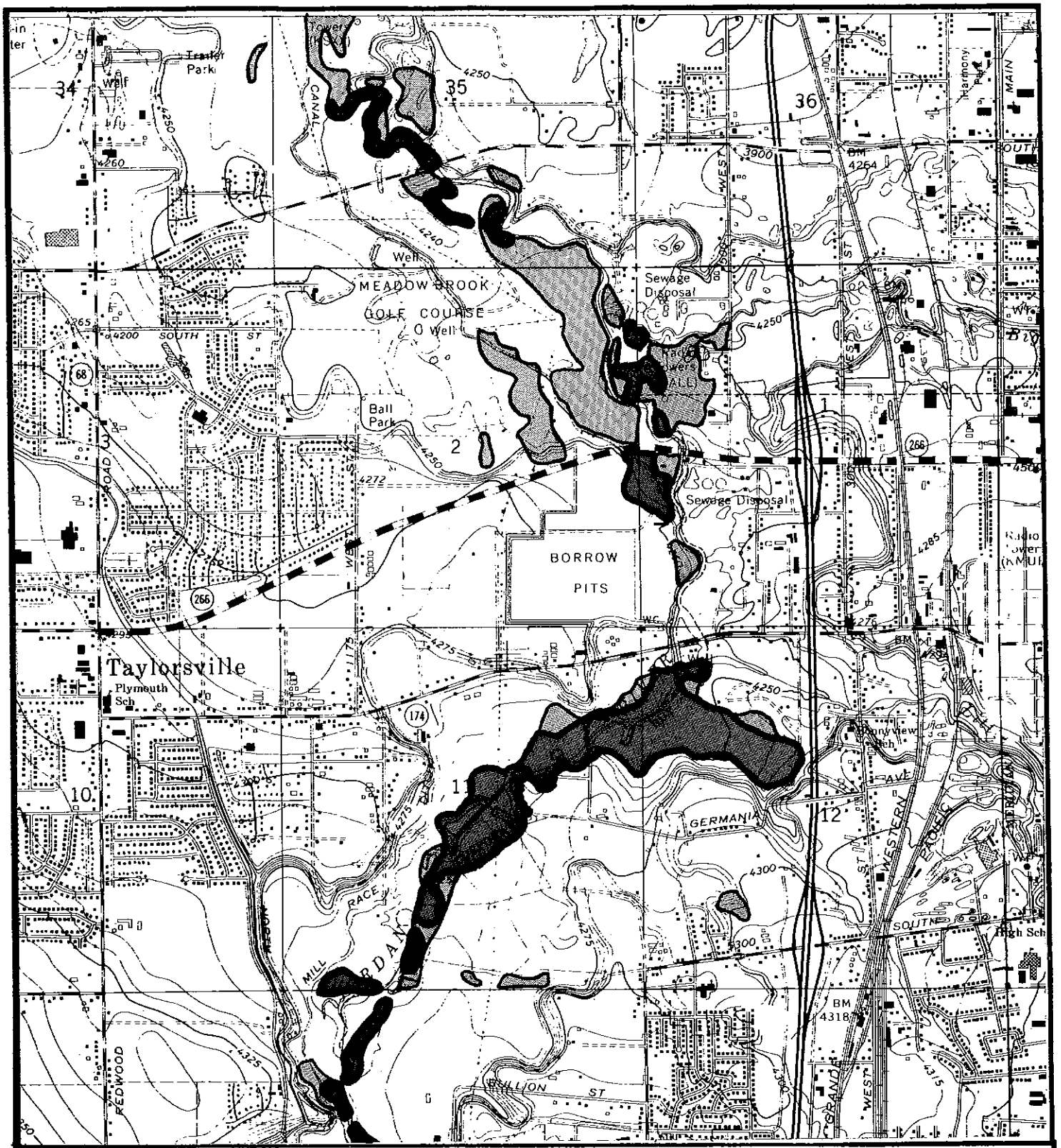
Additional Wetlands Identified by E.P.A.

0 2000'

scale

Financed under Section *208* of the 1977 Clean Water Act, as amended

FIGURE 2a



Division of Water Quality & Pollution Control
Jordan River Wetlands

NORTH

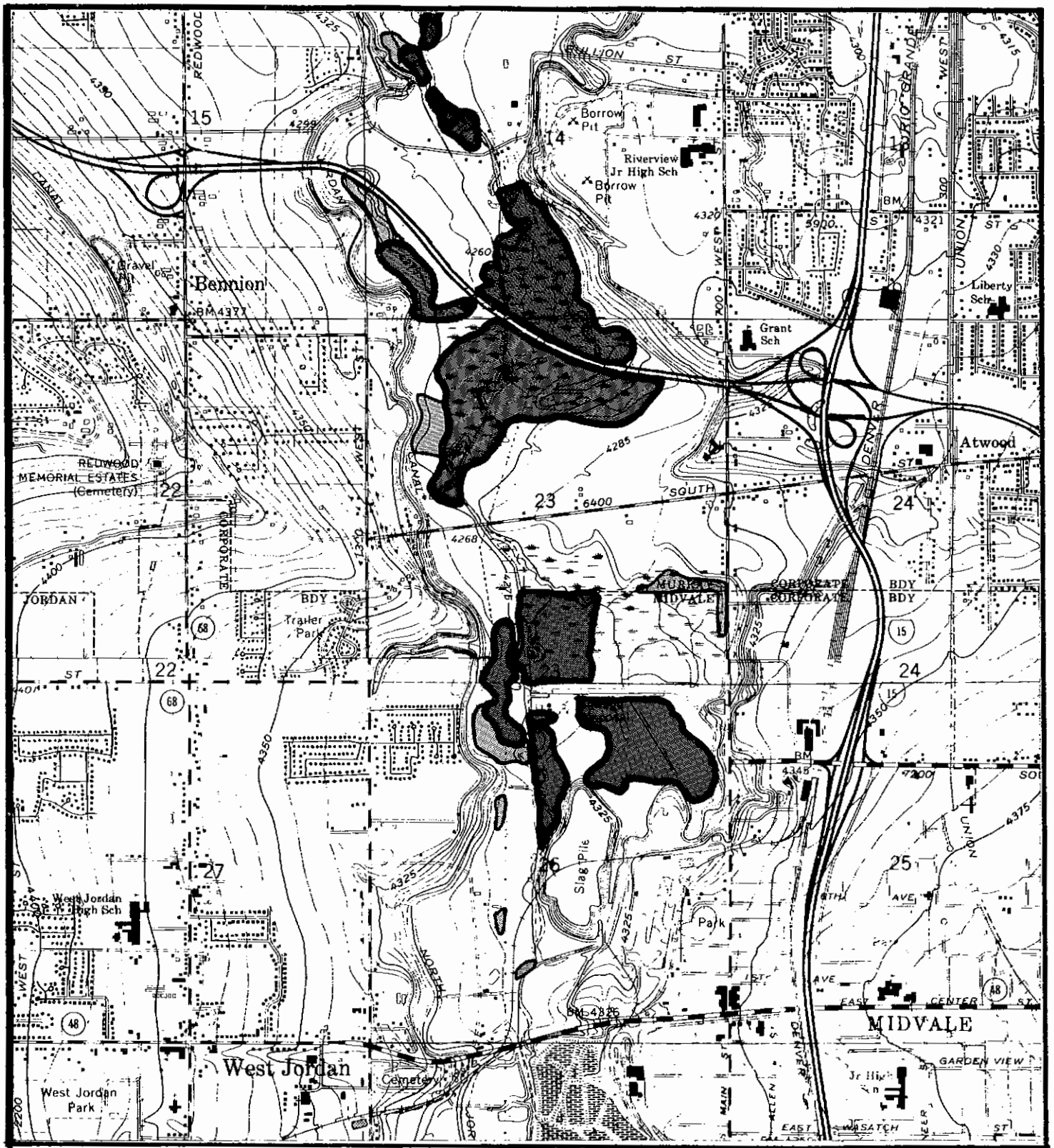
Wetlands Identified by the Corps of Engineers

Additional Wetlands Identified by E.P.A.

0 2000'
scale

Financed under Section **208** of the 1977 Clean Water Act, as amended

FIGURE 2b



Division of Water Quality & Pollution Control
Jordan River Wetlands

NORTH

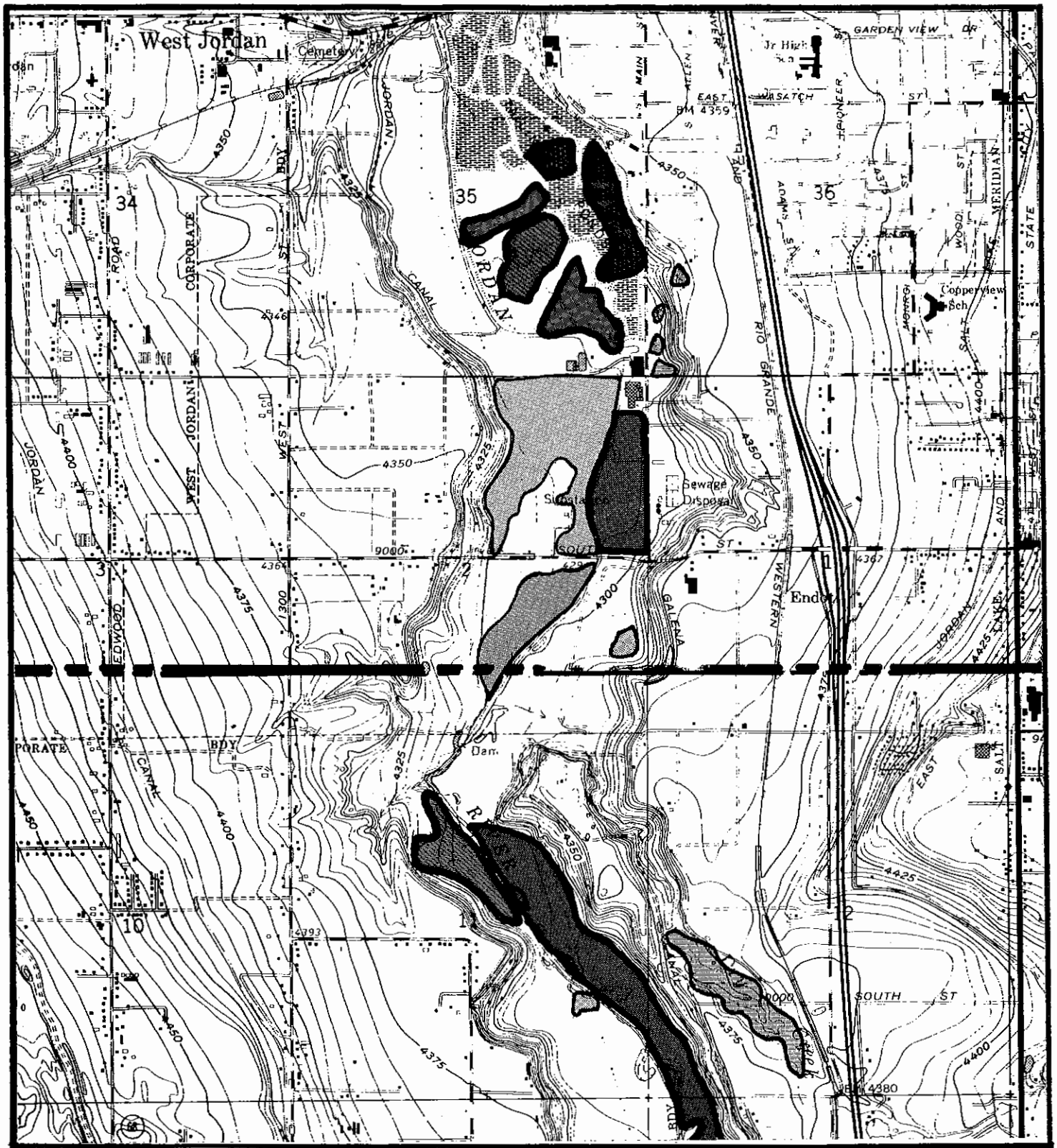
Wetlands Identified by the Corps of Engineers

Additional Wetlands Identified by E.P.A.

0 2000'
scale

Financed under Section **208** of the 1977 Clean Water Act, as amended

FIGURE 2c



Division of Water Quality & Pollution Control

Jordan River Wetlands

NORTH

Wetlands Identified by the Corps of Engineers

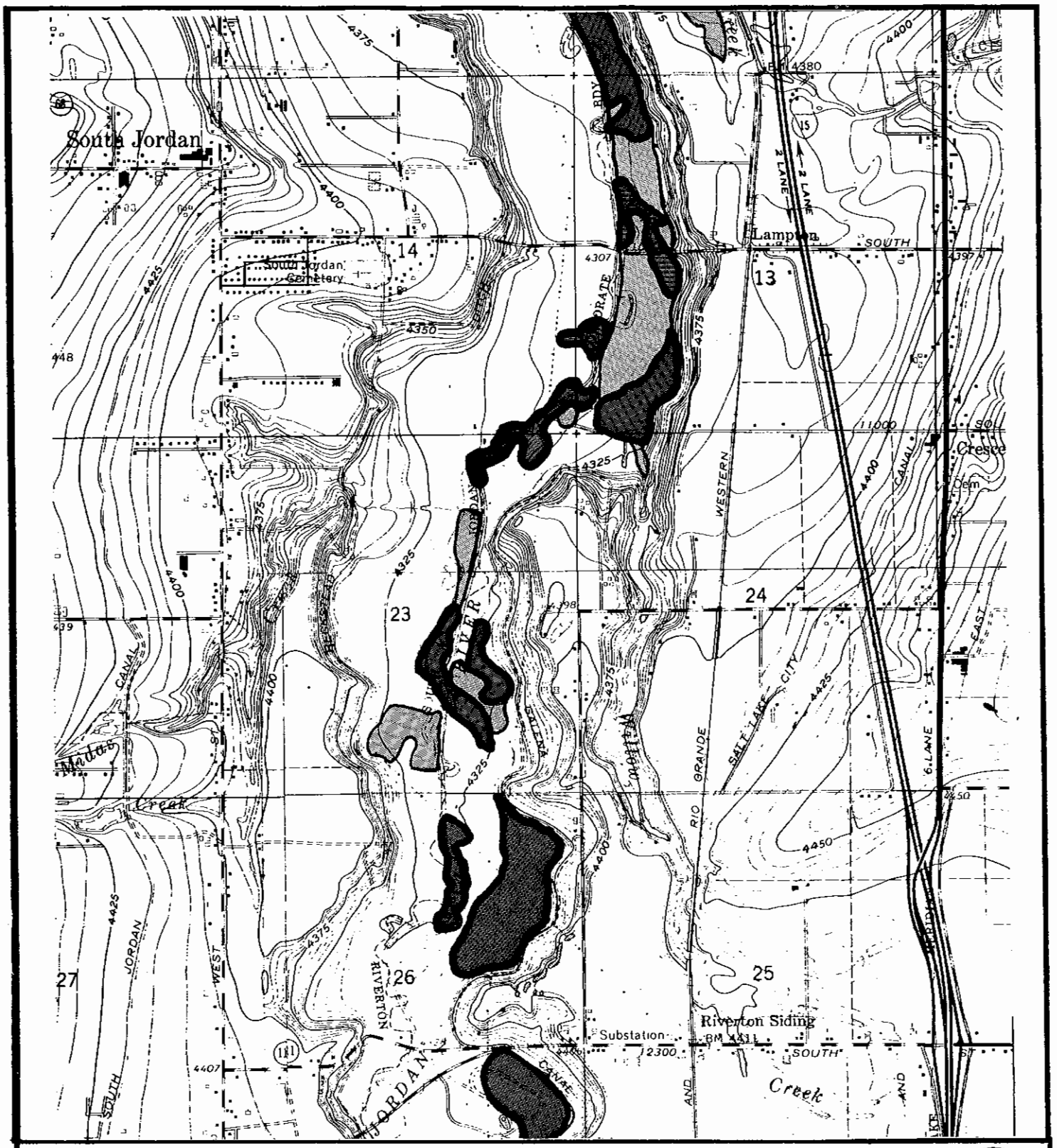
Additional Wetlands Identified by E.P.A.

0 2000'

scale

Financed under Section *208* of the 1977 Clean Water Act, as amended

FIGURE 2d



Division of Water Quality & Pollution Control

Jordan River Wetlands

NORTH

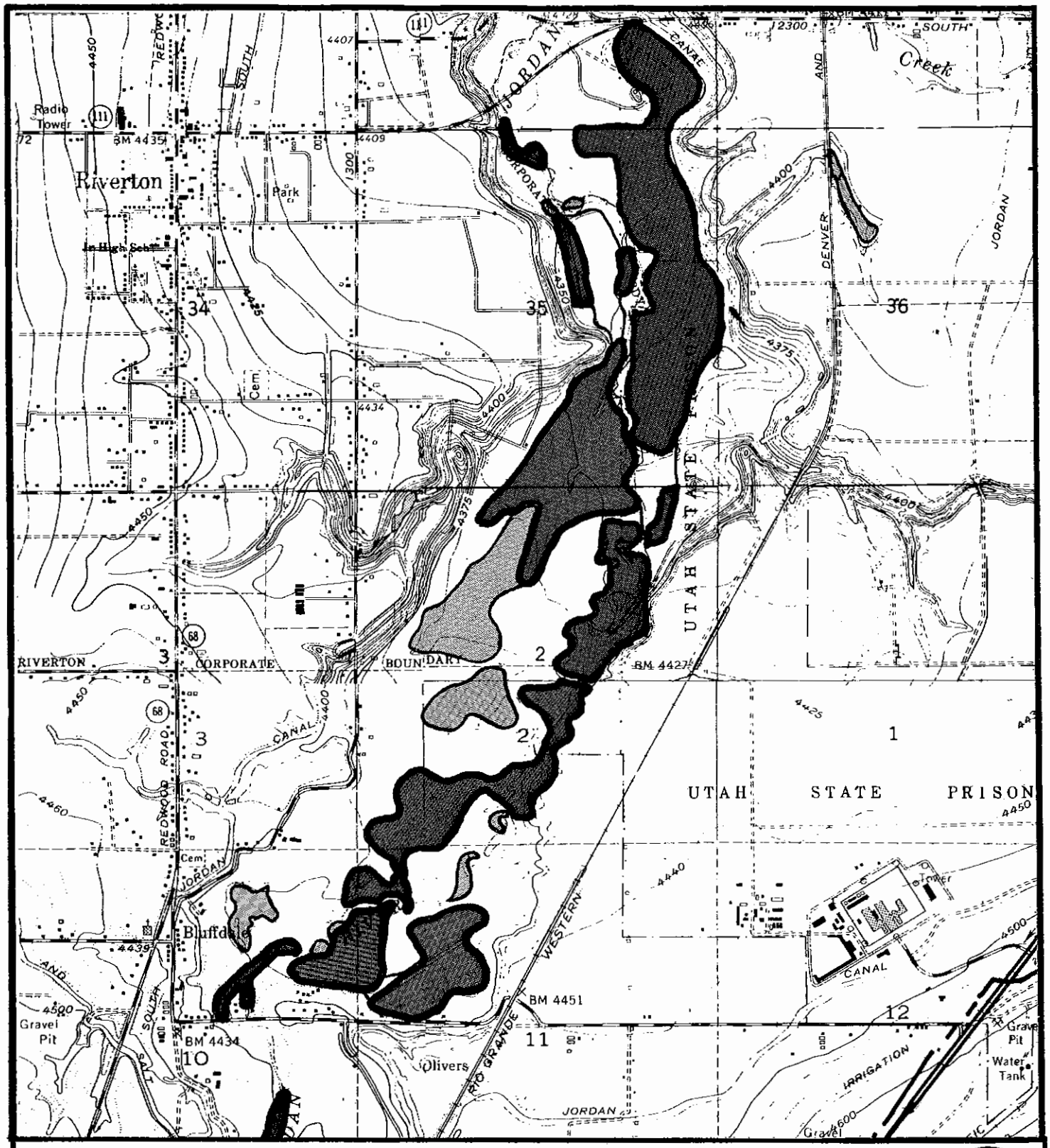
Wetlands Identified by the Corps of Engineers

Additional Wetlands Identified by E.P.A.

0 2000'

scale

Financed under Section **208** of the 1977 Clean Water Act, as amended



Division of Water Quality & Pollution Control

Jordan River Wetlands

NORTH

Wetlands Identified by the Corps of Engineers

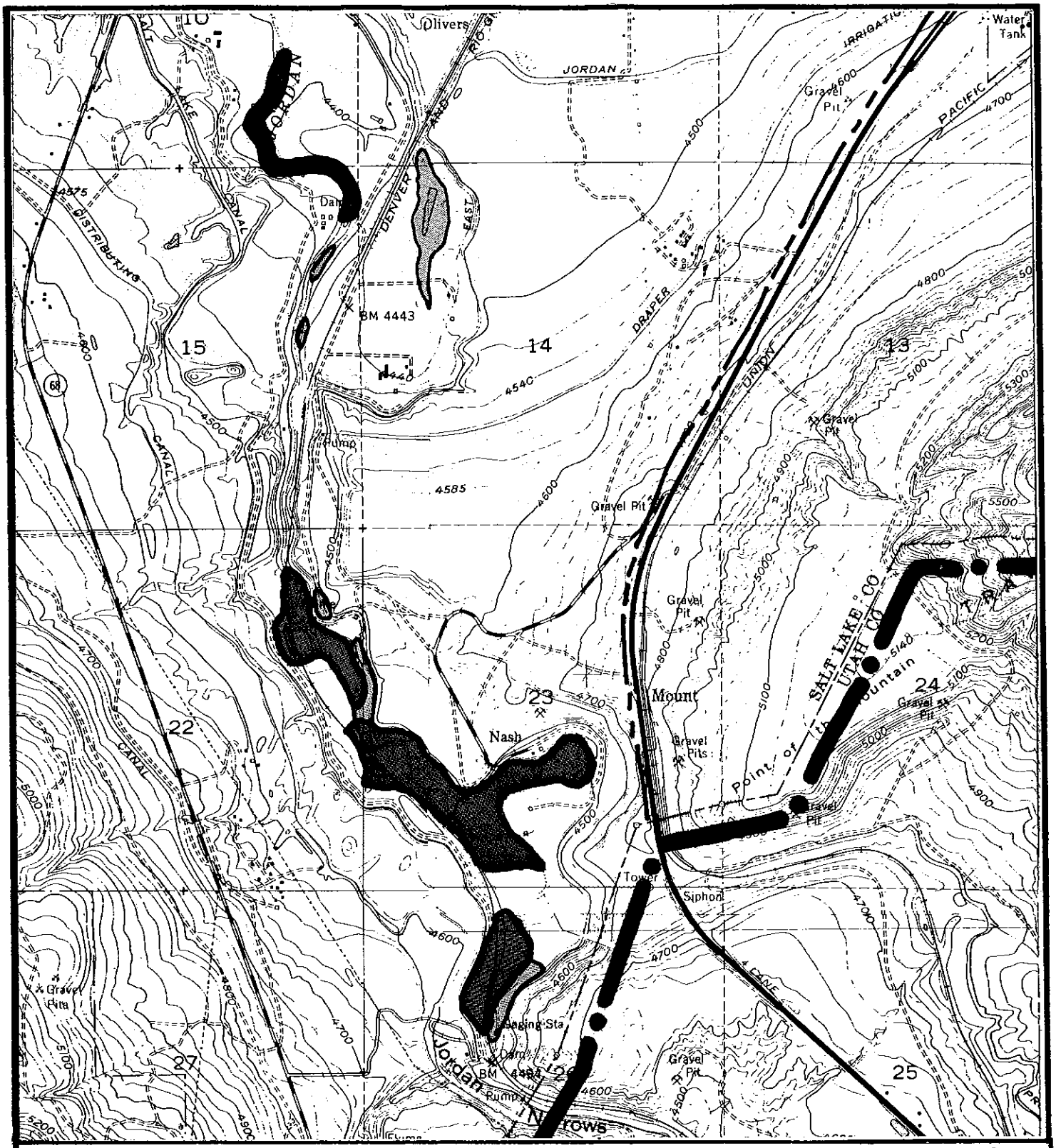
Additional Wetlands Identified by E.P.A.

0 2000'

scale

Financed under Section 208 of the 1977 Clean Water Act, as amended

FIGURE 2f



Division of Water Quality & Pollution Control

Jordan River Wetlands

NORTH

Wetlands Identified by the Corps of Engineers

Additional Wetlands Identified by E.P.A.

0 2000'

scale

Financed under Section 208 of the 1977 Clean Water Act, as amended

FIGURE 2g

Aerial photos at a scale of 1" = 200' covering wetland soil types and other possible wetlands, determined by the Corps of Engineers and EPA,were examined to determine the location of suspect wetlands for subsequent ground proofing. Upon completion of aerial photo identification, each suspected wetland was field checked until winter weather precluded further survey work for the year.

In the field,vegetative types and wetland boundaries were sketched onto the aerial photos. Also, wildlife was observed, drainage basins determined if possible, and proximity to other land uses and general conditions of the wetlands were noted. Classification of wetlands was made according to the publication: Classification of Wetlands and Deepwater Habitats of the United States (U.S. Fish and Wildlife , U.S. Department of the Interior,1979). The site evaluation sheet upon which data were recorded is provided as Figure 3 . More than two person-months have been expended in 1980 by the Divison of Water Quality. As a result, an estimated 40%(75 acres) of the wetlands incident to the valley tributaries have been inventoried and classified (see Figure 4). The remainder of the valley tributaries are scheduled to be inventoried as soon as weather and growing conditions permit in the spring of 1981.

Future Inventory Needs

Work to be initiated in 1981 and completed by the end of 1982 includes completion of Valley Tributaries inventory, initiation of both the "Northwest Quadrant" inventory and wetland resources in the Wasatch Canyons. All three areas are important from a water quality perspective - particularly in the face of pressure for new development. Public expenditure for water quality management may be precluded and pollution increased if available natural systems are not preserved to augument pollution control.

WETLAND SITE REVIEW FORM

AERIAL PHOTO: T._____ R._____ SEC._____ DATE_____

ADDRESS (APPROXIMATE):_____

LOCATION:_____

PROXIMITY TO OTHER USES:

- COMMERCIAL_____
- INDUSTRIAL_____
- RESIDENTIAL_____
- RECREATION AND OPEN SPACE_____
- AGRICULTURAL_____
- INSTITUTIONAL_____
- EASEMENTS_____
- OTHER (SPECIFY)_____

PHYSICAL CHARACTERISTICS:

- DRAINAGE (RIVER, CREEK, ETC.)_____
- SLOPE_____
- SOILS (SERIES, SATURATED?)_____
- PONDS (DEPTH AND SIZE)_____
- MAJOR VEGETATION (MAP):

DOMINANT SPECIES	%	DOMINANT SPECIES	%

- WILDLIEE OBSERVED _____

WETLAND CLASSIFICATIONS:_____

INDIVIDUAL COMPLEX CLASSIFICATIONS:

1._____	6._____
2._____	7._____
3._____	8._____
4._____	9._____
5._____	10._____

WETLAND CONDITIONS:_____

APPARENT WETLAND IMPORTANCE:

- RECREATION_____
- WILDLIFE_____

FLOOD CONTROL:

- FLOOD PLAIN_____
- STORMWATER_____
- WATER QUALITY_____

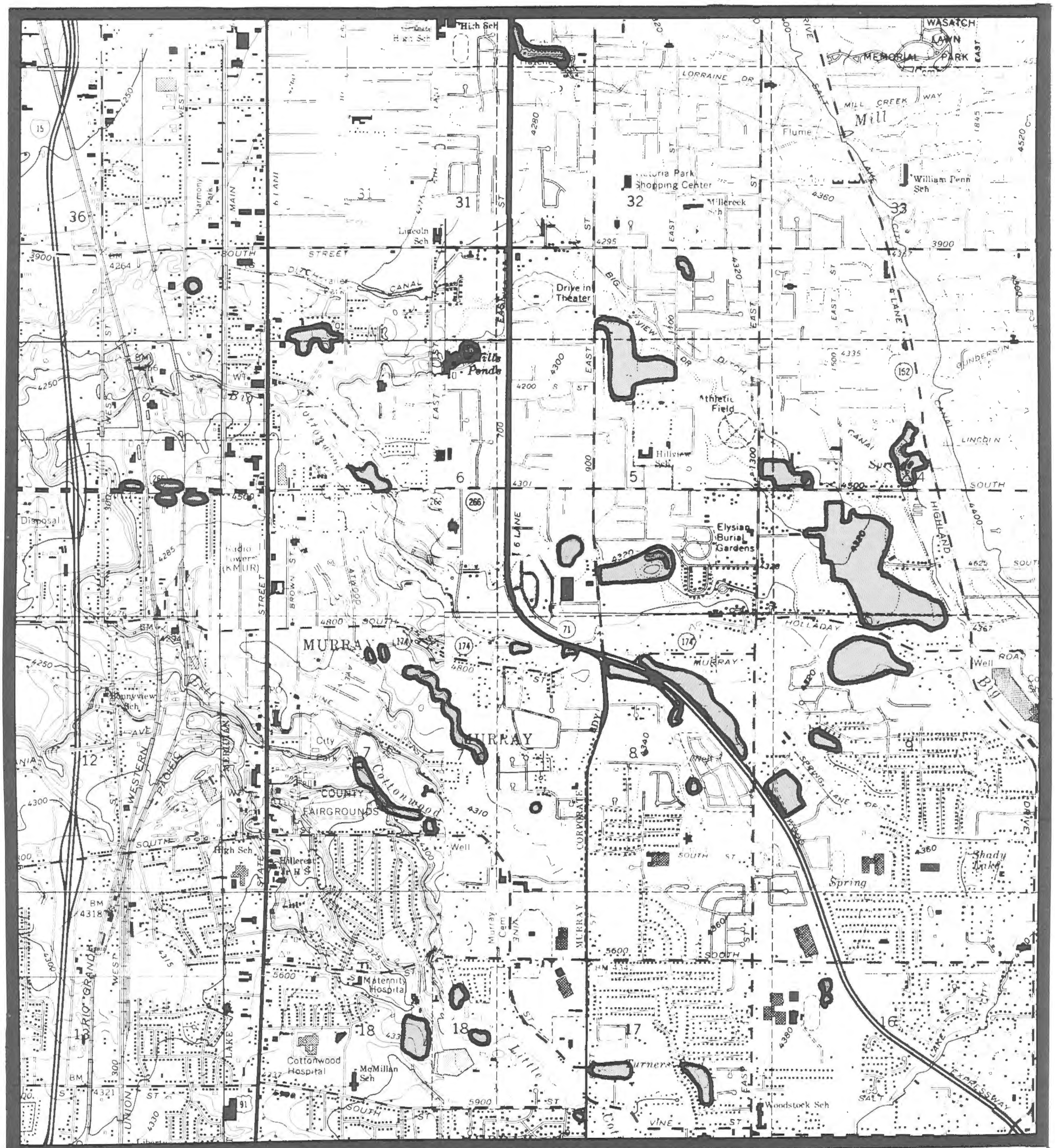
NATURAL OR MAN-MADE/CAUSED:_____

COMMENTS (RECOMMENDATIONS FOR ENHANCEMENT, MITIGATION, ETC.):_____

NOTES:_____

DRAWING: SCALE:

INVESTIGATOR:_____



Salt Lake County Water Quality and Pollution Control

Valley Tributary Wetlands

Financed Under the Federal Clean Water Act of 1977. as Amended

NORTH

0 2000

scale

FIGURE 4

Salt Lake City has plans for the annexation of over 29,000 acres of land in the "Northwest Quadrant" of the County for the purpose of expanding residential, commercial, industrial, facilities.[8] (See Table 2 and Figure 5).

TABLE 2. ADJUSTED ACREAGE FOR WEST AIRPORT STUDY AREA*

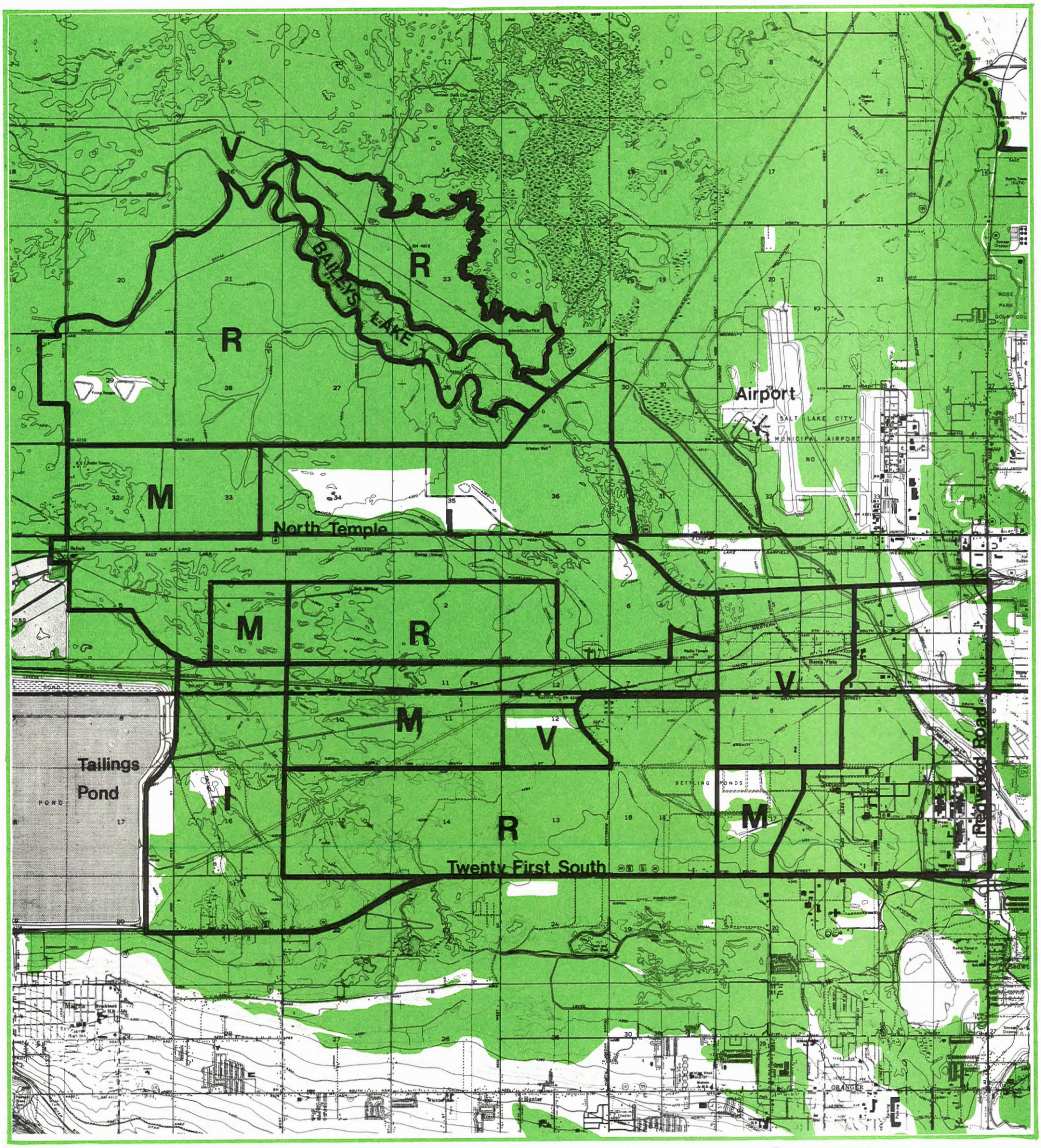
TOTAL	RES.	COMM.	IND.	TRANS.	INST.	UTIL.	PARKS	AG.
%	36.3	8.9	9.7	25.2	7.1	1.0	9.3	2.6
29,065	10,550.6	2586.6	2819.1	7324.4	1062.6	290.6	2702.0	755.7

*Source: Preliminary West Airport Master Plan
Salt Lake City Planning Commission

Since a large portion of the Northwest Quadrant is possible wetland, this area will receive high priority for future inventory efforts to insure any impacts growth might have on the wetlands will be properly mitigated during construction and to emphasize what benefits the wetlands might provide for expected growth.

Due to the vastness of the area (60,000 acres) and the lack of sufficient personnel to conduct an intensive ground inventory, wetland boundaries will be estimated on aerial photos at a scale of 1" = 200' and spot checked on the ground to insure accuracy via a representative grid system. Special emphasis is to be given to those areas to be annexed by Salt Lake City. Vegetation types will be mapped as general communities, with detailed site specific review at the time of 404 Permit application.

The next priority will be to assess wetlands existing in the canyons of the Wasatch. The U.S. Forest Service and the Bureau of Land Management will be consulted as these canyons.



Salt Lake County Water Quality and Pollution Control
Salt Lake City's Land Use Plan for the N.W. Quadrant*

R Residential — Wetland Soil Types

I Industrial

M Mixed Residential & Industrial

V Vacant

N

0 1mi. 2mi.

Scale: 1"=5000'

*Adapted from "General Land Use Plan" map by Nielson, Maxwell & Wangsgard, April 1979.

Financed Under the Federal Clean Water Act of 1977, as Amended

FIGURE 5

come largely under their jurisdiction. If aerial photos of the canyons are available, wetland locations will be outlined on overlays and during the ensuing field inventory actual boundaries and vegetative types will also be sketched on the overlays as accurately as possible. If aerial photos are not available the wetland boundaries will be sketched on 7.5 minute topographic quad maps provided by the U.S. Geological Survey. In addition, a smaller scale map will be sketched showing the vegetative types.

If time allows after the canyon tributaries are inventoried, an in-depth survey of the Jordan River's wetlands will be conducted to verify the inventories conducted by the Corps of Engineers and EPA. Surveying efforts along the Jordan River will be conducted in the same manner as is currently being done for the valley tributaries.

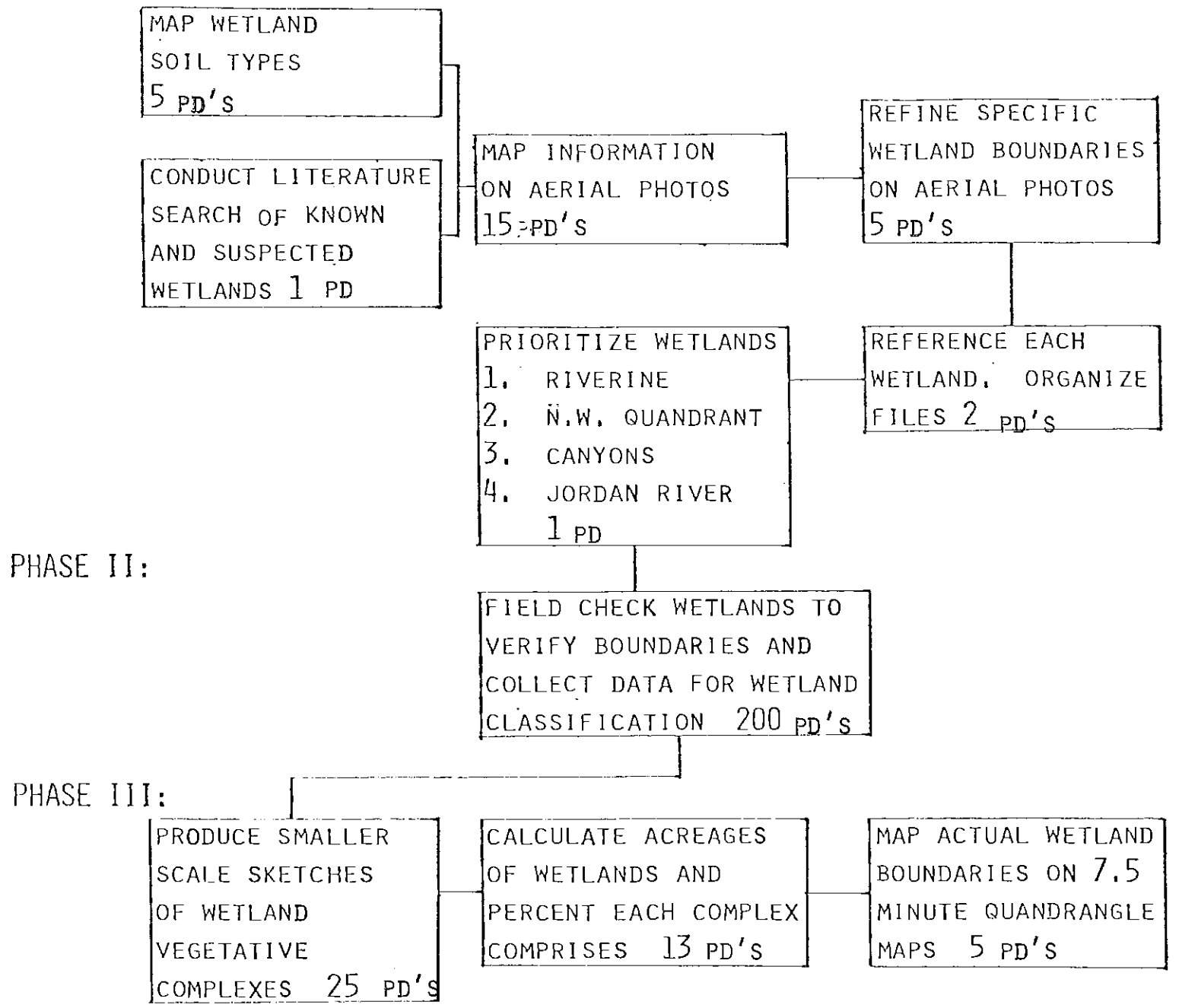
It is estimated that the entire inventory effort will require approximately 480 person days as shown in Table 3 (two person-months have already been expended). In the inventory effort scheduled the local office of the Corps of Engineers has consented to allow one or two of their personnel to assist in the field work.

III. DETAILED SITE SPECIFIC PLANNING APPROACH TO INVENTORY VERIFICATION AND REVIEW

In addition to the on-going inventory process, the Division of Water Quality and Water Pollution Control has inventoried specific wetlands for review and comment on Section 404 Permit applications. The wetlands involved are inventoried using the same method utilized to inventory the valley tributaries. Using the data gathered, the wetlands are analyzed in order to determine priority areas for protection purposes. Comments on the relative importance of the wetland in question and conflicts with proposed land uses are sent to the Corps of Engineers, who has regulatory authority, for their consideration.

TABLE 3

WETLANDS INVENTORY PROGRAM



PD'S = PERSON-DAYS

When determining priority areas, paragraph 320.14 of the 42 Federal Register 37136-7 (1977) is used as a guideline (See Appendix C). Primary attention is given to 320.4 (b) "Effect on Wetlands", i.e. biological functions of wetlands, aquatic environment for wildlife, natural drainage characteristics, sedimentation patterns, flushing characteristics, current patterns, erosion and storm damage protection, storm and flood water storage, groundwater recharge and especially the natural water filtration as it effects water quality.[9]

A summary of application-reviewed wetlands and thier status is given in Table 4, with a description of each wetland resource below:

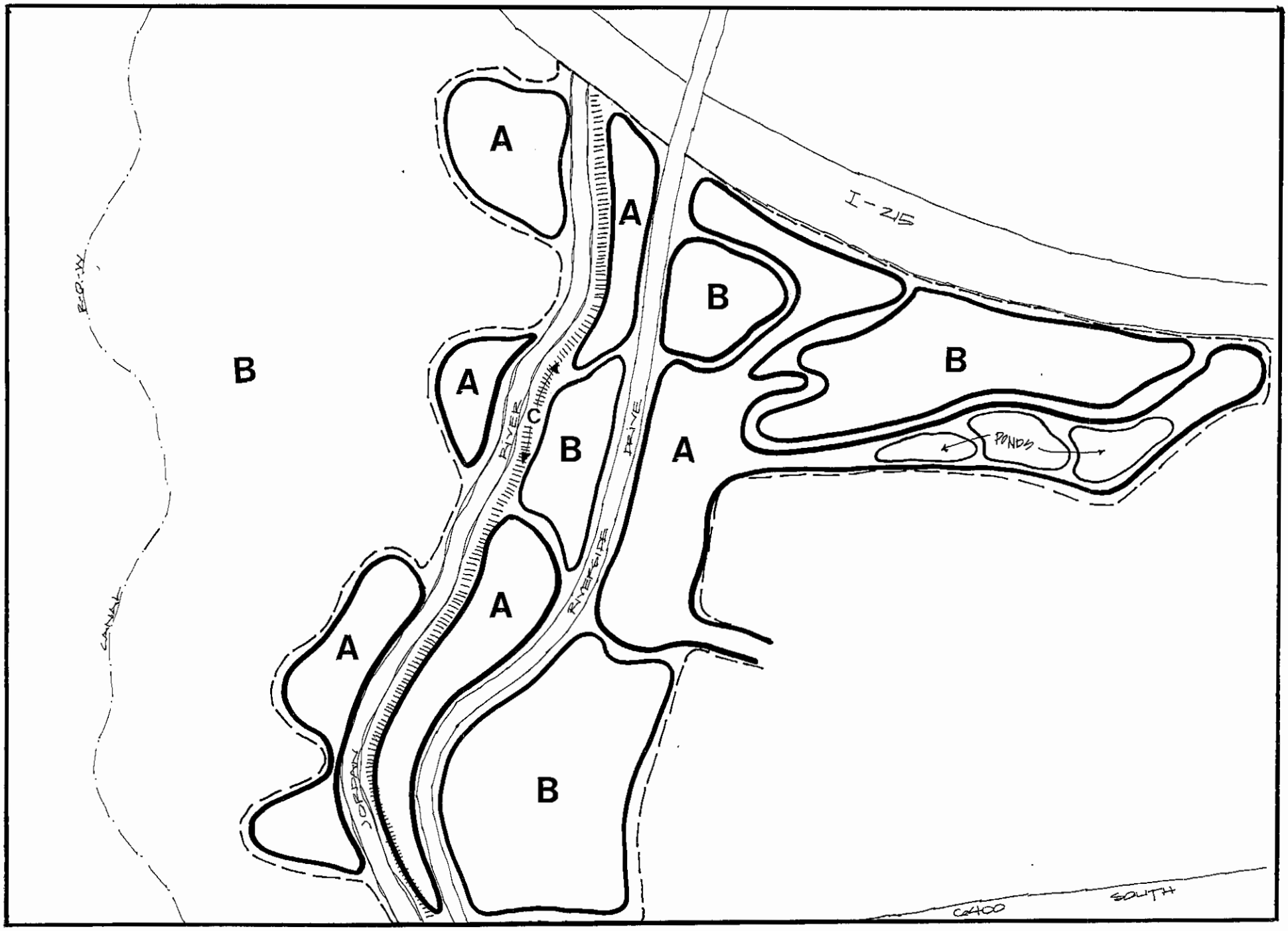
1. Murray City Golf Course

At the request of Murray City a wetland at 6200 South Riverside Drive was inventoried to determine if fill material might be placed to construct a golf course on the site before Murray City purchased the land. Areas were segregated by vegetative types (wetland vs. upland) and the upland types were determined to be suitable for filling but it was advised that the wetland types be left as natural as possible to enhance the naturalness of the area as it eventually becomes integrated with the Jordan River Parkway. (See Figure 6).

A suggestion was made to re-open some old oxbows to allow the river to flow through, increasing storm and flood water holding capacity. Opened oxbows could also serve as desiltation ponds improving water quality of the Jordan River, and improve habitat for fish and waterfowl.

TABLE: 404 PERMIT SUMMARY

APPLICANT OR CASE	WETLAND PRESENT	VALUES ASSESSED	PERMIT APPLICABLE	PERMIT APPROVED	PERMIT DENIED OR CEASE & DESIST ORDER ISSUED	PERMIT UNDER NEGOTIATION
Murray City Golf Course	YES	YES	YES			YES
W.C. Investments	YES	YES	YES			YES
James R. Dean	YES	YES	YES	NO	YES	
Clealon Mann	YES	YES	YES	NO	YES	
City/County Landfill	YES	YES	NO			
Silo Farms Mobile Home Park	NO	YES	NO			
Holladay Wetland Fill	YES	YES	NO			
William O. Adams Development	YES	YES	NO			
Orsen Leavitt	NO	YES	YES	YES		
Salt Lake County/Fur Breeders Agricultural Cooperative	YES	YES	YES	YES		
R. L. Yergensen Development Co.	YES	NO	YES		YES	YES



Salt Lake County Water Quality and Pollution Control
Murray City Golf Course Wetland Analysis

A PRESERVATION/ENHANCEMENT ZONES: Re-contour streambanks & maintain water habitat. Limited footpaths or access. Provide river flood flow through ox-bows.

B MODIFICATION/FILL ZONES: Fill & provide sloping grades to water/ stream habitat. Replace native grasses with domestic varieties.

C DREDGED MATERIAL/ROAD BASE: Remove & use for fill on other areas ("B" Zones).

N

GENERAL WETLAND BOUNDARIES

0 400 800

Scale: 1"=400'

Financed Under the Federal Clean Water Act of 1977, as Amended

FIGURE 6

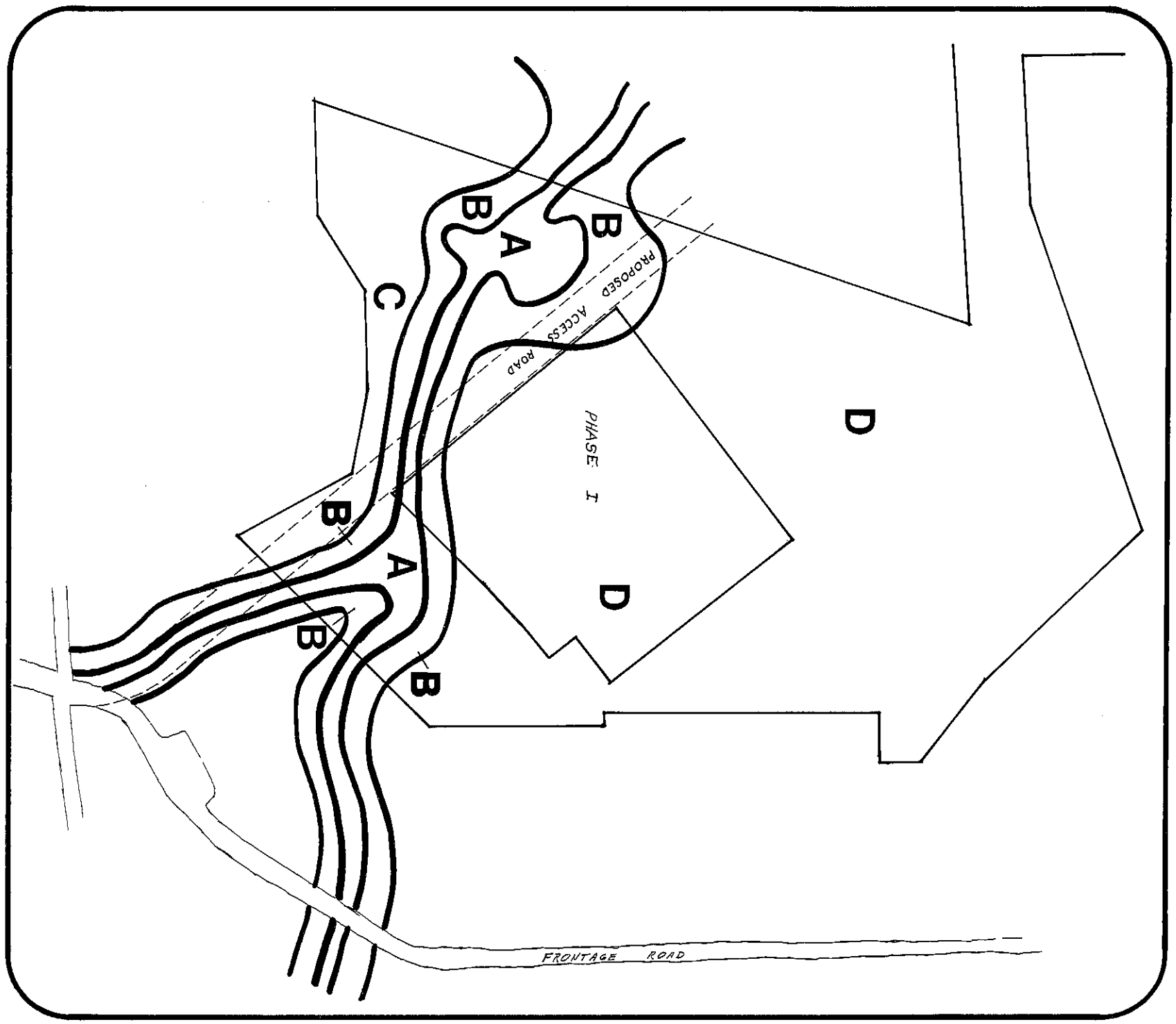
As a result of this inventory the property was re-appraised and determined to be unsuitable for residential development (as was planned by the owner). Therefore the value of the property decreased dramatically allowing Murray City to purchase the property at a great savings to the tax payers.

2. W.C. Investments Development

Upon a request from the Corps of Engineers a wetland at approximately 5300 South 500 West was inventoried to determine where a condominium development might safely be located so as not to destroy wetland values in the area. Examination revealed most of the site to be wetland. However only a relatively small portion (3 to 4 acres) plus a stormwater runoff ditch were determined to be important for natural stormwater filtration purposes. The remainder of the wetlands were considered marginal and of little importance from the standpoint of water quality. (See Figure 7).

As a result of this survey the developer has agreed to avoid the priority areas in his development plans and even enhance wetlands in the common areas. However, the issue has been complicated by Murray City's alignment of Riverside Drive which is designed at present to transect the critical areas.

Presently, the problem is under negotiation between the Corps of Engineers, Murray City, W.C. Investments and the Salt Lake County Division of Water Quality and Water Pollution Control.



Salt Lake County Water Quality and Pollution Control
W.C. Investments Wetland Analysis

A CRITICAL WETLAND AREAS: Contour and stabilize streambanks with riparian vegetation. Leave pond in southwest corner inviolate. Leave all existing riparian vegetation intact.

B NON-ENCROACHMENT ZONE: No development allowed. To be considered a buffer zone.

C OPEN SPACE DEVELOPMENT AND ACTIVITY AREA: Restrict development to open space-recreational use only (ie. tennis courts, swimming pool, etc.)

D HIGH WATER TABLE WETLANDS: Additional subdrainage mitigation costs.

N

0 200 400

Scale: 1"= 200'

Financed Under the Federal Clean Water Act of 1977, as Amended

FIGURE 7

3. James R. Dean Development

At the request of the Corps of Engineers, a wetland next to the Jordan River at approximately 5730 South 1000 West was inventoried to determine if clean fill material could be placed in a wetland to facilitate Mr. Dean's development plans. The inventory indicated the presence of a marginal wetland, however it lies in the standard project flood plain and contains a high water table.

Any development on the site would alter the value of the site for water recharge purposes, detrimentally affect natural drainage characteristics, sedimentation patterns, and flushing characteristics. In addition underground utilities would rapidly deteriorate due to high alkaline soil conditions and it is unlikely sanitary sewer service would be allowed due to location within the flood plain.

Another consideration was the effect the project would have on the Jordan River Parkway. The proposed project lies within the limits of the proposed parkway and would partially compromise the open space corridor for that portion of the Jordan River.

Based on the above comments and comments from other agencies the permit was denied.

4. Clealon Mann Development

At the request of the Corps of Engineers an illegal filling activity of a wetland adjacent to the Jordan River at 780 West 4800 South was investigated to determine the boundaries of the wetland and the extent of the fill. It was discovered that Mr. Mann had filled a

small portion of the wetland including part of an old oxbow pond and had houses already constructed on the fill. Mr. Mann had filed a 404 Permit application indicating that he intended to fill an even larger portion (some 7½ acres), (See Figure 8).

Additional filling was considered unadviseable for several reasons:

1. The site is part of a larger wetland complex comprising several hundreds of acres and as such is extremely important for wildlife habitat.

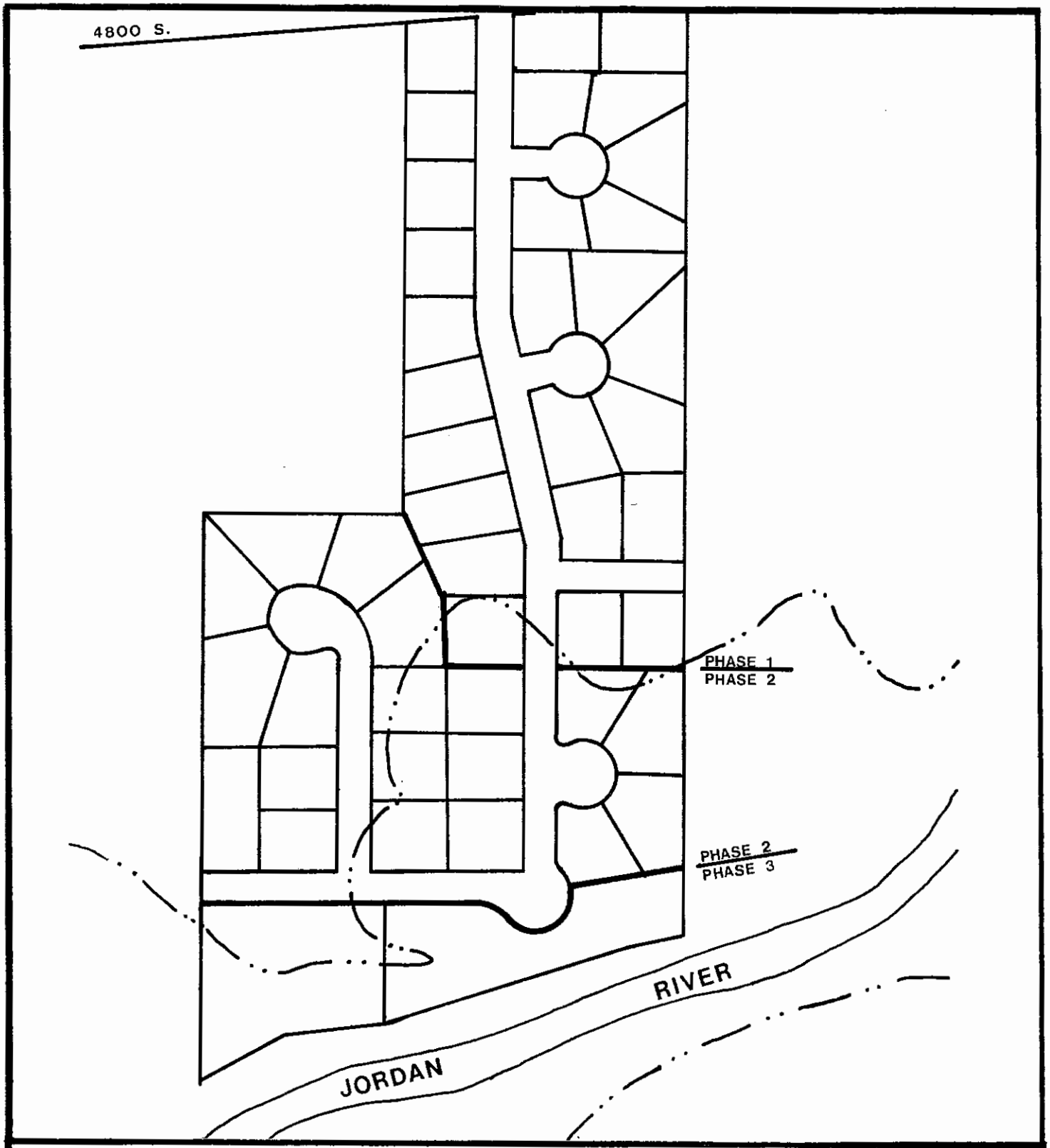
2. The wetland is part of the Jordan River's flood plain. Filling in this area could change natural drainage characteristics, current patterns and would displace the flooding problem onto someone else's property.

3. The wetland could serve as a stormwater filtration system to protect the Jordan River from further degradation.

Taking all of these conflicts into account, it was recommended permission for further filling be denied if it encroached on the wetland. As a result the Corps has denied Mr. Mann's application.

5. City/County Landfill

Salt Lake City and Salt Lake County have plans to develop a sanitary landfill on a portion of the salt marshes south of the Great Salt Lake at 6000 West 1300 South. As a result an inventory of wetland values was conducted to determine if a Corps of Engineers 404 Permit was



Division of Water Quality & Pollution Control
Clealon Mann's Wetland Analysis

NORTH

Wetland boundry

0 200

scale

Financed under Section 208 of the 1977 Clean Water Act, as amended

FIGURE 8

needed. The inventory disclosed that the entire area was a wetland. Also there were several artesian ponds which serve as important habitat for waterfowl (See Figure 9). However, the project was designed to enhance wildlife values over the life of the project and become part of a State game preserve in the future. Therefore concerns about the destruction of wildlife habitat were mitigated.

Since hazardous wastes were planned to be deposited in the area of the artesian ponds, concern was raised about the possibility of groundwater pollution. As a result hazardous wastes have been precluded from being deposited anywhere in the landfill.

The Corps of Engineers did not feel they could exercise authority over a wetland so far removed from the main water way (the Great Salt Lake), therefore, no permit was necessary for activities in the area.

6. Silo Farms Mobile Home Park

Mr. Sid Mulcock of Malibu Investment Co. contacted Water Quality to request a wetland inventory be conducted on his land at 3620 South 1300 West adjacent to the Jordan River. Mulcock was concerned that a 404 Permit might be necessary to construct a mobile home park on his property. An investigation revealed that no wetland values existed on the site and a 404 Permit was not necessary.

7. Holladay Wetland Filling

Mrs. Jana McKinney president of the Utah Chapter of the Audubon Society, contacted Water Quality to report filling near a wetland at 4189 South 900 East. The

Salt Lake County Water Quality and Pollution Control
City/County Sanitary Landfill

1 Saline Flat - Silty clay loam soils, periodically flooded. Vegetation - Saltgrass and Iodinebush. Important waterfowl feeding area.

2 Islands - Loamy soils, poorly drained. Vegetation - Saltgrass, Cheatgrass, various low growing forbs, Greasewood, etc.

3 Railroad and Road Berms

4 Artesian Ponds - Saline water. Vegetation - Saltgrass and Rushes. Important waterfowl resting area.

Saline Marsh - Loamy soils, saturated, incident to artesian ponds. Vegetation - Saltgrass.

N

0 400 800

Scale: 1"= 400'

Financed Under the Federal Clean Water Act of 1977, as Amended

FIGURE 9

Audubon Society maintained that a 404 Permit would be necessary to fill in the wetland so that the filling would be stopped thereby saving some valuable and nearly natural wildlife habitat.

An ensuing field inspection revealed that the fill had not as yet encroached upon the wetland area but merely bordered it. It was also determined that the wetland did not come under the jurisdiction of the Corps of Engineers since it was not incident to any "navigable waters", therefore no 404 Permit was required to fill the area.

8. William O. Adams Development

At the request of Mr. Adams a wetland inventory was conducted on his land at 1250 West 5400 South adjacent to the Jordan River. Mr. Adams was concerned that a 404 Permit would be necessary to subdivide and develop his land.

The site inventory revealed no significant wetlands on the site and that a 404 Permit was not necessary.

9. Orson Leavitt Willow Creek Modification

At the request of the Corps of Engineers an investigation of a wetland adjacent to Willow Creek at about 11100 South 650 West was conducted. Mr. Leavitt wanted permission to vacate a by-pass canal around an existing pond and divert flow back through the pond.

The field examination revealed that no wetlands would be affected. Therefore the Division of Water Quality recommended approval of the project which was in turn granted by the Corps of Engineers.

10. Salt Lake County/Fur Breeders Agricultural Coop Joint Venture

The Fur Breeders Agricultural Coop illegally filled a portion of a wetland at 8800 South 700 West adjacent to the Jordan River for the purpose of constructing a truck terminal/parking lot on the site. In an effort to mitigate the effects of the fill, the Division of Water Quality entered into an agreement with the Fur Breeders that allows the Fur Breeders to construct their parking lot if the fill material is pulled back to a smaller defined area, and restoring the remaining filled area to it's previous natural wetland condition. In return, the Fur Breeders will allow the Division of Water Quality to improve another portion of the wetland by creating an overland flow research site (part of the National Urban Runoff Program) to treat the effluent from a storm drain at 9000 South prior to it's entering the Jordan River (see Figure 10). Wetland vegetation will be planted on the site to facilitate the filtering process.

An application to the Corps of Engineers was submitted for a 404 Permit and is presently under consideration by the Corps of Engineers and other concerned governmental agencies. If permission is granted, the overland flow site should be operational by the Summer of 1981. During the project lifetime, flows will be monitored for quality and quantity at both the stormwater outfall to the wetland and at the discharge point to the river.

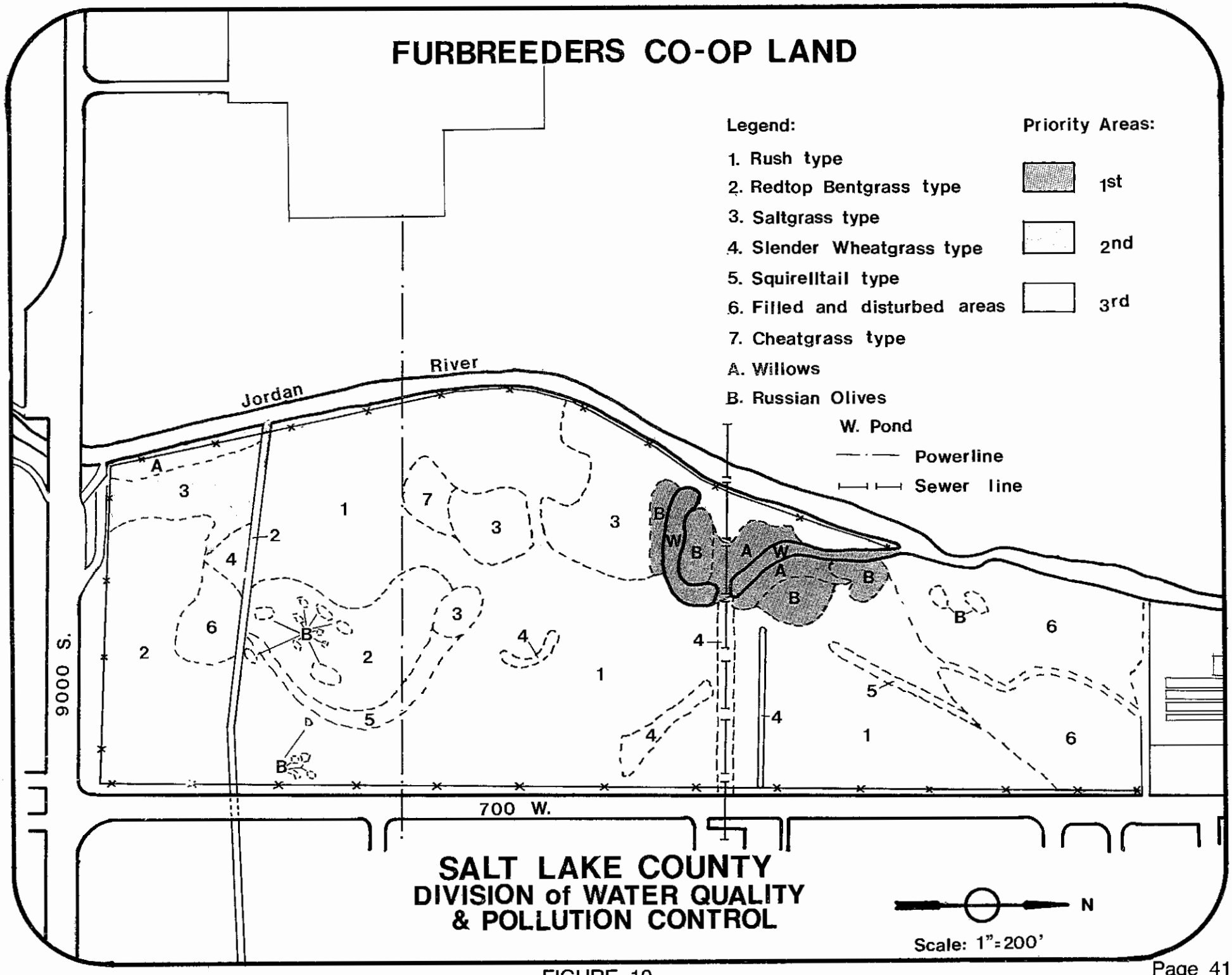

FURBREEDERS CO-OP LAND
Legend:
1. Rush type
2. Redtop Bentgrass type
3. Saltgrass type
4. Slender Wheatgrass type
5. Squirelltail type
6. Filled and disturbed areas
7. Cheatgrass type
A. Willows
B. Russian Olives
W. Pond
Powerline
Sewer line
Priority Areas:
1st
2nd
3rd
Jordan River
9000 S.
700 W.
SALT LAKE COUNTY
DIVISION of WATER QUALITY
& POLLUTION CONTROL
N
Scale: 1"=200'

FIGURE 10

11. R.L. Yergensen Construction Company

At the request of the City of South Jordan, possible illegal filling activity at about 9600 South 900 West was investigated to determine the extent of fill material allegedly placed in a wetland adjacent to the Jordan River. Investigation revealed that significant wetlands had been illegally filled including an old oxbow. Additionally a field of Artic Rushes (Juncus articus) had been burned.

As a result of the investigation a cease and desist order was issued to Mr. Yergensen by the Corps of Engineers.

IV. CONSLUSION: IMPORTANCE OF SALT LAKE COUNTY WETLANDS

Wetlands serve important ecological functions and have practical applications to an urban environment including Flood Control, Wildlife Habitat, Parks and Recreation and Urban Runoff Treatment.

Flood Control

> Only in the past decade or so has the role of wetlands as storm buffers been understood. A flood may be less destructive when marshes and swamps slow velocity and desynchronize peaks of tributary streams as the waters flow through their impeding vegetation and into the main stream. Their action reduces the flood peak along the main stream although it may lengthen the duration of the flood. [3]

In Salt Lake County there may be a potential for flooding as a direct result of past practices of filling wetlands and floodplains as well as from high intensity thundershowers which occur in the area. Therefore without protection, development will continue to fill these wetlands further reducing their flood protection benefits resulting in possibly millions of dollars in damage from future flooding.

Wildlife Habitat

Wetlands serve an important function in the balance of nature. They rate among the most productive lands on the face of the earth. Wetlands provide forage and cover for wildlife, some of which can be harvested by man. In the rural reaches of Salt Lake County, pheasant and duck hunting and some muskrat trapping near wetlands rate among the most popular activities for hunting.[10] Riverine wetlands adjacent to the Jordan River are part of a contiguous wetland system stretching from Utah Lake to the Farmington Bay Refuge near the Great Salt Lake. These wetlands serve migratory waterfowl resting and feeding functions.

Parks and Recreation

According to the U.S. Department of Agriculture's 1972 Book of Agriculture, the Audubon Society of Tacoma, Washington made an attempt to place a dollar figure on nature's amenities:

> What is the value of a tree? A view? Birdlife? The Tacoma Audubon Society, Tacoma, Washington, has prepared a report on the destruction values of various components of a particular landscape. The site is 4,150 acres, the delta of the Nisqually River where it flows into the southern part of Pudget Sound.
>
> Members of the Tacoma Audubon Society, under the guidance of Robert W. Ramsey, a Tacoma landscape architect, carefully established the dollar values of most components of the Nisqually Delta's landscape. The point of this effort was to awaken Tacoma area people to the values of the landscape that would be destroyed if a proposed port is built on the delta.
>
> The authors estimated at $4,000 per lot the value of views that would be lost if the port is built. The total view loss for 530 lots would be $4,120,000.

> Using the National Shade Tree Conference value of trees as $9 per square inch of the tree's diameter at 4½ feet above the ground, together with an assumption of 10 trees of 6-inch diameter for every 1,000 square feet on a 300 acre reforested portion of the proposed port site, the tree destruction value was estimated as $6,657,000.
>
> Valuation of birdlife was $115,000 for the hunting that would be lost and $18,750,000 for an estimated loss of 75,000 new birds per year, computed at $5 per bird over the expected 50-year life of the port.
>
> Loss of grass, soil, and other landscape components were included. The total values that would be destroyed were put at $40,617,000.
>
> The Landscape Destruction Value Doctrine propounded by the Tacoma Audubon Society states that developers "should pay to a public body of jurisdiction a destruction penalty equal to the appraised ecological loss incurred". It is further recommended that such funds be used only to administer programs for land acquisition, and for protection, management, and maintenance of greenbelts, wetlands, shorelands, etc.[11]

These costs were determined in 1972 and need to be adjusted up to equal 1980 costs. Assuming an average compounded rate of 8% inflation over the past eight years, the 1981 damages are estimated at $81,193,571.

A similar cost estimate as that shown above could be calculated for wetlands in Salt Lake County.

The wetlands along the Jordan River tend to create a "Green Belt" which traverses through the urbanized areas of the county. Studies have shown that a green belt in an urban setting is extremely important to the psychological and emotional mood of the residents.[11, 12] Lakes, ponds and rolling meadows all tend to create a quieting and calming effect. The importance of preserving

this green belt is magnified in view of the defeat of the county-wide Recreation Land Aquisition bond measure in 1974. That measure would have satisfied recreation acreage needs for Salt Lake County through 1995.[13] The Jordan River corridor is one of the few valley recreational open space resources left in Salt Lake County.

Water Quality: Urban Runoff Treatment

The greatest concern of Salt Lake County, as the local area-wide 208 Planning Agency, is the impact wetlands have on clean water. As shown in a study of the Wayzata Wetland in Minnesota:

> Four mechanisms are at work in the wetland system. These are physical entrapment, microbial utilization, plant uptake, and adsorption. Physical entrapment is an apparent reality in that 94 percent of the total suspended solids discharged to the wetland were retained. Following entrapment, nutrients are held in fibrous organic soil until the microbial utilization mechanism becomes operative.[14]

This data may be used to determine the pollutant loading generated by certain land use types and to determine the approximate wetland area required in a non-structural mode to renovate the stormwater runoff.

> Table 5 shows the ratio by land use categories of developed area to the required treatment area. The table is based on the loading of phosphorus fournd during the project; however, other constraints could be applied and the results would be modified appropriately. Such constraints include allowable effluent concentration of a given parameter, the physical, microbiological, and chemical characteristics of the treatment area, and the hydrologic setting of the system.[14]

TABLE FIVE. TYPICAL LAND REQUIREMENTS FOR NON-STRUCTURAL RUNOFF TREATMENT SYSTEMS

DRAINAGE GROUP	RATIO OF DEVELOPED AREA TO * WETLAND TREATMENT AREA
I - Single Family, Large Lots	5:1
II - Single Family, Small Lots	3:1
III - Strip Development Traffic Corridor	5:1
IV - Shopping Center	1:1

* Using an allowable loading rate of 2.9 lb/ac/yr of phosphorus.

Of all the wetlands estimated to exist in Salt Lake County, only the approximately 1,650 acres adjacent to the Jordan River and its tributaries may be considered practical for urban runoff treatment. It is estimated that the cost of urban runoff treatment facilities, without the use of wetlands, will cost Salt Lake County $21,000,000 at 1977 costs. These facilities will treat 10,500 acres of urban runoff, (see Table six) at a cost of $2,000 per acre. Assuming each acre of wetland can treat an average of three acres of urban land (as implied by Hickok), the existing 1,650 acres of wetlands could be used to treat 4,950 acres, saving Salt Lake County an estimated 9,900,000.

As explained above, a pilot project is presently being implemented to treat the effluent from the 9000 South storm drain across a wetland owned by the Fur Breeders Agricultural Coop. It is expected that a demonstrable difference can be shown between the stormwater outfall and the discharge point to the Jordan River as a direct result of the filtering and microbial action of the wetland vegetation to be planted.

Salt Lake County is also involved in a nation-wide project to assess the quality of urban stormwater runoff, known as the National Urban Runoff Program. It is expected the results of the project will show a need for stormwater treatment facilities many of which are already in place - wetlands.

> Researchers can tell us a great deal today about the structure and functions of wetlands. They will offer us new information and new insights in the months and years ahead. But how we use this information is up to us. Ultimately the answer to the query - what is a marsh worth? - will not be resolved by ecologists or economists. Whether we elect to save our wetlands will not be a scientific decision but a social decision made up of an infinite number of small and large choices and actions in which each of us, if we wish, can play a part. [3]

TABLE SIX. COST ESTIMATE FOR WET WEATHER DISCHARGE FACILITIES*

ACREAGE BENEFITTED BY DETENTION BASINS = 10,500 ACRES	
COST PER ACRE FOR DETENTION BASINS = $2,000.00	$21,000,000.00
MINUS CONSTRUCTION JOBS COMPLETED	3,000,000.00
TOTAL COSTS FOR DETENTION BASINS	18,000,000.00
LOWER JORDAN RIVER DEVELOPMENT	34,864,000.00
TOTAL	$52,864,000.00

* ESTIMATED AS OF SEPTEMBER 1977 BY USING THE ENGINEERING NEWS RECORD CONSTRUCTION COST INDEX (DENVER).

SOURCE: SALT LAKE COUNTY AREA-WIDE WATER QUALITY MANAGEMENT PLAN 1978

In his Environmental Message to Congress, President Jimmy Carter reminded the nation that "none of us is a stranger to environmental problems". In elevating environmental protection from the purely legislative to the executive realm, he made official a view that many concerned citizens have espoused, that "intelligent stewardship of the environment on behalf of all Americans is a prime responsibility of government". [2]

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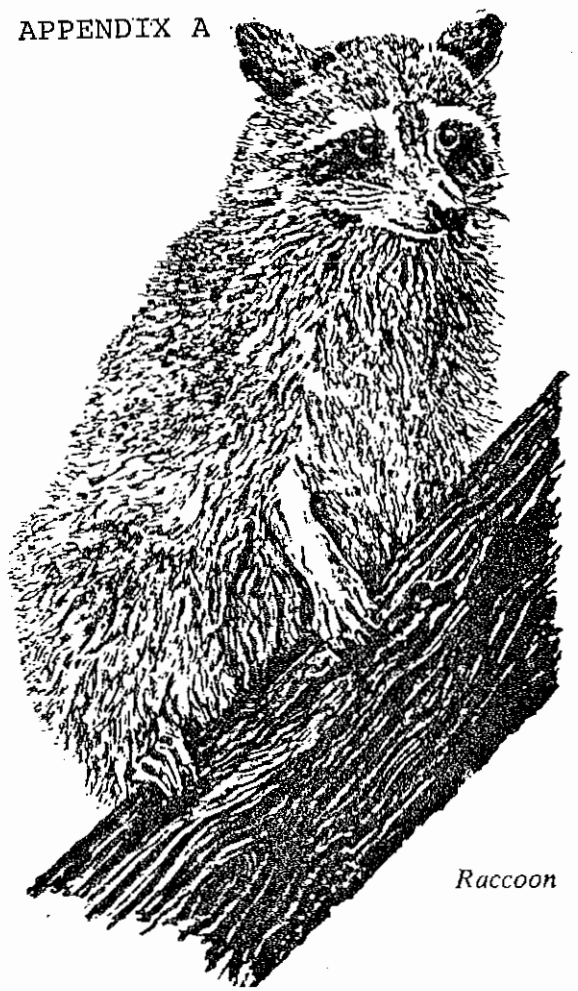
[14] Eugene A. Hickok, "Wetlands for the Control of Urban Stormwater Proceedings - National Conference on Urban Erosion and Sediment Control, Environmental Protection Agency, October 10-12, 1980, pp. 79-88.

APPENDIX

APPENDIX A



Raccoon

PERMITS FOR DREDGED OR FILL MATERIAL

Sec. 404. (a) The Secretary may issue permits, after notice and opportunity for public hearings for the discharge of dredged or fill material into the navigable waters at specified disposal sites. Not later than the fifteenth day after the date an applicant submits all the information required to complete an application for a permit under this subsection, the Secretary shall publish the notice required by this subsection.

(b) Subject to subsection (c) of this section, each such disposal site shall be specified for each such permit by the Secretary (1) through the application of guidelines developed by the Administrator, in conjunction with the Secretary, which guidelines shall be based upon criteria comparable to the criteria applicable to the territorial seas, the contiguous zones, and the ocean under section 403(c), and (2) in any case where such guidelines under clause (1) alone would prohibit the specification of a site, through the application additionally of the economic impact of the site on navigation and anchorage.

(c) The Administrator is authorized to prohibit the specification (including the withdrawal of specification) of any defined area as a disposal site, and he is authorized to deny or restrict the use of any defined area for specification (including the withdrawal of specification) as a disposal site, whenever he determines, after notice and opportunity for public hearings, that the discharge of such materials into such area will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas. Before making such determination, the Administrator shall consult with the Secretary. The Administrator shall set forth in writing and make public his findings and his reasons for making any determination under this subsection.

(d) The term "Secretary" as used in this section means the Secretary of the Army, acting through the Chief of Engineers.

(e) (1) In carrying out his functions relating to the discharge of dredged or fill material under this section, the Secretary may, after notice and opportunity for public hearing, issue general permits on a State, regional, or nationwide basis for any category of activities involving discharges of dredged or fill material if the Secretary determines that the activities in such category are similar in nature, will cause only minimal adverse environmental effects when performed separately, and will have only minimal cumulative adverse effect on the environment. Any general permit issued under this subsection shall (A) be based on the guidelines described in subsection (b) (1) of this section, and (B) set forth the requirements and standards which shall apply to any activity authorized by such general permit.

(2) No general permit issued under this subsection shall be for a period of more than five years after the date of its issuance and such general permit may be revoked or modifed by the Secretary if, after opportunity for public hearing, the Secretary determines that the activities authorized by such general permit have an adverse impact on the environment or such activities are more appropriately authorized by individual permits.

(f) (1) Except as provided in paragraph (2) of this subsection, the discharge of dredge or fill material—

(A) from normal farming, silviculture, and ranching activities such as plowing, seeding, cultivating, minor drainage, harvesting for the production of food, fiber, and forest products, or upland soil and water conservation practices;

(B) for the purpose of maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, and bridge abutments or approaches, and transportation structures;

(C) for the purpose of construction or maintenance of farm or stock ponds or irrigation ditches, or the maintenance of drainage ditches;

(D) for the purpose of construction of temporary sedimentation basins on a construction site which does not include placement of fill material into the navigable waters;

(E) for the purpose of construction or maintenance of farm roads or forest roads, or temporary roads for moving mining equipment, where such roads are constructed and maintained, in accordance with best management practices, to assure that flow and circulation patterns and chemical and biological characteristics

of the navigable waters are not impaired, that the reach of the navigable waters is not reduced, and that any adverse effect on the aquatic environment will be otherwise minimized;

(F) resulting from any activity with respect to which a State has an approved program under section 208(b) (4) which meets the requirements of subparagraphs (B) and (C) of such section, is not prohibited by or otherwise subject to regulation under this section or section 301(a) or 402 of this Act (except for effluent standards or prohibitions under section 307).

(2) Any discharge of dredged or fill material into the navigable waters incidental to any activity having as its purpose bringing an area of the navigable waters into a use to which it was not previously subject, where the flow or circulation of navigable waters may be impaired or the reach of such waters be reduced, shall be required to have a permit under this section.

(g) (1) The Governor of any State desiring to administer its own individual and general permit program for the discharge of dredged or fill material into the navigable waters (other than those waters which are presently used, or are susceptible to use in their natural condition or by reasonable improvement as a means to transport interstate or foreign commerce shoreward to their ordinary high water mark, including all waters which are subject to the ebb and flow of the tide shoreward to their mean high water mark, or mean higher high water mark on the west coast, including wetlands adjacent thereto), within its jurisdiction may submit to the Administrator a full and complete description of the program it proposes to establish and administer under State law or under an interstate compact. In addition, such State shall submit a statement from the attorney general (or the attorney for those State agencies which have independent legal counsel), or from the chief legal officer in the case of an interstate agency, that the laws of such State, or the interstate compact, as the case may be, provide adequate authority to carry out the described program.

(2) Not later than the tenth day after the date of the receipt of the program and statement submitted by any State under paragraph (1) of this subsection, the Administrator shall provide copies of such program and statement to the Secretary and the Secretary of the Interior, acting through the Director of the United States Fish and Wildlife Service.

(3) Not later than the ninetieth day after the date of the receipt by the Administrator of the program and statement submitted by any State, under paragraph (I) of this subsection, the Secretary and the Secretary of the Interior, acting through the Director of the United States Fish and Wildlife Service, shall submit any comments with respect to such program and statement to the Administrator in writing.

(h) (1) Not later than the one-hundred-twentieth day after the date of the receipt by the Administrator of a program and statement submitted by any State under paragraph (1) of this subsection, the Administrator shall determine, taking into account any comments submitted by the Secretary and the Secretary of the Interior, acting through the Director of the United States Fish and Wildlife Service, pursuant to subsection (g) of this section, whether such State has the following authority with respect to the issuance of permits pursuant to such program:

(A) To issue permits which—

(i) apply and assure compliance with, any applicable requirements of this section, including, but not limited to, the guidelines established under section (b) (1) of this section, and sections 307 and 403 of this Act;

(ii) are for fixed terms not exceeding five years; and

(iii) can be terminated or modified for cause including, but not limited to, the following:

(I) violation of any condition of the permit;

(II) obtaining a permit by misrepresentation, or failure to disclose fully all relevant facts;

(III) change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

(B) To issue permits which apply, and assure compliance with, all applicable requirements of section 308 of this Act, or to inspect, monitor, enter, and require reports to at least the same extent as required in section 308 of this Act.

(C) To assure that the public, and any other State the waters of which may be affected, receive notice of each application for a permit and to provide an opportunity for public hearing before a ruling on each such application.

(D) To assure that the Administrator receives notice of each application (including a copy thereof) for a permit.

(E) To assure that any State (other than the permitting State), whose waters may be affected by the issuance of a permit may submit written recommendation to the permitting State (and the Administrator) with respect to any permit application and, if any part of such written recommendations are not accepted by the permitting State, that the permitting State will notify such affected State (and the Administrator) in writing of its failure to so accept such recommendations together with its reasons for so doing.

(F) To assure that no permit will be issued if, in the judgment of the Secretary, after consultation with the Secretary of the department in which the Coast Guard is operating, anchorage and navigation of any of the navigable water would be substantially impaired thereby.

(G) To abate violations of the permit or the permit program, including civil and criminal penalties and other ways and means of enforcement.

(H) To assure continued coordination with Federal and Federal-State water-related planning and review processes.

(2) If, with respect to a State program submitted under subsection (g) (1) of this section, the Administrator determines that such State—

(A) has the authority set forth in paragraph (1) of this subsection, the Administrator shall approve the program and so notify (i) such State, and (ii) the Secretary, who upon subsequent notification from such State that it is administering such program, shall suspend the issuance of permits under subsection (a) and (e) of this section for activities with respect to which a permit may be issued pursuant to such State program; or

(B) does not have the authority set forth in paragraph (1) of this subsection, the Administrator shall so notify such State, which notification shall also describe the revisions or modifications necessary so that such State may resubmit such program for a determination by the Administrator under this subsection.

(3) If the Administrator fails to make a determination with respect to any program submitted by a State under subsection (g) (1) of this section within one-hundred-twenty days after the date of the receipt of such program, such program shall be deemed approved pursuant to paragraph (2) (A) of this subsection and the Administrator shall so notify such State and the Secretary who, upon subsequent notification from such State that it is administering such program, shall suspend the issuance of permits under subsection (a) and (e) of this section for activities with respect to which a permit may be issued by such State.

(4) After the Secretary receives notification from the Administrator under paragraph (2) or (3) of this subsection that a State permit program has been approved, the Secretary shall transfer any applications for permits before the Secretary for activities with respect to which a permit may be issued pursuant to such State program to such State for appropriate action.

(5) Upon notification from a State with a permit program approved under this subsection that such State intends to administer and enforce the terms and conditions of a general permit issued by the Secretary under subsection (e) of this section with respect to activities in such State to which such general permit applies, the Secretary shall suspend the administration and enforcement of such general permit with respect to such activities.

(i) Whenever the Administrator determines after public hearing that a State is not administering a program approved under section (h) (2) (A) of this section, in accordance with this section, including, but not limited to, the guidelines established under subsection (b) (1) of this section, the Administrator shall so notify the State, and, if appropriate corrective action is not taken within a reasonable time, not to exceed ninety days after the date of the receipt of such notification, the Administrator shall (1) withdraw approval of such program until the Administrator determines such corrective action has been taken, and (2) notify the Secretary that the Secretary shall resume the program for the issuance of permits under subsections (a) and (e) of this section for activities with respect to which the State was issuing permits and that such authority of the Secretary shall continue in effect until such time as the Administrator makes the determination described in clause (1) of this subsection and such State again has an approved program.

(j) Each State which is administering a permit program pursuant to this section shall transmit to the Administrator (1) a copy of each permit application received by such State and provide notice to the Administrator of every action related to the consideration of such permit application, including each permit proposed to be issued by such State, and (2) a copy of each proposed general permit which such State intends to issue. Not later than the tenth day after the date of the receipt of such permit application or such proposed general permit, the Administrator shall provide copies of such permit application or such proposed general permit to the Secretary and the Secretary of the Interior, acting through the Director of the United States Fish and Wildlife Service. If the Administrator intends to provide written comments to such State with respect to such permit application or such proposed general permit, he shall so notify such State not later than the thirtieth day after the date of the receipt of such application or such proposed general permit and provide such written comments to such State, after consideration of any comments made in writing with respect to such application or such proposed general permit by the Secretary and the Secretary of the Interior, acting through the Director of the United States Fish and Wildlife Service, not later than the ninetieth day after the date of such receipt. If such State is so notified by the Administrator, it shall not issue the proposed permit until after the receipt of such comments from the Administrator, or after such ninetieth day, whichever first occurs. Such State shall not issue such proposed permit after such ninetieth day if it has received such written comments in which the Administrator objects (A) to the issuance of such proposed permit and such proposed permit is one that has been submitted to the Administrator pursuant to subsection (h) (1) (E), or (B) to the issuances of such proposed permit as being outside the requirements of this section, including, but not limited to, the guidelines developed under subsection (b) (1) of this section unless it modifies such proposed permit in accordance with such comments. Whenever the Administrator objects to the issuance of a permit under the preceding sentence such written objection shall contain a statement of the reasons for such objection and the conditions which such permit would include if it were issued by the Administrator. In any case where the Administrator objects to the issuance of a permit, on request of the State, a public hearing shall be held by the Administrator on such objection. If the State does not resubmit such permit revised to meet such objection within 30 days after completion of the hearing or, if no hearing is requested within 90 days after the date of such objection, the Secretary may issue the permit pursuant to subsection (a) or (e) of this section, as the case may be, for such source in accordance with the guidelines and requirements of this Act.

(k) In accordance with guidelines promulgated pursuant to subsection (h) (2) of section 304 of this Act, the Administrator is authorized to waive the requirements of subsection (j) of this section at the time of the approval of a program pursuant to subsection (h) (2) (A) of this section for any category (including any class, type, or size within such category) of discharge within the State submitting such program.

(l) The Administrator shall promulgate regulations establishing categories of discharges which he determines shall not be subject to the requirements of subsection (j) of this section in any State with a program approved pursuant to subsection (h) (2) (A) of this section. The Administrator may distinguish among classes, types, and sizes within any category of discharges.

(m) Not later than the ninetieth day after the date on which the Secretary notifies the Secretary of the Interior, acting through the Director of the United States Fish and Wildlife Service that (1) an application for a permit under subsection (a) of this section has been received by the Secretary, or (2) the Secretary proposes to issue a general permit under subsection (e) of this section, the Secretary of the Interior, acting through the Director of the United States Fish and Wildlife Service, shall submit any comments with respect to such application or such proposed general permit in writing to the Secretary.

(n) Nothing in this section shall be construed to limit the authority of the Administrator to take action pursuant to section 309 of this Act.

(o) A copy of each permit application and each permit issued under this section shall be available to the public. Such permit application or portion thereof, shall further be available on request for the purpose of reproduction.

(p) Compliance with a permit issued pursuant to this section, including any activity carried out pursuant to a general permit issued under this section, shall be deemed compliance, for purposes of sections 309 and 505, with sections 301, 307, and 403.

(q) Not later than the one-hundred-eightieth day after the date of enactment of this subsection, the Secretary shall enter into agreements with the Administrator, the Secretaries of the Departments of Agriculture, Commerce, Interior, and Transportation, and the heads of other appropriate Federal agencies to minimize, to the maximum extent practicable, duplication, needless paperwork, and delays in the issuance of permits under this section. Such agreements shall be developed to assure that, to the maximum extent practicable, a decision with respect to an application for a permit under subsection (a) of this section will be made not later than the ninetieth day after the date the notice of such application is published under subsection (a) of this section.

(r) The discharge of dredged or fill material as part of the construction of a Federal project specifically authorized by Congress, whether prior to or on or after the date of enactment of this subsection, is not prohibited by or otherwise subject to regulation under this section, or a State program approved under this section, or section 301(a) or 402 of the Act (except for effluent standards or prohibitions under section 307), if information on the effects of such discharge, including consideration of the guidelines developed under subsection (b) (1) of this section, is included in an environmental impact statement for such project pursuant to the National Environmental Policy Act of 1969 and such environmental impact statement has been submitted to Congress before the actual discharge of dredged or fill material in connection with the construction of such project and prior to either authorization of such project or an appropriation of funds for each construction.

(s) (1) Whenever on the basis of any information available to him the Secretary finds that any person is in violation of any condition or limitation set forth in a permit issued by the Secretary under this section, the Secretary shall issue an order requiring such persons to comply with such condition or limitation, or the Secretary shall bring a civil action in accordance with paragraph (3) of this subsection.

(2) A copy of any order issued under this subsection shall be sent immediately by the Secretary to the State in which the violation occurs and other affected States. Any order issued under this subsection shall be by personal service and shall state with reasonable specificity the nature of the violation, specify a time for compliance, not to exceed thirty days, which the Secretary determines is reasonable, taking into account the seriousness of the violation and any good faith efforts to comply with applicable requirements. In any case in which an order under this subsection is issued to a corporation, a copy of such order shall be served on any appropriate corporate officers.

(3) The Secretary is authorized to commence a civil action for appropriate relief, including a permanent or temporary injunction for any violation for which he is authorized to issue a compliance order under paragraph (1) of this subsection. Any action under this paragraph may be brought in the district court of the United States for the district in which the defendant is located or resides or is doing business, and such court shall have jurisdiction to restrain such violation and to require compliance. Notice of the commencement of such action shall be given immediately to the appropriate State.

(4) (A) Any person who willfully or negligently violates any condition or limitation in a permit issued hy the Secretary under this section shall be punishcd by a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than one year, or by both. If the conviction is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $50,000 per day of violation, or by imprisonment for not more than two years, or by both.

(B) For the purposes of this paragraph, the term "person" shall mean, in addition to the definition con-

tained in section 502(5) of this Act, any responsible corporate officer.

(5) Any person who violates any condition or limitation in a permit issued by the Secretary under this section, and any person who violates any order issued by the Secretary under paragraph (1) of this subsection, shall be subject to a civil penalty not to exceed $10,000 per day of such violation.

(t) Nothing in this section shall preclude or deny the right of any State or interstate agency to control the discharge of dredged or fill material in any portion of the navigable waters within the jurisdiction of such State, including any activity of any Federal agency, and each such agency shall comply with such State or interstate requirements both substantive and procedural to control the discharge of dredged or fill material to the same extent that any person is subject to such requirements. This section shall not be construed as affecting or impairing the authority of the Secretary to maintain navigation.

Statement by the President Accompanying Executive Order 11990

42 *Fed. Reg.* 26961 (1977)

By virtue of the authority vested in me by the Constitution and statutes of the United States of America, and as President of the United States of America, in furtherance of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 *et seq.*), in order to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative, it is hereby ordered as follows:

SECTION 1. (a) Each agency shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; and (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

(b) This Order does not apply to the issuance by Federal agencies of permits, licenses, or allocations to private parties for activities involving wetlands on non-Federal property.

SEC. 2. (a) In furtherance of Section 101(b)(3) of the National Environmental Policy Act of 1969 (42 U.S.C. 4331(b)(3)) to improve and coordinate Federal plans, functions, programs and resources to the end that the Nation may attain the widest range of beneficial uses of the environment without degradation and risk to health or safety, each agency, to the extent permitted by law, shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such construction, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use. In making this finding the head of the agency may take into account economic, environmental and other pertinent factors.

(b) Each agency shall also provide opportunity for early public review of any plans or proposals for new construction in wetlands in accordance with Section 2(b) of Executive Order No. 11514, as amended, including the development of procedures to accomplish this objective for Federal actions whose impact is not significant enough to require

The peregrin falcon, an endangered species

the preparation of an environmental impact statement under Section 102(2)(C) of the National Environmental Policy Act of 1969, as amended.

SEC. 3. Any requests for new authorizations or appropriations transmitted to the Office of Management and Budget shall indicate, if an action to be proposed will be located in wetlands, whether the proposed action is in accord with this Order.

SEC. 4. When Federally-owned wetlands or portions of wetlands are proposed for lease, easement, right-of-way or disposal to non-Federal public or private parties, the Federal agency shall (a) reference in the conveyance those uses that are restricted under identified Federal, State or local wetlands regulations; and (b) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successor, except where prohibited by law; or (c) withhold such properties from disposal.

SEC. 5. In carrying out the activities described in Section 1 of this Order, each agency shall consider factors relevant to a proposal's effect on the survival and quality of the wetlands. Among these factors are:

(a) public health, safety, and welfare, including water supply, quality, recharge and discharge; pollution; flood and storm hazards; and sediment and erosion;

(b) maintenance of natural systems, including conservation and long term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, wildlife, timber, and food and fiber resources; and

(c) other uses of wetlands in the public interest, including recreational, scientific, and cultural uses.

SEC. 6. As allowed by law, agencies shall issue or amend their existing procedures in order to comply with this Order. To the extent possible, existing processes, such as those of the Council on Environmental Quality and the Water Resources Council, shall be utilized to fulfill the requirements of this Order.

SEC. 7. As used in this Order:

(a)The term "agency" shall have the same meaning as the term "Executive agency" in Section 105 of Title 5 of the United States Code and shall include the military departments; the directives contained in this Order, however, are meant to apply only to those agencies which perform the activities described in Section 1 which are located in or affecting wetlands.

(b) The term "new construction" shall include draining, dredging, channelizing, filling, diking, impounding, and related activities and any structures or facilities begun or authorized after the effective date of this Order.

(c) The term "wetlands" means those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.

SEC. 8. This Order does not apply to projects presently under construction, or to projects for

which all of the funds have been appropriated through Fiscal Year 1977, or to projects and programs for which a draft or final environmental impact statement will be filed prior to October 1, 1977. The provisions of Section 2 of this Order shall be implemented by each agency not later than October 1, 1977.

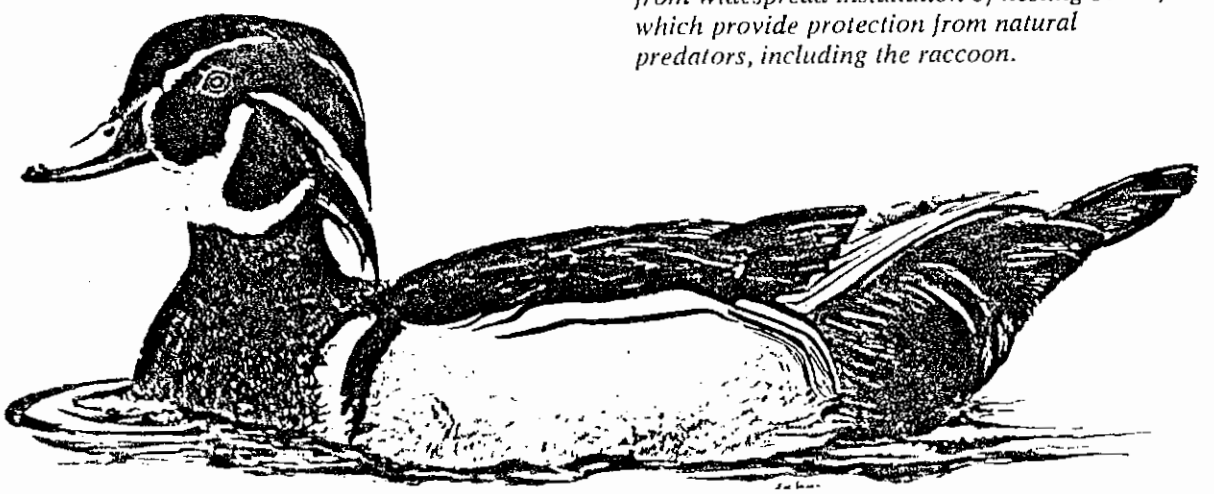
SEC. 9. Nothing in this Order shall apply to assistance provided for emergency work, essential to save lives and protect property and public health and safety, performed pursuant to Section 305 and 306 of the Disaster Relief Act of 1974 (88 Stat. 148, 42 U.S.C. 5145 and 5146).

SEC. 10. To the extent the provisions of Sections 2 and 5 of this Order are applicable to projects covered by Section 104(h) of the Housing and Community Development Act of 1974, as amended (88 Stat. 640, 42 U.S.C. 5304(h)), the responsibilities under those provisions may be assumed by the appropriate applicant, if the applicant has also assumed, with respect to such projects, all of the responsibilities for environmental review, decision-making, and action pursuant to the National Environmental Policy Act of 1969, as amended.

JIMMY CARTER

The White House,
May 24, 1977.

A male wood duck. Wood ducks have profited from widespread installation of nesting boxes, which provide protection from natural predators, including the raccoon.



APPENDIX C

• U.S. Army Corps of Engineers' Public Interest Review and Wetlands Policy

42 *Fed. Reg.* 37136-37 (1977)

§ 320.4 General policies for evaluating permit applications.

The following policies shall be applicable to the review of all applications for Department of the Army permits. Additional policies specifically applicable to certain types of activities are identified in Parts 321–324 of this chapter.

(a) *Public interest review.* (1) The decision whether to issue a permit will be based on an evaluation of the probable impact of the proposed activity and its intended use on the public interest. Evaluation of the probable impact which the proposed activity may have on the public interest requires a careful weighing of all those factors which become relevant in each particular case. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. The decision whether to authorize a proposal, and if so, the conditions under which it will be allowed to occur, are therefore determined by the outcome of the general balancing process (e.g., see 33 CFR 209.400, Guidelines for Assessment of Economic, Social and Environmental Effects of Civil Works Projects). That decision should reflect the national concern for both protection and utilization of important resources. All factors which may be relevant to the proposal must be considered; among those are conservation, economics, aesthetics, general environmental concerns, historic values, fish and wildlife values, flood damage prevention, land use, navigation, recreation, water supply, water quality, energy needs, safety, food production, and, in general, the needs and welfare of the people. No permit will be granted unless its issuance is found to be in the public interest.

(2) The following general criteria will be considered in the evaluation of every application:

(i) the relative extent of the public and private need for the proposed structure of work;

(ii) the desirability of using appropriate alternative locations and methods to accomplish the objective of the proposed structure or work;

(iii) the extent and permanence of the beneficial and/or detrimental effects which the proposed structure or work may have on the public and private uses to which the area is suited; and

(iv) the probable impact of each proposal in relation to the cumulative effect created by other existing and anticipated structures or work in the general area.

(b) *Effect on wetlands.* (1) Wetlands are vital areas that constitute a productive and valuable public resource, the unnecessary alteration or destruction of which should be discouraged as contrary to the public interest.

(2) Wetlands considered to perform functions important to the public interest include:

(i) Wetlands which serve important natural biological functions, including food chain production, general habitat, and nesting, spawning, rearing and resting sites for aquatic or land species;

(ii) Wetlands set aside for study of the aquatic environment or as sanctuaries or refuges;

(iii) Wetlands the destruction or alteration of which would affect detrimentally natural drainage characteristics, sedimentation patterns, salinity distribution, flushing characteristics, current patterns, or other environmental characteristics;

(iv) Wetlands which are significant in shielding other areas from wave action, erosion, or storm damage. Such wetlands are often associated with barrier beaches, islands, reefs and bars;

(v) Wetlands which serve as valuable storage areas for storm and flood waters;

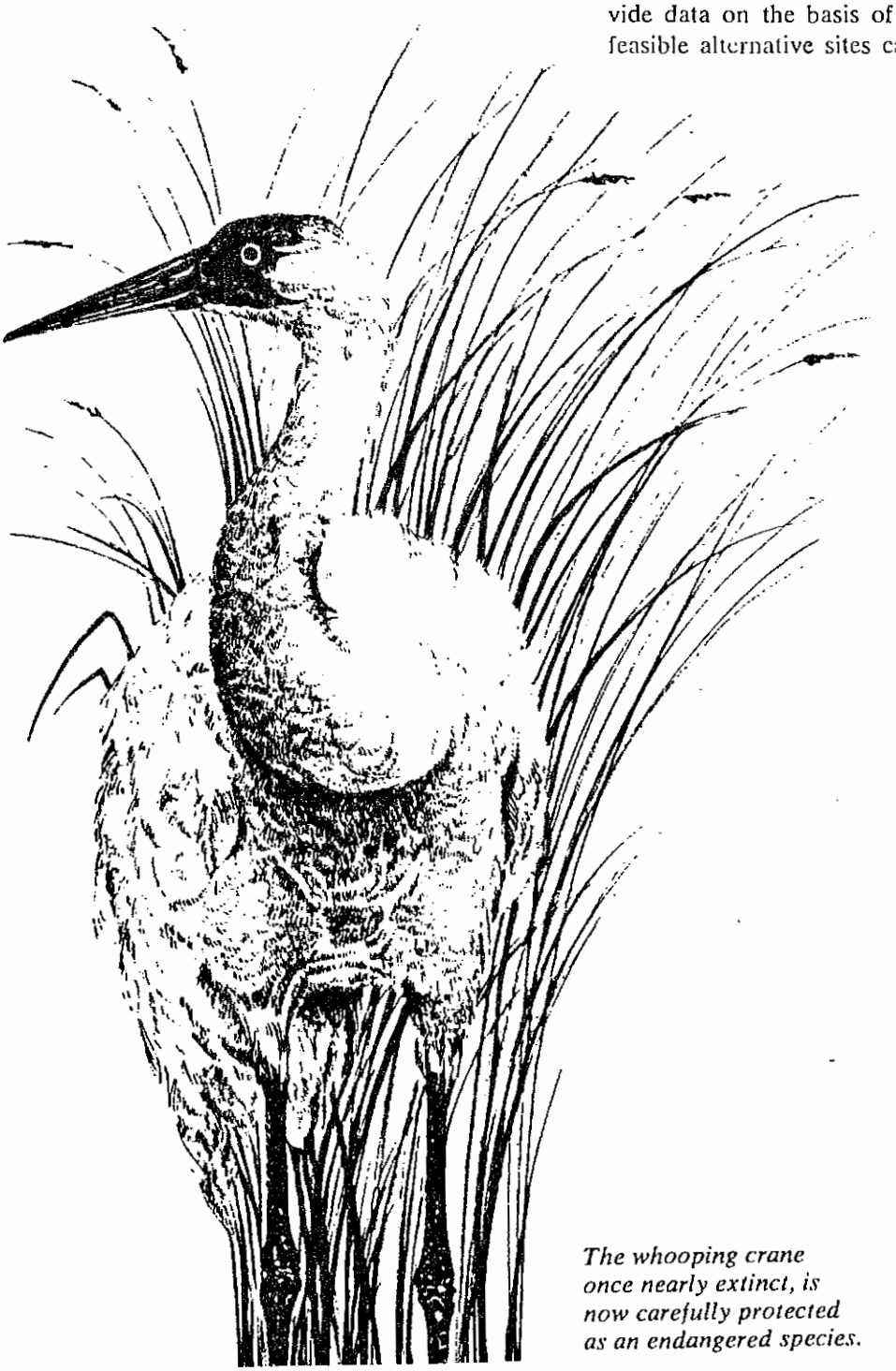
(vi) Wetlands which are prime natural recharge areas. Prime recharge areas are locations where surface and ground water are directly interconnected; and

(vii) Wetlands which through natural water filtration processes serve to purify water.

(3) Although a particular alteration of wetlands may constitute a minor change, the cumulative effect of numerous such piecemeal changes often results in a major impairment of the wetland resources. Thus, the particular wetland site for which an application is made will be evaluated with the recognition that it is part of a complete and interrelated wetland area. In addition, the District Engineer may undertake reviews of particular wetland areas in consultation with the appropriate Regional Director of the Fish and Wildlife Service, the Regional Director of the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration, the Regional Administrator of the Environmental Protection Agency, the local representative of the Soil Conservation Service of the Department of Agriculture, and the head of the appropriate State

agency to assess the cumulative effect of activities in such areas.

(4) No permit will be granted to work in wetlands identified as important by subparagraph (2), above, unless the District Engineer concludes, on the basis of the analysis required in paragraph (a), above, that the benefits of the proposed alteration outweigh the damage to the wetlands resource and the proposed alteration is necessary to realize those benefits. In evaluating whether a particular alteration is necessary, the District Engineer shall consider whether the proposed activity is primarily dependent on being located in, or in close proximity to the aquatic environment and whether feasible alternative sites are available. The applicant must provide sufficient information on the need to locate the proposed activity in the wetland and must provide data on the basis of which the availability of feasible alternative sites can be evaluated.



The whooping crane once nearly extinct, is now carefully protected as an endangered species.