Project Report

A Coastal Wetlands Acquisition Plan for Texas

Texas General Land Office
Coastal Management Program
Garry Mauro, Commissioner

Funded through a cooperative agreement
with the U.S. Environmental Protection Agency
Region 6, Wetlands Protection State Development
Contract CD996083-01-0

September 1995

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by

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ACKNOWLEDGMENTS

The Texas General Land Office (GLO) is pleased to acknowledge the support of this project by the U.S. Environmental Protection Agency (EPA), Region 6, under Cooperative Agreement Number CD996083-01-0.

The Park Special Services Branch and Resource Protection Division of the Texas Parks and Wildlife Department (TPWD) assisted in most project tasks, participating in the interagency work group, developing and reviewing criteria for prioritizing areas for acquisition, and developing and reviewing the questionnaire for agency field managers that was used to determine general categories of coastal wetlands for acquisition by region. The TPWD staff included Mike Herring, Jack Bauer, and Vernon Bevill of the Park Special Services Branch and Julie Anderson of the Resource Protection Division. Other TPWD staff who participated were Leland Roberts, Bob Spain, Warren Pulich, and Dave Sager of the Resource Protection Division.

Maps of federal and state parks, federal refuges, and state wildlife management areas and coastal preserves were prepared by Ron Florence and Scot Friedman, GLO. Cynthia Jennings and Sharon Snow, GLO, helped develop criteria for prioritizing areas for acquisition and assisted with the research on funding sources and techniques. Randy Flores, GLO, provided a legal analysis of the Coastal Wetland Acquisition Act.

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INTRODUCTION

Acquisition is an important nonregulatory component of comprehensive wetland conservation programs. Wetlands acquisition refers to a public and/or private stewardship program to acquire wetlands or otherwise "secure" them from loss from development or resource extraction and then to maintain these systems in a natural state (Washington State Department of Ecology, 1992). Acquisition provides potential for the protection and management of wildlife and other wetland functions and values and establishes public and/or private stewardship of these resources for present and future generations. Wetland acquisition efforts generally require consideration of the purchase of adjacent uplands that form a buffer protecting the functions and values of the wetlands. Uplands and wetlands form a mosaic of habitats, and it would be impractical to separate the two.

Although the Coastal Wetland Acquisition Act (TEX. NAT. RES. CODE §33.231 *et seq.*) provides a legislative mandate to guide and prioritize coastal wetlands acquisition efforts in Texas, no plan has been developed to focus those efforts on the most important, scarce, and vulnerable coastal wetlands. Both the EPA Gulf of Mexico Program and the Galveston Bay National Estuary Program have recognized the need to identify and rank wetland habitats for acquisition. The Texas Wetlands Plan (TPWD, 1988) also recognizes the importance of a wetlands acquisition program and the need to identify new funding sources.

The State-owned Wetland Conservation Plan (PARKS & WILDLIFE CODE §14.002) calls for the development of a plan to prioritize and acquire coastal wetlands, following the guidelines in the Coastal Wetland Acquisition Act. The overall goal of the State-owned Wetland Conservation Plan is "no net loss" of state-owned coastal wetlands.

The Coastal Wetland Acquisition Act provides that the General Land Office (GLO) will certify coastal wetlands "most essential to the public interest" and assign priorities for their acquisition. The act directs the Texas Parks and Wildlife Department, designated as the acquiring agency, to accept grants, gifts, or devises of land; to acquire fee and lesser interests in coastal wetlands by purchase or condemnation; and to manage acquired interests "in a manner that will preserve and protect the productivity and integrity of the land as coastal wetland."

The Coastal Wetlands Acquisition Plan will satisfy the State-owned Wetland Conservation Plan and the Coastal Wetland Acquisition Act by:

- complementing existing wetland preservation programs;
- creating the criteria and guidance for identifying and prioritizing coastal wetlands for state acquisition;

- identifying and ranking general coastal wetland categories by region for acquisition;
- identifying current and potential new funding sources for acquisition; and
- helping satisfy the overall goal of no net loss of state-owned coastal wetlands.

Texas needs a strong coastal wetlands acquisition program to complement any federal acquisition efforts. However, state efforts have been limited, primarily by a lack of funds for purchasing and managing the resources. For example, from 1982 through 1994, the state received approximately $17,500,000 for the waterfowl program from the sale of duck stamps and prints and from federal aid (Texas Wetlands, 1994). Over $15,000,000 of the $17,500,000 was spent on land acquisition. In contrast, Florida's "Preservation 2000" program is based on $300 million in yearly bonded funds over a decade for the purchase of natural lands and has been matched by local government funds in amounts almost as staggering (Herlevich, 1995).

The Coastal Wetland Acquisition Plan identifies current federal, state, and private funding sources and potential new funding sources, primarily used by other states, that could be used to help increase state funding for acquisition. Texas can use a variety of acquisition mechanisms, ranging from fee-simple acquisition to conservation easements, to address different situations.

COASTAL WETLAND TYPES

Salt Marsh

Typical species in the salt marsh community include smooth cordgrass (*Spartina alterniflora*), saltwort (*Batis maritima*), glasswort (*Salicornia virginica* and *S. bigelovii*), saltgrass (*Distichlis spicata*), seashore dropseed (*Sporobolus virginica*), sea ox-eye (*Borrichia frutescens*), and salt-marsh bulrush (*Scirpus maritimus*). Black mangroves (*Avicennia germinans*) are significant components of salt marsh systems in some areas along the central and south Texas coast. The broadest distribution of salt marshes is south of the Galveston Bay area, where they are common on the bayward side of barrier islands and peninsulas and along the mainland shores of narrow bays such as West Galveston Bay. Although salt marshes occur on bay-head deltas, the communities change rather rapidly to brackish, intermediate, and fresh marshes up the river valleys.

Brackish Marsh

The brackish-marsh community is transitional between salt marshes and fresh marshes. Among the dominant species in topographically higher areas are marshhay cordgrass (*Spartina patens*), Gulf

cordgrass (*Spartina spartinae*), saltgrass, salt-marsh bulrush (*Scirpus maritimus*) and sea ox-eye. Brackish marshes are the most extensive wetland communities in the Galveston Bay system (White and Paine, 1992). They are widely distributed along the lower reaches of the Trinity River delta, inland from West Galveston Bay, in the inland system west of the Brazos River, and along much of the lower reaches of the Lavaca and Guadalupe river valleys.

Intermediate Marsh

An intermediate marsh assemblage occurs on the upper coast above Galveston Bay where average salinities are generally between those found in the fresh and brackish-marsh assemblages. Species typical of this environment include seashore paspalum (*Paspalum vaginatum*), marshhay cordgrass, Olney bulrush, cattail (*Typha* sp.), and California bulrush (*Scirpus californicus*).

Fresh Marsh

Environments in which fresh marshes occur are generally beyond the limits of saltwater flooding, except perhaps locally during hurricanes. The freshwater influence from rivers, precipitation, runoff, and groundwater is sufficient to maintain a fresher-water vegetation assemblage consisting of such species as cattail, California bulrush, three-square bulrush (*Scirpus americanus*), water hyacinth (*Eichornia crassipes*), spiney aster (*Aster spinosus*), rattlebush (*Sesbania drummondii*), alligatorweed (*Alternanthera philoxeroides*), and pickerel weed (*Pontederia cordata*). Fresh marshes occur inland along river or fluvial systems and in upland basins, both on the mainland and on barrier islands. Inland from the chenier plain and upstream along the river valleys of the Neches, Trinity, San Jacinto, Colorado, Lavaca, Guadalupe, and San Antonio rivers, salinities decrease and fresh marshes intergrade with and replace brackish marshes.

Swamps and Bottomland Hardwoods

Swamps are most commonly defined as woodlands or forested areas that contain saturated soils or are inundated by water during much of the year. In Texas, these are areas in which bald cypress (*Taxodium distichum*) and water tupelo (*Nyssa aquatica*) occur in association with other species of trees such as sweetgum (*Liquidambar styraciflua*) and willows (*Salix* spp.). Swamps occur principally in the entrenched valleys of the Sabine, Neches, and Trinity rivers. The swamps grade at slightly higher elevations into river bottomland hardwood forest or streamside woodland. Entrenched and nonentrenched river valleys to the south are dominated by drier woodlands or forested areas.

WETLAND FUNCTIONS AND VALUES

Coastal wetlands, an integral part of estuarine ecosystems, have tremendous biologic and economic value. Texas wetlands serve as

nursery grounds for over 95 percent of the recreational and commercial fish species found in the Gulf of Mexico; they provide breeding, nesting, and feeding grounds for more than a third of all threatened and endangered animal species and support many endangered plant species; and they provide permanent and seasonal habitat for a great variety of wildlife, including 75 percent of North America's bird species.

Coastal wetlands also perform many chemical and physical functions. Wetlands temporarily retain pollutants such as suspended material, excess nutrients, toxic chemicals, and disease-causing microorganisms. Marshes can filter nitrates and phosphates from rivers and streams that receive wastewater effluents. Pollutants associated with the trapped material in wetlands may be converted by biochemical processes to less harmful forms, or they may remain buried and be taken up by the wetland plants themselves and either recycled or transported from the area. Wetlands help reduce erosion by absorbing and dissipating wave energy, binding and stabilizing sediments, and increasing sediment deposition. Primarily because of their topography or position in the landscape, wetlands can reduce, capture, and retain surface-water runoff, thus providing storage capacity and overall protection during periods of flooding. Wetlands also promote groundwater recharge by diverting, slowing, and storing surface water, allowing infiltration and percolation of water into the saturated zone.

STATUS AND TRENDS

Estimates of coastal wetland acreage in Texas range from 611,760 acres of fresh, brackish, and salt marshes in 1979 (TPWD, 1988) to approximately 1.1 million acres of salt, brackish, fresh, forested, and scrub-shrub wetlands in the 19 coastal counties in 1979 (Field et al., 1991). Wetlands are disappearing at an alarming rate. The Texas Parks and Wildlife Department estimates that 35 percent of the state's coastal marshes were lost between 1950 and 1979 (TPWD, 1988). The total loss of marshes in the river deltas since the 1950s is about 21,000 acres, or 29 percent of the marsh area that existed in the mid-1950s (White and Calnan, 1990). From the 1950s to 1989, there was a net loss of 33,400 acres in the Galveston Bay system, or 19 percent of the wetlands that existed in the 1950s (White et al., 1993). The rate of loss, however, declined over time from about 1,000 acres per year between 1953 and 1979 to about 700 acres per year between 1979 and 1989. The most extensive loss of contiguous coastal wetlands on the Texas coast has occurred within the Neches River valley in Jefferson and Orange counties (White and Calnan, 1990; White and Tremblay, 1995). Between the mid-1950s and 1978, 9,415 acres of coastal marsh was displaced primarily by open water along an approximately 25.7-mile area of the lower Neches River valley (White and Tremblay, 1995).

PROBABLE CAUSES OF LOSS AND DEGRADATION

Wetland loss results from both natural processes and human activities. Along the upper Texas coast, subsurface fluid withdrawal is considered a primary cause of wetland submergence and loss of emergent vegetation (White et al., 1993; White and Tremblay, 1995). Between the 1950s and 1989, subsidence (primarily from groundwater withdrawal and oil and gas production) and relative sea-level rise converted 26,400 acres of emergent wetlands in the Galveston Bay system, or about 30 percent of the total gross loss (88,500 acres), to open water and barren flats (White et al., 1993). Approximately 5,700 acres of emergent wetlands in the Galveston Bay system were converted to upland urban use (oil and gas facilities, residential development, etc.) between the 1950s and 1989. White et al. (1993) also found that approximately 35,600 acres of fresh or palustrine emergent marshes were transformed to uplands in the Galveston Bay system between the 1950s and 1989. Approximately 33 percent of the gross loss in emergent wetlands is attributed to the conversion of marshes to upland rangeland and cropland. The percentage due to agricultural development is lower than the national average, estimated at 87 percent from the mid-1950s to mid-1970s, and 54 percent from the mid-1970s to mid-1980s (White et al., 1993).

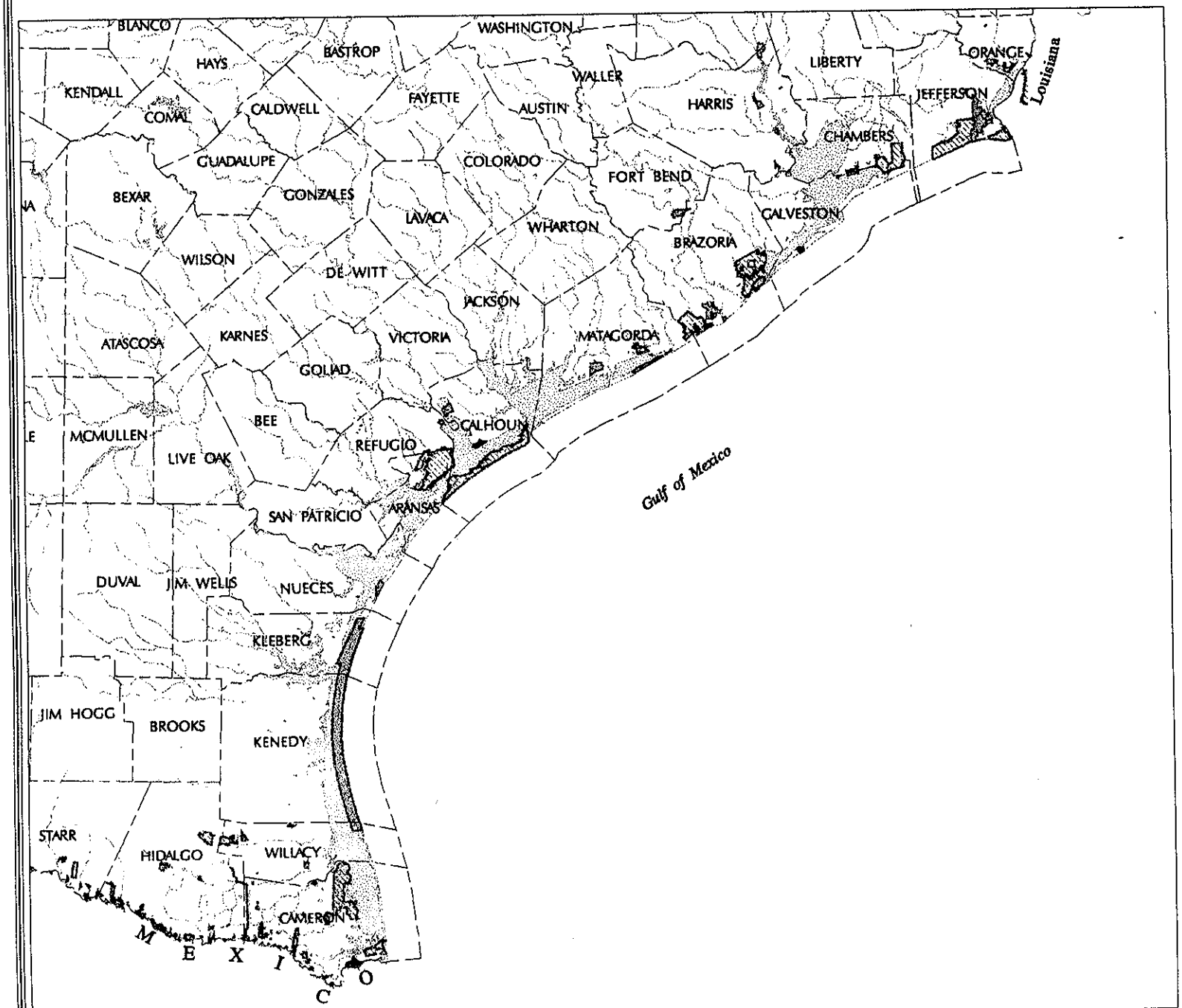
Subsidence is the overriding cause of wetland loss along the river delta marshes, such as those of the San Jacinto River, which is near the center of maximum subsidence resulting from groundwater withdrawal and oil and gas production in the Houston area (White and Calnan, 1990). In the Neches River valley, a combination of factors, including subsidence, relative sea-level rise, fault movement, channel dredging, spoil disposal along levees, and impoundment of sediments along streams, has probably contributed to wetland loss (White and Calnan, 1990).

White and Morton (1995) report that thousands of acres of marsh on the upper coast have been lost as a result of fault activation and subsidence since the 1950s. Thirty-nine faults with a cumulative length of more than 87 miles were mapped by White and Morton (1995). Recent fault movement may be related to oil and gas production and associated formation water.

PUBLICLY OWNED COASTAL WETLANDS

All publicly owned coastal areas in the first tier of 19 coastal counties--including federal wildlife refuges, the Padre Island National Seashore, and state wildlife management areas, parks, and coastal preserves--were mapped (fig. 1). The approximate total acreage of all publicly owned areas is 633,858 acres. Moulton (1990) estimated that the publicly owned areas in the 19 coastal counties contained approximately 346,029 acres of wetlands.

State and Federal Holdings along the Texas Coast



TEXAS GENERAL LAND OFFICE
Austin, Texas

BARRY BAURO
Commissioner

March 1995

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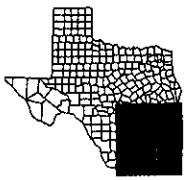
National Seashore
USGS 1:24,000
State Park/Wildlife Management Area
TxDOT
County Boundary
USGS 1:2,000,000 DLG
Stream, Shoreline
USGS 1:2,000,000 DLG
National Seashore
USGS 1:24,000
State Park/Wildlife Management Area
TxDOT
Coastal Preserve
TPWD, GLO 1:24,000
National Wildlife Refuge
U.S. Fish & Wildlife Service 1:24,000
Lake, Bay
USGS 1:2,000,000 DLG

SCALE 1:2,664,456
One inch represents 42.21 miles

0 20 40 80
Miles
0 200,000
0 20 40 60 80 100
Kilometers

Albers Equal Area projection,
1927 North American Datum,
First Standard Parallel: 24.00 Degrees North
Second Standard Parallel: 36.00 Degrees North
Central Meridian: 100.00 Degrees West
Latitude of Origin: 31.00 Degrees North

The Texas General Land Office makes no warranties regarding the accuracy or completeness of any data shown on this map. This map is not to be used for navigation.



COASTAL WETLAND RATING SYSTEM FOR ACQUISITION

The following rating system is based primarily on information modified from the TPWD Wildlife Habitat Potential Site Rating System (1986), other states' rating systems, and the U.S. Fish and Wildlife Service (USFWS) system (1991). The numbering system is relative, but the scale is based on the Habitat Rating System. The rating system for coastal wetland acquisition will be used by the state when comparing two or more wetlands with willing sellers.

Finding an adequate system to rate the wetland functions of floodwater alteration, water quality protection, and shoreline stabilization was difficult. Concepts in the USFWS Emergency Wetlands Resources Act for rating surface water quantity and flood control, which is a combination of best professional judgment and/or documented evidence, were used. In addition, guidance to help the user understand the characteristics that are most significant for each function was added. However, the guidance was not adequately quantified, so it is not a rating system for the three functions. It is simply guidance for those needing some understanding of the key characteristics for each function--so rating is probably still mostly a matter of best professional judgment and/or documentation.

Coastal Wetland Rating System

Vegetation Communities. List the wetland communities (salt, brackish, intermediate, or fresh marsh, swamp, or bottomland hardwood) and the most abundant species.

Overall Quality

0	Poor
6	Medium
10	Good
1-5	Potential for wetland restoration

Threat of Destruction/Degradation

0	Unthreatened; no foreseeable danger of destruction or degradation
3	Potentially threatened; disturbance encroaching in general area
5	Moderate threat; disturbance probable in future
8	Imminent threat; adverse land use planned
10	Adverse land use in progress, but wetland salvageable with immediate action

Proximity/Contiguity

0	Remote from management
3	Other management arrangement
8	Near TPWD management area/park/preserve
10	Contiguous to TPWD management area/park/preserve

Functions and Values

Wildlife/Aquatic Habitat

0 Very common in region/watershed and exhibits very low habitat value

0 Exhibits very low habitat value regardless of abundance

1 Fairly common in region/watershed but decreasing rapidly and exhibits medium to low habitat value

3 Fairly common in region/watershed but decreasing rapidly and exhibits high to medium habitat value

8 Relatively scarce or becoming scarce in region/landscape and highly valuable habitat

10 Very uncommon, unique, or irreplaceable habitat, including habitat for threatened/endangered species

Public use

1 Will support only carefully controlled scientific research and observation

3 Will support limited, carefully controlled public use in selected areas

5 Has potential for compatible, dispersed types of recreation such as canoeing, nature study, and bird-watching

8 Will support limited amounts of typical park development and use, including both overnight and day use

Hunting/fishing potential

0 Location/access or other conditions prohibit hunting and/or fishing

3 Supports limited public hunting and/or fishing

5 Supports moderate public hunting and/or fishing

10 Supports extensive public hunting and/or fishing

Floodflow/Stormwater alteration

1 Exhibits low value based on recognized or documented evidence from state, federal, or local agency, conservation organization, institution or private group due to specific legislation, designations, or management or planning documents

3 Exhibits medium value

8 Exhibits high value

Water quality protection

1 Exhibits low value based on recognized or documented evidence from state, federal, or local agency, conservation organization, institution or private group due to specific legislation, designations, or management or planning documents

3 Exhibits medium value

8 Exhibits high value

Shoreline protection

1 Exhibits low value based on recognized or documented evidence from state, federal, or local agency, conservation organization, institution or private group due to specific legislation, designations, or management or planning documents

3 Exhibits medium value

8 Exhibits high value

Guidance for the Functions of Floodflow Alteration, Water Quality Protection, and Shoreline Stabilization

The following information can be used as guidance in evaluating the wetland functions of floodflow/stormwater alteration, water quality, and shoreline stabilization. Many of the "best" characteristics for the functional indicators are the same for each function. These guidelines are based on Marble (1992), which is a simplified version of the Wetland Evaluation Technique (Adamus et al. 1987). The wetland classification system is based on Cowardin et al. (1979).

Floodflow Alteration

Floodflow alteration is the process by which peak flows from runoff, surface flow, and precipitation are stored or delayed. The importance of a wetland in altering floodflows depends to a great extent on its position in the watershed and its outlet characteristics. Wetlands located in the upper part of the watershed are most effective if the total acreage of wetlands and other surface waters above them in the watershed is less than about seven percent of the watershed. Wetlands low in the watershed can be effective regardless of the available upstream storage. The storage capacity of a wetland depends primarily on the type and location of outlets. Wetlands with no outlet will store all incoming water. If there is a constricted outlet, water storage or detention will be significant.

The following indicators are either moderately or highly significant to floodflow alteration. Indicator descriptions are characteristics that generally produce the "highest" rating for each indicator. Wetland communities with most of these characteristics will be rated "high" for floodflow alteration.

- Type of wetland system: Palustrine, lacustrine, or upper riverine. Flood storage is most significant in these systems.

- Outlet characteristics: Either no permanent outlet or a constricted outlet.

- Water/vegetation proportions and interspersion: A high proportion of vegetation in dense stands with little interspersed open water.

- Vegetation class: Forested or scrub/shrub vegetation.

- Sheet flow: Water flowing primarily as sheet flow.

Water Quality Protection

The water quality protection function includes a wetland's ability to retain sediment and associated toxicants and to remove or transform nutrients. Sediments frequently contain chemically and physically attached nutrients and contaminant materials, such as heavy metals, pesticides, and other organic toxicants. Nutrients and toxicants carried by sediments into the wetland can be removed temporarily or permanently from the water column by sediment deposition, burial, chemical breakdown, and/or assimilation into plant and animal tissues.

The following indicators are either moderately or highly significant to water quality protection. Indicator descriptions are characteristics that generally produce the "highest" rating for each indicator. Wetland communities with most of these characteristics will be rated "high" for water quality protection.

- Type of wetland system: Estuarine, lacustrine, or palustrine. Sediment retention times are generally greatest in these systems.

- Outlet characteristics: Either no permanent outlet or a constricted outlet.

- Channel gradient and water velocity: A gradual gradient and slow water velocity. The potential for sediment and toxicant retention and deposition increases as water velocity decreases.

- Fetch/Exposure: Located in a sheltered area where the adjacent topographic relief is sufficient to protect the site from wind and where the adjoining open water fetch is less than two miles.

- Water depth: Shallow. Wetlands with shallow water offer greater frictional resistance to flow which in turn affects suspended solids. Frictional resistance favors sedimentation.

- Water source: Having a surface water source as the principal water supply.

- Flooding extent and duration: Located adjacent to surface water which is subject to seasonal flooding or experiences a seasonally high water table.

- Vegetated width/class: Containing wide stands of multi-stemmed woody and/or persistent emergent vegetation.

- Water/vegetation proportions and interspersion: A high proportion of vegetation in dense stands with little interspersed open water.

- Wetland/watershed ratio: A high wetland-to-watershed ratio.

- Substrate type: Containing predominantly organic soil or receiving predominantly organic soil from an off-site location.

Shoreline Stabilization

Shoreline stabilization is the binding of soil at the shoreline by wetland plants, and the physical dissipation of erosive energy caused by waves, currents, or tides in a basin or channel. Shoreline stabilization by wetlands protects adjacent uplands from erosion, thereby protecting adjacent land uses. The frictional resistance a wetland offers to erosive energy depends on the vegetated width of the wetland, the density of vegetation, and the height of the vegetation relative to incoming waves and currents. For a wetland to be valued as a shoreline stabilizer, potentially erosive conditions must be present. These may take the form of flowing water, a long fetch adjacent to eroding areas, and water with low turbidity.

The following indicators are either moderately or highly significant to water quality protection. Indicator descriptions are characteristics that generally produce the "highest" rating for each indicator. Wetland communities with most of these characteristics will be rated "high" for shoreline stabilization.

- Erosive conditions: Exposed to erosive forces, such as flowing water with velocities exceeding 1.5 ft/sec., boat wakes, open water expanse greater than 100 ft across but less than 1.2 mi, and unstable slopes exceeding 10 percent immediately adjacent to the wetland.

- Sheet flow: Water flowing through the wetland as sheet flow.

- Vegetation class: Forested, scrub/shrub, and persistent emergent.

- Vegetated width: Wide stands of vegetation near the shoreline.

- Water/vegetation proportions: A high proportion of vegetation in dense stands with little interspersed open water.

- Fetch/exposure: Located in an area perpendicular to the dominant wind direction and having an open-water fetch greater than 100 ft, but less than 1.2 mi.

- Shoreline geometry: Cove configuration. Several basic shore configurations are possible: coves, meandering shorelines, and headlands. The cove configuration is most desirable and the headland configuration least desirable, with the meandering shoreline being intermediate.

PRIORITIZING COASTAL WETLANDS BY REGION

Coastal field staff from the TPWD, GLO, USFWS, and Texas Natural Resource Conservation Commission (TNRCC) helped rank and prioritize general categories of coastal wetlands by coastal region according to degree of threat, loss, and sensitivity. Questionnaires (Appendix A) were sent to 16 field staff with coastal wetlands expertise on the upper, middle, and lower coast (Appendix B). The Coastal Wetland Rating System will help focus acquisition efforts on general categories of wetlands--including salt, brackish, intermediate, and fresh marshes, bottomland hardwoods, and swamps--that are most threatened, scarce, and/or vulnerable within a coastal region. Field staff were also asked to evaluate the effectiveness of the questionnaire and to list other methods for protecting coastal wetlands essential to the public interest.

Table 1 summarizes the results from the coastal field staff questionnaire by coastal region. Results are average rankings, based on a scale of 1 to 10, for each coastal wetland category. On the upper coast, brackish marshes were considered most sensitive to destruction or degradation, and bottomland hardwoods have had the greatest loss. Brackish and intermediate marshes and swamps were the most threatened. Salt marshes and swamps were least impacted. Several respondents stated that they "don't know" the status of freshwater wetlands in terms of threat and loss. There was also a greater disagreement among the respondents in the ranking of most wetland categories on the upper coast than in other coastal regions.

On the middle coast, salt, brackish, and intermediate marshes were considered the most sensitive and threatened, and salt marshes have had the greatest loss. Salt marshes were most sensitive, threatened, and had the greatest loss on the lower coast, followed by brackish, intermediate, and fresh marshes. Swamps were least impacted on the middle coast and intermediate marshes on the lower coast. Respondents on the lower coast stated that they "don't know" the status of bottomland hardwoods and swamps.

The response to the survey evaluation was almost equally divided as to whether the questionnaire was a "good way of identifying, prioritizing, and ranking coastal wetlands for acquisition." Of those that thought it was not a good method, most felt that

Table 1. Average rank, based on a scale of 1 to 10, of general categories of coastal wetlands by region, according to sensitivity, threat, loss, and impact.

UPPER COAST

MOST SENSITIVE	MOST THREATENED	GREATEST LOSS	LEAST IMPACTED
_3_ Salt	_4_ Salt	_4_ Salt	_3_ Salt
_2_ Brackish	_3_ Brackish	_3_ Brackish	_4_ Brackish
_3_ Inter-mediate(Inter.)	_3_ Inter.	_3_ Inter.	_6_ Inter.
_4_ Fresh	_4_ Fresh	_4_ Fresh	_5_ Fresh
_4_ Bottomland hardwood (BH)	_4_ BH	_2_ BH	_4_ BH
_5_ Swamp	_3_ Swamp	_5_ Swamp	_3_ Swamp

MIDDLE COAST

MOST SENSITIVE	MOST THREATENED	GREATEST LOSS	LEAST IMPACTED
_2_ Salt	_2_ Salt	_1_ Salt	_3_ Salt
_2_ Brackish	_2_ Brackish	_2_ Brackish	_3_ Brackish
_2_ Inter-mediate(Inter.)	_2_ Inter.	_2_ Inter.	_2_ Inter.
_4_ Fresh	_4_ Fresh	_4_ Fresh	_3_ Fresh
_5_Bottomland hardwood (BH)	_5_ BH	_5_ BH	_2_ BH
_6_ Swamp	_6_ Swamp	_6_ Swamp	_1_ Swamp

LOWER COAST

MOST SENSITIVE	MOST THREATENED	GREATEST LOSS	LEAST IMPACTED
_1_ Salt	_1_ Salt	_1_ Salt	_4_ Salt
_2_ Brackish	_2_ Brackish	_2_ Brackish	_3_ Brackish
_3_ Inter-mediate(Inter.)	_3_ Inter.	_3_ Inter.	_2_ Inter.
_4_ Fresh	_4_ Fresh	_4_ Fresh	_4_ Fresh
_DK*Bottomland hardwood (BH)	_DK_ BH	_DK_ BH	_DK_ BH
_DK_ Swamp	_DK_ Swamp	_DK_ Swamp	_DK_ Swamp

* DK=Don't Know

generalizations cannot be made about the value and status of coastal wetlands, and that "each wetland is unique." One respondent felt that the survey was based on "impressions and limited knowledge," and that it was better to base a rating system on a quantitative or qualitative assessment of historic and current conditions of each category.

Several respondents listed other methods besides acquisition for protecting coastal wetlands essential to the public interest. Increased coastal wetlands monitoring, public education, and the use of conservation easements were listed several times. Other methods included restoring the hydrology after impacts from navigation projects, installing water-control structures in areas that intersect channels, addressing erosion along channels, ensuring freshwater inflows to bays and estuaries, tax incentives, resource-based recreation and tourism, and regulatory programs.

EXISTING AND POTENTIAL COASTAL WETLAND ACQUISITION FUNDING PROGRAMS

Existing Federal Programs

Land and Water Conservation Fund (LWCF) (1965). The LWCF is used for conservation and recreation purposes. Funds are distributed to four federal agencies: the U.S. Fish and Wildlife Service; the U.S. Forest Service; the Bureau of Land Management; and the National Park Service. Funding for the LWCF is from a part of the receipts from offshore oil and gas leasing and development. Annual income is about $900 million. Recently, little money has come to the USFWS or the states because it has been reallocated to help balance the federal budget (Washington State Department of Ecology, 1991).

The USFWS is probably the federal agency most actively involved in acquiring wetlands. Wetlands acquired by the USFWS with the LWCF must be evaluated by threshold criteria in the National Wetlands Priority Conservation Plan (NWPCP). The NWPCP was developed in response to the enactment of the Emergency Wetlands Resources Act by the U.S. Congress in 1986. The NWPCP requires that each of the USFWS regions prepare Regional Concept Plans that prioritize wetlands for acquisition at a local, site-specific level. Users of the NWPCP may include any federal, state, or local agency or private organization or group interested in wetlands acquisition. Criteria to be considered in determining acquisition priorities include wetland functions and values, historic wetland losses, and threat of future wetland loss (Pierce, 1987). The NWPCP also requires that all states include a wetland preservation component consistent with their Statewide Comprehensive Outdoor Recreation Plan to retain eligibility for Land and Water Conservation Funding. The Texas Parks and Wildlife Department developed the Texas Wetlands Plan (TPWD, 1988) as an addendum to the Texas Outdoor Recreation Plan in order to qualify for LWCF monies. The TPWD is currently revising the Texas Wetlands Plan.

Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) (1990). The CWPPRA authorized funding from the Sport Fish Restoration Account for coastal and Great Lakes wetlands conservation projects. Grants are available to coastal and Great Lakes states on a competitive basis and require a 50/50 federal/state match, or 75/25 if the state has a land trust for acquisition of wetlands or open space. If a wetland acquisition area is not a priority conservation area as designated in the USFWS National Wetlands Priority Conservation Plan, preparation of an assessment of the area using the USFWS criteria will be required. In Texas, the TPWD has received CWPPRA monies for coastal wetland acquisition.

Coastal Zone Management Act (CZMA) (1972). The National Oceanic and Atmospheric Administration (NOAA) administers the CZMA. The Resource Management Improvement Grant, Section 306a of the CZMA, affords coastal states that have a federally approved Coastal Management Program (CMP) with 50/50 matching grants for acquisition projects which preserve coastal natural resources, including coastal wetlands. Coastal states can also obtain educational, interpretive, and management costs. Although Texas does not currently have a federally approved CMP, the state is developing a program for submission to NOAA.

Disaster Relief Act (1972). Under the Disaster Relief Act (1972), the Federal Emergency Management Agency (FEMA) provides funding for acquisition of property, including wetlands, within a floodplain that has recently received severe damage by flooding. Under Section 1362 of the Act, several conditions must be met to provide eligibility. These include an existing FEMA insurance policy on the structure in question; a commitment by a local governing body to revert and retain the property in open space; and other specifications regarding level of damage (Washington State Department of Ecology, 1991). If the conditions are met, then funds can be used to acquire structures and land.

Pittman-Robertson (1937) and Dingell-Johnson (1950) Acts. Wildlife restoration and sport fish restoration programs were authorized by the Pittman-Robertson Act and the Dingell-Johnson Act, which was expanded through the Wallop-Breaux Amendment (1984). Both acts provide up to 75 percent of land costs to states for acquisition of lands for wildlife management and restoration. The funding source is a tax on hunting and fishing equipment and a portion of the gasoline tax. Together, they total approximately $350 million annually (Washington State Department of Ecology, 1991).

Intermodal Surface Transportation Efficiency Act (1991) (ISTEA). The ISTEA reauthorizes the federal transportation program. This Act allocates funds to states for expansion and maintenance of the federal highway system and for other transportation planning and improvement projects. The largest funding category in ISTEA is the Surface Transportation Program. Ten percent of each state's allocation must be spent for transportation enhancements. The

transportation enhancement provision of the ISTEA strives to improve the nation's transportation system by providing special funding for scenic, environmental, and historic preservation activities within the nation's transportation corridors. Under the ISTEA, activities eligible for funding include acquisition of scenic easements and scenic and historic sites and other enhancement projects. Projects must have a direct relationship to the nation's transportation system. Federal money can be used to finance up to 80 percent of a given transportation enhancement project, and state or local governments must provide the remaining 20 percent.

Existing State Programs

Texas Parks and Wildlife Department. The TPWD is the state agency most active in wetlands acquisition. The TPWD funds for habitat acquisition, including wetlands, are the following.

Game, Fish, and Water Safety Account (1979)
Funds from the sale of hunting and fishing licenses, stamps and prints, permits, sale of sand and gravel, magazine subscriptions, fees for boat registrations, boat and motor titling, fines, arrest fees, federal aid and depository interest are used for wildlife administration, game conservation, fish propagation, enforcement of game and fish laws, and other purposes.

In 1981, the Texas Waterfowl Stamp Act was passed requiring all waterfowl hunters to purchase a stamp. From 1982 to 1994, the duck stamp program has raised over 17 million dollars, over 15 million of which was spent on land acquisition. The TPWD also issues a waterfowl print each year which has become a popular collector's item. A minimum of 50 percent of these funds are to be spent on wetlands acquisition and development.

State Parks Account (1931)
Funds from park recreational use charges and operation of concessions and causeways or contracts for their operation, magazine subscriptions, leases, rentals, royalties, prospecting, and mining of oil, gas, and minerals, allocation of sales tax on sporting goods and depository interest are used for acquisition, planning, development, administration, operation, maintenance, and improvements of state parks and historic sites.

Texas Park Development Account (1967)
Funds from the sale of Texas Park Development Bonds and depository interest are used for acquiring land for state park sites and developing the sites.

Nongame and Endangered Species Conservation Account (1983)
Private contributions, grants, receipts from the sale of wildlife prints, decals, and stamps, and other sources are used to acquire, develop, investigate, survey, research, manage, protect, and restore nongame and endangered species habitats.

Land and Water Conservation Account (1965)
Federal grants from the LWCF are used for the planning, acquisition, operation and development of outdoor recreation areas.

Lifetime License Endowment Account (1985)
Funds from lifetime hunting, fishing, or combination licenses, contributions, donations, grants, and interest from investments are used to acquire, develop, manage, and repair public hunting and fishing areas.

Other potential acquisition techniques used by the TPWD include acquisition and management of new lands through compensatory mitigation options (TPWD, 1994). When adverse impacts to wetlands are unavoidable and on-site compensatory mitigation is not practicable, then compensation through acquisition of ecologically important off-site wetlands is a viable option. Appropriate legal mechanisms to preserve the wetland in perpetuity include deed transfers to the TPWD, or deed restrictions and conservation easements. Once the wetland is transferred to the TPWD, an appropriate management plan that may include wetland enhancement or restoration will be developed for the site.

Texas Natural Resource Conservation Commission (TNRCC). The TNRCC is not actively involved in wetlands acquisition efforts at the present time, but that may change in the future. The TNRCC is in the process of integrating its floodplain management program with a broader-based watershed management system which could incorporate a wetlands acquisition program as a form of flood control. They are presently working on a report concerning flooding along the Trinity River. An acquisition program might be among their recommendations.

Existing Private Programs

At the private level, groups like the Nature Conservancy, Ducks Unlimited, and the Conservation Fund have been very active in wetlands acquisition. The Nature Conservancy and Conservation Fund are examples of land trusts at the national level. Land trusts are nonprofit conservation organizations that acquire property, assist public agencies in acquiring parks or natural areas, and help land owners establish legal restrictions that limit development on their property, preserving its natural functions and values for subsequent owners (Herlevich, 1995). The Nature Conservancy has facilitated or assisted in the acquisition of 200,000 acres on the Texas Coast (Calnan, 1993). They have worked with local, state, and federal agencies to acquire such sites as Matagorda Island, San Bernard National Wildlife Refuge, McFaddin Marsh, Sea Rim Marsh, Barrow Ranch, and Smith Marsh (Wilwerding, 1984). Currently, they own a 3,900-acre preserve near Palacios adjacent to Mad Island. They also own Pierce Marsh--1,500 acres of wetlands near Galveston. Ducks Unlimited has been very active in funding local, state, and federal acquisition activities through their MARSH Program. The Conservation Fund has only been in existence in Texas for

approximately three years. They are attracting donations from many sources, however, and will undoubtedly play an important role in wetlands acquisition in the future.

Land trusts exist at the local level in Texas, but their numbers are limited. Several local governments have also been active in wetland acquisition projects for protection purposes (TPWD, 1988).

POTENTIAL FUNDING TECHNIQUES AND PROGRAMS

Many funding techniques and programs currently used in other states are not being used in Texas. Other states may use several different and effective techniques and programs, including documentary stamp taxes, land assembly projects, tax incentives, and vanity license plates.

In 1992, the GLO mailed questionnaires to wetland contacts in other states (Calnan, 1993). Respondents were asked to indicate which, if any, of the funding and acquisition techniques listed on the questionnaire their state utilized. A scale was included on the questionnaire so that respondents might rate the effectiveness of the techniques.

Tables 2 and 3 list the wetland funding and acquisition techniques included on the questionnaire, the number of responding states using each technique, and a ranking of each technique. Some of the techniques, such as conservation stamps, are currently being used in Texas, but most are not. Thirty-seven states and Puerto Rico responded. Of these respondents, 11 indicated that they had land acquisition policies that placed a high priority on wetlands acquisition. Only four states--California, Florida, North Dakota, and Oregon--have specific wetlands acquisition programs.

Several points concerning the responses and other sources of information are worth noting:

- Conservation stamps are a popular and effective wetlands acquisition funding mechanism.
- Bonds are also effective but are used less frequently because it is often difficult to get them passed.
- State income tax checkoffs are considered less effective than other techniques because of the low level of funds generated.
- Reactions to special tax districts are mixed for unspecified reasons.
- Conservation easements are used in many states but are not considered the most effective method of acquiring land. Often the costs associated with their purchase are not much lower than fee simple purchase, and the benefits are definitely fewer--no public access, monitoring costs, etc. Minnesota has

Table 2. Wetlands acquisition funding techniques, the number of responding states using each, and a ranking of effectiveness (Calnan, 1993).

Wetlands Acquisition Funding	# of States	Effectiveness			
		VG	A	P	U
conservation stamp	20	12	6	0	2
bonds	11	7	2	0	2
state income tax checkoff	7	1	3	2	1
real-estate sales taxes	6	3	3	0	0
severance taxes on oil and minerals	4	1	3	0	0
special tax districts	3	1	1	1	0
"doc" taxes	3	2	1	0	0
vanity license plates	2	0	1	0	1
revenues - state forests and parks	2	1	1	0	0

VG = Very Good
A = Average
P = Poor
U = Undifferentiated

Table 3. Wetlands acquisition techniques, the number of responding states using each, and a ranking of effectiveness (Calnan, 1993).

Wetlands Acquisition Techniques	# of States	Effectiveness			
		VG	A	P	U
conservation easements	21	5	9	4	3
land trusts	16	6	7	0	3
tax incentives	12	1	6	2	3
land assembly projects	10	6	3	0	1

VG = Very Good
A = Average
P = Poor
U = Undifferentiated

conservation easement programs that involve enrolling land in the Permanent Wetland Preserves Program and the Reinvest in Minnesota Reserve Program. Conservation easements involve the acquisition of specific land rights for conservation purposes. Landowners who offer the state a conservation easement receive a payment to stop cropping and/or grazing the land and in turn initiate conservation practices such as establishing vegetative cover or restoring drained wetlands. Any individual who has owned land for at least one year and can provide evidence of a good and marketable land title can apply. Payments for the easements vary by township and land use history. Most easements purchased by the state are perpetual.

Among the possible advantages to a landowner who grants a conservation easement is reduction of the value of the property for federal gift and estate tax purposes (Herlevich, 1995). Large landholdings, which might otherwise have to be sold and fragmented to settle estate tax bills, can be passed more easily to future generations. If the easement is an *inter vivos* gift and the land is long-term capital gain property, the donor may also claim an income tax deduction for the value of the easement and deduct that figure in an amount up to 30% of adjusted gross income for individuals, with a five year carry-over provision (Herlevich, 1995).

- Land trusts are effective and common in many states.

- Tax incentives are used frequently but do not rank high in terms of effectiveness. Tax incentives alone will not usually induce a landowner to donate land.

- Although they are not used very often, land assembly projects were considered effective. Land assembly projects involve the public purchase of a proposed development site, replatting the area to preserve an environmental asset, and then reselling the individual lots.

- Both Tennessee and Florida have used "doc" (documentary) stamp taxes for effective acquisition programs. Documentary stamp taxes include taxes on deeds and other instruments relating to the transfer of property, stock certificates, bonds, debentures, and certificates of indebtedness.

- Iowa and Colorado fund state parks with the proceeds from lottery revenues (World Wildlife Fund, 1992).

- Michigan, Florida, Montana, and Tennessee utilize severance taxes or royalties on the extraction of oil and minerals for acquisition (World Wildlife Fund, 1992).

Besides direct purchase, donation of privately owned coastal wetlands to the state should be encouraged. Hightower (1993) surveyed 24 coastal states to determine methods used in value assessment, appraisal, and acquisition of coastal wetlands based on their functions and values. Hightower recommended several methods that integrate many factors into the property appraisal process to determine the monetary value of the functions of coastal wetlands only for the purpose of donating privately owned wetlands to the state with a subsequent tax deduction.

Texas has effectively used conservation stamps and other funds and techniques to fund wetland acquisition. Other successful funding techniques and funds used by other states and not by Texas, such as land assembly projects, lottery revenues, conservation easement programs, and documentary stamp taxes, could potentially be used by the state to preserve coastal wetlands.

SUMMARY

Greater effort should be directed in Texas toward preserving coastal wetlands in perpetuity through a coastal wetlands acquisition program. This is an excellent nonregulatory means of conserving valued wetlands. The complex qualities of coastal wetlands are not easily replaced, and any up-front costs of a wetlands acquisition program may be considerably less than costs incurred in an attempt to restore or replace the functions of coastal wetlands that are degraded or lost.

The Coastal Wetland Acquisition Plan presents criteria and guidance for identifying and prioritizing coastal wetlands for state acquisition. The criteria will help focus acquisition efforts on categories of coastal wetlands that are most threatened, scarce, and/or vulnerable in each of the three regions of the Texas coast. The survey of coastal field staff indicates that, on the upper coast, brackish marshes are most sensitive to destruction or degradation, and bottomland hardwoods have had the greatest loss. Brackish and intermediate marshes and swamps were the most threatened. On middle coast, salt, brackish, and intermediate marshes were considered the most sensitive and threatened, and salt marshes have had the greatest loss. Salt marshes were most sensitive, threatened, and have had the greatest loss on the lower coast.

Acquisition of high-priority coastal wetlands will depend on funding availability, willing sellers, and other factors. Perhaps the biggest challenge for the state is finding sufficient dedicated funds for site acquisition and management. Funding sources currently used in other states and not in Texas, such as land assembly projects, lottery revenues, conservation easement programs, and documentary stamp taxes, may be effective in providing additional dedicated funds for coastal wetland acquisition.

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APPENDIX A
Coastal Field Staff Questionnaire

July 20, 1995

Dennis Brown
Mad Island Wildlife Management Area
2601 North Azalea, Suite 31
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Dear Mr. Brown:

The Texas Parks and Wildlife Department (TPWD) and the General Land Office (GLO) are developing criteria for prioritizing and ranking coastal wetlands for acquisition. This effort will assist the TPWD and GLO in not only identifying coastal wetlands "essential to the public interest," but also in developing the acquisition component of both the State and the State-owned Wetlands Conservation Plans.

Coastal wetlands will be ranked according to degree of threat, restoration or enhancement potential, proximity/contiguity, cost, and functions and values. The criteria will help focus acquisition efforts on general categories of wetlands that are most threatened, scarce, and/or vulnerable in a coastal region. Acquisition of high priority wetlands will depend on funding availability, willing sellers, and other factors. Although acquisition is only one important nonregulatory method of conserving wetlands, it is the only means of protection of interest in this survey.

To help identify important wetland categories for acquisition in your region of the coast, please complete the attached questionnaire and return it in the postage-paid envelope, or fax it to (512) 475-0680, by August 8, 1995. The results will be sent to all participants.

If you have any questions about this survey, please contact
Tom Calnan
Texas General Land Office
Coastal Division
1700 North Congress Avenue
Austin, Texas 78701-1495
Telephone:512-463-5100
Fax:512-475-0680

Thanks for your help.

Sincerely,

Mike Herring
Head, Park Special Services
Texas Parks and Wildlife Department

Tom Calnan
Biologist
General Land Office

SIX COASTAL WETLAND CATEGORIES

The following six general coastal wetland categories will be ranked on the basis of sensitivity, exposure to potentially destructive human actions, and extent of loss.

Salt marsh: Estuarine, intertidal emergent wetlands. Typical species include smooth cordgrass (*Spartina alterniflora*), saltwort (*Batis maritima*), glasswort (*Salicornia virginica*), saltgrass (*Distichlis spicata*), seashore dropseed (*Sporobolus virginica*), sea ox-eye (*Borrichia frutescens*), etc.

Brackish marsh: Transitional between salt and fresh marshes. Typical species in topographically higher areas are marshhay cordgrass (*Spartina patens*), Gulf cordgrass (*S. spartinae*), saltgrass, salt-marsh bulrush (*Scirpus maritimus*), etc.

Intermediate marsh: Occurs on the upper coast where salinities are generally between those of fresh and brackish marsh. Typical species include seashore paspalum (*Paspalum vaginatum*), marshhay cordgrass, Olney bulrush (*Scirpus olneyi*), cattail (*Typha* sp.), and California bulrush (*S. californicus*), etc.

Fresh marsh: Generally occurs beyond the limits of saltwater flooding except perhaps locally during hurricanes. Salinities < 0.5 ppt. Typical species include cattails, California bulrush, rattlebush (*Sesbania drummondii*), alligatorweed (*Alternanthera philoxeroides*), etc.

Bottomland hardwood: River or streamside forests of hydrophytic perennials. Typical species include black willow (*Salix nigra*), water oak (*Quercus nigra*), water hickory (*Carya aquatica*), etc.

Swamp: Woodlands or forested areas with saturated soils or are inundated by water during much of the year. Typical species include bald cypress (*Taxodium distichum*), water tupelo (*Nyssa aquatica*), etc.

Please rank the six general wetland categories in your region from 1-10, with 1 the highest rank and 10 the lowest according to the following.

Most Sensitive: Most susceptible to human change/disturbance.
Most Threatened: In greatest danger of destruction/degradation through human actions.
Greatest Loss: Most acreage destroyed/degraded through human actions.
Least Impacted: Categories in relatively good condition.

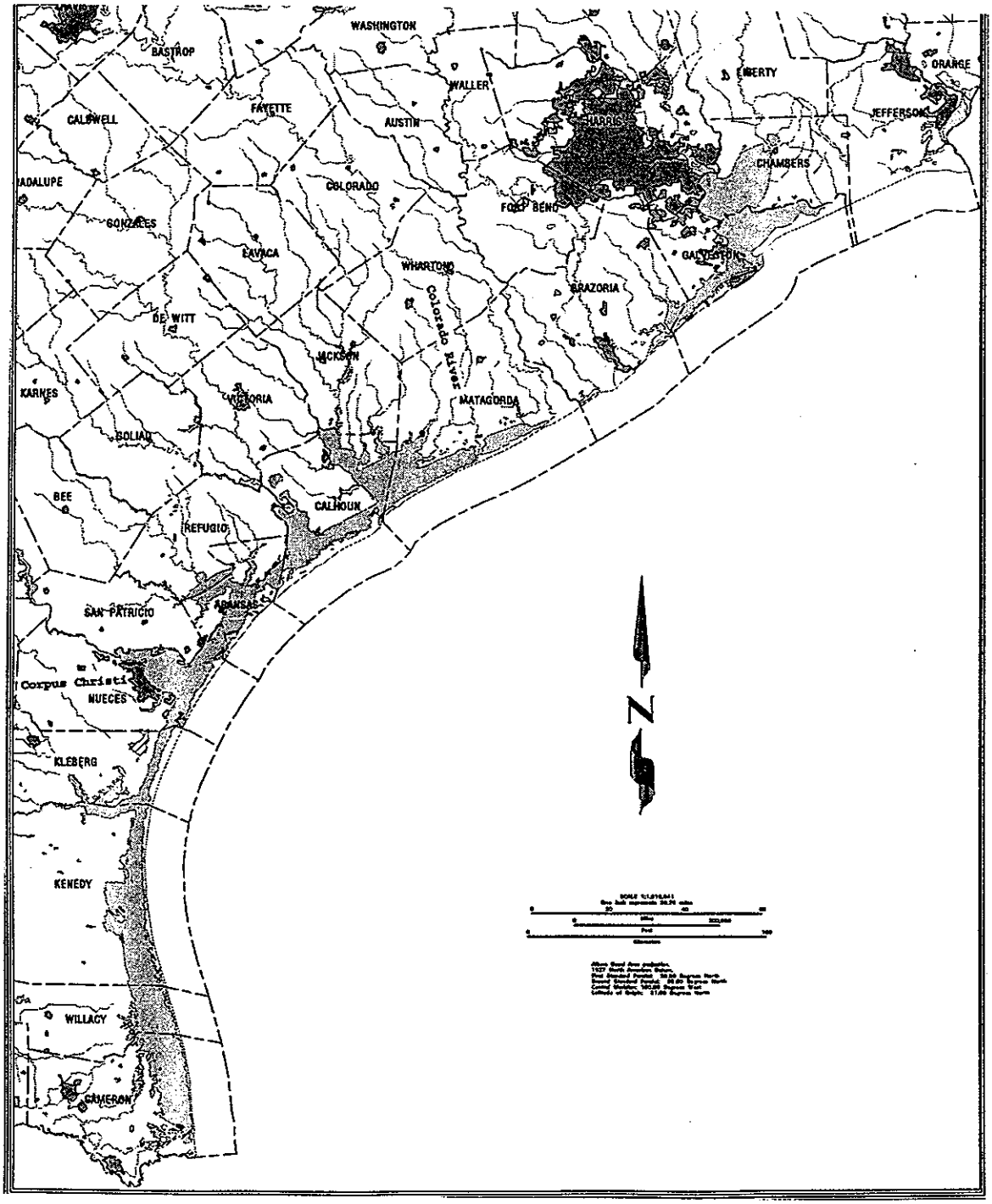
Example: If brackish marsh is the most sensitive of the six categories in your region, rank it #1. If you do not know the status of a category in your region(s), please write in "DK" for Don't Know.

MOST SENSITIVE	**MOST THREATENED**	**GREATEST LOSS**	**LEAST IMPACTED**
____ Salt	____ Salt	____ Salt	____ Salt
____ Brackish	____ Brackish	____ Brackish	____ Brackish
____ Inter-mediate (Inter.)	____ Inter.	____ Inter.	____ Inter.
____ Fresh	____ Fresh	____ Fresh	____ Fresh
____ Bottomland hardwood (BH)	____ BH	____ BH	____ BH
____ Swamp	____ Swamp	____ Swamp	____ Swamp

COASTAL WETLANDS SURVEY

Using the map below, please indicate your coastal region. If the area under your administration or management includes more than one region, please fill out one form for each region. For the purpose of this survey, only coastal wetlands in the following coastal counties will be considered: Cameron, Willacy, Kenedy, Kleberg, Nueces, San Patricio, Aransas, Refugio, Calhoun, Victoria, Jackson, Matagorda, Brazoria, Harris, Galveston, Chambers, Liberty, Jefferson, and Orange.

_____ Upper (northeast of the Colorado River)
_____ Mid (Corpus Christi to the Colorado River)
_____ Lower (south of Corpus Christi)



SURVEY EVALUATION

Is this a good way of identifying, prioritizing, and ranking coastal wetlands for acquisition? If not, please explain.

_____ Yes _____ No

Besides acquisition, please list other methods for protecting coastal wetlands "essential to the public interest."

APPENDIX B
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