GREAT SALT LAKE WETLAND INVENTORY

NARRATIVE REPORT

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This report provides collateral data for
National Wetland Inventory maps produced in 1983.

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Great Salt Lake Wetland Inventory

Narrative Report

I. Introduction

During the summer of 1982, the Utah Department of Natural Resources (DNR), Corps of Engineers (CE), and Fish and Wildlife Service (FWS) entered into an agreement to produce wetland maps for 26 1:24,000 quadrangles encompassing the eastern shore of Great Salt Lake. All maps were produced by the FWS through the National Wetland Inventory (NWI).

All wetland information was digitized through the Wetland Analytical Mapping System (WAMS) and is stored at the FWS Western Energy and Land Use Team (WELUT) in Fort Collins, Colorado. Final maps are available at the FWS Regional Office located in Denver, Colorado.

An integral part of all final maps is completion of narrative reports for areas having similar hydrology and geography. This narrative report provides general and specific information which aids the user in understanding not only the general area of Great Salt Lake, but also representative details of its associated wetland habitat.

II. Map Preparation

Wetland delineation was done by Martel Laboratories, Inc. on 1:65,000 Color Infrared photography captured by National Aeronautical Space Administration (NASA) U-2 aircraft during June 1981. Ground truthing aerial photography and use of collateral data such as soil surveys and USGS topographic maps are mandatory requirements during initial photointerpretation. Annotated imagery of 1:65,000 is transferred to acetate draft maps at 1:24,000 that are used in conjunction with corresponding 7.5 minute USGS quadrangles. Following draft map review by participating agencies and consolidation of comments, final maps at 1:24,000 scale are produced and wetland data digitized. Wetland classification is done in accordance with Classification of Wetlands and Deepwater Habitats of the United States, Cowardin et al. (1979). Specific mapping conventions developed by the NWI are used to assist in photointerpretation.

Map users are reminded that wetland identification with high altitude aerial photography has some limitations, because 100 percent ground truthing is not achieved. Wetlands are identified through stereoscopic examination of photography on the basis of tone, texture, site, local ecology, and cultural patterns.

III. Area Description

A. Bailey's Ecoregions

In May 1978, Robert G. Bailey published Description of the Ecoregions of the United States. This document provides a broad synthesis of knowledge relating to the ecosystem geography of the country. It provides brief descriptions of five major categories: land surface form, climate, vegetation, soils, and fauna. Accompanying the publication is a map of the United States (1:7,500,000) indicating major boundaries separating different geographical units.

Essentially, the 26 1:24,000 quadrangles for this project are found in the Dry Domain (3000), Steppe Division (3100), Intermountain Sagebrush Province (3130), and the Bonneville Saltbrush-Greasewood Section (3134). A brief description of these five major categories is found on pages 48 and 49 of Bailey's publication.

B. Hydrologic Mapping Units

The U.S. Geological Survey in cooperation with the Water Resources Council prepared a Hydrologic Unit Map in 1974, which divided individual States into eight-digit hydrologic unit codes. Hydrologic units are part of an effort by the USGS to provide a series of uniform, Nationally consistent maps which delineate hydrologic boundaries. Units are tied to a computer file (Catalog of Information on Water Data) which contains information on water data (Landford and Kapinas, 1979). All of the wetlands delineated in this Great Salt Lake mapping effort are within the Great Basin having the Region code of 16. The main body of Great Salt Lake is 16020310. The area of Promontory Point and eastern portion of Bear River Bay is 16020309. The Bear River drainage is 16010204. The Weber River drainage and south to Farmington is 16020102. The area of Salt Lake City adjacent to the Lake is 16020204.

IV. Special Mapping Interpretations

The eastern shoreline of Great Salt Lake including adjacent wetlands presents a complex hydrological setting. The combination of ever fluctuating lake levels, water management of public and private waterfowl areas, annual differences in runoff amounts from the Wasatch Mountains, extensive irrigated fields involving complex water delivery systems, and industrial, urban, and agricultural encroachment have all combined to result in dynamic and complex relationships between land and water. The record high lake level and record runoff experienced in Salt Lake City in early summer of 1983 clearly attests to the dynamic nature of the wetland environment in this area.

It is important in implementing the Cowardin Wetland System that wetlands be typed according to the vegetative and hydrological conditions that most often exist during the hydrological cycle. Attempts to type wetlands during times of drought or flooding are avoided. Consequently, Great Salt Lake as well as all other wetlands are typed according to the physical set of conditions that they are most likely to express over the hydrological cycle. Therefore, it is very

important that NWI map users take into consideration all factors influencing wetland conditions at the time of map inspection such as time of year, precipitation, etc. when utilizing NWI maps.

The 4,200 foot contour line is the approximate shoreward limit of the lake and also is the approximate level of the lake at the time of photography (June 1981). Unconsolidated shore without standing water and above 4,200 is labeled L2USA. For elevations less than 4,200 feet, the following discussion applies.

Water levels in Great Salt Lake generally reach maximum elevation in May or June and then begin to recede. The 4,195 foot contour line is the average low water mark for the period of record (1931-1973). The low water mark occurs in the fall, usually in September or October which also corresponds to the end of the growing season. Therefore, on the average, water in Great Salt Lake is at or below the 4,195 foot contour at the end of the growing season. Consequently, all water above the 4,195 foot contour line is classified as seasonally flooded (L2USC) unless otherwise specifically delineated and identified on photography.

In the shallower portion of the seasonal interval, water was present at least part of the year in 8 years of the period of record while water was present throughout the year in 2 of the 43 years. In the deeper portion of this interval, water was present at least part of the year in 37 of the 43 period of record and was present throughout the year in 22 years during that period.

In the interval between 4,194 foot and 4,195 foot, water was present throughout the year, approximately 75 percent of the period of record (32 out of 43 years). This interval is classified as semipermanently flooded (L2UBF).

Below the 4,194 foot contour line, water was present throughout the year for at least 90 percent of the period of record. The 4,191 foot contour line is the lowest recorded level of the Great Salt Lake. Thus, the interval between 4,191 foot and 4,194 foot is classified as intermittently exposed (L2UBG). All water beyond the 4,191 foot contour line is classified as permanently flooded.

To establish the limit of the littoral zone of the Lake, 6 feet were subtracted from the average low water level of 4,195, which resulted in the 4,189 foot contour line. On the average, the interval between 4,189 and 4,195 is less than 6 feet deep and thus is classified as lacustrine littoral, permanently flooded (L2UBH). All water beyond the 4,189 foot contour line is classified as lacustrine limnetic, permanently flooded (L1UBH).

In summary, Great Salt Lake contour levels relate to the Cowardin System, NWI mapping conventions, and wetland maps as follows:

Contour Interval	Classification
4,195-4,200	L2USC
4,194-4,195	L2UBF
4,191-4,194	L2UBG
4,189-4,191	L2UBH
4,189	L1UBH

During standard draft map review procedures, several individuals commented on problems identified in several areas where temporarily flooded and seasonally flooded water regimes were used inaccurately. Although this problem was corrected and changes made on many final maps, the photographic signatures did not allow 100 percent correction. Consequently, map users are cautioned that in some areas water regimes do not reflect actual field conditions with respect to whether the wetland is either temporarily or seasonally flooded.

In areas of extensive wetlands or complex delineations, it often is impossible to identify small upland islands. Consequently, small areas of upland are occasionally treated as upland inclusions as they are included in wetland delineations. Although this procedure is necessary only in a limited number of areas, it is important for the map user to be aware of this condition.

Another special mapping interpretation involves greasewood (Sarcobatus vermiculatus) which when found in combination with upland species such as cheat grass (Bromus tectorum) is considered upland. However, when greasewood is found in combination with salt grass (Distichlis stricta) or species of rush (Juncus spp.), then the area is wetland and should be typed PSS/EMA to reflect the woody and herbaceous vegetative characteristics. Unfortunately, greasewood in the Salt Lake City area is not particularly vigorous and cannot be photographically distinguished from emergent species. In addition, greasewood is often less than 30 percent aerial coverage. Consequently, wetland typing in the Great Salt Lake area, by necessity and as well as by photographic limitations, omits the existence of greasewood, and the area is typed PEMA or possibly PEM/USA if extensive flats are involved.

A final word of caution to map users involves diked and impounded wetlands. The diked/impounded modifier (h) was put on all wetlands that were believed to be influenced by water levels controlled by any impoundment. It is difficult, however, to determine exactly the definitive boundary as to the water level's impact on soil and vegetation as a result of the dike. In addition, a variety of different management objectives involving water level manipulation further obscures the use of the "h" modifier resulting from impounded water.

V. Wetland Plant Database

The National Wetland Inventory is constructing a Wetland Plant Database to assist in the identification and understanding of wetlands. Wetland plants or "hydrophytes" are defined as plants "growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water." For purposes of the listing, wetland plants are divided into four indicator categories based on a plant's frequency of occurrence in wetlands: (1) obligate - always found in wetlands (>95% of the time), (2) facultative wet - usually found in wetlands (66-95% of the time), (3) facultative - sometimes found in wetlands (33-66%) and (4) facultative upland - seldom found in wetlands (<33%). The NWI Wetland Plant Database not only includes the list of hydrophytes, but also contains information such as the plant's ecology, geographic distribution, common names, indicator status, and other information. Of an estimated 5,000 species of plants believed to occur in U.S. wetlands, about half has been entered into the database.

VI. Wetland Values Database

The NWI is building a wetland values database to organize information on the functions and values of wetlands contained in the diverse and scattered scientific literature. The database consists of abstracts of scientific articles and reports addressing wetland values, including use, habitat, water quality, hydrology, food chain, and recreation/conservation. About 1,000 articles are in the database and by October 1, 1983, the database should include 2,000 articles.

VII. Geography

The Great Salt Lake and associated wetlands are in the northeast corner of the Great Basin Region. The Great Basin Region, including many of its subregions such as the Great Salt Lake, encompasses the largest area in North America with no natural drainage to any ocean. Most major streams in the area originate in the high mountains along the eastern borders and terminate in nearby lakes or sumps such as the Great Salt Lake. Elevation varies only a few hundred feet from the Lake, at 4,200 feet MSL, to the bench area at the base of mountains to the east. The Wasatch Mountains then rise steeply to near 13,000 feet elevation at their highest peaks. Vegetation around the perimeter of the Lake includes greasewood, shadscale and desert grasses changing to sagebrush, which is the most noticeable of natural species, and irrigated croplands as one approaches the base and bench areas of the mountains to the east.

The east and south sides of the lake are heavily populated. It is estimated that this area, commonly and locally referred to as the Wasatch Front, is home for approximately 80 percent of the state's population. The main economic activities include light industry, Government, education, and tourism. The nearby mountains provide watershed, forest resources, wildlife, and recreation in both summer and winter and benefits to the main population centers on the region.

VIII. Geology

The Great Salt Lake and its associated wetlands are a remnant of the ancient Lake Bonneville. This Lake overflowed into the Snake River drainage in Idaho through the Red Rock Pass north of Preston, Idaho, at about 5,150 feet elevation. Lake Bonneville stood for a long period of time at the 4,750 foot level and built extensive bars, benches, and deltas, many of which can be seen along the west face of the Wasatch Mountains between Salt Lake and Brigham City, Utah.

The major parent materials are unconsolidated lacustrine sediments. Located in the western portion of the state, these sediments were deposited in ancient Lake Bonneville during the Pleistocene time. The lake sediments are mainly from limestone and calcareous sandstone of the late Paleozoic Age. The water movement in the lake sorted these materials, and the coarser sediments were deposited near the mouth of canyons and the finer sediments carried further into the lake. As the lake began to recede, streams continued to deposit materials both above and within the lake. Wave action and stream deposition

formed terraces. As the lake receded to its present level, now known as Great Salt Lake, evaporation of salt water left extensive areas with a high salt accumulation. (Soils of Utah, 1975).

The parent material of the mountain ranges to the east and south, Wasatch and Oquirch respectively, is basically sedimentary rock of the Paleozoic, Mesozoic, and Tertiary Ages. The soil mantle is mainly shallow to moderately deep along the steep mountain fronts, but the soils are usually deep on the more gentle slopes. (Soils of Utah, 1975).

IX. Soils

Soil is an important element of wetland and is a basic criterion in the definition of wetland as defined by Cowardin et al. (1979). The National Wetland Inventory and Soil Conservation Service cooperatively are preparing a list of hydric soils to accompany the Cowardin Wetland Classification System. Although the list is not complete, the Soil Conservation Service has published soil surveys that cover the entire 26 7.5 quadrangles included within the Great Salt Lake wetland inventory. These soil surveys provide important collateral information which is important in understanding the general area including the specifics of land use.

Hydric soils are defined by soil saturation for significant periods or by frequent flooding for long periods during the growing season. The list includes both hydric soils (essentially always associated with wetlands) and soils that exhibit hydric conditions under certain circumstances. The hydric soils list will be most useful for making wetland determinations in the field or in the office through use of soil survey maps. Interim lists for each State are available from Soil Scientists at SCS's State Offices.

Hydric soils in the Great Salt Lake mapping area consist primarily of silty clay loams, silt loams, and loamy fine sands which were formed on alluvium or old lake sediments. These soils are affected, sometimes strongly, by saline, alkaline, or calcareous deposits. Drainage in these soils ranges from somewhat poorly drained to very poorly drained. Most hydric soils are included in the order Mollisols according to the National Cooperative Soil Survey classification system. Also the Soil Conservation Service groups land into various range sites which are areas of range which are uniform enough in climate, soils, drainage, exposure, and topography that it produces a specific kind and amount of vegetation. Wetlands in the mapping area are included in alkali bottom, salt meadow, semiwet meadow, and wet meadow range sites.

X. Climate

Both temperature and precipitation can be quite variable between the Great Salt Lake and the bench area of the Wasatch Mountains to the east. The lake with its high salt content tends to have a modifying effect on temperatures over the area particularly during winter and summer.

July's average maximum temperature is 92.0° F. and average minimum is 59.0° F. January's average maximum is 37.5° F. and average minimum is 18.4° F. The average length of the growing season or frost free period is approximately 155 days, beginning in late April and extending until mid-October. (Soil Survey - Davis-Weber Area, Utah, USDA, 1968).

The average annual precipitation is approximately 12 inches along the western border of the area near the lake and as much as 20 inches along the eastern border of the west front of the Wasatch Mountains. The wettest month usually is April, the month when most parts of the area receive more than 1 1/2 inches of rain. About one-third of the annual precipitation comes as snow that falls during the period from December through March. The average annual snowfall ranges from 40 to 60 inches along the western front of the Wasatch Mountains.

XI. Wetlands

A. Community Description

1. Lacustrine System - The Lacustrine System is defined as wetlands and deepwater habitats with the following characteristics: 1) situated in a topographic depression or a dammed river channel; 2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30 percent aerial coverage; and 3) total area exceeds 20 acres. Other lacustrine systems include wetlands and deepwater habitats with active waveformed or bedrock shoreline or water depth in the deepest part of the basin exceeding 2 meters at low water (Cowardin et al., 1979). Great Salt Lake includes both limnetic (deep water greater than 2m deep) and littoral (shallow water less than 2m deep subsystems. Maximum depth of the lake is 33 feet, assuming a surface elevation of 4,200 feet MSL. The substrate is composed of salts and small grain sediments. High salinity typically precludes the growth of aquatic vegetation. Thus, the class unconsolidated bottom is used to describe the more permanent water regimes of Great Salt Lake including semipermanently flooded (L2UBF), intermittently exposed (L2UBG, L1UBG), and permanently flooded (L1UBH, L2UBH). Unconsolidated shore is the class used for the more temporary water regimes including seasonally flooded (L2USC) and temporarily flooded (L2USA). For an explanation of classes and water regimes in relation to elevations of Great Salt Lake, refer to the section on special mapping interpretations.

Generally, other lacustrine systems in the mapping area are shallow (less than 2m deep at low water), with gradual slopes and a substrate composed of small grain sediments. The combination of low rainfall and high evaporation during summer months results in receding water levels, often to the point of completely dewatered basins. Basins that contain water only in the initial stages of the growing season are temporarily flooded (L2USA); those that contain water for extended periods of the growing season are seasonally flooded (L2USC); those that contain water through the growing season in most years are semipermanently flooded (L2UBF); and those that contain water throughout the year except in years of drought are intermittently exposed (L2UBG or L1UBG depending on water depth).

Another habitat type in the lacustrine system includes unvegetated flats and flats with less than 30 percent persistent vegetation. These areas are generally adjacent to Great Salt Lake or in close proximity. Vegetation normally associated with these flats is greasewood (Sarcobatus vermiculatus), glassworts (Salicornia sp), and iodine bush (Allenrolfea occidentalis). Since water is present on these areas only during the early portion of the growing season, they are classified as unconsolidated shore temporarily flooded (L2USA).

Also included in the lacustrine system are artifically created lakes and reservoirs. These areas are identified with the diked/impounded special modifier (h) following the appropriate water regime. Included in this category are Willard Reservoir; all impoundments greater than 20 acres contained within Federal, State, and privately owned waterfowl management areas; and salt evaporation ponds. Impoundments in waterfowl management areas often contain various types of pondweed (Potomogeton sp), duckweed (Lemna sp), and algae (Cladophora). These areas are classified as lacustrine aquatic bed (L2ABG) or with the mixed class L2AB/UBG if each aquatic bed and open water constitute at least 30 percent aerial coverage of the impoundment.

2. Riverine System - The Riverine System includes all wetlands and deep-water habitats contained within a channel with two exceptions: 1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens; and 2) habitats with ocean-derived salts in excess of 0.5 parts per thousand. A channel is an open conduit either naturally or artifically created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water (Cowardin et al., 1979). The area encompassed by this mapping effort contains only lower perennial rivers and intermittent streams. Lower perennial rivers contain flowing water throughout the year with relatively low gradient and slow velocity and a substrate composed primarily of sand or mud. Intermittent streams contain flowing water every year but do not flow throughout the year. Water Resources Data for Utah (USGS, 1980), which contains information obtained from stream gaging stations, was utilized to determine duration of flow for rivers in the mapping area. Major rivers such as the Bear, Weber, and Jordan Rivers have historical data indicating continuous flow for the entire period of stream gaging records. These rivers were identified as lower perennial, permanently flooded (R2UBH). Rivers such as Salt Creek which have stream gaging information for only a few years and either indicating continuous flow or perennial on United States Geological Survey (USGS) topographic maps were identified as intermittently exposed lower perennial rivers (R2UBG). Other streams were identified as intermittent streams (R4SB) providing that they contained less than 30 percent aerial coverage of persistent vegetation. Channels with exposed substrate were identified as temporarily flooded intermitted streambed (R4SBA). Narrow channels often interrupted with small stands of emergent vegetation were identified as seasonally flooded (R4SBC). Larger intermittent streams were classified as semipermanently flooded intermittent streambed (R4SBF). Examples of the latter category include Kays Creek and Howard Slough.

Ditches and canals were identified separately with the excavated special modifier (x) following the appropriate water regime (e.g., R4SBFx). Included in this category are irrigation ditches, drainage ditches, and supply canals associated with salt evaporation ponds.

3. Palustrine System - The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens. It also includes wetlands lacking such vegetation, but with all of the following four characteristics: 1) area less than 20 acres; 2) active waveformed or bedrock shoreline features lacking; 3) water depth in the deepest part of the basin less than 2m at low water; and 4) salinity due to ocean-derived salts less than 0.5 parts per thousand (Cowardin et al., 1979). A variety of vegetated wetlands occurs in the mapping area. Temporarily flooded emergent wetlands (PEMA) are composed primarily of combinations of the following species: glasswort (Salicornia utahensis), iodine bush (Allenrolfea occidentalis), saltgrass (Distichlis spicata), foxtail barley (Hordeum jubatum) and Mediterranean barley (Hordeum marinum). Greasewood (Sarcobatus vermiculatus) frequently occurs in temporarily flooded wetlands but cannot be identified on photography utilized for this project. In addition, an annual species of glasswort (Salicornia europaea) occurs in combination with the previously mentioned perennial species. Wetlands which include interspersions of unvegetated flats in combination with temporarily flooded emergent plant species are identified with the mixed class PEM/USA or PUS/EMA, depending on the predominate class occurrence by aerial composition. In this situation each class must compose at least 30 percent aerial coverage. Occasionally, emergent vegetation which is present on the ground does not appear on the photography. Consequently, such areas are identified as PUSA (if the area in consideration is less than 20 acres) or L2USA (if the area is greater than 20 acres). In these instances the map user may find upon field inspection that an area identified as unconsolidated shore may contain a high percentage of emergent vegetation or greasewood.

Small upland inclusions may occur in areas identified as temporarily flooded to avoid overly complex maps. Elevational changes between wetland and upland may be quite small, but it is sufficient to result in the occurrence of upland species such as cheatgrass (Bromus tectorum) or sage (Artemesia sp).

Whereas temporarily flooded emergent wetlands are associated more with Great Salt Lake, seasonally flooded emergent wetlands (PEMC) are related more to runoff from the Wasatch Range. Plant species found in seasonally flooded emergent wetlands include rushes (Juncus sp), sedges (Carex sp.), and spikerush (Eleocharis sp). Seasonal wetlands include not only naturally occurring wetlands but also those that result from irrigation where water is present long enough to allow growth of hydrophytes. Frequently, in meadows utilized for cattle grazing, vegetation in low spots is composed almost exclusively of hydrophytes. Remaining portions of these meadows are composed of combinations of hydrophytes and upland grasses. Where the vegetation consists primarily of hydrophytes, the area is classified as wetland, primarily as PEMC in these wet meadows.

Vegetation in semipermanently flooded emergent wetlands (PEMF) includes cattail (Typha sp), hardstem bulrush (Scirpus acutus), alkali bulrush (Scirpus paludosus), and Olney's threesquare (Scirpus olneyi). Occasionally, these species are found in seasonally flooded wetlands although normally they are not the predominant species in such a situation. Cattail growing in ditches is identified with the excavated special modifier (PEMFx). Often, open water is found interspersed throughout semipermanently flooded emergent wetlands. In areas where

each vegetation and open water constitute at least 30 percent aerial coverage, mixed classes are used (PEM/UBF). In Federal, State, and private waterfowl management areas, semipermanently flooded emergent wetlands are formed by the creation of dikes and impoundments. These wetlands are identified with the diked/impounded special modifier (PEMFh or PEM/UBFh where appropriate).

Woody vegetation in wetlands in this mapping area is restricted primarily to areas adjacent to watercourses. Species, all of which are deciduous, include cottonwood (Populus deltoides), narrowleaf cottonwood (Populus angustifolia), willow (Salix sp), and box elder (Acer negundo). Vegetation greater than 20 feet tall is classified as forested (PFO1A); vegetation less than 20 feet is classified as scrub/shrub (PSS1A).

Also included in the palustrine system are small (less than 20 acres), shallow (less than 6 feet deep) bodies of open water. These areas may be unvegetated (PUBF or PUBG, depending on water duration) or contain aquatic beds such as sago pondweed or duckweed (PABF or PABG). This category includes excavated ponds and those created by dikes or impoundments.

XII. Wetland Values

Wetlands adjacent to the Great Salt Lake are an extremely important asset to waterfowl and shore and wading birds. These wetlands are the most important duck production areas in Utah if not the mountain west. Palustrine wetlands adjacent and those in close proximity to the Great Salt Lake have been recognized both at State and National levels by those in the environmental field for their waterfowl and shorebird productivity. G. Horton Jensen and John E. Chattin in their article printed in Waterfowl Tomorrow, U.S. Department of Interior, describe "the marshes adjacent to the Great Salt Lake as premium-grade waterfowl producers" capable of producing 200-250 broods per square mile as compared to 30-50 broods per square mile in the Canadian prairie.

In regards to other wildlife, these complex wetland systems provide excellent resting, feeding, and nesting habitat for many species of migratory songbirds and raptors including the peregrine falcon and bald eagle. Resident species such as the pheasant use the area year-round. Small mammal usage includes skunks, muskrats, and weasels.

During dry periods many of the temporary and seasonal wetlands provide emergency grazing and hay for cattle ranches. Some cattle operations are entirely dependent on these areas for supplemental winter livestock grazing and feed.

XIII. Wetland Vulnerability

Up to the last decade there has been limited loss of wetlands around the Great Salt Lake. However, with the rapid population and industrial growth along the Wasatch Front in recent years, desirable lands for development are limited. To the east, the Wasatch Mountains, of which most of the west facing slopes are in National forests, present a physical barrier. Many private home developments

from Salt Lake to Brigham City, Utah, and beyond are already abutting these forest boundaries. To the west the Great Salt Lake is the natural barrier to industrial and residential development.

The local governments are therefore looking to the wetlands that are between these two barriers as their new source of a tax base for their communities. Many parcels that were once zoned as agriculture pasture have been rezoned to industrial in recent years. With this anticipated industrial growth, services will be required such as new highways, airport expansion, industrial waste disposal sites, etc., all of which are in the planning stage at this time.

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