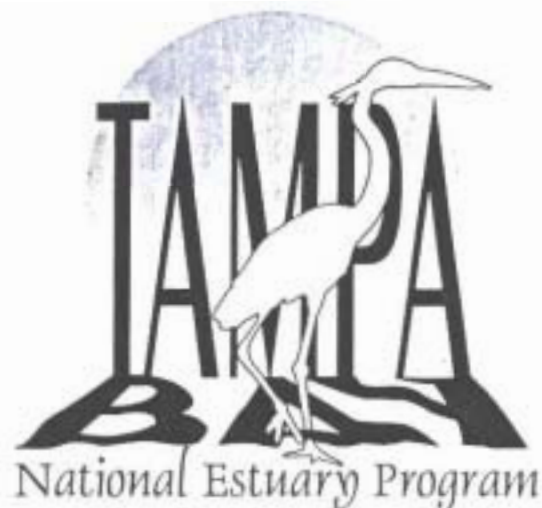




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SETTING PRIORITIES FOR TAMPA BAY HABITAT PROTECTION AND RESTORATION: RESTORING THE BALANCE

FINAL REPORT

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Setting Priorities for Tampa Bay Habitat Protection and Restoration: Restoring the Balance

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ACRONYMS

Used to Designate Bay Segments

(as described by Lewis and Whitman 1985)

BCB	—	Boca Ciega Bay
HB	—	Hillsborough Bay
LTB	—	Lower Tampa Bay
MR	—	Manatee River
MTB	—	Middle Tampa Bay
OTB	—	Old Tampa Bay
TCB	—	Terra Ceia Bay

EXECUTIVE SUMMARY

The *Tampa Bay Habitat Protection and Restoration Masterplan* project has analyzed trends in emergent marine and estuarine wetland loss and determined that there has been greater loss, on a percentage basis, of the shallow, lower salinity tidal marshes predominantly found in tidal streams, than of the higher salinity coastal mangrove and cordgrass marshes. In 1900, there were an estimated 16,200 acres of these oligohaline marshes; there are now 4,117 acres, for a decrease of almost 75%. In total area, the 1900 acreage of tidal marshes was nearly equivalent to that of mangroves, but mangroves have not decreased to the same extent, now totaling 13,764 acres (a loss of 17%). Salt barrens experienced the smallest decline of these coastal wetland habitats, decreasing from 1,012 acres c. 1900 to 877 acres in 1990, for a 13% loss.

Estimated acreage of these three habitat types (tidal marshes, mangroves/cordgrass marshes, and salt barrens) in 1950 shows that nearly 80% of the loss of tidal marshes occurred during the first half of the century. But between 1950 and 1990, relative losses of both tidal marshes and salt barrens far exceeded that of mangroves. As a result of these differential losses, the relative proportions of each habitat type have changed dramatically since 1900. The ratio of mangroves : tidal marsh : salt barrens (based on percent of total emergent wetland acreage) in 1900 is estimated to have been 49:48:3, respectively. By 1950 this had changed to 67:28:5, and by 1990 had reached 73:22:5.

The basic premise of the proposed protection and restoration plan is that a combination of habitats is essential to the continued ecological viability of Tampa Bay, and that these habitats must be protected and restored with regard to historic proportions. From this premise and the trend analysis conducted, which clearly shows a differential loss of critical wetland habitats, comes an alternative for defining the living resource restoration target. **The concept is to restore the predevelopment balance of "habitat ratios," or the relative proportion of the different types of emergent tidal wetland that were present during a benchmark time period representative of a less impacted condition. This paradigm is termed "Restoring the Balance."**

The importance of habitat ratios is based on the assumption that combinations of habitat types, in certain proportions, are essential to the continued survival of groups of organisms with similar habitat needs (guilds). In addition to differential loss, this assumption provides additional justification for the targeting of tidal marshes for restoration. Based on the requirements of the guild of birds in which white ibis are included, tidal marshes are of particular significance as adult feeding areas. Not only do the multiple habitat needs of the white ibis illustrate the concept of habitat ratios directly, but this is also a locally abundant species in real need of the precise kind of habitat protection and restoration proposed by this plan.

Because these areas have also been characterized as critical nursery habitat for many important fish and invertebrate species of both commercial and recreational value, the proposed plan has recommended bay tidal stream habitats as the top priority for future restoration plans. This recommendation is made in order to restore the historical balance of

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the key emergent wetland plant communities in the watershed. In determining restoration target ratios and areas for the three habitat types, four options were considered: restoration to c. 1900 area and proportions; restoration to c. 1950 area and proportions; restoration to c. 1900 proportions; and restoration to c. 1950 proportions. For the latter two options, area would be increased only as necessary to attain the proportions determined. For reasons of cost and practicality, restoration to c. 1950 proportions was chosen as the preferred minimum option. Annual estimated costs for the four options ranged from \$350,000 to more than \$3 million. These costs are based on 100-year projections assuming the current rate of restoration, which is approximately 100 acres every five years.

An evaluation matrix was developed for application in this plan, using criteria that can be scored and thus yield a relatively objective assessment of site rankings for protection. It is recognized that this procedure is merely an example of an attempt toward objective assessment, and that many other criteria can (and perhaps should) be used. Several alternatives have been offered by reviewers of draft versions of this document, and have either been incorporated or are included in the appendixes.

All existing emergent marine and estuarine wetlands not currently under some form of protection from development are identified as priority acquisition or negotiated protection (i.e. conservation easement) areas. Twenty-eight specific areas are identified for protection, including critical areas of existing or potentially restorable freshwater marshes essential for the continued existence of healthy white ibis populations and other bay wildlife species.

Achieving the target levels proposed in this plan will require protection (through direct acquisition or otherwise) of key parcels that are currently under private ownership. Protection of publicly owned lands must also be assured into the future; it cannot be assumed that sites now under regulatory protection will remain so in years to come.

The 40 proposed new habitat restoration projects outlined in the draft five-year SWIM plan (FY 95–99) are suggested as a starting point for establishing priorities for future restoration. Many of these already meet the priority criteria suggested from this project. A one-year phase-in period is recommended during which ongoing restoration projects will continue and a new list of priority restoration projects will be produced for SWIM and other entities to use in future years. Because post-restoration/protection management is considered to be of critical importance, it is included in the criteria suggested by this project.

Development of this plan resulted in an updated inventory of tidal streams tributary to Tampa Bay. These results indicate that there is ample area available to attain the restoration target set for tidal marshes. Furthermore, such restoration is likely to be highly effective in terms of cost and practicality, as a major part of such restoration is proposed to be the control of exotic invasive plant species, particularly Brazilian pepper and Australian pine. This has been identified as a critical part of an overall Tampa Bay habitat restoration and protection plan.

Additional specific recommendations include:

- Conducting an Implementation Workshop
- Incorporation of upland protection and restoration in the overall Fish and Wildlife Service regional wildlife habitat plan
- Development and implementation of long-term management plans
- Implementation of monitoring



This is Technical Publication No. 09-95 of the Tampa Bay National Estuary Program.

INTRODUCTION

Emergent tidal wetlands occur primarily along a natural intertidal shelf which rims the bay and its tidal tributaries, and to a lesser extent along filled intertidal areas created by urban and port development. Three classes of emergent tidal wetlands are generally recognized in the Tampa Bay area: mangrove forests, salt marshes, and salt barrens (Lewis and Estevez 1988). Based upon the salinity regime in which they occur, and their species composition, salt marshes can be further subdivided into three categories. Polyhaline marshes coexist with mangroves along the shoreline of the bay; mesohaline and oligohaline marshes occur in rivers and tidal tributaries to the bay. Hypersaline plant communities or salt barrens typically occur in infrequently flooded tidal flats, usually at or above the spring high water line.

In the subtropical latitudes of Tampa Bay where infrequent freezing weather can occur, the assemblage of plant species which comprise tropical mangrove forests and temperate polyhaline marshes generally exist in a state of dynamic equilibrium, with the herbaceous marsh grasses serving a pioneer successional role and the woody mangrove trees representing the climax community (Lewis and Estevez 1988, Lewis 1990a). Furthermore, given the proper elevation, substrate and energy environment, these species are capable of naturally colonizing newly created intertidal areas, and existing intertidal areas which have been denuded by freeze damage or erosion. Therefore, the overall coverage and relative composition of the various types of emergent tidal wetlands in the bay are in a constant state of flux due to both natural and anthropogenic factors.

These emergent tidal wetlands collectively form an important habitat complex in Tampa Bay. They provide critical habitat for much of the bay's wildlife, are an important component of nutrient cycles, stabilize submerged shoreline sediments and minimize shoreline erosion, and assimilate pollutants carried in runoff from upland urban areas. Emergent tidal wetlands provide attachment sites for algal and invertebrate communities, and provide habitat below the water surface for hundreds of recreational and commercially important species of fish, shrimp, and crabs, and other shellfish (Haddad 1989). These species include pink shrimp, menhaden, blue crabs, mullet, red drum, tarpon, and snook (Lewis et al. 1985, Edwards 1991). The marsh grasses and mangrove trees also provide critical feeding, nesting, and sheltering habitat for a variety of birds such as pelicans, cormorants, herons, ibises, spoonbills and egrets (Paul and Woolfenden 1985).

Similarly, adjacent upland plant communities such as coastal hydric hammocks buffer emergent tidal wetlands from urban and agricultural development, and provide important transitional habitat for reptiles such as the diamondback terrapin and the mangrove water snake. The status and ecological function of coastal upland habitats in Tampa Bay, however, have generally been poorly studied.

Despite the dynamic nature of emergent tidal wetlands, a substantial net loss of these critical living resources has occurred in Tampa Bay since 1950. The most significant losses occurred during the 1950s and 1960s when dredge and fill activities associated with urban residential and port development were largely unregulated (Lewis 1977). With the passage of more stringent wetland protection laws during the mid-1970s and early 1980s, the rate of emergent

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tidal wetland destruction from dredge and fill activities has been greatly reduced. Nonetheless, due to the substantial historic wetland losses that have been incurred, and the adverse impact of these losses on dependent animal species, measures are needed to restore previously impacted areas, and to better protect existing emergent tidal wetland and associated upland communities in Tampa Bay. Furthermore, although the existing stands of emergent tidal wetlands are protected from major impacts by federal, state and local regulatory programs, the swinging of the political pendulum does not guarantee this protection in the future.

The Emergent Tidal Wetland Communities of Tampa Bay

Both air temperature and salinity are critical factors in determining the distribution and species composition of emergent tidal wetlands. Defining the relevant salinity regimes as they relate to Tampa Bay is complicated. Hedgpeth (1951) was the first to develop a classification scheme for salinity zones within estuaries. The Venice System (anonymous 1959) adopted in 1959 used a slightly modified system from that of Hedgpeth (1951), and Bulger et al. (1990) have recently proposed a third. The three systems are compared here:

	Hedgpeth	Venice	Bulger	component
Freshwater	<0.5 ppt	0–0.5 ppt	0–4 ppt	1
Oligohaline	0.5–3.0	0.5–5	2–15	2
Mesohaline	3.0–16.5	5–18	11–19	3
Polyhaline	16.5–30	18–30	15–28	4
Euhaline	>30	>30	23–35	5

Unfortunately, none of these classification schemes has been universally adopted by the scientific community. With respect to the species composition and community distribution of emergent tidal wetlands in Tampa Bay, the classification scheme developed by Bulger et al. (1990) generally corresponds with the vegetational zonation observed in the field. Mangrove forests and associated cordgrass fringe marshes typically occur within the polyhaline zone, whereas mangroves and needlerush typically occur within the mesohaline zone. Oligohaline zones are the most diverse, often supporting six or more herbaceous species dominated by black needlerush and occasional black mangroves (Lewis 1990, p. 75). Salt barrens exist in a hypersaline regime caused by seawater ponding and evaporation.

Although mangrove and marsh communities often co-exist as complex assemblages, each is a distinct ecosystem with unique characteristics. The distribution and species composition of salt marsh, mangrove and salt barren communities of Tampa Bay are discussed here.

Mangrove Forests

Mangrove forests in Florida are composed of four species of trees: *Rhizophora mangle* L. (red mangrove), *Avicennia germinans* (L.) L. (black mangrove), *Laguncularia racemosa* Gaertn. f.

(white mangrove) and *Conocarpus erecta* L. (buttonwood). The tree species are generally distributed along a gradient in the intertidal zone with the red mangrove at the lowest elevations and the buttonwood at the highest. Forest structure in Florida is, however, not uniform and many variations on the classic zonation pattern first described by Davis (1940) occur (Snedaker 1982, Lewis et al. 1985). In addition, due to factors such as local topography, time since the last freeze event, changes in freshwater discharge, and other periodic disturbances, a given intertidal plant community can include marsh species at elevations lower or higher than the forest itself, and within windfalls or lightning strike areas of the forest. Mangroves are cold-sensitive tropical plants, and for this reason exhibit latitudinal zonation dependent on their cold tolerance (Lot-Hergueras et al. 1975, McMillan 1975, Lugo and Patterson-Zucca 1988, McMillan and Sherrod 1986). The black mangrove is the most cold tolerant species and extends northward along the Gulf coast to Louisiana as scattered shrubs within the predominant tidal marsh vegetation. There are approximately 273,000 ha of mangrove forest remaining in Florida, a reduction of 23% since World War II (Lewis et al. 1985).

An important characteristic of all mangroves is that their reproduction includes seedling dispersal by water and by vivipary. Vivipary means that there is no true or independent "seed", but continuous development from embryo to seedling occurs while attached to the parent tree (Gill and Tomlinson 1969). For this reason the final reproductive unit released from the parent tree is often referred to as a "propagule" (Rabinowitz 1978).

Ecologically, mangroves are considered important as fisheries habitat (Lewis et al. 1985), as sources of detritus to support estuarine food chains (Odum et al. 1982), and as shoreline stabilizers (under limited conditions; Carlton 1974).

Tidal Marshes

Atlantic coastal marshes in Florida are dominated by *Spartina alterniflora* Loisel. (smooth cordgrass) while Gulf coast marshes are dominated by *Juncus roemerianus* Scheele (black needlerush). Several other plant species are common minor components of the marshes including *Spartina patens* (Ait.) Muhl. (saltmeadow cordgrass), *Distichlis spicata* (L.) Greene (saltgrass) and *Batis maritima* L. (saltwort). Tidal marshes are widely distributed around the coast of Florida and often intermingle with mangrove communities (Durako et al. 1985). There are approximately 155,000 ha of tidal marsh in Florida (Lewis et al. 1985).

Reproduction takes place by waterborne seeds and asexually produced rhizomes. Due to their rhizomatous method of asexual propagation and ability to rapidly expand and anchor, some tidal marsh species such as smooth cordgrass are often pioneer colonizers of disturbed habitats and are replaced as other species such as mangroves naturally invade such habitats (Davis 1940, Lewis and Dunstan 1976, Lewis 1982a, 1982b).

Oligohaline Marshes

Though often not recognized as a distinct plant community (Durako et al. 1985), these marshes are unique in both their species composition and their ecological role, and are thus treated here as a distinct plant community. Oligohaline is defined by Cowardin et al. (1979) as

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referring to "water with a salinity of 0.5 to 5.0 ppt due to ocean-derived salts" (p. 43). In Florida, oligohaline marshes are herbaceous wetlands located in tidally influenced rivers or streams where the plant community exhibits a mixture of true marine plants and typical freshwater taxa (*Typha* [cattails], *Cladium* [sawgrass]) that tolerate low salinities. The predominant plant species of oligohaline marshes include black needlerush, *Acrostichum danaeifolium* Langsd. & Fisch. (leather fern), *Typha domingensis* Pers. (brackish water cattails), *Cladium jamaicense* Crantz (sawgrass), *Scirpus robustus* Pursh. (bulrush) and *Hymenocallis palmeri* S. Wats. (spider lily).

Ecologically, oligohaline marshes (Rozas and Hackney 1983) and low salinity mangrove forests are becoming recognized as critical nursery habitat for such species as *Callinectes sapidus* (blue crab), *Centropomus undecimalis* (snook), *Megalops atlanticus* (tarpon) and *Elops saurus* (ladyfish) (Odum et al. 1982, Gilmore et al. 1983, Lewis et al. 1985). Because recognition of this key role in estuarine life cycles has come only recently, much of this habitat has been lost or highly modified. The reduced amount of this habitat type may represent a limiting factor in total population sizes of some estuarine-dependent species.

Salt Barrens

The salt barren represents the upper intertidal flat which is inundated typically only by spring tides once or twice a month. This results in hypersaline conditions with seasonal expansion of typically low-growing succulent salt-tolerant vegetation with lower interstitial salinities during the rainy season, and retreat with less frequent inundation and rainfall. This produces the characteristic open unvegetated patches of the salt barren substrate. These areas are also referred to as salt flats or salinas. The salt barren is typically located behind a mangrove forest or tidal marsh at a somewhat higher elevation and often occurs on exposed rock outcrops with shallow sand sediments. Although technically oligohaline marshes, salt barrens are treated here as a distinct plant community due to their unique flora and ecological value. Common plant species consist of saltwort, saltgrass, *Salicornia bigelovii* Torr. (annual glasswort), *Salicornia virginica* L. (perennial glasswort), *Monoanthochloe littoralis* Engelm. (key grass), *Limonium carolinianum* (Walt.) (sea lavender), *Blutaparon vermiculare* (L.) Mears (samphire) and *Sesuvium portulacastrum* L. (sea purslane).

These areas have unique ecological values as seasonal feeding areas for wading birds when the lower elevation mudflats are more routinely inundated (Powell 1987), and as night feeding habitat on spring tides for snook, tarpon and ladyfish (G. Gilmore, pers. comm.). However, due to their low structural complexity and apparent lack of numerous fauna, these areas are often assumed to have low ecological value. Data now being generated strongly contradicts this assumption.

Impacts to Emergent Tidal Wetlands

Because they exist along the shoreline of the bay and its tributaries, emergent tidal wetlands have historically been very susceptible to encroachment from urban development. The physical impacts associated with dredge and fill activities have been, and continue to be, the primary cause of emergent tidal wetland losses in Tampa Bay.

Historic dredging and the disposal of the resulting dredged material have directly resulted in the loss of thousands of acres of intertidal and shallow bay-bottom habitat around Tampa Bay. The U.S. Geological Survey estimated that the total surface area of the bay has been reduced by approximately 8,320 acres or 3.6% (Goodwin 1984). Of this acreage, approximately 11% has been attributed to causeways, 29% to residential and commercial development, and 60% to industrial and port development, inclusive of the spoil disposal islands (Goodwin 1984). More recent analyses inclusive of Boca Ciega Bay have shown that over 13,000 acres of intertidal and submerged habitats in Tampa Bay have been filled since the early 1900s (Coastal Environmental 1994).

Although shipping channels were historically constructed primarily in the naturally deeper areas of the bay, approximately 14,381 acres of bay bottom have been impacted by either dredging or filling for port development and spoil disposal (Coastal Environmental 1994). While some of this dredged material has been disposed of in shoreline areas historically occupied by emergent tidal wetlands, the majority of this spoil material was deposited on submerged bay bottom. This practice has resulted in the creation of numerous spoil islands and shallow intertidal areas that, in many cases, have been naturally recolonized by emergent tidal wetland vegetation. While these gains in emergent tidal wetland coverage have partially offset the associated losses, the net loss in Tampa Bay has been estimated to be greater than 5,000 acres since 1950 (Coastal Environmental 1995).

Another potential long-term threat to emergent tidal wetlands in Tampa Bay is rising sea level. Analysis of geological formations in Florida indicate that marsh and mangrove communities have always been closely tied to sea level (TBRPC 1993). Since the last ice age approximately 10,000 years ago, sea level has risen slowly, allowing the sediment load from rivers to maintain a relatively stable coverage of marsh and mangrove communities. Although emergent tidal wetlands are naturally dynamic communities capable of advancing and retreating with long-term changes in sea level, encroaching upland development (e.g., vertical seawalls and upland filling) has limited the ability of intertidal wetland communities to advance landward with rising sea level. Therefore, preservation of adjacent upland communities is needed not only to protect existing wetland and coastal upland habitats, but also to maintain the long-range viability of emergent tidal wetlands in the bay.

Review of Previous Habitat Restoration Plans

There has been only one previous effort to prepare a baywide habitat restoration plan. The Tampa Bay Regional Planning Council (TBRPC 1986a) prepared a combined wetland trend analysis (Table 1) and recommended restoration plan that included 39 specific emergent wetland (mangrove forest and tidal marsh) and seagrass restoration sites (Table 2), of which four have been completed and 22 are no longer under consideration. This listing of projects was prepared in response to the data generated from the study and previous reports of substantial loss of marine and estuarine habitats by Lewis (1977) and the associated declines in commercial fisheries harvests (Lombardo and Lewis 1985). TBRPC reported a substantial differential loss of emergent wetlands, with mangroves declining by 4% and tidal marshes declining by 56% between 1957 and 1982 (Table 1). Haddad (1989 Table 1, p. 116) reported the results of a port mitigation study (with the U.S. Fish and Wildlife Service) which

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indicated that while only 7% of the mangroves in Tampa Bay were lost between 1950 and 1982, 30% of the saltmarshes were lost.

Table 1. Tampa bay area habitat gains and losses (TBRPC 1986a).

HABITAT TYPE	1957 INVENTORY		1982 INVENTORY		GAINS/LOSSES	
	acres	percent of total	acres	percent of total	acres	percent of total
Marine open water	199,757.81	18.94	201,289.02	19.08	+1,531.21	0.77
Estuarine open water	212,067.52	20.11	226,722.86	21.49	+14,655.34	6.91
Beaches, flats and bars	17,712.41	1.68	23,002.81	2.18	+5,290.40	29.87
Dredged spoil area	120.54	0.01	253.09	0.02	+132.55	109.96
Marine aquatic	1,305.03	0.12	75.62	0.01	-1,229.41	94.20
Estuarine vascular aquatic	59,536.83	5.63	31,240.20	2.96	-28,116.63	47.37
Mangrove	20,826.65	1.97	19,944.40	1.89	-882.25	4.24
Estuarine emergent	7,903.57	0.75	3,475.63	0.33	-4,427.94	56.02
Fresh open water	6,166.64	0.58	14,596.18	1.38	+8,429.54	136.70
Palustrine emergent	18,945.17	1.80	8,288.98	0.79	-10,656.19	56.25
Palustrine forested wetland	30,115.76	2.86	29,008.22	2.75	-1,107.54	3.68
Upland developed	79,992.66	7.58	251,498.62	23.84	+171,505.96	214.40
Other upland classes	388,220.72	36.81	228,063.47	21.63	-160,157.25	41.25
Unknown data	12,263.01	1.16	17,370.15	1.65	+5,107.14	41.65
TOTAL	1,054,754.30	100.00	1,054,829.30	100.00	—	—

TBRPC (1986b) and Clark (1991) provided the first listing of the minor tidal tributaries or creeks entering Tampa Bay and made specific recommendations regarding tidal creek restoration. Although specific restoration sites were not identified, the importance of tidal creeks for flood storage and attenuation, water quality maintenance, and critical fisheries habitat was emphasized and a framework for management of tidal creeks suggested (Table 3).

Dial and Deis (1986) identified 27 possible port mitigation sites (Table 4) of which 14 were eventually rejected and 13 subjected to further review. One of these has been completed and four have been partially completed, although none of these were done for mitigation of port activities.

Beever et al. (1992) made 12 specific recommendations regarding both upland and wetland habitat management for MacDill Air Force Base, pending its closure. One of these included the removal of spoil mounds associated with mosquito control ditching of the Coon Hammock Creek system and recontouring "to simulate the meander of natural creeks."

HDR Engineering, Inc. (1994) recommended seven restoration sites in the Palm River / McKay Bay complex (Table 5), emphasizing exotic plant removal, tidal circulation restoration to historical tidal creek areas, and replanting with native species (Figure 1).

Table 2. The 39 potential wetland habitat restoration sites identified by TBRPC (1986a).

SITE			TYPE*	1995 STATUS**
Pinellas County	1.	Dog Leg Key	I	UC
	2.	Skyway Bridge	I	NUC
	3.	Skyway Bridge Artificial Reef	S	C
	4.	Pinellas Point, intertidal	I	PC, NUC
	5.	Pinellas Point, subtidal	S	NUC
	6.	Lassing Park	S	C
	7.	Salt Creek	I	NUC
	8.	Coffee Pot Bayou	I	NUC
	9.	Gandy Causeway	I	UC
	10.	West end, Howard Frankland Causeway	S	NUC
	11.	St. Petersburg-Clearwater Intl. Airport	I,S	NUC
	12.	Booth Point	I	UC
Hillsborough County	13.	Channel A	I	PC
	14.	Fish Creek	I	UC
	15.	East end, Howard Frankland Causeway	I,S	PC
	16.	Kaul Fill site	I,S	UC
	17.	Rattlesnake Spoil Island	I,S	NUC
	18.	MacDill site, intertidal	I	NUC
	19.	MacDill site, subtidal	S	NUC
	20.	Broad Creek	I	UC
	21.	Bayshore Boulevard	I	NUC
	22.	McKay Bay	I	NUC
	23.	Palm River / Tampa Bypass Canal	I	UC
	24.	Delaney Creek Pop-off Canal	I	C
	25.	Delaney Creek Pop-off Canal to Alafia River	S	C
	26.	Spoil Island 2-D	I	NUC
	27.	Spoil Island 3-D	I	NUC
	28.	Port Redwing	I,S	UC
	29.	Newman Branch site	S	NUC
	30.	E.G. Simmons Park	I	PC
	31.	E.G. Simmons Park to Apollo Beach	S	NUC
Manatee County	32.	Piney Point	I,S	NUC
	33.	Hendry site, intertidal	I	PC
	34.	Hendry site, subtidal	S	NUC
	35.	Bishops Harbor	S	NUC
	36.	Palmetto Point	I	NUC
	37.	Perico Bayou	I	NUC
	38.	Anna Maria Island	I	NUC
	39.	Oneco Landfill / Gap Creek	I	UC

*I – intertidal, S – subtidal

**C – completed; PC – partially completed; UC – still under consideration; NUC – no longer under consideration

Setting Priorities:

Table 3. Framework for management / restoration plans for Tampa Bay tidal creeks (from TBRPC 1986b).

OBJECTIVE:	Maintenance / Restoration of Natural Function
CONSIDERATION:	Water Quality and Quantity
POLICY:	Water quality improvement through control of nonpoint source pollutant loadings
A.	Identify problem areas
B.	Prioritize improvements
C.	Coordination of agencies for improvements
POLICY:	Minimize point source pollutants
A.	Develop ecological criteria for all discharges
B.	Promote water recycling
C.	Promote effluent disposal alternatives for problematic septic tank and package plant systems
POLICY:	Protect natural fresh water inputs
A.	Groundwater
B.	Surface water
POLICY:	Develop consistent tidal creek monitoring and enforcement program
A.	Water quality
B.	Habitat and species utilization
CONSIDERATION:	Habitat Utilization
POLICY:	Protect or improve natural channel alignment and elevation requirements for maintenance of productivity
POLICY:	Preserve natural vegetation and fish and wildlife resources
A.	Removal of exotic species
B.	Encourage wetland creation
C.	Restore impacted areas
POLICY:	Protection of archaeological sites
A.	Identification of sites in all areas before development
B.	Preservation or excavation prior to destruction
OBJECTIVE:	Develop consistent and compatible land use standards
POLICY:	Promote public land acquisition and conservation easements for environmentally sensitive lands
POLICY:	Encourage compatible low density development on adjacent upland areas.
A.	Minimize development within the 25-year floodplain
POLICY:	Encourage clustering of water-oriented land uses
OBJECTIVE:	Management of tidal creeks as an important public asset
POLICY:	Promote public education
A.	Value of tidal tributaries
B.	Prevent public degradation
C.	Minimize user conflicts
POLICY:	Promote compatible public access

Table 4. Possible port mitigation/habitat restoration sites identified by Dial and Deis (1986).

REGION	SITE	TYPE*	1995 STATUS**
Hillsborough Bay	Pendola Point to Alafia River	I	C
	3-D Spoil Island	I	NUC
	2-D Spoil Island	I	NUC
	Port Redwing Basin	I,S	NUC
	McKay Bay	I	UC
	MacDill area	I,S	NUC
	Delaney Creek	I	UC
	Bayshore area	I	NUC
Old Tampa Bay	Channel A	I	PC
	Booth Point	I	UC
	St. Petersburg / Clearwater Airport	I,S	NUC
	Weedon Island	I	NUC
	West end, Howard Frankland Causeway	S	NUC
	Kaul Fill site	I,S	NUC
	Sheldon fill site and borrow pit	I,S	NUC
	Port Tampa to Gandy Blvd.	I,S	NUC
	Largo Inlet	I,S	NUC
	Lake Tarpon Channel	I	PC
	Alligator Lake	I	NUC
Lower Tampa Bay, north side	Maximo Channel	I	NUC
	Coffee Pot Bayou	I	NUC
Lower Tampa Bay, south side	E.G. Simmons Park	I	PC
	Cockroach Bay	I	UC
Port Manatee and Manatee River area	Port Manatee area	I	PC
	Perico Bayou	I	NUC
	Bishop Harbor	S	NUC
	Manatee River — Palmetto, Ellenton	I	NUC

*I – intertidal, S – subtidal

**C – completed; PC – partially completed; UC – still under consideration; NUC – no longer under consideration

Setting Priorities:

Table 5. Potential habitat restoration sites along Palm River and eastern McKay Bay (HDR 1994).

SITE (OWNERSHIP)	RECOMMENDED RESTORATION MEASURES
Palm River / McKay Bay (public)	backfill dredged channels in Palm River and McKay Bay (to the extent possible so as not to interfere with flood control functions of the Tampa Bypass Canal system) and use spoil material to create subtidal and intertidal habitats
Washington Street (Tampa Expressway Authority)	- wetland creation / restoration - exotic vegetation removal and replanting with native species - upland enhancement
S.R. 60 Marsh (CSX Transportation; NCNB National Bank of Florida)	Tampa Welding Co. site (3A) - acquire site - wetland creation / restoration and enhancement - exotic vegetation removal and replanting with native upland vegetation - tidal circulation improvement McGinty / Torque Quip Co. site (3B) - acquire site - wetland creation - tidal circulation improvement
Lykes Parcel (ELAPP Parcel)	- exotic and nuisance plant species removal and replanting with native species - spoil mound removal and regrading - evaluate selective backfilling of mosquito control ditches to restore historical tidal flow patterns - excavate and/or re-establish shallow pond network
TECO Easement (Tampa Electric Co.)	restoration alternatives similar to and/or in concert with site 4 above (Lykes Parcel as appropriate without interference with utility operations)
SWFWMD Dredged Material Disposal Areas (SWFWMD)	- exotic vegetation removal from adjacent lands and replanting with native vegetation - wetland restoration / enhancement - upland enhancement
City Incinerator Fly Ash Pond Site (Tampa Port Authority)	- exotic plant species removal and replanting with native species - wetland / upland creation / enhancement

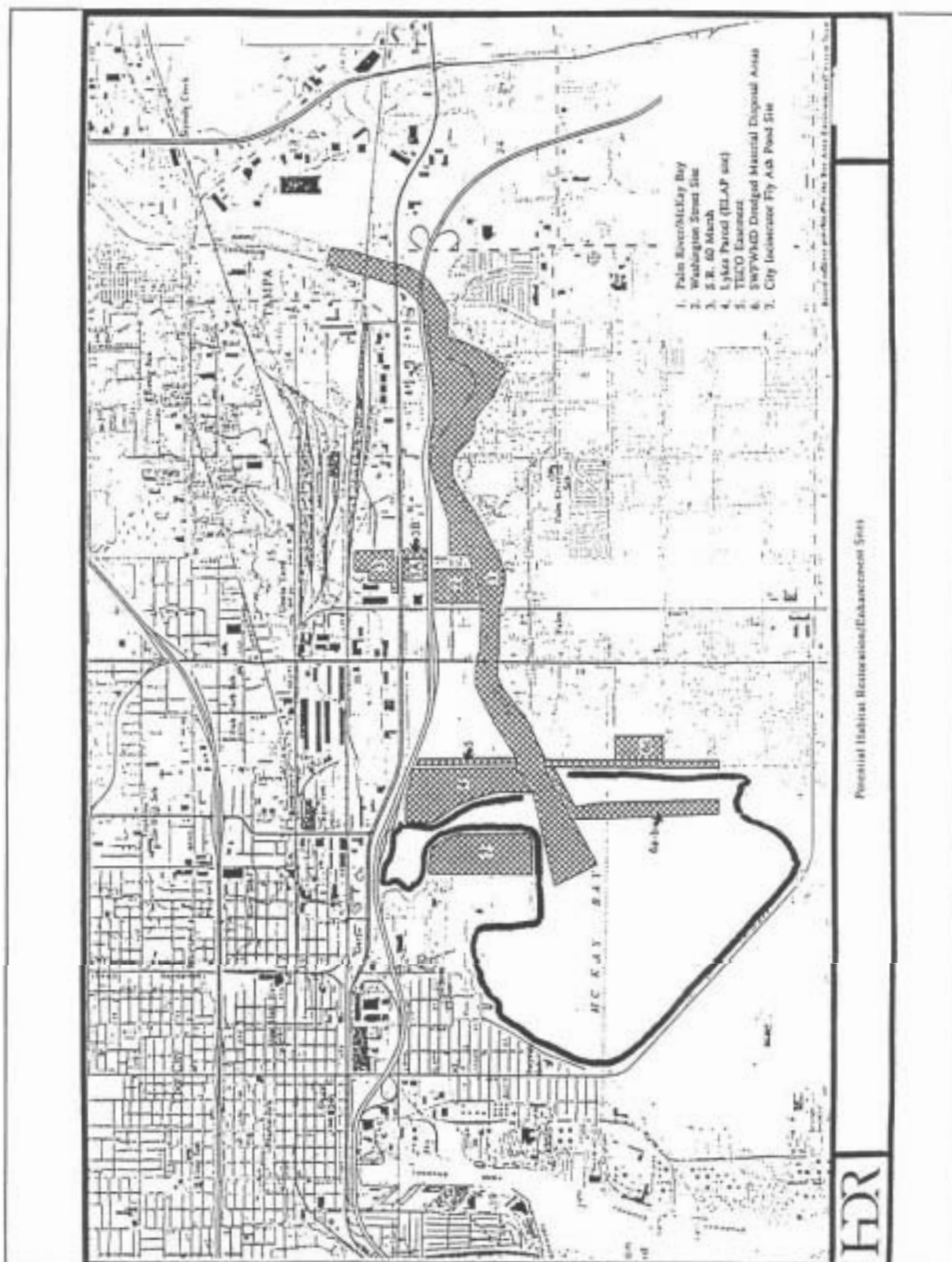


Figure 1. Potential habitat restoration sites in the McKay Bay / Palm River portion of Tampa Bay (from HDR 1994).

Setting Priorities:

Finally, the Surface Water Improvement and Management (SWIM) Program within the Southwest Florida Water Management District has had several annual reports and preliminary site assessment reports that are being combined into a summary document and five-year plan (1995–1999). The SWIM Program has provided a draft of *SWIM Potential Restoration Sites Five-Year Plan FY 95–FY 96* from which the information here has been abstracted. Table 6 lists the 24 completed habitat restoration projects which total 85.6 acres of restored wetlands. Table 7 lists the 40 preliminary proposed habitat restoration sites for implementation between 1995 and 1999. Based upon responses and review comments received from the SWIM Program (Appendix A), the selection criteria used in selecting these sites are listed in order of importance in Table 8.



Table 6. Restoration projects, completed and in progress, by SWIM and FDEP, protected land acquisitions, Hillsborough and Manatee Counties. EVC – exotic vegetation control; C – completed; IP – in progress; UD – under design & permitting; NCA – no current activity.

LEAD AGENCY	SITE NAME	STATUS	BAY SEGMENT	SIZE (ac)	HABITAT	COOP AGENCIES	MANAGEMENT RESPONSIBILITY	MANAGEMENT PLAN EXISTS	MANAGEMENT PLAN IS FUNDED
FDEP	Osgood Point	C	BCB	9.0	salt marsh, mangroves, dunes	SWIM, City of Gulfport	City of Gulfport	N	N
	South Parcel	C	HB	25.0 wetland, 300 total	wetland	SWIM, Cargill Fertilizer, Inc.	Cargill Fertilizer, Inc.	N	N
	Foch Lake	C	Pinellas Co.	4.0	tidal pond	City of St. Petersburg	City of St. Petersburg	N	N
	Gandy North	C	OTB	1.0	wetland	Marine Corps	not specified	N	N
	Gandy South	C	OTB	2.0	wetland	FDOT, SWIM, TBNEP, BAEAT	not specified	N	N
SWIM	Peanut Lake / Hendry site	C	LTB	10.0	tidal lagoons, creeks	SWIM, Port Manatee	potentially FDEP Bureau of Coastal & Aquatic Managed Areas	N	N
	Cockroach Bay EVC	C	MTB	80.0	ditch banks, abandoned farm fields, disturbed saltmarsh, hammock	EPC, HCC, HCELAPP	HCELAPP	UD	Y
	Joe's Creek	C	BCB	60.0 reconnect, 10.0 created	tidal creeks, wetlands	Pinellas County	not specified	N	N
	Hendry Delta	C	LTB	3.0	saltmarsh	DNR	not specified	N	N
	South Bayshore	C	HB	1.5	marsh & upland plantings	City of Tampa	none specified	N	N
	E.G. Simmons Park I	C	MTB	14.0	13.0 ac wetlands, 1.0 ac hammock	Hillsborough County	Hillsborough County Parks Dept.	N	N
	Polaris Park I	C	OTB	1.0	tidal ponds, wetlands, upland	15 others, public and private	Tampa Parks Dept.?	N	N
	NE McKay Bay	C	HB	4.0	tidal stream, marsh	HCELAPP	HCELAPP	Y	Y
	Mangrove Bay	C	OTB	13.5	intertidal creeks, 0.5 ac salt marsh	City of St. Petersburg	City of St. Petersburg	N	N
	Boca Ciega I	C	BCB	3.5	fresh & oligohaline wetlands	Pinellas County	Pinellas County?	N	N
	Little Bayou	C	MTB	3.0 of 13.4 total	oligohaline tidal creek	City of St. Petersburg	City of St. Petersburg, (TBAEP maintains)	N	N

(continued)

Table 6 continued.

LEAD AGENCY	SITE NAME	STATUS	BAY SEGMENT	SIZE (ac)	HABITAT	COOP. AGENCIES	MANAGEMENT RESPONSIBILITY	MANAGEMENT PLAN EXISTS	MANAGEMENT PLAN IS FUNDED
(SWIM)	Tarpon Outfall Canal I	?	OTB	1.0	no further information provided			N	N
	Boca Ciega II	UD	BCB	1.0	as Phase I ?			N	N
	Picnic Island	C	OTB	8.0	tidal channels, marsh platforms	City of Tampa	City of Tampa	N	N
	E.G. Simmons Park II	UD	MTB	1.0	hammock, improve tidal flow	Hillsborough County Parks & Recreation	Hillsborough County	N	N
	Gandy Park (Phase II - info on Ph I?)	C	OTB	2.0	tidal marsh	City of Tampa	not specified	N	N
	Terra Ceia Causeway	C	TCB	2.2	EVR, marsh planting	FDOT	not specified	N	N
	Jungle Prada Park	C	BCB	1.0	intertidal wetland, riprap (hard bottom)	City of St. Petersburg	City of St. Petersburg ?	N	N
	Harbor Palms	C	OTB	4.4	intertidal marsh, saltmarsh, island hammocks	City of Oldsmar	not specified	N	N
	Howard Frankland east	C	OTB	3.0	not specified	FDOT	not specified (maintenance by FDOT & District)	N	N
	Osgood Point	C	BCB	10.0	no further information provided				
ELAPP	Joe's Creek IA	C	BCB	0.5	not specified	Pinellas County	not specified	N	N
	Tarpon Outfall Canal II	UD	OTB	1.0	no further information provided			N	N
	Long / Cross Bayou	UD	BCB	2.0	not specified	Pinellas County?	not specified	N	N
	Alafia River South Prong	NCA	HB	800	not specified	SWFWMD	HCELAPP	N	Y
	Alderman's Ford Addition	IP	not specified	1,000	upland forest	not specified	HCELAPP	Y	Y
	Balm-Doyette Scrub	IP	not specified	4,916	upland forest	FDPE/CARL	HCELAPP	UD	Y
	Bolding Tract	NCA	not specified	65	not specified	not specified	HCELAPP	Y	Y
	Boy Scout	NCA	not specified	400	not specified	not specified	HCELAPP	UD	Y

(continued)

Table 6 continued.

LEAD AGENCY	SITE NAME	STATUS	BAY SEGMENT	SIZE (ac)	HABITAT	COOP. AGENCIES	MANAGEMENT RESPONSIBILITY	MANAGEMENT PLAN EXISTS	MANAGEMENT PLAN IS FUNDED
(ELAPP)	Brook Creek Headwaters	NCA	not specified	940	not specified	SWFWMD	HCELAPP	UD	Y
	Camp Bayou	NCA	not specified	300	not specified	not specified	HCELAPP	Y	Y
	Clearwater Property	UD	not specified	400	upland forest/ hardwood swamp	not specified	HCELAPP	UD	Y
	Cockroach Bay	IP	MTB	960	not specified	not specified	HCELAPP	UD	Y
	Dairy Farm	NCA	not specified	370	not specified	WCRWSA, DEP/FPS	DEP/FPS	Y	Y
	Diamondback Tract (AKA Brackers Tract)	C	not specified	10	coastal hammock	TINEP	HCELAPP	Y	Y
	English Creek	NCA	not specified	455	not specified	HCC	HCELAPP	Y	Y
	Fish Hawk	NCA	not specified	285	not specified	not specified	HCELAPP	UD	Y
	Gibson Lands	UD	not specified	40	coastal hammock	not specified	HCELAPP	UD	Y
	Golden Aster Scrub	NCA	not specified	1,200	not specified	DEP/CARL	HCELAPP	UD	Y
	Hammer Tower	NCA	not specified	10	not specified	not specified	HCELAPP	UD	Y
	Little Manatee River	NCA	not specified	1,500	not specified	SWFWMD	HCELAPP	UD	Y
	Lithia Springs Addition	IP	not specified	40	upland forest, Hardwood swamp	not specified	HCELAPP	Y	Y
	McKay Bay	NCA	HB	145	not specified	not specified	HCELAPP	Y	Y
	Pam Callahan Nature Preserve	NCA	not specified	143	not specified	not specified	HCELAPP	UD	Y
	Rhodose Road	NCA	not specified	600	not specified	not specified	HCELAPP	Y	Y
	Saffold	NCA	not specified	355	not specified	not specified	HCELAPP	UD	Y
	Sterling Downs	NCA	not specified	60	not specified	not specified	HCELAPP	Y	Y
	SMD 48	NCA	not specified	48	not specified	City of Tampa	HCELAPP	UD	Y
	Troydale Road	NCA	not specified	275	not specified	not specified	HCELAPP	UD	Y

(continued)

Table 6 continued.

LEAD AGENCY	SITE NAME	STATUS	BAY SEGMENT	SIZE (ac)	HABITAT	COOP. AGENCIES	MANAGEMENT RESPONSIBILITY	MANAGEMENT PLAN EXISTS	IS FUNDED
(ELAPP)	Wolf Branch	UD	MTB	1,080	tidal creeks,	SWIM	HCELAPP	UD	Y
	Oakridge	NCA	not specified	925	not specified	not specified	SWFWMD	Y	Y
	Riverhills Park Addition	NCA	not specified	15	not specified	not specified	Temple Terrace	UD	N
	Temple Terrace Riverfront Park	NCA	not specified	75	not specified	not specified	Temple Terrace	UD	N
MANATEE COUNTY	Eco Palms	NCA	not specified	1,036	not specified	not specified	HCELAPP	N	N
	Apollo Beach	NCA	not specified	58	not specified	not specified	HCELAPP	N	N
	Bald Road Scrub	NCA	not specified	920	not specified	not specified	HCELAPP	N	N
	Blackwater Hammock	NCA	not specified	8	not specified	not specified	HCELAPP	N	N
	Bullfrog Creek Scrub	NCA	not specified	1,500	not specified	not specified	HCELAPP	N	N
	Port Roebing	NCA	not specified	140	not specified	not specified	HCELAPP	N	N
	Gibson Fish Farm	NCA	not specified	20	not specified	not specified	HCELAPP	N	N
	Lake Ruth Ranch	NCA	not specified	1,200	not specified	not specified	HCELAPP	N	N
	Live Oak Ranch	NCA	not specified	1,270	not specified	not specified	HCELAPP	N	N
	Leffis Key	C	Sarasota Bay	30	not specified	not specified	not specified	N	N
FDEP, IN PROGRESS	Emerson Point	UD	MR	193	not specified	not specified	not specified	N	N
	Williams Park Pier	IP	HB	not specified	artificial reef	EPC, Oyster Reef Designs, Inc.	monitoring by EPC	N	N
	McKay Bay	IP	HB	not specified	create wetlands, enhance transitional	EPC, City of Tampa	City of Tampa Parks Dept.	N	N
	Cockroach Bay	IP	MTB	>500-ac site	EVC, coastal, wetland, upland	FDEP, SWIM, Hillsborough County, TINEP	HCELAPP	UD	Y
	Cypress Point (pending ELAPP acquisition)	NCA	OTB	not specified	coastal	SWIM, City of Tampa	City of Tampa	N	N

NOTE (added in proof): Suggested revisions to this table were suggested by F. Courtney and are included here as Appendix K.

Table 7. Future restoration and protection projects EVC – exotic vegetation control

LEAD AGENCY	SITE NAME	BAY SEGMENT	SIZE	HABITAT/ PROPOSED ACTIVITY	COOP. AGENCIES	MANAGEMENT RESPONSIBILITY
FDEP (\$ available) (\$450,000, with \$150,000 of that from GTF*)	Delaney Creek	HB	not specified	tidal creek wetlands (?)	EPC, SWFWMD,	not specified
	Cooper's Point (\$50,000 initial phase, \$600,000 total cost)	OTB	not specified	tidal lagoons & creeks, uplands	SWIM, City of Clearwater	not specified
	Emerson Point (\$715,000 total, \$60,000 initial approved)	LTB	not specified	tidal creeks & lagoons, uplands	SWIM, TBNEP, Manatee County	not specified
SWIM FY 95	Clam Bayou I	BCB	15 acres	remove sediment, EVC, marsh planting	City of Gulfport, Pinellas County	not specified
	MacDill AFB II	HB or MTB	5 acres	EVC, marsh planting	USAF	not specified
	Mangrove Bay III	OTB	5 acres	EVC, regrade, intertidal marsh	City of St. Petersburg, FMRI	not specified
	Cabbagehead Bayou	OTB	1–2 acres	adjust tidal elevation	FDOT	not specified
	TECO Rock Ponds	MTB	10–12 acres	EVC, create transitional areas, tidal connection	TECO	conservation easement probable
	Emerson Point (same as FDEP above)	LTB	70–80 acres	EVC & regrade to upland/wetland mosaic	Manatee Co., FDEP	not specified
	Braden River II	MR	5-acre project	EVC, tidal creek to mangroves	FDOT	not specified

*Gardiner Trust Fund

(continued)

Table 7 continued.

LEAD AGENCY	SITE NAME	BAY SEGMENT	SIZE	HABITAT/ PROPOSED ACTIVITY	COOP. AGENCIES	MANAGEMENT RESPONSIBILITY
(SWIM FY 95)	Mobbly Bay	OTB	15 acres	tidal creeks & marsh platforms, EVC	City of Oldsmar	not specified
	Cooper's Point	OTB	5 acres	EVC, regrade, plant	City of Clearwater	not specified
	Allen's Creek I	OTB	2 acres	regrade to create tidal marsh	Pinellas County	not specified
SWIM FY 96	Boca Ciega II	BCB	3-4 acres	flood control; stormwater treatment	Pinellas County	not specified
	Peanut Lake II	MTB or LTB	5 acres	phosphate processing wastewater treatment	Port Manatee	not specified
	South Skyway	LTB	5-6 acres	mangroves; EVC, regrade	FDOT, possibly Manatee Co.	not specified
	Bartlett Park	OTB	3-acre site	marsh restoration	City of St. Petersburg	not specified
	Howard Frankland W	OTB	50-200 acres	tidal creek restoration; freshwater marsh creation (in private borrow pit)	FDOT, FDEP, Pinellas County	not specified
	SE McKay Bay (alt.)	HB	8-10 acres	EVC, regrade to transitional marsh	Tampa Audubon Society, TECO	owned by District (except TECO easement)
	Wolf Branch Creek	MTB	80-500 acres	fill pits, restore tidal connections to bay	Hillsborough County	not specified
	S.R. 580	OTB	2 acres	regrade to tidal marsh	FDOT	FDOT
	Cypress Point	OTB	5 acres	regrade, create tidal creek	City of Tampa	City of Tampa

(continued)

Table 7 continued.

LEAD AGENCY	SITE NAME	BAY SEGMENT	SIZE	HABITAT/ PROPOSED ACTIVITY	COOP. AGENCIES	MANAGEMENT RESPONSIBILITY
SWIM FY 97	Dug Creek	HB	10 acres	remove berm to de-channelize; salt marsh planting	Hillsborough Co.	probably Hillsborough Co. (owner)
	Port Manatee Isle	MTB	56 acres	plant; possible creation of a tidal creek	Port Manatee	not specified
	Davis Tract	HB	30 acres	EVC; regrade to transitional marsh	Hillsborough Co., Audubon	not specified
	Little Manatee River	MTB	200 acres	upland, transitional and wetland restoration	Hillsborough Co.	not specified
	Mobbly Bay II	OTB	20 acres	EVC; regrade to tidal marsh	City of Oldsmar	not specified
SWIM FY 98	Cockroach Bay 1C and 1D	MTB	200 acres	50 ac. EVC; littoral shelf creation; oligohaline habitat	Hillsborough Co., FDEP, HCEPC	not specified
	Allen's Creek II	OTB	4 acres	create tidal marsh	Pinellas County, City of Largo	not specified
	Cross Bayou / Joe's Creek	BCB	5 acres	4-5 ac EVC; create intertidal & high marsh	Pinellas County (owner)	not specified
	Port Redwing	HB	30-40 acres	enhance marsh; upland restoration	Tampa Port Authority, Hillsborough Co.	not specified
	Apollo Beach	MTB	12 acres	create wetlands; EVC; manatee habitat	Hillsborough Co.	not specified
	Del Oro Tract	OTB	2-ac site	create 1-ac pond; stormwater treatment; marsh platforms	City of Clearwater	not specified

(continued)

Table 7 continued.

LEAD AGENCY	SITE NAME	BAY SEGMENT	SIZE	HABITAT	COOP. AGENCIES	MANAGEMENT RESPONSIBILITY
(SWIM FY 98)	Rocky Creek	OTB	10-25 acres	not specified	Hillsborough County	not specified
	Cracker Road Fish Farm	HB	40 acres	create lg. open water features, tidal creeks	Hillsborough County	not specified
	Terra Ceia Isles	LTB	500 acres	EVC; create upland/wetland mosaic	FDEP	not specified
	U.S. 41 Fish Farm	Hillsborough County	10-ac site	EVC; create pond and connection	Hillsborough County	not specified
SWIM FY 99	MacDill AFB III	HB/MTB	6 acres	create marsh and salinity gradient, EVC	US Air Force	not specified
	Clam Bayou II	BCB	7 acres	EVC; intertidal marsh creation	City of Gulfport	not specified
	Dick Creek	OTB	10-20 acres	restore circulation	FDEP	not specified
	Tarpon Outfall Canal	OTB	1-5 acres	reconnect marsh to open water	SWFWMD	not specified
	Cargill Property	HB	50-60 acres	EVC; regrade	Cargill Fertilizer, FDEP	not specified
	Delaney Creek Pop-off II	HB	40-60 acres	create stormwater treatment marsh	Hillsborough Co., Tampa Audubon	not specified
MANATEE COUNTY	Manatee Headwaters at Duette	MR	2,100 acres	none specified	Manatee County	not specified

(continued)

Table 7 continued.

LEAD AGENCY	SITE NAME	BAY SEGMENT	SIZE	HABITAT	COOP. AGENCIES	MANAGEMENT RESPONSIBILITY
(MANATEE COUNTY)	Emerson Point Addition	LTB	20 ac	coastal wetlands, mangrove swamp	not specified	not specified
	Perico Island	LTB/MR	280 ac	seagrass, mangroves	not specified	not specified
	Riverbay	LTB/MR	534 ac	seagrass, mangroves, salt barren	not specified	not specified
SAVE OUR RIVERS Group A	Alafia River Corridor	HB	29,051	floodplain wetlands	not specified	not specified
	Frog Creek	LTB	1,713	mangroves, saltmarsh, coastal hammock	not specified	not specified
ELAPP	Little Manatee River	LTB	31,005	floodplain forest	not specified	not specified
	Alderman's Ford South Prong Addition	HB	650	not specified	not specified	not specified
	Blackwater Creek	not specified	3,600	not specified	not specified	not specified
	Cypress Creek	not specified	5,000	not specified	not specified	not specified
	Cypress Street	OTB	60	not specified	not specified	not specified
	Fish Hawk Ranch	not specified	1,480	not specified	not specified	not specified
	Greenwood Tract	not specified	47	not specified	not specified	not specified
	Little Manatee Corridor	not specified	3,400	not specified	not specified	not specified
	Trout & Cypress Creeks Corridor	not specified	2,400	not specified	not specified	not specified
	Upper Little Manatee	not specified	500	not specified	not specified	not specified

(continued)

Table 7 continued.

LEAD AGENCY	SITE NAME	BAY SEGMENT	SIZE (ac)	HABITAT	COOP. AGENCIES	MANAGEMENT RESPONSIBILITY
(ELAPP)	Baker Creek	not specified	900	not specified	not specified	not specified
	Bullfrog Creek/ The Kitchen/ Gibson Land	not specified	629	not specified	not specified	not specified
	Cone Ranch Addition	not specified	5,500	not specified	not specified	not specified
	Dick Creek	not specified	60	not specified	not specified	not specified
	Hammer Tower	not specified	60	not specified	not specified	not specified
	Marina Point	not specified	60	not specified	not specified	not specified
	McKay Bay Causeway	HB	45	not specified	not specified	not specified
	North Prong Alafia	HB	3,800	not specified	not specified	not specified
	Racetrack Road	not specified	800	not specified	not specified	not specified
	Sever-Packard	not specified	18	not specified	not specified	not specified
	South Prong Alafia	HB	2,200	not specified	not specified	not specified
	Sun City Scrub	not specified	40	not specified	not specified	not specified
	Triple Creek Ranch	not specified	1,200	not specified	not specified	not specified
	Valroy Road	not specified	640	not specified	not specified	not specified
	Zindler	not specified	10	not specified	not specified	not specified
	Madison Avenue	not specified	570	not specified	not specified	not specified

(continued)

Table 7 continued.

LEAD AGENCY	SITE NAME	BAY SEGMENT	SIZE	HABITAT	COOP. AGENCIES	MANAGEMENT RESPONSIBILITY
(ELAPP)	Massey Tract	not specified	900	not specified	not specified	not specified
	Woolley Tract	not specified	670	not specified	not specified	not specified
	Cowhouse Creek	not specified	110	not specified	not specified	not specified
	CSX/Delaney Pop-off	not specified	70	not specified	not specified	not specified
	Gray Road	not specified	69	not specified	not specified	not specified
	Hoedt Road	not specified	180	not specified	not specified	not specified
	Lake Park	not specified	600	not specified	not specified	not specified
	Lake Rogers	not specified	473	not specified	not specified	not specified
	Pendola Tract	HB	280	not specified	not specified	not specified
	Sheldon	not specified	340	not specified	not specified	not specified
	Valrico Fire Tower	not specified	50	not specified	not specified	not specified
	Williams Road	not specified	10	not specified	not specified	not specified

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Table 8. Recommended SWIM criteria for selection of emergent wetland habitat protection and restoration projects, in order of priority (Henningsen, letter dated August 22, 1995; Appendix B). Items 1–5 are “most important.”

-
- | | |
|-----|-----------------------------------|
| 1. | Habitat diversity / complexity |
| 2. | Cost / benefit ratios |
| 3. | Size of parcel |
| 4. | Freshwater source |
| 5. | Management issues |
| 6. | Ownership of parcel |
| 7. | Cooperative involvement |
| 8. | Access |
| 9. | Permittability |
| 10. | Location with Tampa Bay ecosystem |
| 11. | Public visibility |
-



SETTING PRIORITIES FOR HABITAT RESTORATION AND PROTECTION: RESTORING THE BALANCE

The Tampa Bay National Estuary Program (TBNEP) includes a number of projects designed to guide the development of a Comprehensive Conservation and Management Plan (CCMP) for the bay. One of these is the preparation of a Habitat Protection and Restoration Masterplan.

The plan is centered around the habitat needs of ten faunal guilds (groups of animals with similar habitat requirements) which contain 38 species selected by the Habitat Protection and Management Advisory Committee as important indicators of bay health (Table 9). Nine of these species are listed by the Florida Game and Fresh Water Fish Commission and/or the U.S. Fish and Wildlife Service as species of special concern, threatened or endangered. The list was derived from a similar, although shorter, listing of species chosen by Killam et al. (1992) as "important fisheries and wildlife species" for life history descriptions by TBNEP (Table 10). The concept of using fish and wildlife guilds to guide and evaluate restoration plans has also been recently proposed for the Kissimmee River restoration (Weller 1995).

The goal of this plan is to ensure the existence of healthy, self-maintaining populations of these species and others associated with their guilds for the foreseeable future (50–100 years). Achieving this goal requires an understanding of the life history needs of these species, the historical habitat modifications or loss within the bay proper and its watershed, and the concept of multiple habitat needs by the members of a guild.

Although the life history features of all species within the guilds may not be completely known, it is assumed that the species have evolved to be adapted to relative proportions of different, often complementary, habitats. The five habitats addressed in this plan are:

- Coastal uplands
- Mangrove forests and *Spartina* (smooth cordgrass) marshes
- Oligohaline and mesohaline tidal marshes, dominated by *Juncus* (needlerush)
- Salt barrens
- Freshwater foraging habitats

The Concept of Multiple Habitat Requirements

Habitat is defined as "any part of the earth where [a] species can live, either temporarily or permanently" (Krebs 1985, pp. 64–65). Traditionally, the habitat needs of a species have been characterized by a given area of adult habitat, or home range, requirements (Cox et al. 1994). For example, the home range requirement of the Florida panther is given as 135,800 acres for males and 74,100 acres for females (Cox et al. 1994). Thus to support 100 independent free-living adult panthers (assuming equal numbers of males and females) would require 50 times 74,100+135,800 or 10,495,000 acres, assuming no overlap of home ranges. In reality, overlap does occur and thus the average density is one per 27,000 acres.

The home range requirements of a single, nonherding land mammal are relatively easily determined by radio-tagging several members of the population and plotting their travels over a period of time. When researchers look at herd-forming species, particularly those that

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Table 9. Faunal guilds for habitat restoration and land acquisition masterplan for Tampa Bay

GUILD NO.	TYPE	LIFE HISTORY STAGE	COMMON NAME	SCIENTIFIC NAME
1	open water filter feeder	adult	bay anchovy Atlantic menhaden Atlantic thread herring	<i>Anchoa mitchilli</i> <i>Brevoortia tyrannus</i> <i>Opisthonema oglinum</i>
2	shallow water forage fish	adult	striped killifish sheepshead killifish silver perch spot clown goby lined sole hogchoker	<i>Fundulus majalis</i> <i>Cyprinodon variegatus</i> <i>Bairdiella chrysoura</i> <i>Leiostomus xanthurus</i> <i>Microgobius gulosus</i> <i>Achirus lineatus</i> <i>Trinectes maculatus</i>
3	recreationally and commercially important fish and shellfish	juvenile	tarpon red drum snook* spotted seatrout striped mullet blue crab pink shrimp	<i>Megalops atlanticus</i> <i>Sciaenops ocellatus</i> <i>Centropomus undecimalis</i> <i>Cynoscion nebulosus</i> <i>Mugil cephalus</i> <i>Callinectes sapidus</i> <i>Penaeus duorarum</i>
4	subtidal invertebrates	adult	soft-bottom deposit feeders caridean shrimp	
5	intertidal invertebrates	adult	fiddler crabs horn shells marsh snails	<i>Uca</i> spp. Cerithiidae <i>Melampus littorina</i>
6	estuarine molluscs	adult	marsh clam crown conch	<i>Rangia</i> spp. <i>Melongena corona</i>
7	estuarine-dependent birds	adult	brown pelican* least tern** reddish egret* American oystercatcher* roseate spoonbill* willet laughing gull	<i>Pelecanus occidentalis</i> <i>Sterna antillarum</i> <i>Egretta rufescens</i> <i>Haematopus palliatus</i> <i>Ajaia ajaja</i> <i>Catoptrophorus semipalmatus</i> <i>Larus atricilla</i>
8	estuarine-dependent birds requiring freshwater foraging habitat (during nesting season)	adult	white ibis* snowy egret* little blue heron*	<i>Eudocimus albus</i> <i>Egretta thula</i> <i>Egretta caerulea</i>
9	estuarine reptiles	adult	diamondback terrapin mangrove water snake	<i>Malaclemys terrapin macrospilota</i> <i>Nerodia clarkii compressicauda</i>
10	marine mammals	adult	manatee*** bottlenose dolphin	<i>Trichechus manatus</i> <i>Tursiops truncatus</i>

*Species of Special Concern, FGFWFC

**listed by FGFWFC as Threatened

***listed as Endangered, FGFWFC and USFWS

Table 10. List of species chosen for synthesis of life history information (from Killam et al. 1992).

Fish	Tarpon	<i>Megalops atlanticus</i>
	Bay anchovy	<i>Anchoa mitchilli</i>
	Striped killifish	<i>Fundulus majalis</i>
	Snook	<i>Centropomus undecimalis</i>
	Spotted seatrout	<i>Cynoscion nebulosus</i>
	Red drum	<i>Sciaenops ocellatus</i>
	Silver perch	<i>Bairdiella chrysoura</i>
	Spot	<i>Leiostomus xanthurus</i>
	Striped mullet	<i>Mugil cephalus</i>
	Clown goby	<i>Microgobius gulosus</i>
	Lined sole	<i>Achirus lineatus</i>
	Hogchoker	<i>Trinectes maculatus</i>
Invertebrates	Blue crab	<i>Callinectes sapidus</i>
	Pink shrimp	<i>Penaeus duorarum</i>
	American oyster	<i>Crassostrea virginica</i>
	Hard clam	<i>Mercenaria mercenaria</i> , <i>M. campechiensis</i>
	Grass shrimp	<i>Palaemonetes</i> spp.
Benthic Community	Polychaete	<i>Diopatra cuprea</i>
Marine Mammals	Florida manatee	<i>Trichechus manatus latirostris</i>

undertake long, seasonal migrations, the concept becomes more complicated. The caribou, for example, migrates long distances each season and needs several distinct habitat types. The permanent blockage of access to or loss of all or one of these habitat types could doom the species to extinction. On a smaller scale, the reduction in area of just one of these habitat types, while the others remained the same, would represent the limiting factor on the ultimate population size. This follows what is termed a modified Leibig's Law of the Minimum (Russell-Hunter 1970, p. 54); that is, the factor available in the least amount determines the carrying capacity of the overall ecosystem for a particular species, where that factor is critical in its life history (see also Lewis et al. 1985, p. 310).

Applying all of this to the ten faunal guilds discussed here is difficult, particularly where the "home range" needs and even a complete understanding of the multiple habitat needs ("the habitat mosaic", Lewis et al. 1985, p. 310) of most the species are not known. We have thus chosen to look at *approximate habitat ratios* as an alternative to specific habitat needs by area for each target guild species, unless more specific information is available (e.g., white ibis). The concept originated with Estevez (1982) in considering how to manage cumulative impacts to Florida's coastal wetlands. This method has been specifically rejected by DeFreese in looking at biodiversity protection for the Indian River Lagoon (IRL) (DeFreese 1995, p. 18–19) because while "identification of appropriate indicator species represents an ongoing resource management goal to evaluate ecosystem health and sustainability ... the identification of appropriate indicator species or species associations continues to represent a

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significant scientific challenge". Instead, a "landscape [ecosystem] approach" is suggested as providing the most appropriate method of protecting biodiversity and emphasizes land acquisition and restoration (if needed). It is unclear how various parcels are prioritized without specific species goals, which DeFreese characterizes as having "inherent risks" (p. 19).

Habitat Ratios

This study is limited to looking at target habitat protection and restoration goals for five habitat types needed by estuarine-dependent species: 1) coastal uplands; 2) mangrove forests and euhaline cordgrass (*Spartina*) marshes; 3) oligohaline and mesohaline tidal marshes, dominated by needlerush (*Juncus*); 4) salt barrens, and 5) critical freshwater foraging habitats for guild 8 (estuarine-dependent birds). Habitat types 1 and 5 represent special cases to be discussed later.

For the remaining three habitats, the concept of target habitat ratios is illustrated in Figure 2. If we assume that the ten guilds developed successful life history strategies during the evolution of the species in that guild that included the optimum use of various habitats in quantities available for use in the undisturbed (c. 1900) Tampa Bay (Figure 2), then the recent modification or loss of habitats in an unequal manner (i.e., 10% loss of some habitats, 90% loss of others) has produced an abundance of some habitats while others have become more rare due to differences in the recent rate of loss. Day and Yáñez-Arancibia (1985, p. 28), in support of the importance of specific habitat requirements, state that:

... utilization of the lagoon-estuarine environments by marine and freshwater organisms is not random. Many species have evolved adaptations that optimize the use of estuarine richness during juvenile stages by the timing of reproduction and migration patterns.

Following the modified Leibig's Law of the Minimum, if a more rare habitat is essential as part of the life history requirements of a species, then it could represent a "choke point" or limiting factor for the overall population size in the Tampa Bay ecosystem. It is reasonable to assume that the development of successful life history strategies by estuarine-dependent species (e.g., the semi-catadromous reproductive strategy of redfish and snook) was driven by the optimal use of the relative proportion of various critical habitat types that were present during their evolution. Therefore, the rationale for "restoring the balance" is this concept of the relative proportions of various critical habitat types. Addressing the question of critical habitat is only part of the necessary overall ecosystem management plan needed for Tampa Bay (Lewis et al. [1985] describe factors other than habitat availability that could also represent "choke points," including specific water quality parameters or reduced availability of specific food items), but providing the proper balance of critical habitats is essential to the long-term stability of estuarine-dependent animal populations.

Returning to Figure 2, we have used the best available information (published data, aerial photography, soil maps; see also pp. 43–48) to illustrate the approximate percentages that each of three critical habitat types contributed to the total "marine emergent wetland mosaic" of Tampa Bay at three periods of time (c.1900, c.1950 and 1995). These habitat types are

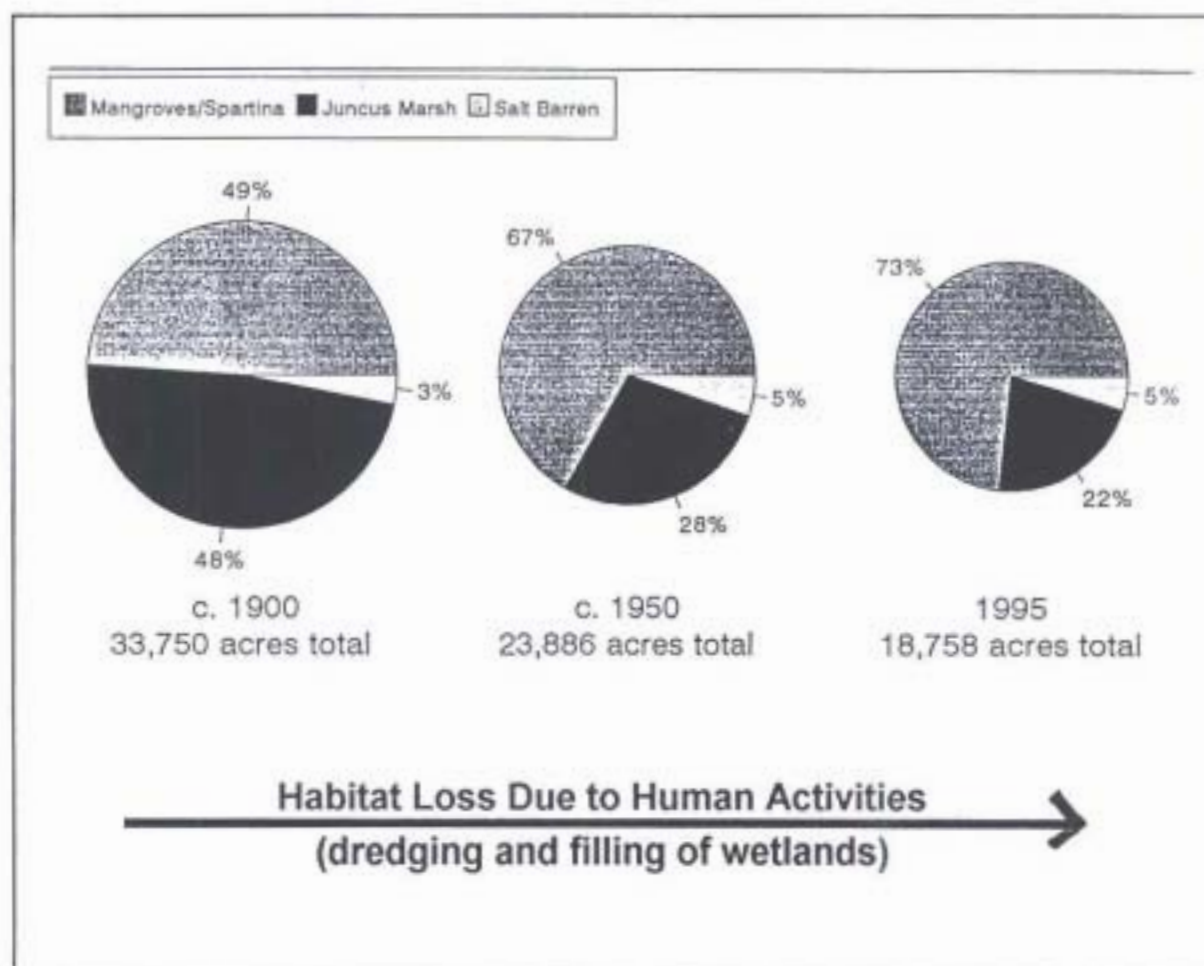


Figure 2. Conceptual differential habitat loss (modified from data from Lewis 1977, Haddad 1989, Janicki et al. 1994).

often linked together, as illustrated in Figures 3 and 4, as critical habitat components needed by certain marine and estuarine fish and invertebrate species, including many listed in Table 1, to complete their life cycles. These species, in turn, are important food items for other species such as those in guilds 7, 8, 9 and 10. The role of nursery habitats for juvenile and early juvenile stages of many fish species of commercial and recreational importance has, in particular, received a lot of interest in recent years (Gilmore et al. 1982, 1983; Lewis et al. 1985; Peters and McMichael 1987; Day et al. 1989; Edwards 1991; Peebles et al. 1991; Lewis 1992). Day et al. (1989) critically examined the classic fisheries management methods as illustrated by the "Ricker analyses" and termed them a failure when it came to managing estuarine-dependent fisheries. Instead these authors suggested (p. 501) that

...there appears to be an emerging consensus among fisheries researchers that the key to understanding and predicting fish stocks for any given year is to determine the events that produce high or low survival during the critical days, weeks or months after the fish are born ... it is important for young fishes to grow out of the stages in which they are very vulnerable to predation as rapidly as possible and ... food availability and habitat greatly affect growth rates.... The

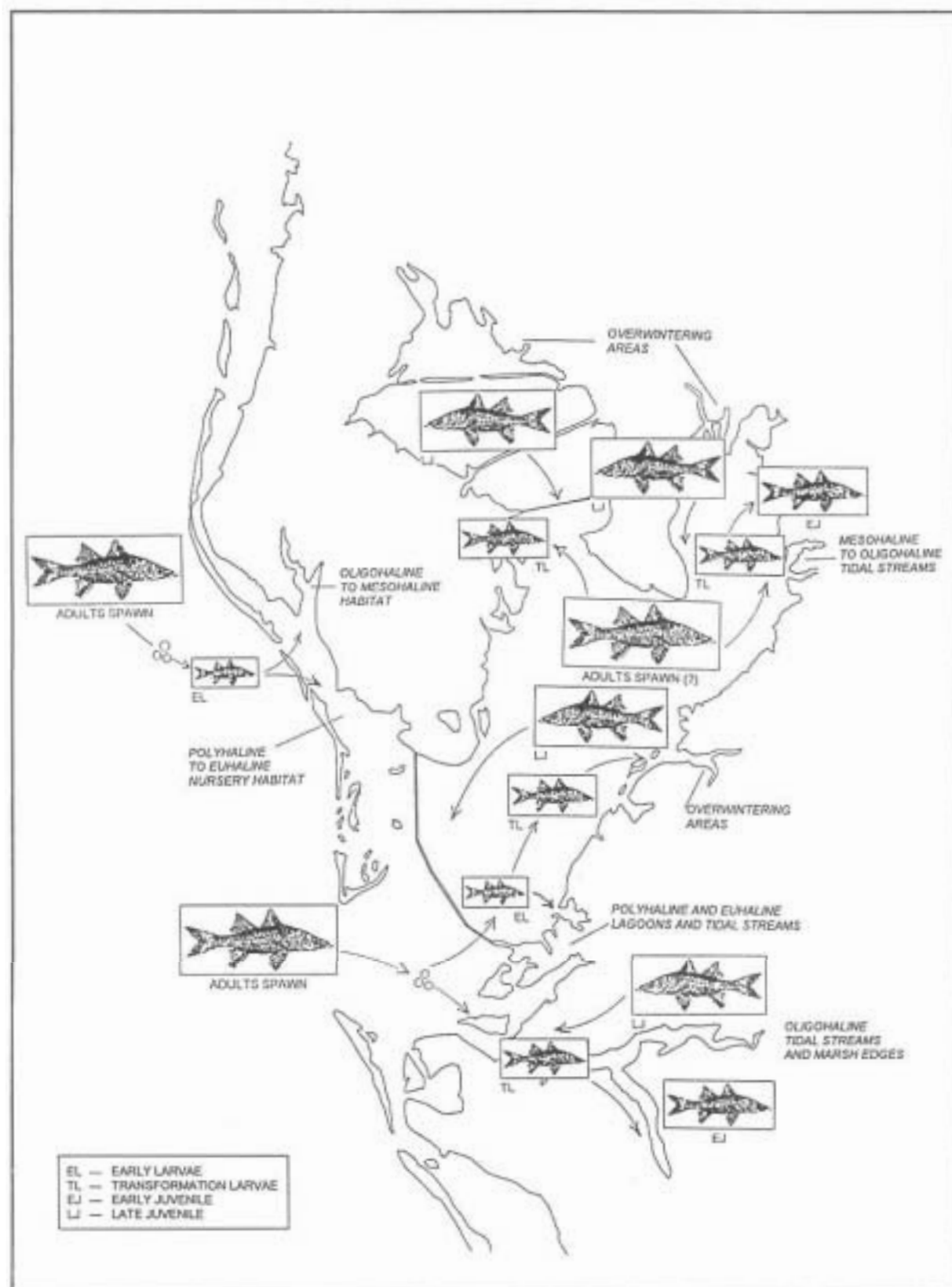


Figure 3. Life cycle of the snook, *Centropomus undecimalis*.

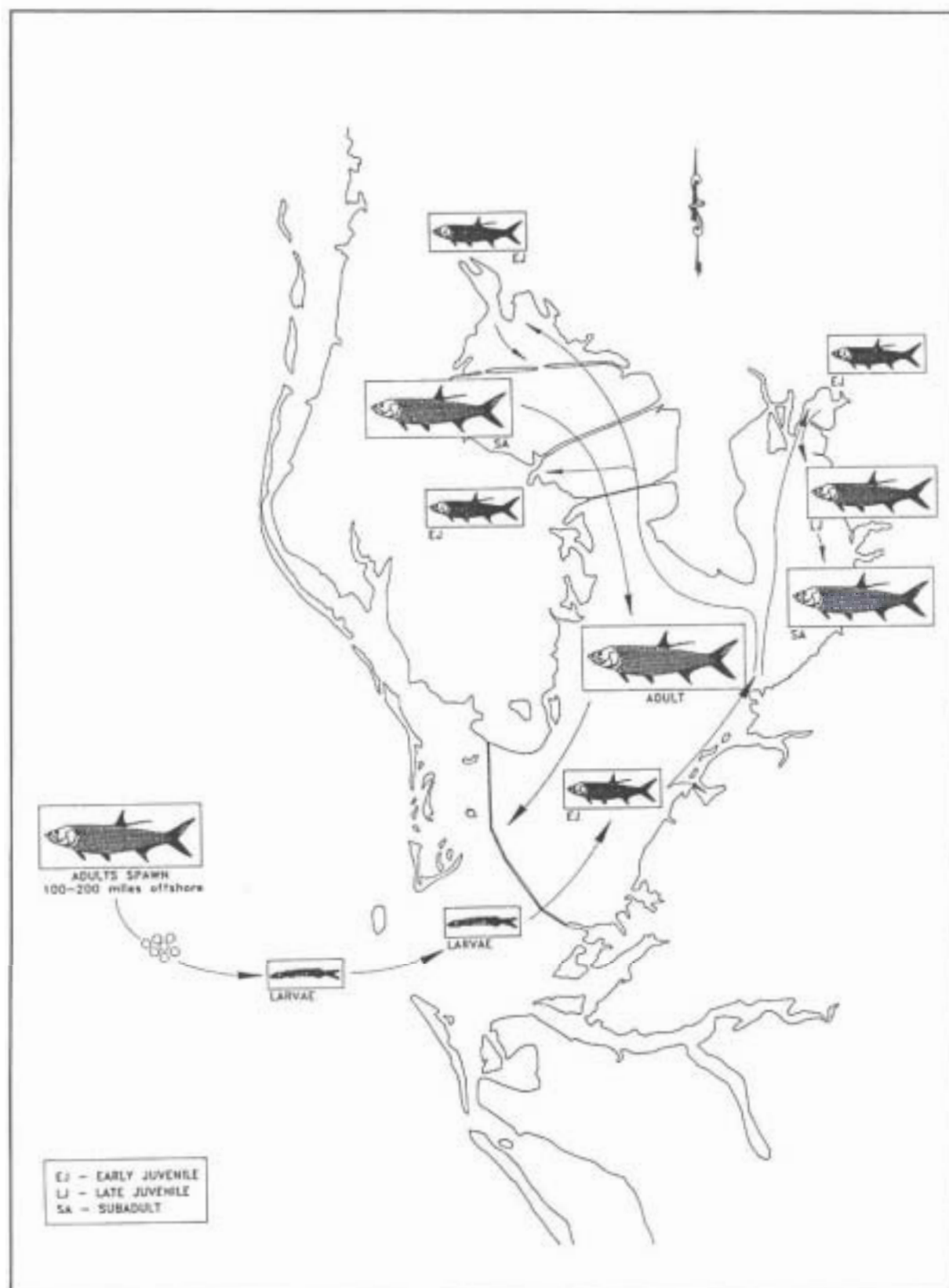


Figure 4. Life cycle of the tarpon, *Megalops atlanticus*.

question then becomes whether or not we can predict such things as plankton abundance and *habitat area* [emphasis added].

Figure 2 is intended to illustrate the hypothesis that *differential loss* of certain habitat types (i.e., mesohaline and oligohaline tidal marshes) could produce an imbalance in the historic percentages of the total "marine emergent wetland mosaic". If this is in fact the case, then restoration might be directed towards *preferentially* restoring certain habitat types in order to attempt to achieve an historical balance, rather than the random or "sites of opportunity"-based restoration planning programs that currently operate. This is based upon the fact that none of the previously discussed habitat restoration programs for the bay has derived from or has been directed toward a defined ecological goal.

The key, then, is to determine as accurately as possible what changes have occurred in both the acreage and distribution of the "marine emergent wetland mosaic" of Tampa Bay. This effort, as illustrated by the previous efforts of Lewis (1977), Lewis and Estevez (1988), Haddad (1989), Estevez et al. (1991), and Janicki et al. (1994) has suffered from differences in the total area of study, differences in photographic interpretation, and differences in which classification system is used. The results to date have not allowed an accurate determination of differential habitat losses, particularly for the rarer habitat types such as oligohaline to mesohaline tidal marshes. This is best illustrated by the attempt by TBNEP (1992) to quantify the existing areas of oligohaline wetlands in Tampa Bay on the basis of salinity data. Because salinity data was used for only the larger rivers, the maps produced did not identify smaller, but no less important, low salinity wetlands. The more recent efforts of Janicki et al. (1994) did not specifically define tidal creek wetlands as part of their study, although the mapping efforts did extend up most tributaries to Tampa Bay. These smaller tributaries like Fish Creek in Old Tampa Bay and the Delaney Pop-off canal in Hillsborough Bay have been shown to be important fish nursery habitats (Roberts 1989; TBRPC 1989; Clark 1991; Whitman and Gilmore 1995), but their generally smaller size and the scale of most mapping efforts to date have meant that they have "fallen through the cracks" in most habitat management efforts to date. Because of this, the scope of this study was expanded to include three new mapping efforts in an attempt to more accurately map lower salinity wetlands.

Methods and Results

The first of these was a field verification of the location and plant community composition of tidal streams. Between July 17 and August 1, 1995, five tidal stream systems (Bullfrog Creek, Little Manatee River, Alafia River, Delaney Creek, and Ironhead Creek) were inspected, mapped and photographed to confirm the location of the critical mesohaline to oligohaline tidal marshes dominated by needlerush (*Juncus roemerianus*), often with leather fern (*Acrostichum danaeifolium*) as a key indicator of low salinity. (Previous field work had concentrated on the Manatee River.) This information was compared with 1:24,000-scale National Wetland Inventory maps and the previous map products used by Janicki et al. (1994) in an attempt to confirm tidal marsh signatures.

The second new effort, using the c.1950 data set, involved the classification of land cover pursuant to a customized classification scheme. Five classification codes were determined to

be relevant to the temporal trend analyses of emergent tidal wetlands: mangrove (04), marsh/mangrove (05), saltmarsh (06), flats/beach (08), and vegetated flats (09). In the 1990 data set, land cover was classified using the Florida Dept. of Transportation *Florida Land Use, Cover and Forms Classification System* (FLUCCS) Level III protocol (FDOT 1985). Only two classification codes were determined to be relevant to emergent tidal wetlands, mangrove swamps (615) and saltwater marshes (642). Because salt barrens were poorly represented in this data set, a project-specific coverage for this wetland type was developed. From the signature interpretation of 1990 1:24,000-scale infrared aerial photography obtained from SWFWMD, salt barren polygons were identified and digitized into a separate coverage, which was then rectified and merged into the coverages for mangroves and saltwater marshes.

Due to cover classification differences between the two time periods it was necessary to combine certain emergent tidal wetland categories in the c.1950 data set to maximize comparability with the 1990 data set. The Marsh/Mangrove and Saltmarsh categories from the c.1950 data set were combined into a single category to be comparable to the Saltwater Marshes category of the 1990 dataset. The decision to merge these two categories was based on the signature interpretation of c.1950 aerial photography contained in historic Soil Conservation Service Soils Atlases for Hillsborough and Manatee Counties. The Marsh/Mangrove category appeared to encompass transitional marsh communities characterized by a mix of herbaceous and woody species, probably *Spartina alterniflora*, *Juncus roemerianus*, and low-growing *Avicennia germinans*. The Saltmarsh category appeared to encompass mesohaline/oligohaline marshes characterized by monospecific stands of *Juncus roemerianus* and other associated species such as *Acrostichum*. Combined, these two categories were considered to be comparable in description to the Saltwater Marsh category in the 1990 dataset.

In addition, the Flats/Beach and Vegetated Flats categories of the c.1950 datasets were combined in order to be comparable to the project-specific salt barren coverage developed for the 1990 time period. Based on the signature interpretation of c.1950 aerial photography contained in historic Soil Conservation Service Soils Atlases for Hillsborough and Manatee Counties, the Vegetated Flats category appeared to correspond well with the 1990 salt barren signature. The Flats/Beach coverage, on the other hand, appeared to include both sandy beaches along estuarine shorelines as well as sparsely vegetated tidal flats landward of the mangrove coverage. Therefore, it was necessary to edit the c.1950 Flats/Beach coverage; this was done by plotting the Flats/Beach coverage onto vellum and physically overlaying the coverage onto c.1950 aerial photography obtained from the Soil Conservation Service for Manatee and Hillsborough Counties. Those signature polygons that were indicative of salt barrens were retained, whereas those that were indicative of estuarine shoreline beaches or intertidal mud flats were deleted. The resultant coverage was merged with the Vegetated Flats coverage to create the final c.1950 salt barren coverage.

The Mangrove Swamps category of the 1990 dataset, and the Mangrove category of the 1950 dataset were considered to be comparable. Both of these categories encompass mangrove forest canopy as well as the fringe polyhaline *Spartina alterniflora* marshes which are often successional associated with mangrove forests.

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Table 11 shows how the classification codes between the two datasets were consolidated for the temporal trend analyses. The edited 1990 and c.1950 datasets were overlaid by using a geometric union operation of the Arc/Info GIS software package (ESRI 1993). Because mangrove forests and polyhaline marshes typically represent different successional stages of the same plant community, the acreages of both habitats were combined, and are herein referred to as "mangrove/*Spartina*." Similarly, the species which characterize mesohaline and oligohaline marshes were combined into the single category of "tidal marsh" or "*Juncus* marsh."

Table 11. Consolidation and cross-referencing of emergent tidal wetland classification codes for the temporal trend analysis.

SWFWMD 1990	FDNR c.1950	DESCRIPTION	TREND ANALYSIS DESIGNATION
Mangrove Swamps (612)	Mangrove (04)	Mangrove forests with fringe polyhaline marshes of <i>Spartina alterniflora</i>	Mangrove/ <i>Spartina</i> marsh
Saltwater Marshes (642)	Marsh/Mangrove (05)	Transitional mesohaline marshes characterized by mixtures of <i>Spartina</i> , <i>Juncus roemerianus</i> , and <i>Avicennia germinans</i>	Tidal or <i>Juncus</i> marsh
	Saltmarsh ¹ (06)	Mesohaline/oligohaline marshes characterized by <i>Juncus roemerianus</i>	
Salt Barren ² (digitized from aerial photointerpretation)	Flats/Beaches ³ (08)	Sparsely vegetated tidal flats characterized by <i>Batis maritima</i> and <i>Salicornia</i> spp.	Salt barren
	Vegetated Flats (09)	Vegetated tidal flats characterized by succulents as well as <i>Distichlis spicata</i> and <i>Paspalum vaginatum</i>	

¹ This classification code is not well represented in the SWFWMD 1990 data set.

² This classification code is not well represented in the SWFWMD 1990 data set. Therefore, a project-specific coverage was developed by photointerpretation of the original 1:24,000-scale aerial photography followed by digitization of the delineated polygons.

³ This classification code includes both shoreline beaches and tidal flats. Therefore, the coverage for this code was plotted and edited via aerial photointerpretation to include only high marsh tidal flats indicative of salt barrens.

As summarized in Table 12, approximately 18,758 acres of emergent tidal wetlands existed in Tampa Bay in 1990. Of this total, mangrove/*Spartina* made up 13,764 acres (73%), tidal marshes made up 4,117 acres (22%), and salt barrens made up 877 acres (5%). During the

c.1950 time period, there were approximately 23,886 acres of emergent tidal wetlands. Of this total, 15,894 acres (67%) were mangrove/*Spartina*; 6,621 acres (28%) were tidal marshes, and salt barrens made up 1,371 acres (5%). This analysis indicates that there has been a baywide net loss of approximately 5,128 acres (-21%) of emergent tidal wetlands between 1950 and 1990. Table 13 shows the trend analysis by bay segment.

Table 12. Baywide emergent tidal wetland temporal trends for the period c.1950 to 1990.

HABITAT TYPE	1950		1990		NET CHANGE	
	acres	percent	acres	percent	acres	percent
Mangroves / <i>Spartina</i> marsh ¹	15,894	67%	13,764	73%	-2,130	-13%
<i>Juncus</i> marsh ²	6,621	28%	4,117	22%	-2,504	-38%
Salt barren ³	1,371	5%	877	5%	-494	-36%
TOTAL	23,886		18,758		-5,128	-21%

¹ Includes mangrove forests represented by *Rhizophora*, *Avicennia* and *Laguncularia*, and successional polyhaline marshes represented predominantly by cordgrass (*Spartina*).

² Includes mesohaline and oligohaline marshes represented predominantly by needlerush (*Juncus*), leather fern (*Acrostichum*), sawgrass (*Cladium*) and cattails (*Typha*) with a mix of black mangroves (*Avicennia*) and cordgrass.

³ Includes hypersaline salt barrens represented predominantly by saltwort (*Batis*), glasswort (*Salicornia*) and saltgrass (*Distichlis*).

The third mapping effort was a more detailed analysis of trends in wetland loss back as far as maps and aerial photography would allow. Two test areas were chosen (Figure 5) based upon the known availability of vertical aerial photography and maps illustrating these areas back to c. 1900, or before most major losses of marine habitats had occurred. As far as can be determined, the test areas are representative of the bay in general, based on a comparison with the available older aerial photography for other areas of the bay. Urban impacts to these wetlands were similar to the combined impacts of rural development and agriculture.

Figures 6–9 illustrate “before-and-after” conditions generated from very detailed mapping of these two areas. Table 14 summarizes the areal cover data. These data again confirm the greater loss of tidal marshes and degradation of tidal streams, and also allow the analysis in Table 15.

The combined data and percentages by marine habitat type shown in Table 14 were used to generate a “best professional estimate” of the areal relationships of habitats prior to man's major impact on the bay. Surprisingly, it indicates that tidal stream marshes may have been as extensive as shoreline mangroves (48% v. 49%, respectively). These data were used to finalize the c. 1900 areal cover estimates and ratios of the three marine habitat mosaic wetland types in Figure 2. This was done by assuming the current acreage represents 56% of the historical cover (as determined by Lewis 1979) which means the c. 1900 coverage was

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approximately 33,750 acres. Applying the percentages in Table 15 gives the acreages shown in Figure 2 for the c. 1900 and c. 1950 marine emergent wetland acreage.

Table 13. Temporal trends in acreage of emergent tidal wetlands by bay segment, 1950–1990.

BAY SEGMENT		MANGROVES/ SPARTINA	JUNCUS MARSH	SALT BARREN	TOTAL
Old Tampa Bay	1950	3,321	1,446	516	5,283
	1990	3,452	1,150	147	4,749
	Net change	+131	-296	-369	-534
	Percent gain / (loss)	4%	(20%)	(72%)	(10%)
Hillsborough Bay	1950	1,112	603	195	1,910
	1990	751	499	13	1,263
	Net change	-361	-104	-182	-647
	Percent gain / (loss)	(32%)	(17%)	(93%)	(34%)
Middle Tampa Bay	1950	5,225	2,075 ¹	436 ²	7,736
	1990	5,061	737 ¹	533 ²	6,331
	Net change	-164	-1,338 ¹	+97 ²	-1,405
	Percent gain / (loss)	(3%)	(64%)	22%	(18%)
Lower Tampa Bay	1950	2,563	606	194	3,363
	1990	2,174	389	168	2,731
	Net change	-389	-217	-26	-632
	Percent gain / (loss)	(15%)	(36%)	(13%)	(19%)
Boca Ciega Bay	1950	2,143	274	14	2,431
	1990	1,121	84	0	1,205
	Net change	-1,022	-190	-14	-1,226
	Percent gain / (loss)	(48%)	(69%)	(100%)	(50%)
Terra Ciega Bay	1950	937	13	1	951
	1990	711	6	6	723
	Net change	-226	-7	+5	-228
	Percent gain / (loss)	(24%)	(54%)	500%	(24%)
Manatee River	1950	592	1,604	15	2,211
	1990	494	1,252	10	1,756
	Net change	-98	-352	-5	-455
	Percent gain / (loss)	(17%)	(22%)	(33%)	(21%)

¹ Probably an overestimate due to photointerpretation errors in both the USFWS and SWFWMD data sets.

² Probably an underestimate due to photointerpretation errors in both the USFWS and SWFWMD data sets.

³ Probably not correct due to artifacts of classification (Haddad 1989).

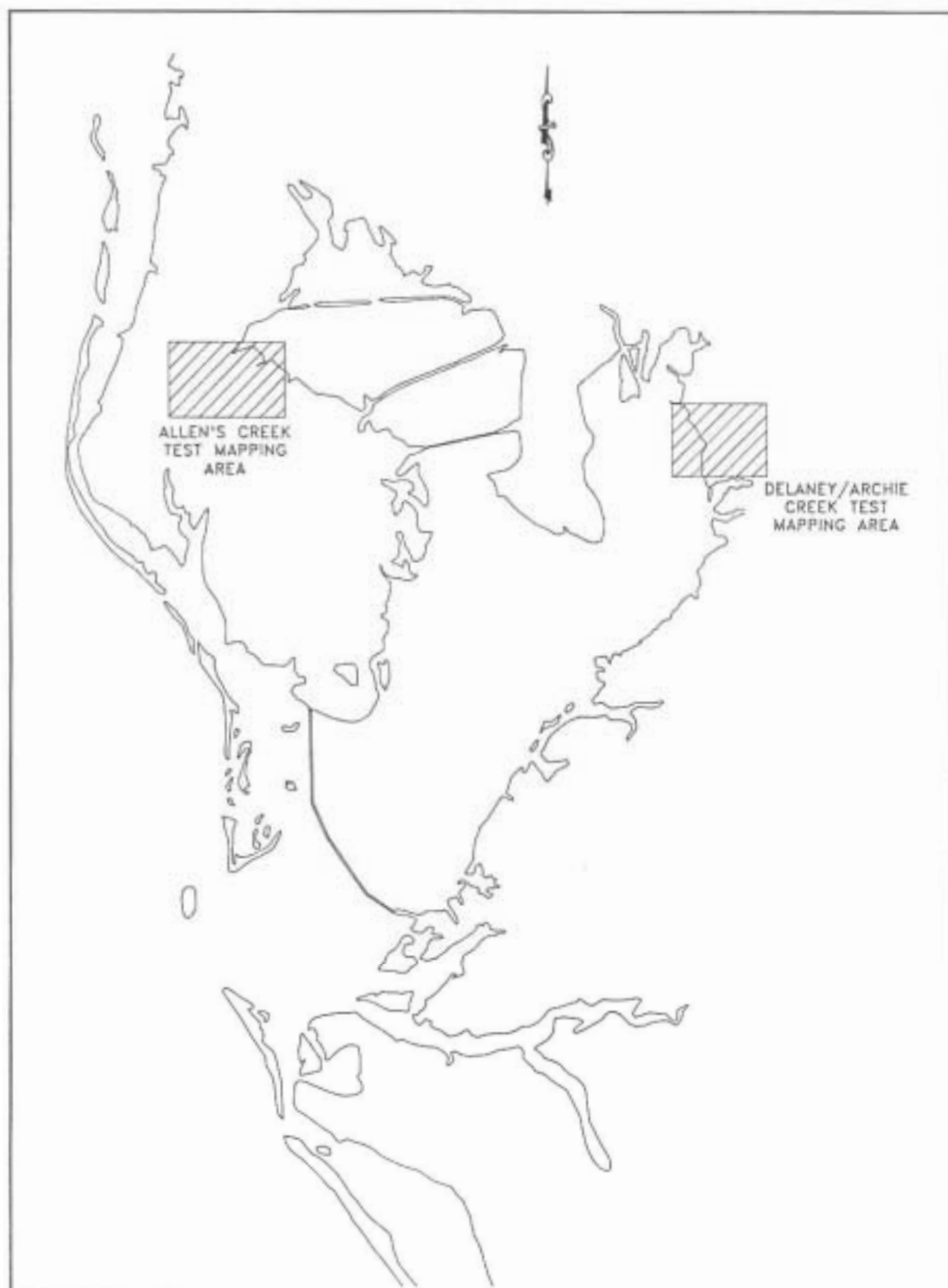


Figure 5. Location map, Allen's Creek and Delaney / Archie Creeks, test mapping sites.

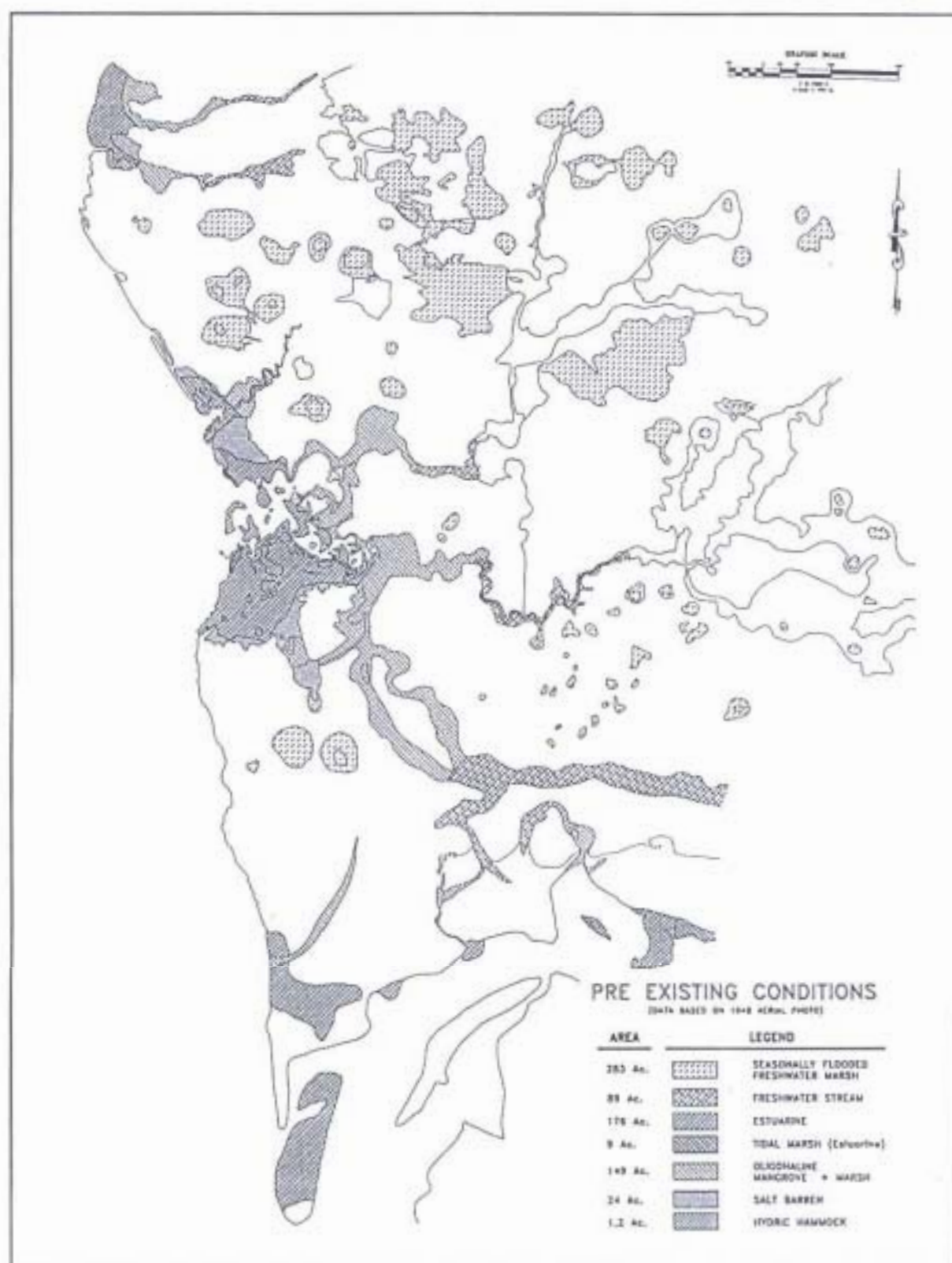


Figure 6. Historical distribution of wetlands, Delaney and Archie Creek (Hillsborough County).

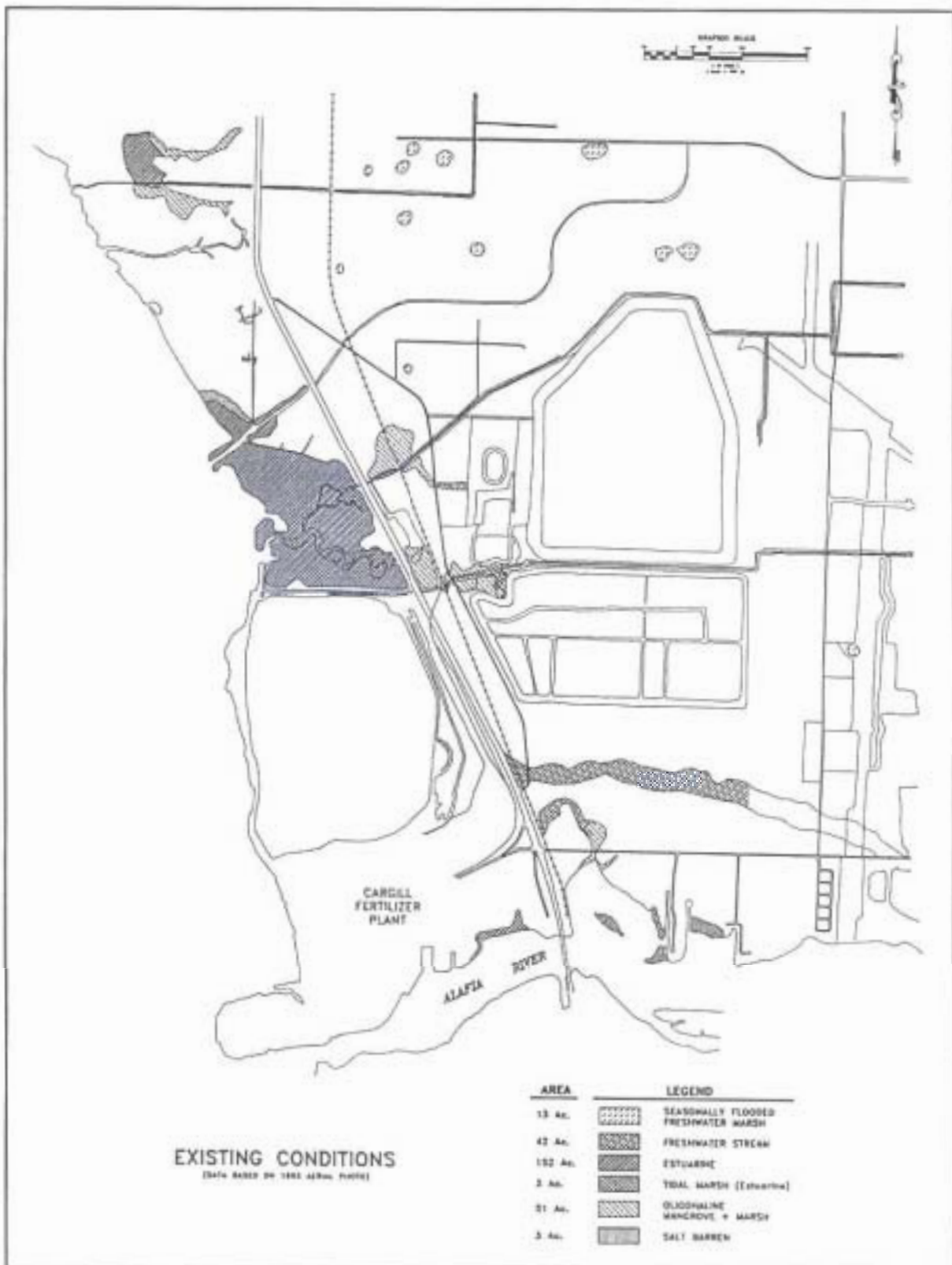


Figure 7. Current distribution of wetlands, Delaney and Archie Creek (Hillsborough County), c.1990.

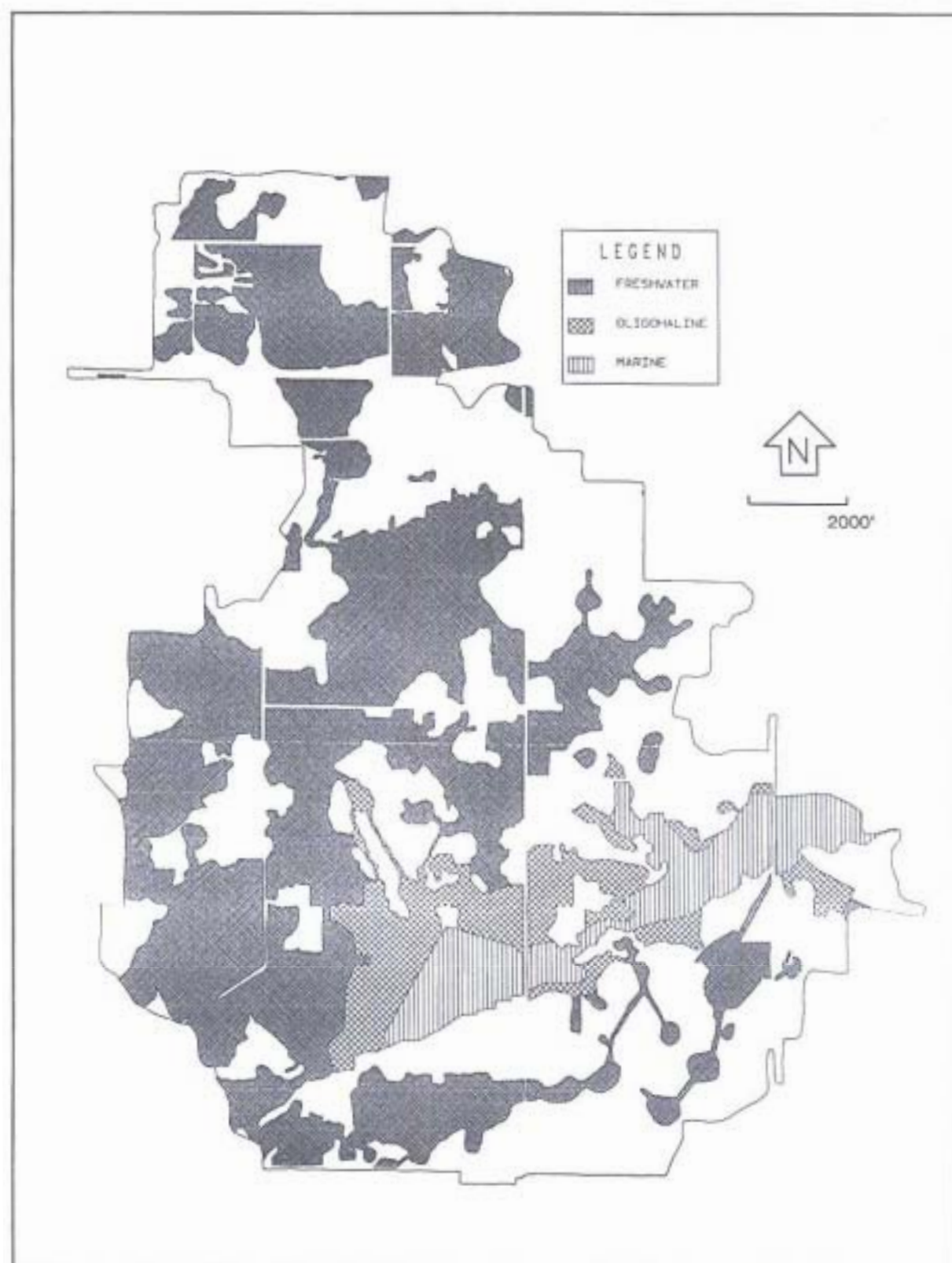


Figure 8. Historical distribution of wetlands based on 1926 aerial photography, Allen's Creek watershed (from Reynolds Smith & Hills 1992).

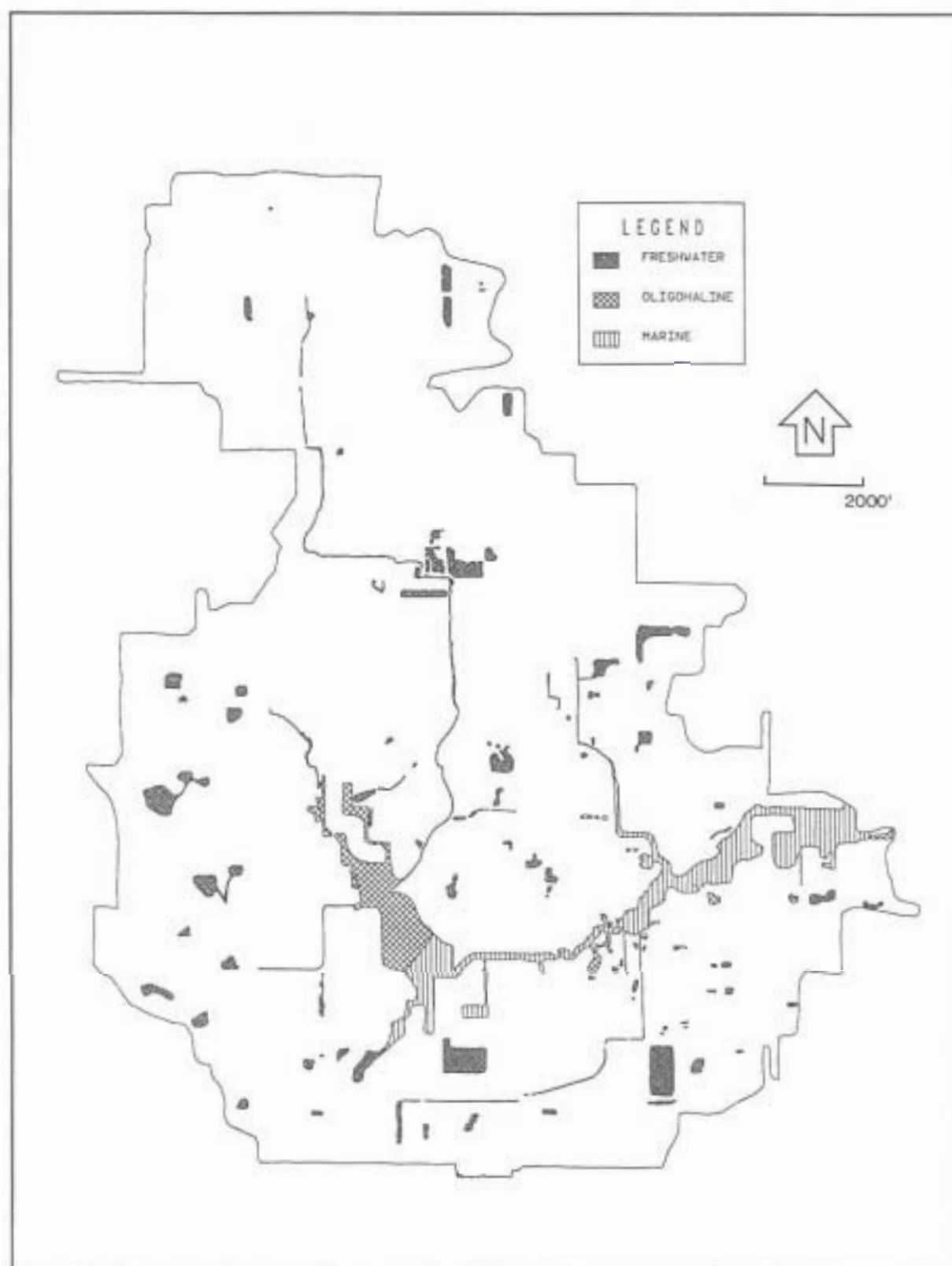


Figure 9. Current distribution of wetlands, Allen's Creek watershed (from Reynolds Smith & Hills 1992).

Setting Priorities:

Table 14. Test mapping data, historic vs. existing dominant wetland systems, Delaney and Archie Creek watershed and Allen's Creek watershed (Figures 6-9).

	WETLAND TYPE	HISTORIC ACREAGE (c. 1900)	EXISTING ACREAGE (1993)	CHANGE (acres)	PERCENT CHANGE
DELANEY & ARCHIE CREEK	Freshwater	372.0	55.0	-317.0	-85.2
	Tidal Marsh	149.0	51.0	-98.0	-65.8
	Mangrove/ <i>Spartina</i>	185.0	155.0	-30.0	-16.2
	Salt Barrens	24.0	3.0	-21.0	-87.5
	Hydric Hammock	1.2	1.0	-0.2	-16.7
	Total	731.2	265.0	-466.2	-63.8
ALLEN'S CREEK	Freshwater	1,840	96.7	-1,743.3	-94.7
	Tidal Marsh	295	97.5	-197.5	-67.0
	Mangrove/ <i>Spartina</i>	268	176.5	-91.5	-34.1
	Total	2,403	370.7	-2,032.3	-84.6

Table 15. Combined data from Table 14, marine habitats only.

WETLAND TYPE	ACREAGE c. 1900	PERCENT OF TOTAL
Mangrove	453	49
Tidal marsh	444	48
Salt Barren	24	3
TOTAL	921	100

The initial hypothesis that tidal stream habitats, including mesohaline and oligohaline plant communities that serve as fish and invertebrate nursery areas, have been differentially lost to a higher degree than the other studied habitats has been confirmed with these specific case studies. Therefore, the concept of targeting restoration to attempt to "restore the balance" to historical (i.e. c. 1900) percentages has been proposed for consideration by the Habitat Protection and Restoration Masterplan Review Committee and was approved at their meeting on June 22, 1995.



ESTABLISHMENT OF PROTECTION AND RESTORATION TARGETS

The acreage of emergent tidal wetlands present in 1990 has been identified by the TBNEP as the living resource protection target, and a baywide protection target of 18,750 acres has been determined for these important habitats. In addition, distinct habitat types that are known to be essential to a guild—specifically, freshwater foraging habitat for ibises and other members of guild 8—are also included as protection targets under this Plan. Uplands associated with coastal wetlands (e.g., hydric hammocks, surrounding mesic slash-pine dominated forests) are targeted for protection as a consequence of their rarity and ecological value. An extended discussion of these special habitats follows in this section (p.50).

As indicated in Table 12, a net loss of mangrove and salt marsh habitat of 5,128 acres occurred in Tampa Bay between 1950 and 1990. This is a revised figure from that of 5,600 acres reported by Janicki et al. (1994, p. 26). It has been estimated that the cost of restoring mangrove/marsh habitat typically ranges from \$25,000 to \$50,000 per acre (Appendix B). Therefore, if the 5,128-acre restoration target were to be addressed solely by publicly funded habitat restoration projects the total cost would range from \$128 million to \$256 million, not including land costs. Applying the new information provided here (Figure 2 and Table 15), the loss since 1900 has been 14,992 acres, and restoration costs could therefore approach \$750 million. These alternatives are illustrated as Options A and B in Figure 10; two other options (D and E) are also diagrammed (Figure 11). The lower cost option was rejected by the Management Committee as we expect the highest cost option would be also.

An alternative for defining a living resource restoration target for emergent tidal wetlands involves the concept of restoring the predevelopment balance of “habitat ratios,” or the relative proportion of the different types of emergent tidal wetlands that were present during a benchmark time period representative of a less impacted condition. This paradigm is termed “Restoring the Balance”.

Based upon the trend analyses summarized in Tables 12–15, it is clear that disproportionate losses have occurred among the three classifications of emergent tidal wetlands, both on a baywide scale and within bay segments. On a baywide scale, tidal marshes and salt barrens have suffered substantially greater losses than have mangrove/marsh communities. These disproportionate losses can be explained by the fact that lower salinity tidal marshes and salt barrens occur upstream and landward, respectively, of mangrove forests and polyhaline marshes. As result, these habitats have been most impacted by urban and agricultural development which has encroached into the bay from the headwaters and uplands. In addition, these marshes (e.g., black needlerush) and salt barrens are typically not as resilient as polyhaline marshes (e.g., smooth cordgrass) and mangrove forests, and do not exhibit the same ability to naturally re-establish along denuded shorelines. Their more typical tidal stream shoreline habitat is also more easily shaded by exotic invasive species like Brazilian pepper. For these reasons, mesohaline/oligohaline marshes and salt barrens are in need of maximum protection from future impacts and should be a high priority for future restoration efforts.

Setting Priorities:

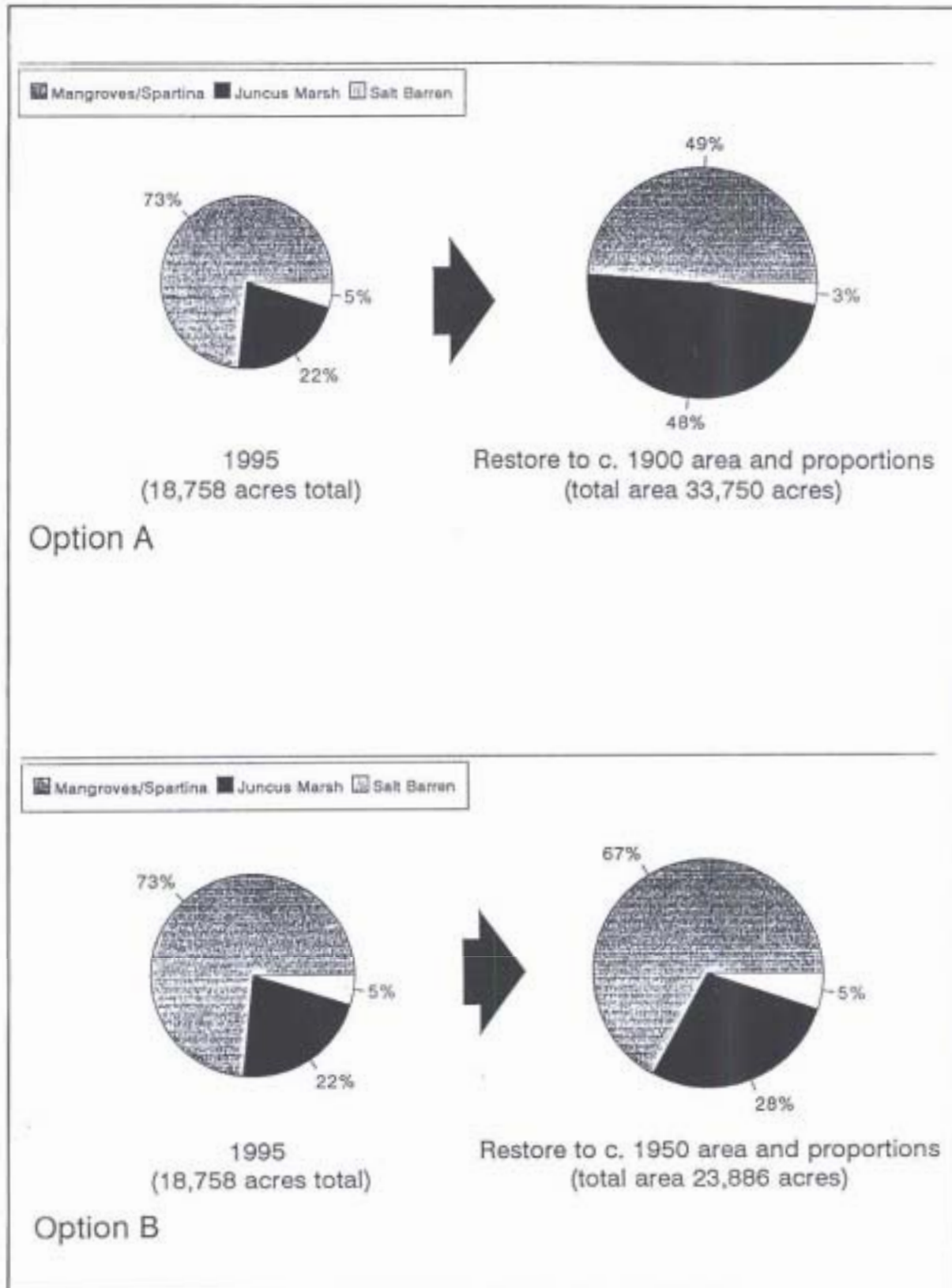


Figure 10. Diagram of restoration options A and B.

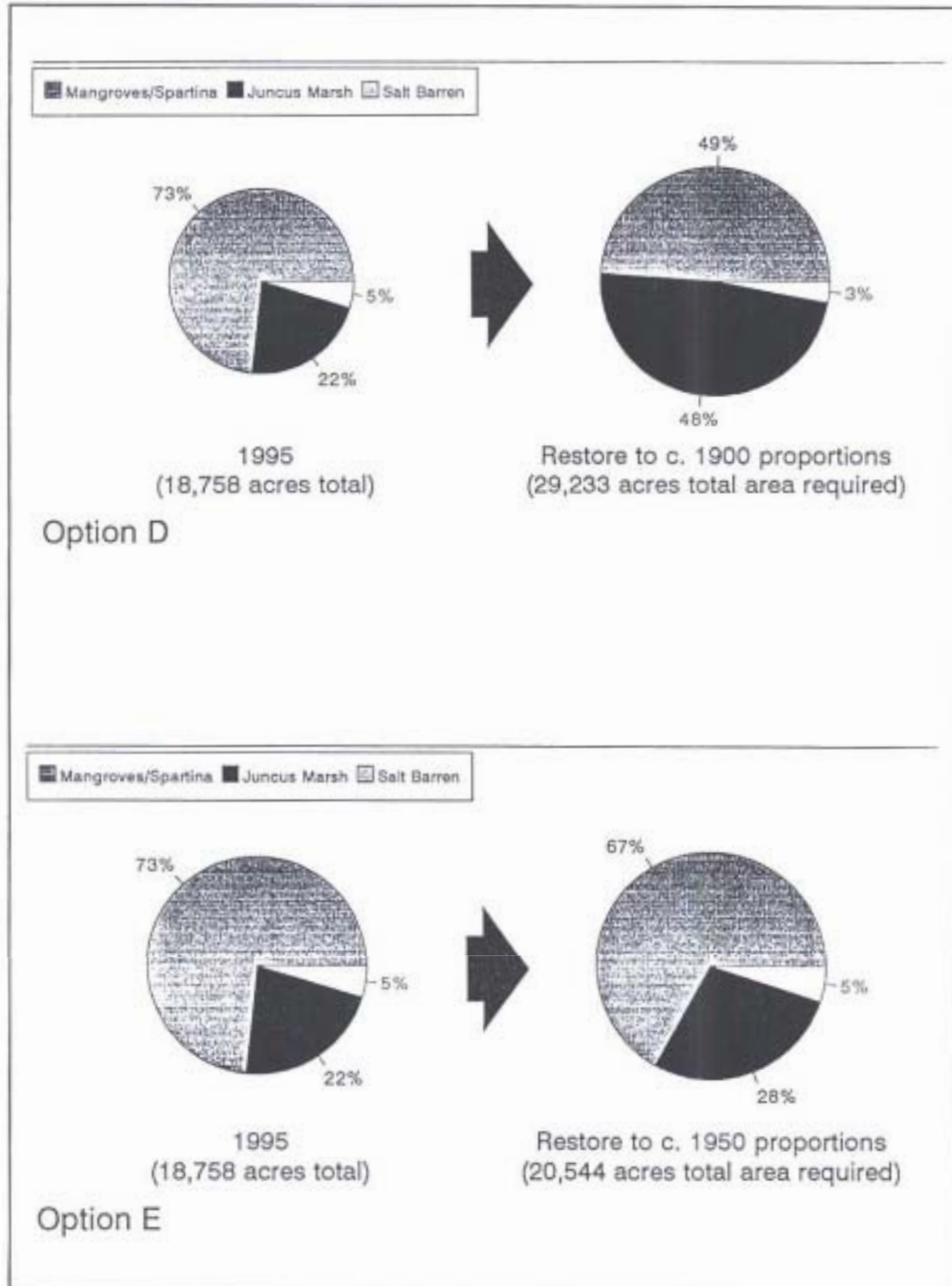


Figure 11. Diagram of restoration options D and E.

Setting Priorities:

The establishment of restoration targets under the "Restoring the Balance" paradigm involves attempting to restore the relative proportions, or ratios, of the three wetland classifications present in the benchmark period (c. 1900) within a total coverage area greater than that present in current period. This can be done by holding constant the acreage of the least impacted wetland type on a percentage basis, and raising the acreage of the other two wetland types to attempt to restore a benchmark ratio. Options D and E (Table 16, Figure 11) illustrate these options, with the 1950s ratio used only as a recommended *minimum* restoration target due to projected costs.

Table 16. Restoration of coastal habitat types to attain Options A, B, D, E of Figure 2.

		CURRENT		TARGET		CHANGE IN
		ac	%	ac	%	ACREAGE
						ac
Option A: c. 1900 area & proportions	Mangroves	13,764	73	16,538	49	+2,774
	Tidal Marsh	4,117	22	16,200	48	+12,083
	Salt Barren	877	5	1,012	3	+135
	Total	18,758		33,750		+14,992
Option B: c. 1950 area & proportions	Mangroves	13,764	73	15,894	67	+2,130
	Tidal Marsh	4,117	22	6,621	28	+2,504
	Salt Barren	877	5	1,371	5	+494
	Total	18,758		23,886		+5,128
Option D: c. 1900 proportions	Mangroves	13,764	73	14,324	49	+560
	Tidal Marsh	4,117	22	14,032	48	+9,915
	Salt Barren	877	5	877	3	0
	Total	18,758		29,233		+10,475
Option E: c. 1950 proportions	Mangroves	13,764	73	13,764	67	0
	Tidal Marsh	4,117	22	5,753	28	+1,636
	Salt Barren	877	5	1,027	5	+150
	Total	18,758		20,544		+1,786

To develop baywide restoration targets for Tampa Bay using this approach, the 1990 mangrove/marsh acreage (13,766) was divided by the 1950 mangrove/marsh percentage (0.67) to yield the total restoration target acreage (20,546). This total restoration target acreage was then multiplied by the 1950 percentage of tidal marsh (0.28) and salt barren (0.06) to derive the restoration targets for these two habitat types (1,636 and 150 acres, respectively). Table 17 shows the resulting baywide protection and restoration targets using this approach, termed the "minimum acceptable restoration targets" approach. That is, efforts to move closer to the c. 1990 habitat ratios are the *ideal* level of effort, but we will propose in

the cost of restoration section what is felt to be the most cost-effective restoration target at this time.

Under this approach priority is given to tidal marshes and salt barrens for restoration activities. This does not imply that mangrove/marsh habitat restoration should not be pursued; mangrove/marsh habitat restoration should continue to be implemented on a "site-opportunity basis," where appropriate sites are available and public support and funding exists. Rather, these targets should be used to establish public policy direction and funding priorities for achieving an annual "net gain" in emergent tidal wetland acreage which furthers the attainment of the defined targets.

Table 17. Baywide emergent tidal wetland protection and minimum acceptable restoration target acreage under the "Restoring the Balance" paradigm (c. 1950 habitat ratios).

HABITAT TYPE	PROTECTION	RESTORATION	TOTAL
Mangrove/Marsh	13,764	SB	≥ 13,764
Tidal Marsh	4,117	1,636 (+40%)	5,753
Salt Barren	877	150 (+17%)	1,027
TOTAL	18,758	≥ 1,786	≥ 20,544

To develop restoration targets for each bay segment, the minimum acceptable baywide targets for tidal marsh (1,636 acres) and salt barren (150 acres) were apportioned pursuant to the calculated percentage of the total loss for each habitat type incurred in that segment. For example, approximately 12% of the 2,504 acre loss of tidal marsh habitat has been incurred in Old Tampa Bay. Therefore, the tidal marsh restoration target for Old Tampa Bay was calculated by multiplying the baywide tidal marsh restoration target of 1,639 acres by 0.12 to yield a bay segment restoration target of 196 acres. For salt barren habitat, slight gains were observed over the c. 1950 to 1990 time period in both the Middle Tampa Bay and Terra Ceia Bay segments. In these cases, the restoration targets are also to be addressed on a site-opportunity basis. Table 18 shows protection and restoration targets for each bay segment.

The protection and restoration targets shown in Tables 16 and 17 clearly direct the priorities predominantly towards the mesohaline and oligohaline marsh habitats found within the tidal tributaries to Tampa Bay. Since the majority of the rivers and tidal creeks flowing to Tampa Bay have been impacted by impoundments, channelization, hardening, and other dredge and fill activities, future restoration activities should focus on the functional recovery of these tributaries which historically supported critical low-salinity habitat and in addition provided water quality protection through pollutant removal.

Setting Priorities:

The restoration targets established herein are based on habitat conversions and losses that occurred in the time period c. 1950 to 1990. However, it should be noted that significant losses of mesohaline and oligohaline marsh habitat occurred prior to the c. 1950 time period through the impoundment of at least four major historically estuarine waterbodies: the Hillsborough River (Hillsborough River Reservoir); the Braden River (Evers Reservoir); Long Bayou (Lake Seminole); Salt Creek (Lake Maggiore) and Alligator Creek (Alligator Lake). Although these habitat losses have not been quantified, they were substantial, based on a qualitative review of the areas involved.

Table 18. Emergent tidal wetland protection and restoration target acreage by bay segment under the "Restoring the Balance" paradigm.

BAY SEGMENT		MANGROVE/ MARSH	TIDAL MARSH	SALT BARREN
Old Tampa Bay	Protection	3,452	1,150	147
	Restoration	SB	193	93
Hillsborough Bay	Protection	751	499	13
	Restoration	SB	68	46
Middle Tampa Bay	Protection	5,061	737	533
	Restoration	SB	874	SB
Lower Tampa Bay	Protection	2,174	389	168
	Restoration	SB	142	6
Boca Ciega Bay	Protection	1,121	84	0
	Restoration	SB	124	4
Terra Ceia Bay	Protection	711	6	6
	Restoration	SB	5	SB
Manatee River	Protection	494	1,252	10
	Restoration	SB	230	1

SB — site opportunity basis; restoration should be pursued wherever cost-effective site opportunities exist.

In addition to a 21% net loss of emergent tidal wetlands, this trend analysis also indicates that a substantial acreage of wetland habitat has been converted from one wetland type to another during the study period. The GIS methodology that was used allows for the calculation of acreage changes to and from the various land cover categories. Table 19 shows the results of this change analysis by bay segment whereby conversions were calculated for each of the three major types of emergent tidal wetlands. All other categories were lumped into an "other" category. For example, if an area was salt barren habitat in 1950 but mangrove/marsh habitat in 1990, the acreage of the area involved is placed in the table at the intersection of the "1950 Salt Barren" column and the "1990 Mangrove/Marsh" row. Conversions to or from any

land cover category other than the three emergent tidal wetland types were combined into an "other" category. For example, if an area was uplands in 1950 but mangrove/marsh in 1990 it would be in the table at the intersection of the "1950 Other" column and the "1990 Mangrove/Marsh" row.

Table 19. Emergent tidal wetland change analysis by bay segment, 1950–1990.

BAY SEGMENT		1950 MANGROVES/MARSH	1950 TIDAL MARSH	1950 SALT BARREN	1950 OTHER
Old Tampa Bay	1990				
	Mangroves/Marsh	2,042	448	169	793
	Tidal Marsh	199	407	82	462
	Salt Barren	15	6	57	68
	Other	1,064	585	208	—
Hillsborough Bay	1990				
	Mangroves/Marsh	228	97	1	425
	Tidal Marsh	125	97	30	247
	Salt Barren	0	6	0	7
	Other	755	403	164	—
Middle Tampa Bay	1990				
	Mangroves/Marsh	3,241	598	46	1,196
	Tidal Marsh	49	456	10	222
	Salt Barren	50	220	208	55
	Other	1,866	792	171	—
Lower Tampa Bay	1990				
	Mangroves/Marsh	1,469	237	42	426
	Tidal Marsh	124	71	17	177
	Salt Barren	34	62	66	6
	Other	932	272	68	—
Boca Ciega Bay	1990				
	Mangroves/Marsh	628	43	2	448
	Tidal Marsh	34	6	9	35
	Salt Barren	0	0	0	0
	Other	1,473	225	3	—
Terra Ciega Bay	1990				
	Mangroves/Marsh	482	9	1	219
	Tidal Marsh	5	0	0	1
	Salt Barren	3	1	0	2
	Other	450	3	0	—
Manatee River	1990				
	Mangroves/Marsh	173	132	0	189
	Tidal Marsh	89	730	0	433
	Salt Barren	0	0	10	0
	Other	329	742	5	—

NOTE (added in proof): Maps depicting changes in emergent tidal wetland between 1950 and 1990 are included in Appendix J.

Setting Priorities:

Despite these efforts to maximize the comparability of the 1950 and 1990 datasets, some classification problems still exist and may have resulted in over- and underestimates of changes in emergent tidal wetland coverage in certain areas of the bay. In particular, the 1950 classification of tidal marsh habitat near the mouth of the Little Manatee River in the Middle Tampa Bay segment appears to have included a significant acreage of salt barren habitat.

If these areas were misclassified, it would result in an overestimate of tidal marsh losses or conversion, as well as the salt barren gains, in Middle Tampa Bay. In addition, it is known that the mangrove forest category of the 1990 dataset includes areas of Brazilian pepper coverage. This misclassification, in turn, likely results in an overestimate of mangrove coverage in 1990.

A thorough review of the 1950 and 1990 datasets indicate that these types of misclassifications probably represent a very small percentage of the overall area evaluated. Therefore, the use of this trend analysis for target setting on a baywide basis is considered to be very defensible; however some caution should be exercised when using this information for setting targets in individual bay segments. Artifacts of previous photointerpretation may introduce a bias in the data not based on genuine changes in habitats (Haddad 1989). For these reasons, we would urge caution in the use of the target restoration acreage figures for individual bay segments until the recommended monitoring plan is implemented. Also, each proposed restoration project should receive careful outside review by professionals such as the staff of the Florida Marine Research Institute (see Appendix C) to ensure that the most current research results are applied to the "Restoring the Balance" paradigm.

Special Habitats

The first of the special habitats to be discussed is critical freshwater foraging habitat for guild 8. Three bird species are used to illustrate the unique role played by isolated freshwater wetlands in the Tampa Bay watershed.

The first of these species is the white ibis. The Florida Game and Fresh Water Fish Commission (Montalbano 1992) has described the recent population dynamics of this species as follows:

The white ibis occurs in the southeastern coastal plain from North Carolina through Texas, and numerically is still one of the most abundant wading birds in Florida, often occurring in relatively large flocks, but the statewide nesting population has declined by an estimated one-half since the mid-1970s—from 180,000 to less than 70,000 (Runde 1991). In south Florida alone, the white ibis breeding population has declined from about 100,000 in the 1940s (Kushlan et al. 1984) to an estimated 23,800–53,200 in the early 1970s (Kushlan 1977; Kushlan and White 1977), and further to 4,700–8,300 in 1986–87 (Frederick and Collopy 1988), a regional decline of 65% to 84% during the most recent 10–17 year period. Similar declines have been reported from other southeastern states (Frederick, unpubl. data), with the possible exception of Louisiana. Also, historically white ibises typically nested in colonies containing very large numbers of birds, but most of those colonies are

now gone; during 1990, ibises failed to breed in any aggregations of over 1,000 nests in the Carolinas, Georgia, and nearly all of Florida (Frederick, in press). Via resolutions, the Colonial Waterbird Society and International Council for Bird Preservation / United States Branch have recently acknowledged the white ibis as biologically threatened and has petitioned the Commission to list it as such (Colonial Waterbird Society 1992, ICBP/U.S. 1992). The Specialist Group on Storks, Ibises and Spoonbills (a coalition of representatives from the International Union for Conservation of Nature, the International Council for Bird Preservation, and the International Waterfowl and Wetlands Research Bureau) has likewise acknowledged the species' threatened status and similarly petitioned for listing (letter to Colonel Robert M. Brantly, Executive Director, dated 23 December 1992).

Bildstein (1993, p. 212) describes the dilemma of managing coastal populations of white ibis as requiring first the acknowledgment that they need both a "bedroom" and a "kitchen" to survive and that:

These freshwater marshes or swamps in South Carolina are often 21 to 31 kilometers (13–19 miles) inland from the coastal nesting sites. The adult ibis must travel these distances (26–38 miles round trip) in order to pick up and return freshwater crayfish and fish to feed their young who cannot tolerate the higher salt levels in more estuarine crustaceans normally eaten by adult birds such as fiddler crabs.

The draft *Development Guidelines for White Ibis Habitat Protection in Florida* (FGFWFC 1994) includes a map (Figure 12) showing the locations of active white ibis nesting colonies and associated foraging habitats in central peninsular Florida. That portion including the watershed of Tampa Bay and the bay itself has been enlarged to a scale of 1:100,000 and printed in color by the FGFWFC Non-game Section for use in this study.

Table 20 lists the number of breeding pairs of white ibis in 1994 or 1995, at the four colonies in Tampa Bay where they nest. Figure 13 shows these four locations with a circle centered over each colony with a radius of 9.3 miles (15 km) which is an average foraging distance for adults feeding young (FGFWFC). All freshwater wetlands within these circles deserve special protection, but particularly those in areas where foraging circles overlap. Areas of double and triple overlap, and all areas within the Alafia Banks (Colony #1) foraging circle are of particular interest as protection and restoration sites.

Little blue herons and snowy egrets are included in this guild because, while less studied, the indications are that their numbers "had been reduced by the mid-1970s to at best one quarter of the probable 1930s numbers" (Frederick and Collopy 1988). They also feed in a similar combination of both marine and freshwater habitats, but with specific dependence on food items such as frogs and small freshwater fish and shrimp that occur in the unique small inland marshes that frequently dry during low rainfall periods.

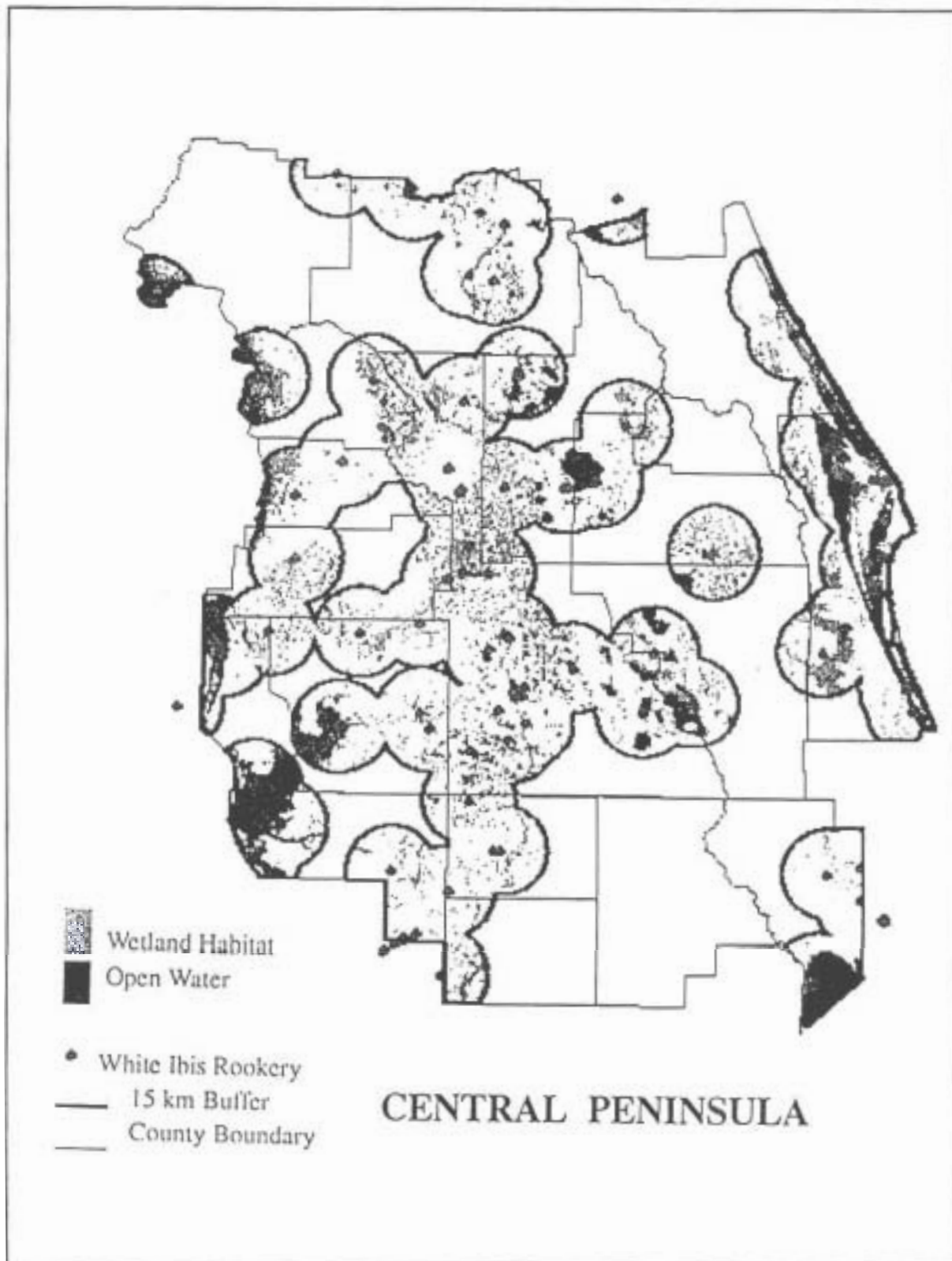
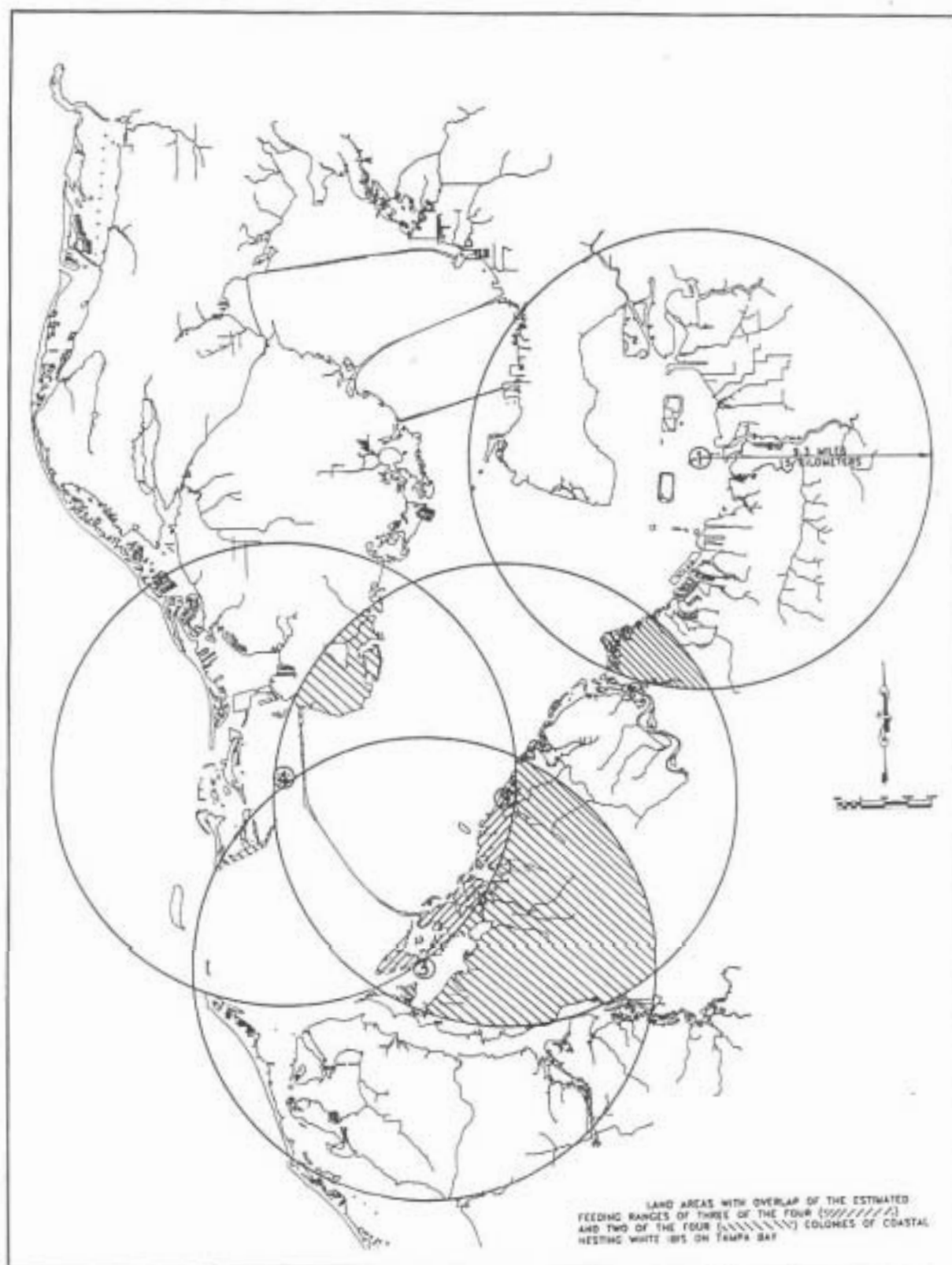


Figure 12. 1994 locations of active and currently active white ibis nesting colonies and associated foraging habitat in central peninsular Florida (figure from FGFWFC 1994).



Setting Priorities:

Table 20. Colonial waterbird nesting colonies in Tampa Bay where white ibis occur. (Data from National Audubon Society)

LOCATION	NUMBER OF BREEDING PAIRS OF WHITE IBIS	
Alafia Banks	8,500	(1995)
TECO Rock Ponds	1,000	(1995)
Washburn Sanctuary	500	(1994)
Tarpon Key	370	(1995)

The second of the special habitats targeted for protection under this Plan are uplands associated with coastal wetlands. These upland communities consist of two types, hydric hammocks and surrounding mesic slash pine-dominated forests existing between approximately the +3.5' and +6.0' NGVD ground level contours (Simons et al. 1989, Vince et al. 1989). Recent mapping of these areas has excluded the shoreline of Tampa Bay (Johnson and Muller 1993) (Figure 14).

Coastal hydric hammocks are perhaps the most rare habitat type currently existing along Tampa Bay. This habitat type is described (Vince et al. 1989, p. 1) as:

... a small but distinct part of the natural landscape of the Florida peninsula north of Lake Okeechobee ... often have a broad-leaved evergreen appearance and typically contain live and swamp laurel oaks (*Quercus virginiana* and *Quercus laurifolia*), cabbage palm (*Sabal palmetto*), southern red cedar (*Juniperus silicicola*), sweet gum (*Liquidambar styraciflua*) and hornbeam (*Carpinus caroliniana*).

The coastal hammock is one of the four types of hydric hammock (Simons et al. 1989). The other three are the inland, loblolly pine and seepage types.

The value of coastal hydric hammocks includes their role in controlling and cleansing upland drainage to coastal wetlands, their unique botanical communities including epiphytes such as butterfly orchid (*Encyclia tampensis*), shoestring fern (*Vittaria lineata*) and ballmoss (*Tillandsia recurvata*), and their importance to overwintering passerines (perching birds and songbirds). As Vince et al. (1989, p. 59) note,

"much attention has been given recently ... to the role of Neotropical forests in supporting populations of migrant passerines that breed in eastern North America, but the same role of forests of the Southeastern United States, and hydric hammocks in particular, is less well recognized."

Cox (1995, p. 2) further notes that:

Each year, the forests, grasslands and marshes of Florida play host to a dazzling variety of migratory birds. About two-thirds of the birds that breed in North America migrate, and many depend on our state's pine forests, oak hammocks, coastal scrubs and grasslands, and other habitats to complete

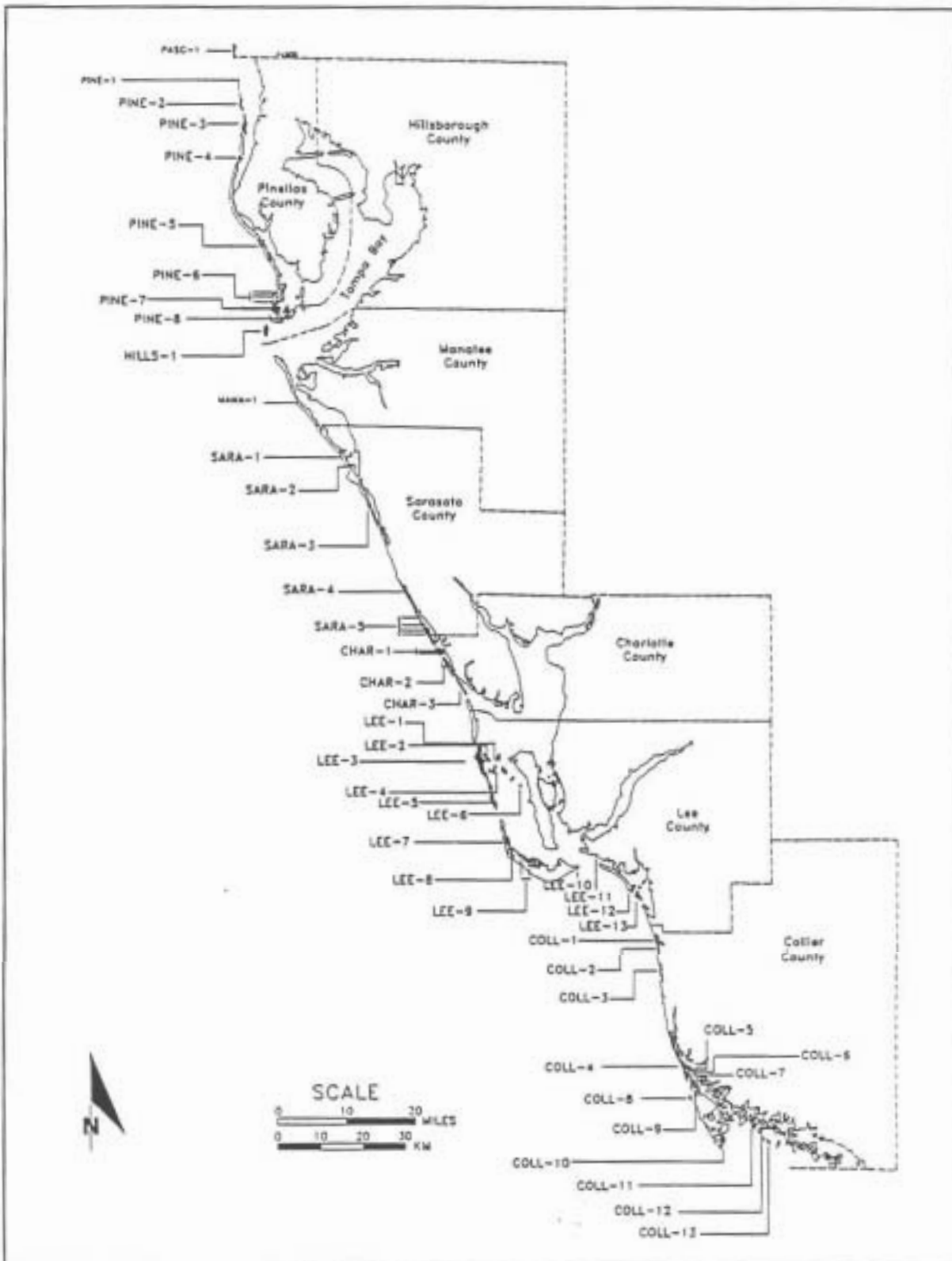


Figure 14. Natural coastal upland sites in central section of the southwest region of the Florida coast (as mapped by Johnson and Muller 1993).

Setting Priorities:

their biennial treks...Unfortunately, coastal habitats important to migratory birds and many other species are being quickly gobbled up by Florida's ever expanding human population.

Beever (1994) includes a map of the existing preserved wildlife habitat (Figure 15) and a proposed Tampa Bay Regional Wildlife Habitat Plan (Figure 16). He notes that three general types of regional wildlife habitat were identified: coastal, riverine and large mammal. The coastal habitats are described as follows:

The designated coastal habitats buffer and interconnect estuaries and their tributaries. This provides migratory flyways for waterfowl, shorebirds, and passerine birds, and protects rookeries and nesting areas. These habitats include coastal strand and dunes, tropical hardwood hammock, coastal oak hammock, coastal scrub, mangrove forest, saltmarsh, high marsh, riverine riparian forest and pine forests.

It was proposed for review and comment that the proposed plan be adopted as part of the Tampa Bay Habitat Protection and Restoration Masterplan and the Habitat Protection and Restoration Masterplan Review Committee concurred on June 22, 1995.



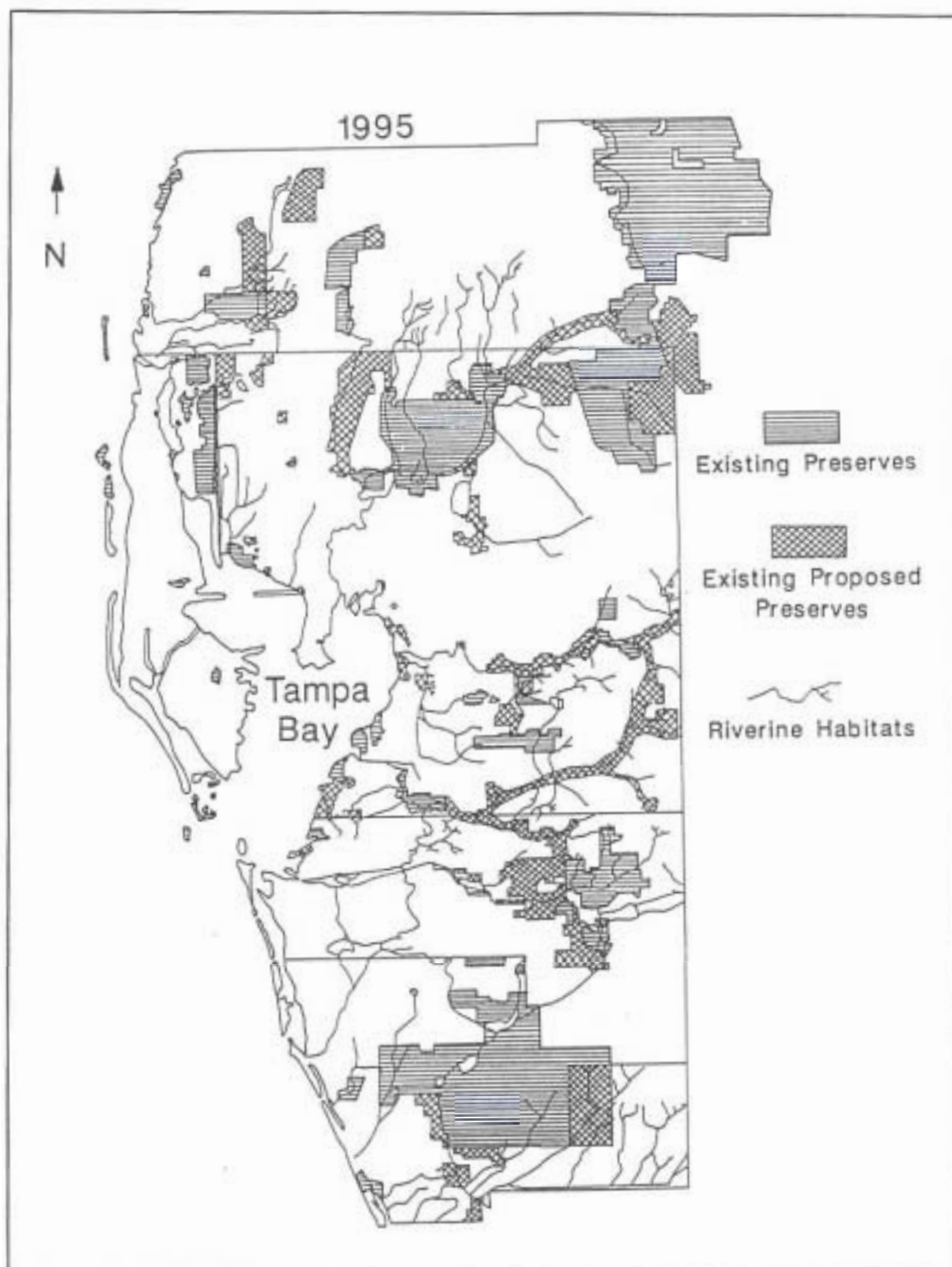


Figure 15. Existing regional wildlife habitat plan for the Tampa Bay region (from FGFWFC 1995).

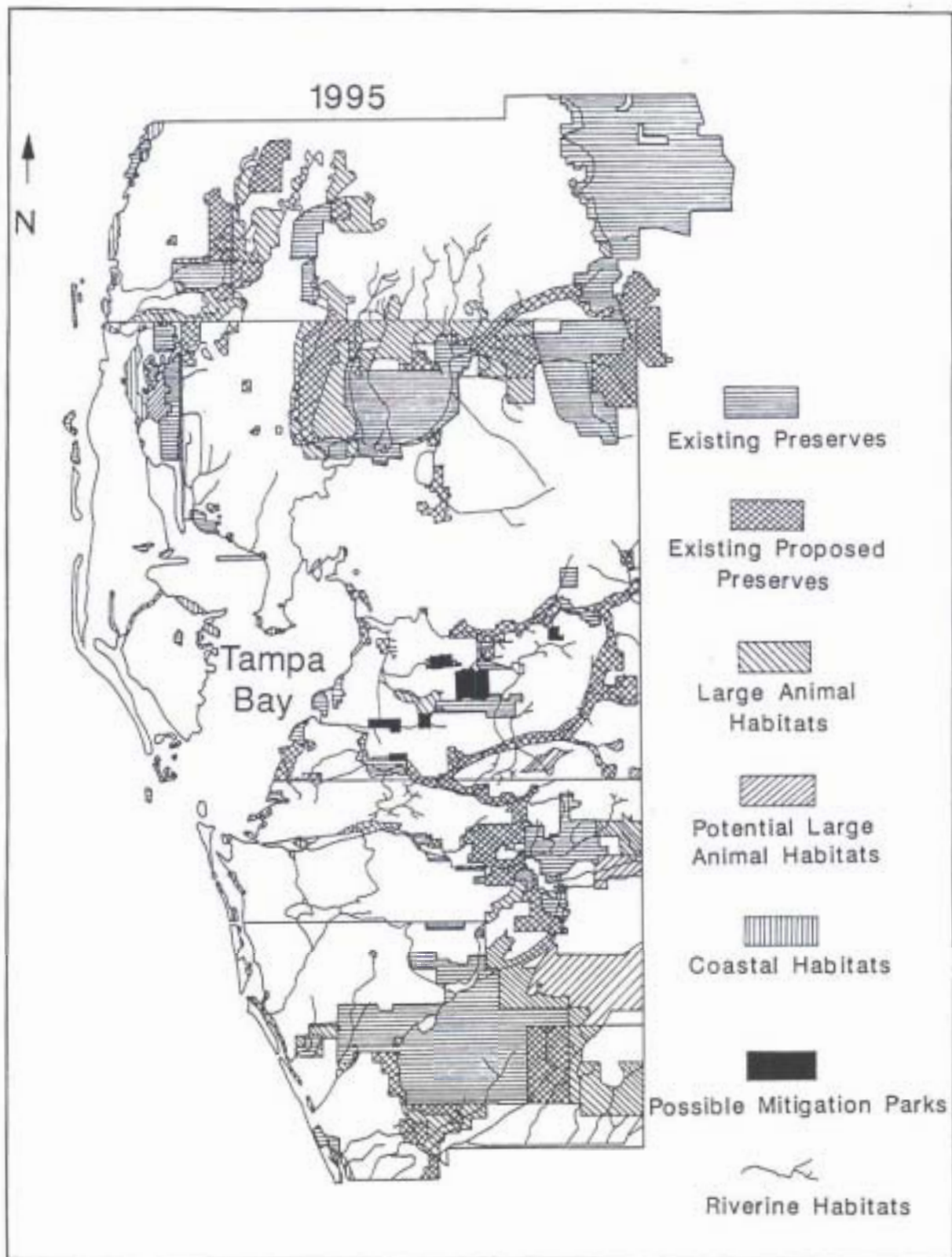


Figure 16. Proposed revisions to the regional wildlife habitat plan for the Tampa Bay region (FGFWFC).

**PROPOSED
TAMPA BAY HABITAT PROTECTION AND RESTORATION PLAN
Protection Component**

The proposed protection strategy includes the acquisition in fee or less than fee, if appropriate, of all mangrove forests, tidal marshes, and salt barrens currently existing along the shores or in the watershed of Tampa Bay and that are not now in public protection. Prior to the preparation of this plan, most of these areas not under a public protection umbrella were considered "protected" due to the existing wetland laws—federal, state and local.

This situation has changed in recent years due to property rights issues. Legislation has been proposed, and some placed into law, that would require purchase in fee of privately owned wetlands for which development permits were denied. This issue is likely to become more important as private property rights come to the fore. For this reason, the existence of current wetland protection laws cannot be guaranteed to continue into the future. The logical fallback position is to plan now to place these wetlands, representing only approximately 45% of the historical acreage, under a public protection umbrella at the least cost to the public. Planning now will save money in the future.

Assessment of Publicly Owned Conservation Lands

One objective of this project was to identify and map the distribution of publicly owned land parcels in the Tampa Bay watershed which have been purchased and/or dedicated for preservation, conservation or passive recreational uses. This information was then to be used to identify strategically located privately owned parcels, and prioritize them for future public purchase.

Information on publicly owned lands was solicited from the following governmental units:

- Florida Internal Improvement Trust Fund
- Florida Department of Environmental Protection
- Florida Department of Transportation
- Florida Game and Freshwater Fish Commission
- Southwest Florida Water Management District Land Acquisition and Management Department
- Southwest Florida Water Management District Surface Water Improvement and Management (SWIM) Department
- Tampa Bay Regional Planning Council
- Pinellas County Tax Assessors Office
- Pinellas County Planning Department
- Hillsborough County Tax Assessors Office
- Hillsborough County Environmental Lands Acquisition and Protection Program (ELAPP)
- Hillsborough County Parks and Recreation Department
- Hillsborough River Greenways Task Force
- Manatee County Tax Assessors Office
- Manatee County Department of Ecosystem Management
- The National Audubon Society
- The Nature Conservancy

Setting Priorities:

An attempt was made to acquire all relevant information in digital format for conversion to a common GIS format (e.g., Arc/INFO). Information was subsequently received in a wide variety of digital and hard copy formats, and was subjected to a comprehensive screening process. For example, digital database queries performed by the Hillsborough County Tax Assessors Office yielded over 1,700 parcels that were recorded in public ownership, including land uses such as schools, libraries, pump stations, retention ponds etc. Only those parcels that are currently in use as preservation, conservation or passive recreation areas were retained. Parcels identified as passive recreation areas include public parks where some natural habitat is conserved and nature interpretive activities (e.g., birdwatching, canoeing, hiking, etc.) are the primary use; as opposed to active recreation areas where athletic activities (e.g., ballfields) are the primary use.

Digital information was converted to GIS format, transformed and rectified to the greatest extent possible. The standard Tampa Bay National Estuary Program shoreline and watershed boundaries served as the baseline coverage. Relevant hard copy information was digitized and merged into the GIS database. In addition, a major roadway coverage was merged into the GIS database to improve spatial orientation of the mapped parcels. In general, parcels less than 5 acres in size were not mapped due to the desired mapping scales.

Once the screening process was completed, all retained parcels were given a parcel identification number. The GIS was then used to calculate parcel size and centroid location (latitude and longitude). In addition, a map legend number was assigned to each parcel for color coding according to the following five categories:

- Existing publicly owned conservation lands;
- Conservation lands approved/nominated for public purchase;
- Privately owned conservation lands;
- Other publicly owned lands; and
- State Aquatic Preserves.

The "Other Publicly owned Lands" category includes large tracts such as airports, military bases, and port facility lands where substantial natural habitat still exists or where future habitat restoration activities have a reasonable potential for occurring. The "Privately owned Conservation Lands" category includes large tracts owned by private entities, but which have been dedicated for conservation uses, based on the information provided. Some of these parcels have recorded conservation easements; however, the resulting coverage does not represent a comprehensive inventory of conservation easements in the watershed. The "Conservation Lands Approved/Nominated for Public Purchase" category includes those parcels which have been identified and approved or nominated for future public purchase by some land acquisition agency. To be included in this category, a parcel must have been formally evaluated and listed on a pending purchase list. However, future public purchase of some of the mapped parcels may not be guaranteed due to possible future funding constraints.

No attempt was made to verify the information provided by the various agencies solicited. Actual parcel boundaries and acreages are likely to vary somewhat from their mapped depiction due to: 1) inconsistent formats of the original information; 2) lack of quality control

in the original information; 3) and digital GIS transformation and rectification adjustments. Nonetheless, the public lands maps produced from this effort represent the first attempt to develop a comprehensive seamless coverage of public land ownership for the Tampa Bay watershed, and will likely prove very useful for regional resource planning efforts including the development of a Comprehensive Conservation and Management Plan for Tampa Bay. The data obtained through this mapping effort is included here as Appendix D.

Merging of Publicly Owned Lands Coverage with Emergent Tidal Wetland Coverage

The seamless GIS coverage for publicly owned lands was overlaid onto the 1990 emergent tidal wetland coverage using the Arc/INFO union process. The resulting intersection was used to calculate the acreage of the three types of emergent tidal wetlands (mangrove / marsh, tidal marsh, and salt barren) in the following three categories:

- Currently in public ownership;
- Proposed for public ownership; and
- Currently in private ownership.

The results of this analysis are shown in Table 21 for baywide figures, and Table 22 for each bay segment (maps depicting emergent tidal wetlands currently in and proposed for public ownership are presented in Appendix F). As shown in Table 21, approximately 34% of the emergent tidal wetland systems are currently in public ownership, and another 17% are proposed for public purchase. Therefore, assuming that all approved parcels are purchased by the year 2000, approximately 52% of the emergent tidal wetlands will be protected under public ownership. The existing mesohaline and oligohaline tidal marshes are the least protected wetland type with only 31% currently in public ownership, and only 8% proposed for future public purchase. Furthermore, this estimate does not include substantial unmapped acreages of tidal marsh habitat contained in small linear systems which have not yet been adequately mapped.

Table 21. Public vs. private ownership of emergent tidal wetlands, baywide area (acres) totals.

	MANGROVE / MARSH	TIDAL MARSH	SALT BARREN	TOTAL
Currently in Public Ownership (%)	4,813 (35)	1,289 (31)	325 (37)	6,427 (34)
Proposed for Public Ownership (%)	2,560 (19)	308 (8)	343 (39)	3,211 (17)
Currently in Private Ownership (%)	6,391 (46)	2,520 (61)	209 (24)	9,120 (49)
Total area (%)	13,764 (73)	4,117 (22)	877 (5)	18,758

Setting Priorities:

Table 22. Public vs. private ownership of emergent tidal wetlands, acreage by bay segment.

	OWNERSHIP	MANGROVE / MARSH	TIDAL MARSH	SALT BARREN	TOTAL
OLD TAMPA BAY	Currently public	1,538	636	124	2,298
	Proposed public	13	49	0	62
	Private	1,901	465	23	2,389
HILLSBOROUGH BAY	Currently public	94	18	0	112
	Proposed public	484	128	3	615
	Private	173	353	10	536
MIDDLE TAMPA BAY	Currently public	2,385	433	186	3,004
	Proposed public	1,182	80	304	1,566
	Private	1,494	224	43	1,761
LOWER TAMPA BAY	Currently public	107	173	15	295
	Proposed public	732	46	36	814
	Private	1,335	170	117	1,622
BOCA CIEGA BAY	Currently public	561	27	0	588
	Proposed public	0	0	0	0
	Private	560	57	0	617
TERRA CEIA BAY	Currently public	71	0	0	71
	Proposed public	149	5	0	154
	Private	491	1	6	498
MANATEE RIVER	Currently public	60	2	0	59
	Proposed public	0	0	0	0
	Private	463	1,250	10	1,697

Sample Site Acquisition Selection Procedure

Major wetland and associated upland habitat areas not in public ownership are listed in Table 23. Each was rated according to 23 criteria (Table 24) in order to determine a comparative rating (Table 25; A–C, A being the highest). This method is modeled after the “ecosystem management criteria” prepared by the Florida Department of Environmental Protection (Form FPS-A016[10/94], Table 26).

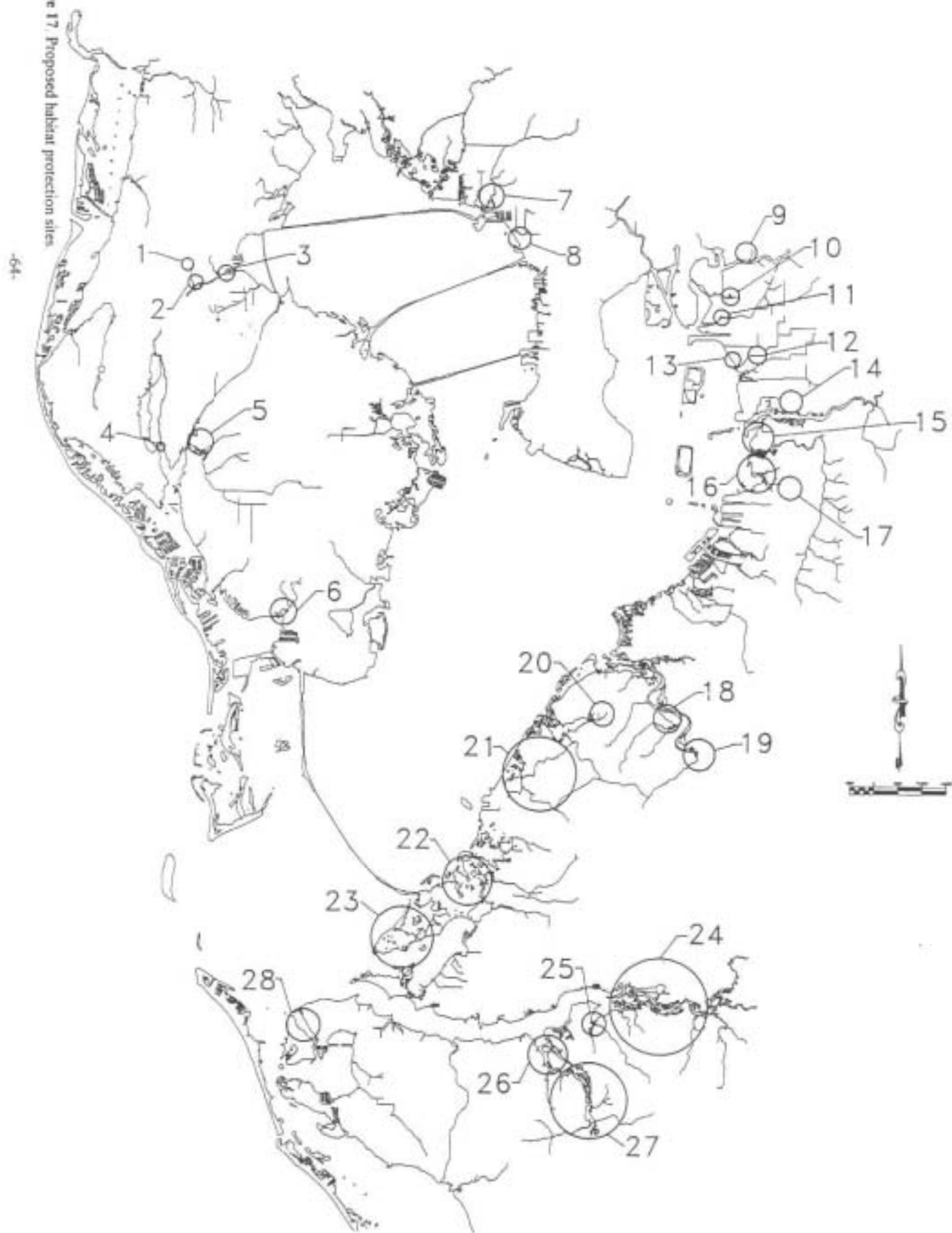
The proposed 28 habitat protection sites listed in Table 23 have been rated on 24 characters resulting in total scores ranging from 29 to 63. Two sites are ranked much higher than the rest, primarily due to their location within overlapping white ibis foraging areas. These sites are the TECO Port Manatee/Reeder property, rated number two out of the 28 sites with 61 points, and the Terra Ceia Isles site rated number one with 63 points. These are termed “A” sites. The next ten sites all scored 36 or above up to 40. They are termed “B” sites. The remaining 16 sites scored between 29 and 35, and are termed “C” sites. Since these ratings are based upon only one individual’s (RRL) scoring using a preliminary ranking system, the

values should be viewed as suggesting an approach, but still in need of refinement. In particular, these sites need to be combined with all other nominated sites being evaluated by other land protection programs (i.e. Save Our Rivers, Hillsborough County ELAPP, etc.) within a proposed Tampa Bay Fish and Wildlife Management Program (see Recommended Implementation Plan).

Table 23. Proposed habitat protection sites.

	SITE	BAY SEGMENT	OWNER	FIGURE	ACREAGE	RATING
1.	Allen's Creek 1	OTB	?	—	?	B
2.	Allen's Creek 2	OTB	?	—	?	C
3.	Allen's Creek 3	OTB	?	—	?	C
4.	Long Bayou	BCB	?	18	31.1	B
5.	Joe's Creek	BCB	?	18	16.1	C
6.	Clam Bayou	BCB	?	—	50	C
7.	Sweetwater Creek	OTB	?	19	66.8	C
8.	Fish Creek south	OTB	Airport Authority	19	109.7	C
9.	Palm Creek	HB	CSX/Tampa Tank	1	590.0	B
10.	Ironhead Creek	HB	?	20	175.6	B
11.	Lower Delaney Creek	HB	?	20	180.2	B
12.	Delaney Creek Pop-off E.	HB	CSX and ?	21	626.8	C
13.	North Parcel	HB	Cargill	21	200	C
14.	E. Tampa	HB	Cargill	—	?	C
15.	South Parcel	HB	Cargill	—	370	C
16.	Bullfrog Creek / Port Redwing	HB	various	22	585.6	C
17.	Big Bend Road	MTB	?	22	125.3	B
18.	Wildcat Creek	MTB	?	23	109.2	B
19.	Little Manatee River	MTB	?	—	?	C
20.	Andrews Creek N.	MTB	?	23	306.1	B
21.	Port Manatee	MTB	TECO	24	2,600	A
22.	Terra Ceia Isles	TCB	?	25	3,171.3	A
23.	Rattlesnake Key	LTB	?	26	2,630.3	B
24.	Manatee River marshes	MR	?	—	?	C
25.	Branches Hammock	MR	?	—	?	C
26.	Upper Braden River Marshes	MR	?	—	?	C
27.	Lower Braden River Marshes	MR	?	—	?	C
28.	Perico Bayou	LTB	?	27	1,704.2	B

Figure 17. Proposed habitat protection sites



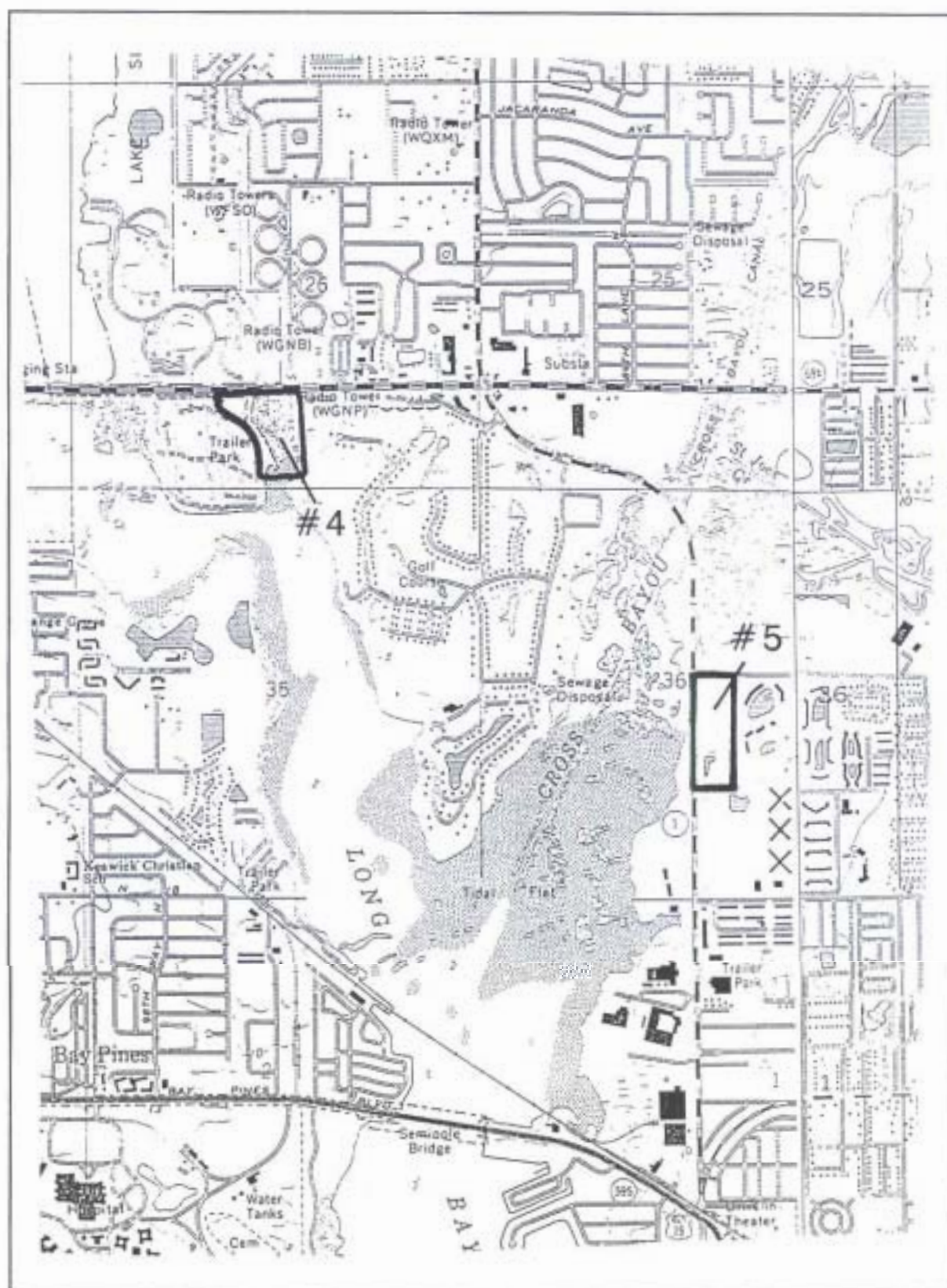


Figure 18. Proposed protection sites 4 and 5.



Figure 19. Proposed protection sites 7 and 8.

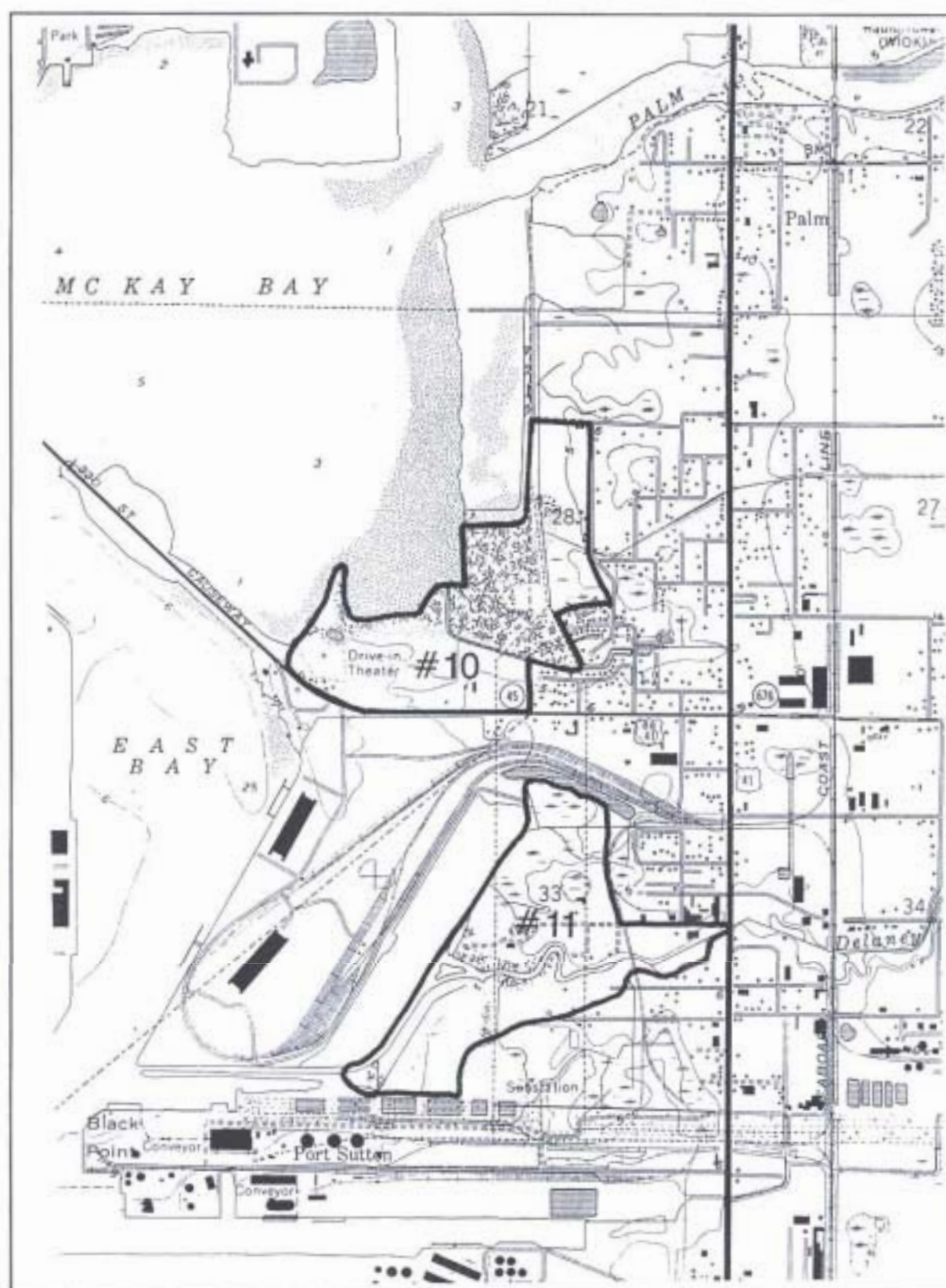


Figure 20. Proposed protection sites 10 and 11.

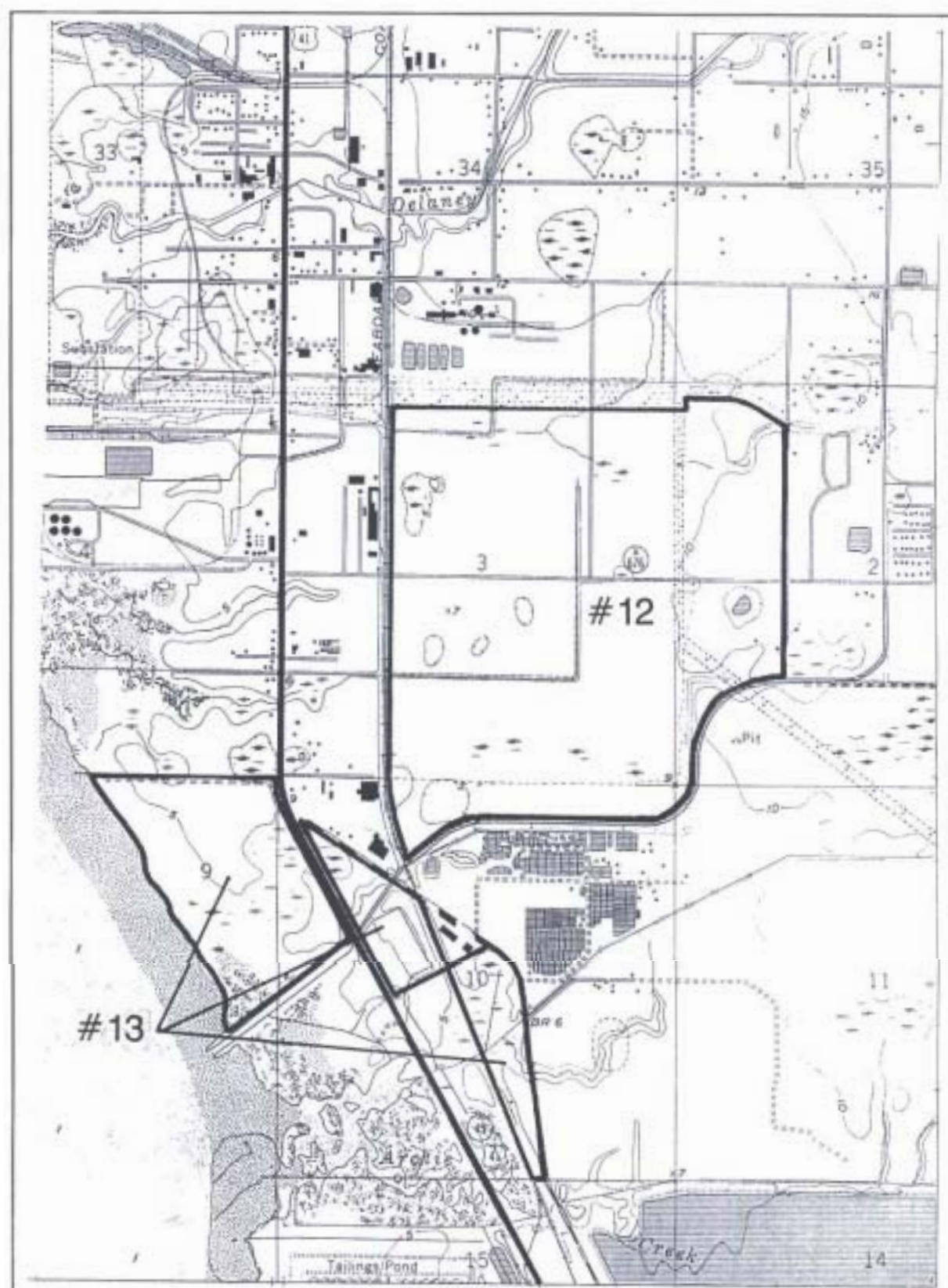


Figure 21. Proposed protection sites 12 and 13.

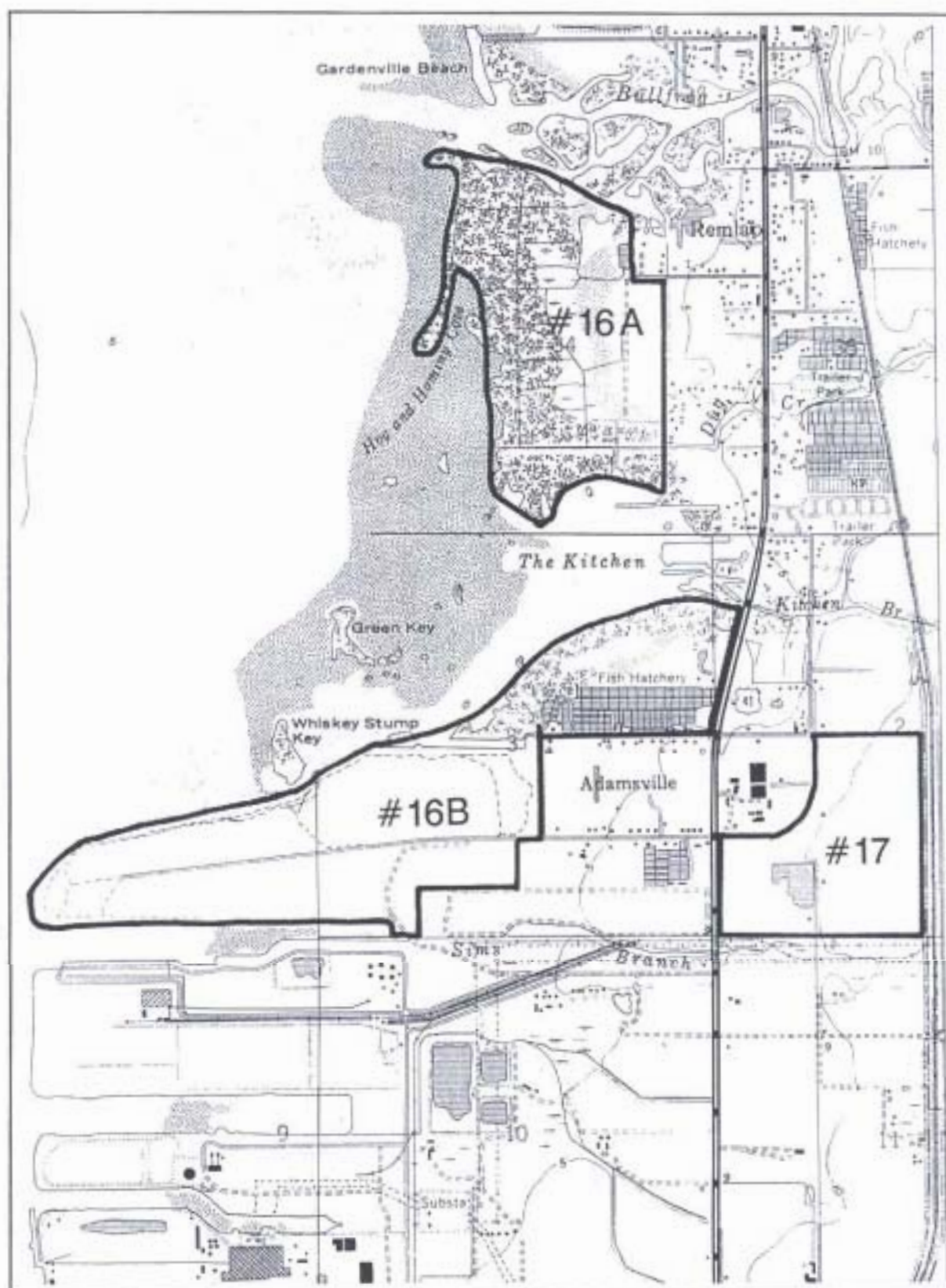


Figure 22. Proposed protection sites 16 and 17.

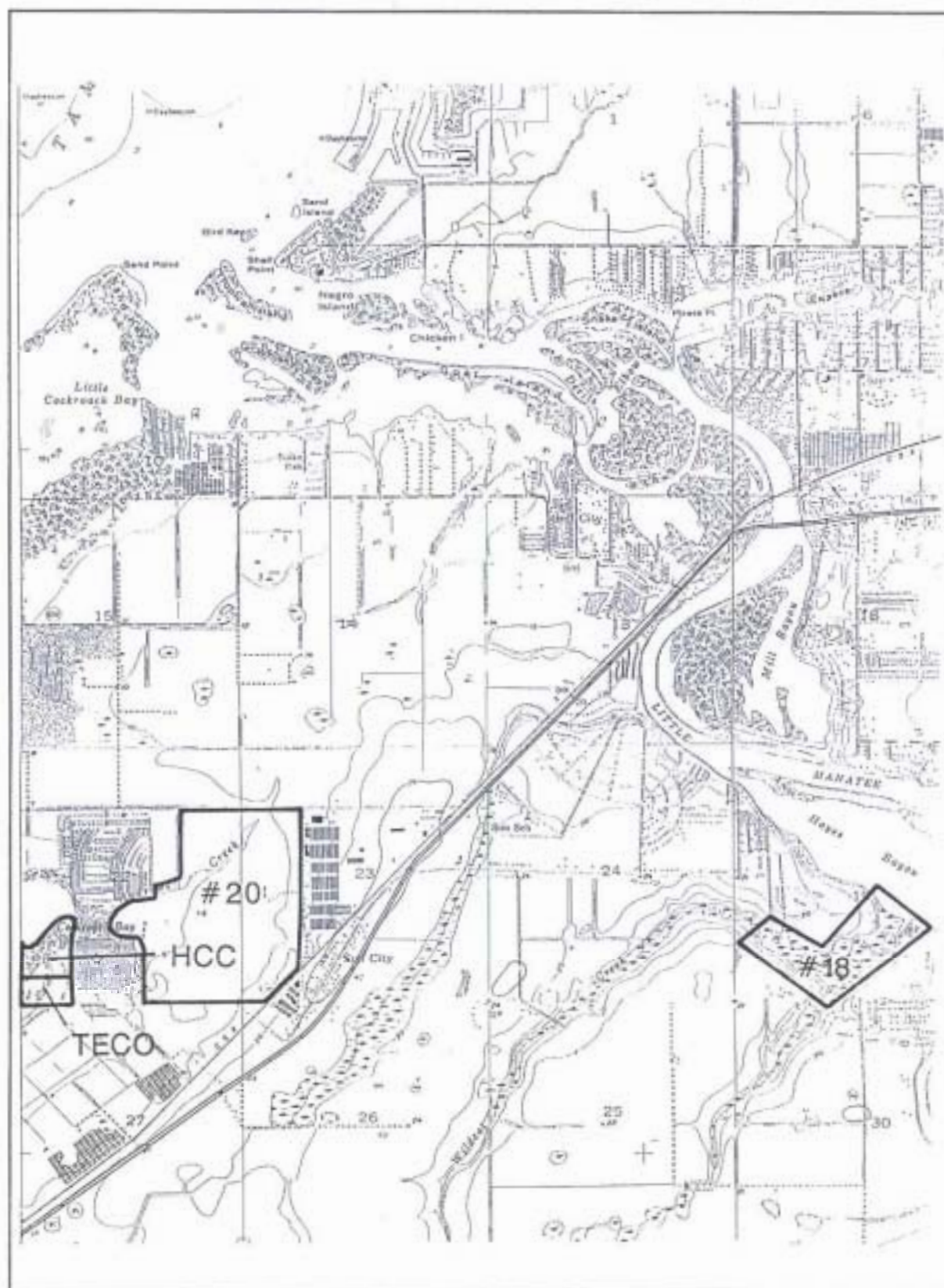


Figure 23. Proposed protection sites 18 and 20.

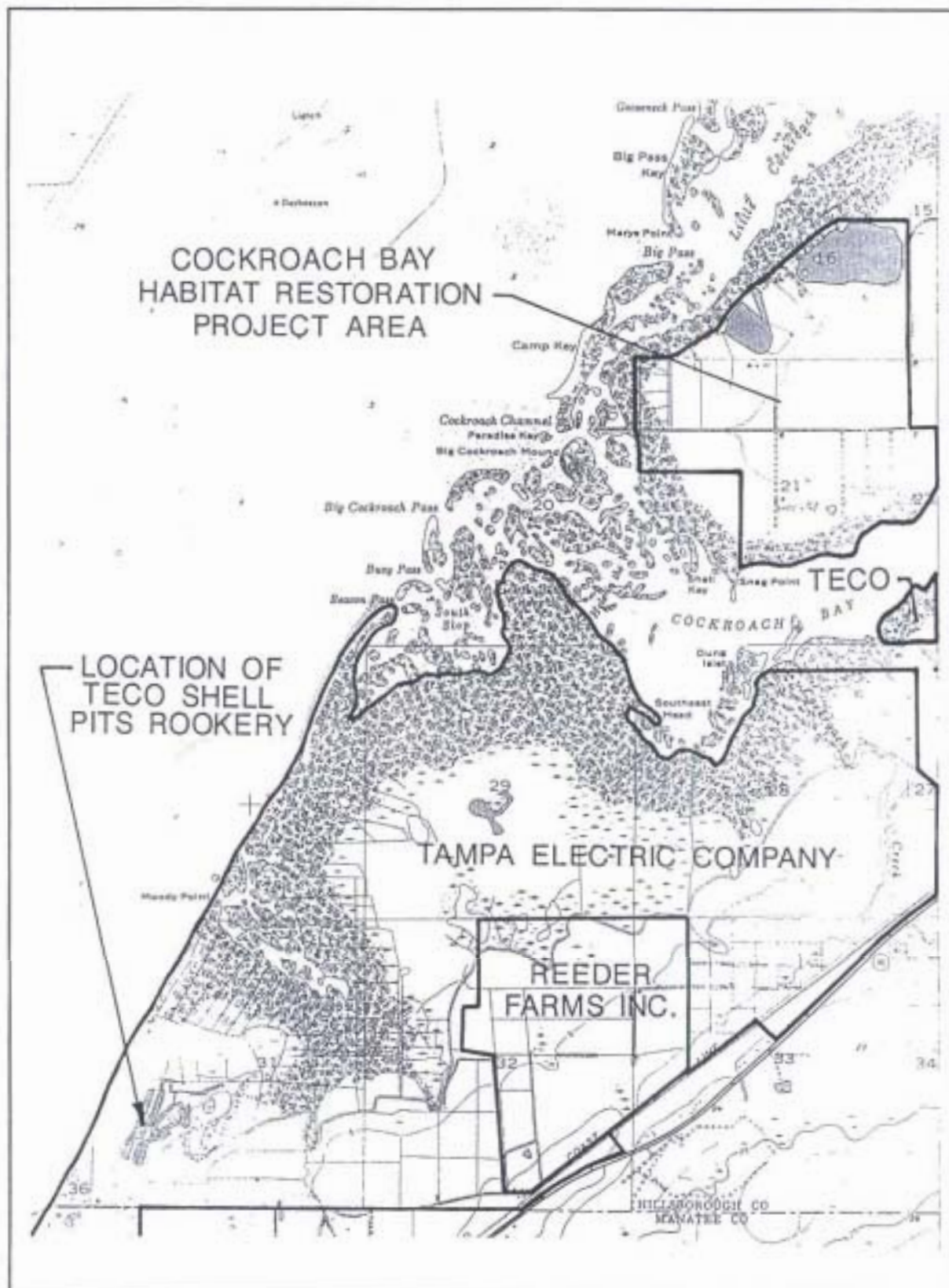


Figure 24. Proposed protection site 21.

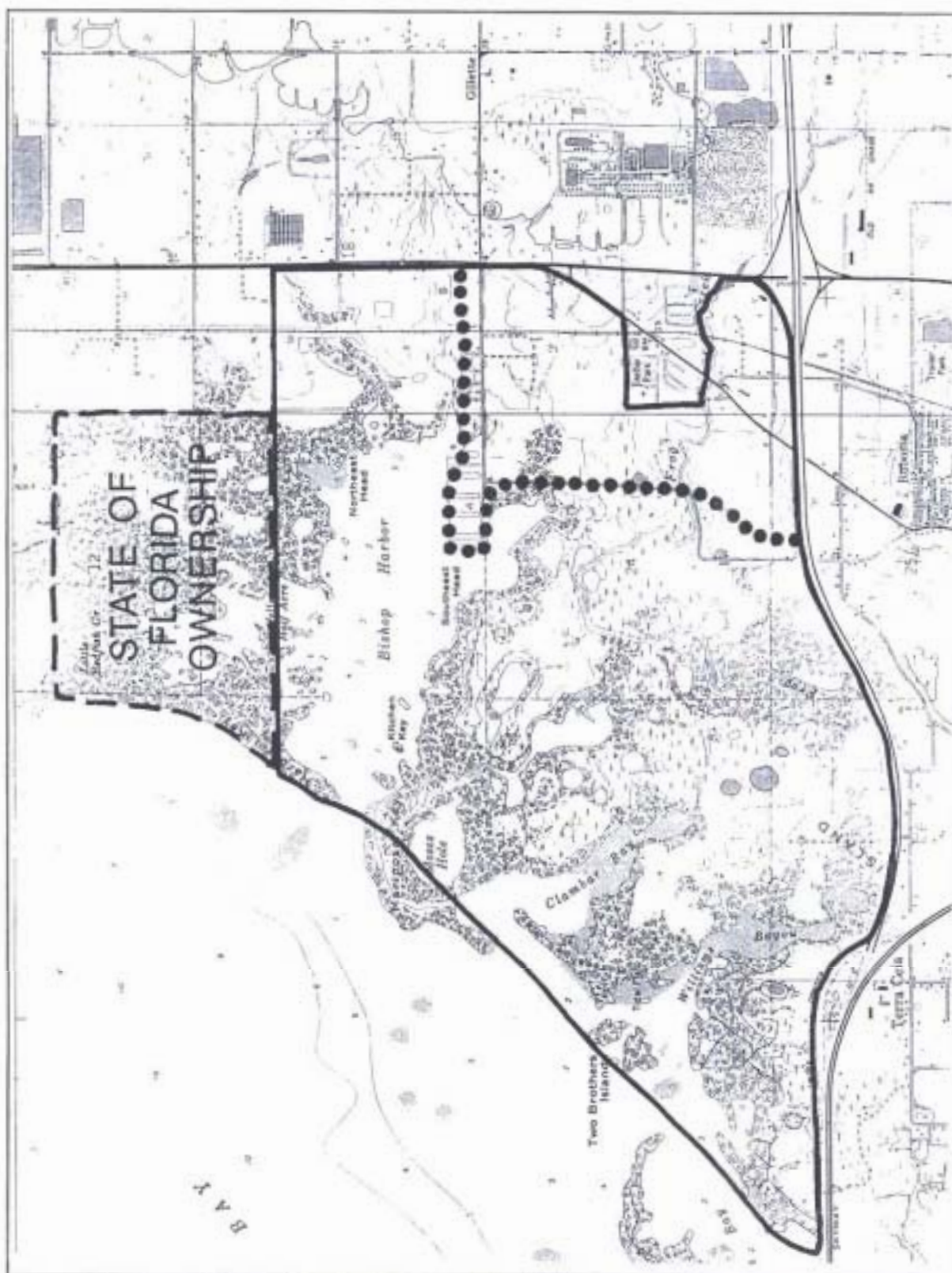


Figure 25. Proposed protection site 22. Dotted line indicates acquisition boundary subject to change, to exclude certain developed or platted areas (information provided by Manatee Co.).



Figure 26. Proposed protection site 23. Dotted line indicates acquisition boundary subject to change, to exclude certain developed or platted areas (information provided by Manatee Co.).

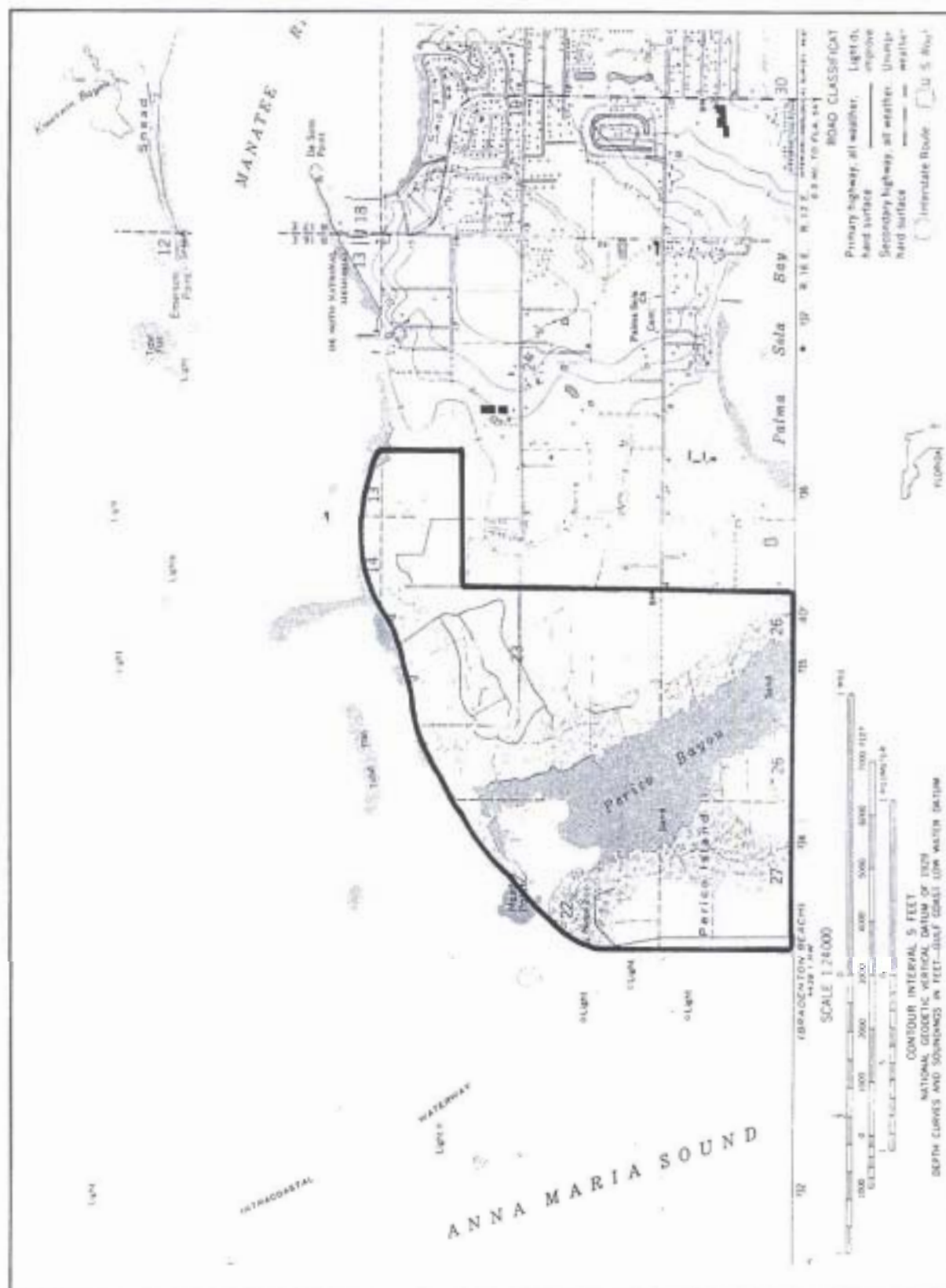


Figure 27. Proposed protection site 28.

Table 24. Criteria for acquisition matrix and ranking.

CRITERION	NUMERICAL VALUE TO BE ASSIGNED		
	N/A	NO	YES
ACQUISITION, PROTECTION, MANAGEMENT AND RESTORATION (IF NEEDED) WILL:			
1. Lead to improved water quality	1	2	3
2. Improve groundwater recharge in a water resource caution area	1	2	3
3. Improve quality, quantity, and timing of freshwater input into a marine estuarine or freshwater system	1	2	3
4. Help achieve the minimum flows and levels of an aquatic system	1	2	3
5. Restore or improve tidal circulation	1	2	3
6. Re-establish natural hydroperiod	1	2	3
7. Contribute to recovery of a natural community or population	1	2	3
8. Enhance and protect natural community populations which have been identified by state or federal agencies as severely limited, endangered or threatened in Florida	1	2	3
9. Contribute to native species diversity in the region	1	2	3
10. Eliminate or significantly reduce a source of exotic plant species infestation and seed source	1	2	3
11. Enhance a unique, regionally scarce or imperiled community	1	2	3
12. Prevent continued habitat loss or damage due to pollution or environmental degradation	1	2	3
13. Improve a wildlife corridor fragmented by alteration	1	2	3
SITE WILL PROVIDE ECOLOGICAL LINK TO, CREATE BUFFER FOR, OR RECONNECT FRAGMENTED SYSTEMS ASSOCIATED WITH:			
14. State identified ecosystems	1	2	3
15. SWIM designated water bodies with approved plans	1	2	3
16. National Estuary Program designated areas	1	2	3
17. Public lands	1	2	3
18. Aquatic Preserves	1	2	3
19. Outstanding Florida Waters	1	2	3
20. Shellfish harvesting areas	1	2	3
21. Areas of Critical State Concern	1	2	3
SITE IS LOCATED WITHIN:			
22. Nine miles (15 km) of existing white ibis nesting site	0	—	3
23. Overlap of feeding range zones of existing white ibis nesting sites	two zones 2		three zones 3

Table 25. Proposed habitat acquisition site selection matrix

SITE	CRITERIA																							Total	Rank	Letter Rank
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
22. Terra Ceia Isles	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	1	1	3	3	3	1	3	3	63	1.59	A
21. Port Manatee	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	1	1	3	3	61	1.64	A
9. Palm Creek	3	1	3	1	3	3	3	3	1	3	1	1	1	3	3	3	1	1	1	1	1	3	0	40	2.50	B
10. Ironhead Creek	3	1	3	1	3	1	3	1	1	3	3	1	1	3	3	3	1	1	1	1	1	3	0	40	2.50	B
23. Rattlesnake Key	1	1	3	1	1	1	1	1	1	3	1	1	1	1	3	1	1	3	3	3	1	3	3	39	2.56	B
11. Lower Delaney Creek	3	1	3	1	1	1	3	1	1	3	3	1	1	1	3	3	1	1	1	1	1	3	0	38	2.63	B
17. Big Bend Road	1	3	1	1	1	3	3	1	1	3	1	1	1	1	3	3	3	1	1	1	1	3	0	38	2.63	B
18. Wildcat Creek	3	1	3	1	1	1	3	1	1	3	3	1	1	1	3	1	1	3	1	1	1	3	0	38	2.63	B
28. Perico Bayou	1	1	3	3	3	3	3	1	1	3	1	1	1	1	3	1	1	1	1	1	1	3	0	38	2.63	B
1. Allen's Creek 1	3	1	3	1	1	1	3	1	1	3	3	1	1	1	3	3	1	1	1	1	1	3	0	37	2.70	B
4. Long Bayou	3	1	3	1	1	1	3	1	1	3	3	1	1	1	3	3	1	3	1	1	1	0	0	37	2.70	B
20. Andrews Creek N.	3	3	3	1	1	1	1	1	1	3	1	3	1	1	3	3	1	3	1	1	1	0	0	36	2.78	B
7. Sweetwater Creek	3	1	3	1	1	1	3	1	1	3	1	3	1	1	3	3	1	1	1	1	1	0	0	35	2.86	C
12. Delaney Creek Pop-off E.	3	1	3	1	1	1	3	1	1	3	1	1	1	1	3	1	1	1	1	1	1	3	0	34	2.94	C
16. Bullfrog Creek/Port Redwing	3	1	3	1	1	1	3	1	1	3	1	1	1	1	3	1	1	1	1	1	1	3	0	34	2.94	C
25. Branches Hammock	3	1	3	3	1	1	1	1	1	3	1	1	1	1	3	1	1	1	1	1	1	3	0	34	2.94	C
5. Joe's Creek	1	1	3	1	1	1	3	1	1	3	3	1	1	1	3	1	1	3	1	1	1	0	0	33	3.03	C
13. North Parcel	1	1	1	3	1	1	3	1	1	3	1	1	1	1	3	1	1	1	1	1	1	3	0	32	3.13	C
15. South Parcel	1	1	1	3	1	1	3	1	1	3	1	1	1	1	3	1	1	1	1	1	1	3	0	32	3.13	C
26. Upper Braden River marshes	3	1	3	3	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	3	0	32	3.13	C
27. Lower Braden River marshes	3	1	3	3	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	3	0	32	3.13	C
14. E. Tampa	1	1	1	1	1	1	3	1	1	3	1	1	1	1	3	1	1	1	1	1	1	3	0	30	3.33	C
19. Little Manatee River	1	1	3	1	1	1	1	1	1	1	1	1	1	1	3	1	1	3	1	1	1	3	0	30	3.33	C
2. Allen's Creek 2	3	1	3	1	1	1	1	1	1	1	1	1	1	1	3	1	1	3	1	1	1	0	0	29	3.45	C
3. Allen's Creek 3	3	1	3	1	1	1	1	1	1	1	1	1	1	1	3	1	1	3	1	1	1	0	0	29	3.45	C
6. Clam Bayou	1	1	3	1	1	1	3	1	1	1	1	1	1	1	3	1	1	3	1	1	1	0	0	29	3.45	C
8. Fish Creek south	1	1	1	1	1	1	3	1	1	3	1	3	1	1	3	1	1	1	1	1	1	0	0	29	3.45	C
24. Manatee River marshes	3	1	3	3	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	0	0	29	3.45	C

Table 26. Ecosystem management criteria (from FDEP).¹

A. ENVIRONMENTAL RESTORATION

1. Restoration will lead to improved water quality
2. Restoration will significantly improve ground water recharge.
3. Groundwater recharge improvement is in a water resource caution area.
4. Restoration will improve groundwater protection for a first magnitude spring.
5. Restoration will improve quality, quantity and timing of freshwater input into a marine, estuarine or freshwater system.
6. Restoration will help achieve the minimum flows and levels of an aquatic system.
7. Restoration will re-establish natural hydroperiod.
8. Restoration will contribute to the recovery of a natural community or population and may include, but not be limited to, contributing to native species diversity or reducing a source for exotic infestation. Communities or populations which have been identified by state and federal agencies as severely limited, threatened or endangered may be given priority.

B. ECOSYSTEM INTEGRATION

1. Restoration sites will be ecologically linked to, create buffer for, or reconnect fragmented systems within:
 - State identified ecosystem management areas, as recognized by the Department of Environmental Protection
 - SWIM designated water bodies with approved plans
 - National Estuary Program designated areas
 - Public lands
 - Aquatic preserves
 - Outstanding Florida Waters
 - Shellfish harvesting areas
 - Areas of Critical State Concern
 - National Estuarine Research Reserve
 - National Marine Sanctuary
 - Other significant ecosystems or special management areas
2. Restoration will improve a wildlife corridor fragmented by alteration.

C. ENVIRONMENTAL PROTECTION

1. Pollution prevention achieved through source reduction, waste minimization, or on-site recycling.
2. Protection through reducing or elimination of the generation and use of toxic and hazardous substances.
3. Protection through addressing media transfer of pollutants and minimizing the transfer of pollutants from one medium to another.
4. Protection through pollution source investigation.
5. Protection through monitoring.

D. AIR QUALITY PROTECTION

1. Protection through energy conservation to include energy efficiency and utilization for both mobile and stationary sources that will lead to improved air quality.
 2. Protection through the reduction of criteria pollutants (ozone, sulfur dioxide, carbon monoxide, nitrogen oxides, lead, particulate matter PM-10) that will lead to improved air quality.
-

¹Other criteria have been suggested by reviewers; see also Appendix F for comments regarding use of these criteria.

Other Protection Strategies

Another protection strategy, beyond land acquisition, is the establishment of management plans for all public lands with conservation aims, including passive parks, with budgeted operation and maintenance (O&M) funding to ensure that restoration sites, including public mitigation areas, do not revert back to degraded wetlands through neglect. Re-invasion by non-native plants is currently a major unresolved management issue in newly restored wetland sites in the Bay area (e.g. Pendola Point Port mitigation, Simmons Park restoration site). As illustrated in Table 8, existing funded management plans for publicly owned conservation lands or restoration sites are virtually nonexistent.

A third protection strategy is the management of Tampa Bay emergent wetlands as sea level rises. The United Nations Environment Program (UNEP) is supporting studies on the impact of sea level rise at various locations around the world including the wider Caribbean region (Maul 1993). The assumption being addressed is an increased temperature of 1.5–4.5°C and sea level rise of 20–140 cm (8–56 inches) before 2100 and an ongoing temperature rise of 1.5°C and sea level rise of 20 cm by the year 2025.

Snedaker (1993) addresses the short-term scenario as having the potential to produce moderate impacts to mangrove forests of the region, including those in Tampa Bay. Subtropical tidal marshes would likely be similarly affected. These plant communities can be expected to retreat inland as long as upland area is available, but they would disappear if retreat is not possible due to marked changes in elevation or development. Because mangrove productivity generally increases with reduced salinities, Snedaker (1993) hypothesizes that mangroves with appropriate upland freshwater sources might keep up with sea level rise by normal peat production. The key recommendation he makes (p. 298) is applicable to Tampa Bay emergent wetlands:

Because of the importance of fresh water in sustaining high rates of mangrove primary productivity and in production and accumulation of organic peat, water management authorities should block surface water drainage canals and divert surplus fresh water discharges into mangrove areas based on a delivery schedule that promotes mangrove productivity.

The recent re-establishment of flow into the mangroves along the old south channel of the Alafia River (as part of the Cargill Fertilizer, Inc. / SWIM / FDEP South Parcel restoration project) is an example of this kind of effort. Another example of blocking drainage channels to restore sheet flow is proposed for the area south of Cockroach Bay (Figure 28).

Restoration Component

The second major component of the proposed plan is restoration. Three habitat types are addressed: 1) coastal emergent wetlands (e.g. mangrove forests, tidal marshes and salt barrens); 2) critical freshwater marshes used by the coastal guild of wading birds including white ibis; and 3) coastal uplands adjacent to the Bay considered important wildlife habitat, and coastal habitat including hydric hammocks.

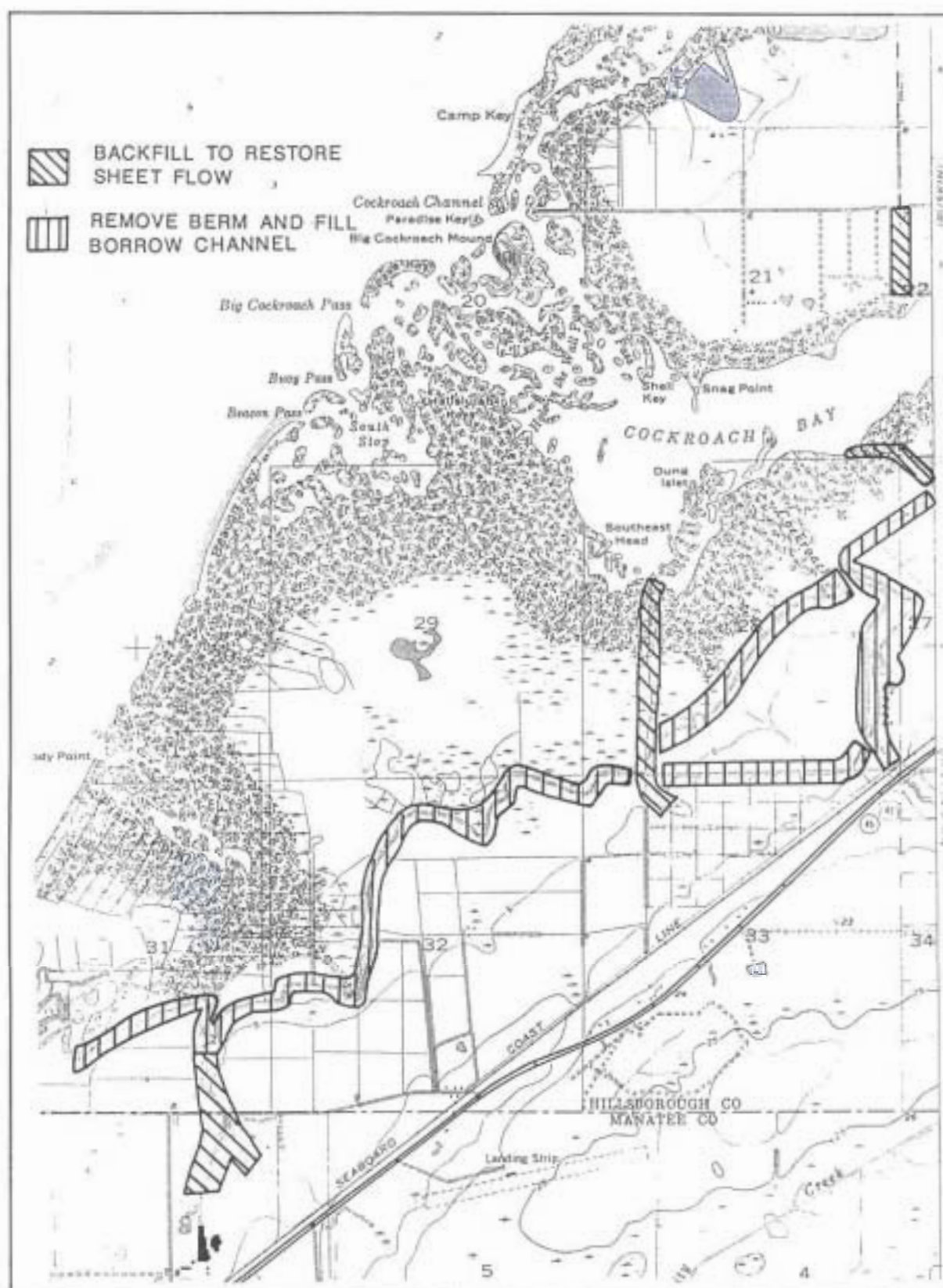


Figure 28. Proposed drainage channel modifications.

Setting Priorities:

An analysis of changes in acreage of the various emergent wetlands has shown that the important shallow water tidal stream and low salinity tidal marsh nursery habitats have been differentially lost to a greater degree than other emergent habitats. In addition, the remaining areas of this habitat type have been or are being degraded by exotic plant invasion, primarily Brazilian pepper (*Schinus terebinthifolius*), based upon the observations made during the field verification portion of this study. Proposed drainage "improvements" also threaten these remnant habitats (e.g., Sweetwater Creek, Delaney Creek, Allen's Creek).

To address priorities in tidal stream restoration, an updated analysis of the location, size and number of minor tidal tributaries was performed. This effort resulted in the identification of 101 tidal streams of which 95 are tributary to Tampa Bay (Figure 29, Table 27). This is nearly triple the number of 37 previously identified by TBRPC (1986b). Each of these needs its own restoration plan as none are pristine. A formal matrix analysis was applied to each of the 95 systems plus 36 of the 38 proposed SWIM restoration sites and the seven Palm River / McKay Bay sites listed in HDR 1994 (Table 7). These total 138 potential restoration sites (Table 28). Criteria included are listed in Table 29.

The totaled scores of the 138 sites ranged from 23 to 41. Since the ranking has been done by only one individual (RRL), the totals should be considered only as preliminary values for purposes of categorizing projects as rating "high" or "low". These tables are available (from the Tampa Bay NEP office) as an Excel 5.0 file that can be manipulated by anyone wishing to attempt their own evaluation.

The combined results of a number of individuals familiar with the sites and the proposed restoration activities (many of which are only theoretical at this time) are needed to validate the rankings. A recommended task of the proposed Fish and Wildlife Management Plan Workshop is to work through the matrix and come to agreement on site rankings. The exercise of setting up the matrix is intended to illustrate a methodology and direction to proceed to implement the "Restoring the Balance" paradigm. It is not meant to represent any criticism of the existing process, but to suggest a possible alternative for the future.

Table 28 is suggested as a point of departure for comparison with Table 8. The proposed SWIM Five-Year Plan (Table 9) already includes some sites that fit well with this restoration plan. The Cabbagehead Bayou and Dug Creek projects (Figures 30 and 31) proposed by SWIM are examples of projects that the workshop participants may review and make recommendations for enhancement which can increase the oligohaline habitat potential.

Figure 32 represents an example of large-scale habitat restoration projects for Tampa Bay. It combines features providing habitat needed in all three of the critical habitat areas, including freshwater marsh for white ibis foraging and hydric hammock / mesic pine upland restoration.

The critical freshwater marsh preservation and restoration strategy has involved the placement of a 9.3-mile (15-km) radius circle around the four existing Tampa Bay white ibis nesting colonies (Alafia Banks, TECO Ponds, Washburn Sanctuary and Tarpon Key) and identifying marsh restoration and preservation sites within each circle (see Figure 13). Areas of overlap

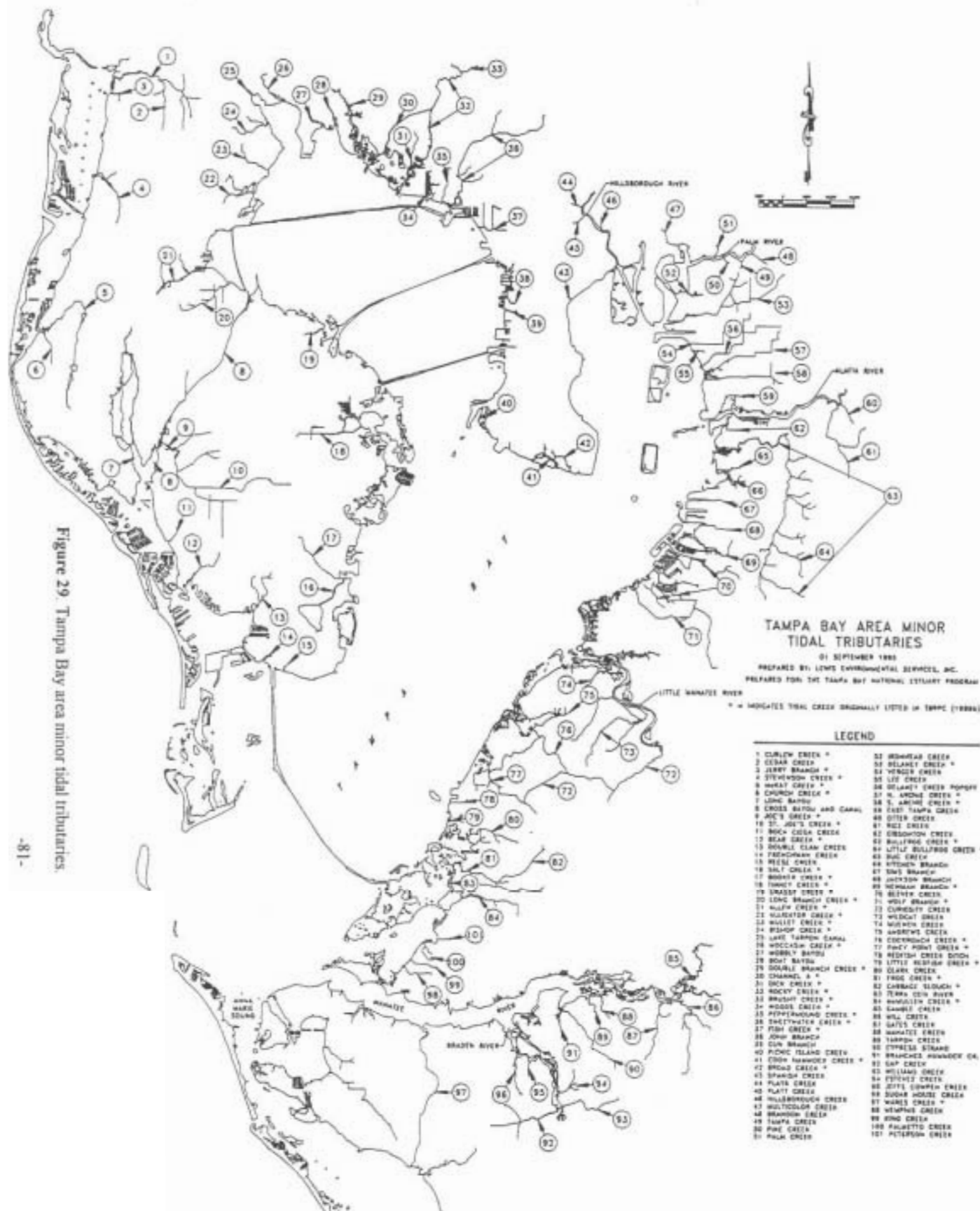


Figure 29. Tampa Bay area minor tidal tributaries.

Setting Priorities:

Table 27. List of the 95 minor tidal tributaries to Tampa Bay identified as part of this study.

Boca Ciega Bay (BCB)	7. Long Bayou	Lower Tampa Bay (LTB)	78. Redfish Creek Ditch
	8. Cross Bayou & Canal		79. Little Redfish Creek
	9. Joe's Creek		80. Clark Creek
	10. S. Joe's Creek	Old Tampa Bay (OTB)	18. Tinney Creek
	11. Boca Ciega Creek		19. Grassy Creek
	12. Bear Creek		20. Long Branch
Middle Tampa Bay (MTB)	13. Double Clam Creek		21. Allen Creek
	14. Frenchman Creek		22. Alligator Creek
	15. Reese Creek		23. Mullet Creek
	16. Salt Creek		24. Bishop Creek
	17. Booker Creek		25. Lake Tarpon
	41. Coon Hammock Creek		26. Moccasin Creek
	42. Broad Creek		27. Mobbly Creek
	68. Jackson Branch		28. Boat Creek
	69. Newman Branch		29. Double Branch Creek
	70. Beaver Creek		30. Channel A
	71. Wolf Branch		31. Dick Creek
	72. Curiosity Creek		32. Rocky Creek
	73. Wildcat Creek		33. Brushy Creek
	74. Muench Creek		34. Woods Creek
Hillsborough Bay (HB)	75. Andrews Creek	Terra Ceia Bay (TCB)	35. Peppermound Creek
	76. Cockroach Creek		36. Sweetwater Creek
	77. Piney Point Creek		37. Fish Creek
	43. Spanish Creek		38. John Creek
	44. Playa Creek		39. Gun Creek
	45. Platt Creek		40. Picnic Island Creek
	46. Hillsborough Creek	Manatee River (MR)	81. Frog Creek
	47. Multicolor Creek		82. Cabbage Slough
	48. Brandon Creek		83. Terra Ceia River
	49. Tampa Creek		84. McMullen Creek
	50. Pine Creek		98. Memphis Creek
	51. Palm Creek		99. King Creek
	52. Ironhead Creek		100. Palmetto Creek
	53. Delaney Creek		101. Peterson Creek
	54. Verger Creek		85. Gamble Creek
	55. Lee Creek		86. Mill Creek
	56. Delaney Ck. Pop-off		87. Gates Creek
	57. N. Archie Creek		88. Manatee Creek
	58. S. Archie Creek		89. Tarpon Creek
	59. East Tampa Creek		90. Cypress Strand
	60. Otter Creek		91. Branches Hammock Cr.
	61. Rice Creek		92. Gap Creek
	62. Gibsonton Creek		93. Williams Creek
	63. Bullfrog Creek		94. Estevez Creek
	64. Little Bullfrog Creek		95. Jeffs Cowpen Creek
	65. Dug Creek		96. Sugar House Creek
	66. Kitchen Branch		97. Ware's Creek
	67. Sims Branch		

Table 28

Ranking of the 95 tidal tributaries, 36 SWIM sites, and 7 HDR sites (total 138).

Number	Map Ref	SITE	Type	Day Segment	Ranking Criteria -----																	Total	Rank
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
3.	9	Joe's Creek	tc	BCB	3	3	3	1	1	1	3	3	2	2	2	2	3	2	3	2	3	41	2.44
17.	71	Wolf Branch	tc	MTB	3	3	3	1	1	1	3	3	3	2	3	2	3	2	3	2	3	41	2.44
59.	55	Lee Creek	tc	HB	2	2	2	3	1	1	3	3	3	2	3	2	3	2	3	2	3	40	2.50
133.		Washington St.	HDR	HB	3	2	2	3	3	3	1	1	3	3	2	1	3	2	3	2	3	40	2.50
87.	92	Gap Creek	tc	MR	3	1	2	2	1	1	3	3	3	3	3	1	3	2	3	2	3	39	2.56
134.		S.R. 60 Marsh	HDR	HB	3	2	2	3	3	3	1	1	3	3	1	1	3	2	3	2	3	39	2.56
36.	30	Channel A	tc	OTB	3	1	2	3	1	1	3	1	3	3	3	2	3	1	3	2	3	38	2.63
60.	56	Delaney Ck. Pop-off	tc	HB	2	2	2	3	1	1	3	1	2	3	3	2	3	2	3	2	3	38	2.63
132.		Palm River/McKay Bay	HDR	HB	3	2	2	3	3	3	1	1	3	3	3	2	3	1	2	1	2	38	2.63
136.		TECO Easement	HDR	HB	3	2	2	3	3	3	1	1	3	3	3	2	3	1	2	1	2	38	2.63
2.	8	Cross Bayou & Canal	tc	BCB	3	3	3	3	1	1	1	1	2	2	2	2	3	2	3	2	3	37	2.70
12.	41	Coon Hammock Creek	tc	MTB	2	3	3	1	1	1	1	1	3	2	3	2	3	2	3	3	3	37	2.70
13.	42	Broad Creek	tc	MTB	2	3	3	1	1	1	1	1	3	2	3	2	3	2	3	3	3	37	2.70
27.	21	Allen Creek	tc	OTB	2	1	2	3	3	1	3	1	2	3	3	2	3	2	3	1	2	37	2.70
58.	54	Vernor Creek	tc	HB	2	2	2	3	1	1	3	3	3	2	3	1	3	1	3	1	3	37	2.70
98.		Mangrove Bay III	SS	OTB	3	1	2	3	3	1	3	1	2	2	3	2	3	2	3	1	2	37	2.70
118.		Cockroach Bay IC, ID	SS	MTB	3	1	3	1	3	3	3	3	3	2	3	1	2	1	3	1	1	37	2.70
135.		Lykes Parcel	HDR	HB	3	2	2	3	3	3	1	1	3	3	3	2	2	1	2	1	2	37	2.70
38.	32	Rocky Creek	tc	OTB	2	1	2	3	1	1	1	1	3	3	3	2	3	2	3	2	3	36	2.78
57.	53	Delaney Creek	tc	HB	2	2	2	3	3	3	1	1	2	2	2	1	3	1	3	2	3	36	2.78
104.		Boca Ciega II	SS	BCB	2	3	3	3	3	1	3	1	2	2	3	1	3	1	2	1	2	36	2.78
110.		S.E. McKay Bay	SS	HB	3	2	2	3	1	1	1	1	3	2	2	2	3	2	3	2	3	36	2.78
119.		Cross Bayou/ Joe's Creek	SS	BCB	3	3	3	3	1	1	3	1	3	2	3	1	2	2	3	1	1	36	2.78
124.		Davis Tract	SS		3	2	2	3	3	1	3	1	1	2	3	2	3	1	3	1	2	36	2.78
22.	76	Cockroach Creek	tc	MTB	3	3	3	1	1	1	3	1	2	2	1	2	3	2	3	1	3	35	2.86
35.	29	Double Branch Creek	tc	OTB	2	1	2	3	1	1	1	1	3	2	3	2	3	2	3	2	3	35	2.86
43.	37	Fish Creek	tc	OTB	2	1	2	3	1	1	1	1	3	3	3	2	3	2	3	2	3	35	2.86
56.	52	Ironhead Creek	tc	HB	3	2	2	3	1	1	1	1	3	2	2	2	3	1	3	2	3	35	2.86
94.	79	Little Redfish Creek	tc	LTB	2	2	2	1	3	1	3	1	3	2	3	2	3	2	3	1	1	35	2.86
99.		Cabbagehead Bayou	SS	OTB	3	1	2	3	3	1	3	1	3	3	3	2	3	1	1	1	1	35	2.86
111.		Wolf Branch Creek I	SS	MTB	2	2	1	1	1	1	3	1	3	2	3	2	3	2	3	2	3	35	2.86
116.		Rocky Creek	SS	OTB	2	1	2	3	3	1	1	1	2	3	3	2	3	2	3	1	2	35	2.86
137.		SWFWMD DMDA	HDR	HB	3	2	2	3	3	3	1	1	3	3	3	2	2	1	1	1	1	35	2.86
28.	22	Alligator Creek	tc	OTB	3	1	2	3	3	1	1	1	2	3	2	1	3	2	3	1	2	34	2.94
51.	47	Multicolor Creek	tc	HB	2	2	2	3	1	1	3	3	2	2	2	1	3	1	2	1	3	34	2.94
69.	65	Dug Creek	tc	HB	2	2	2	3	1	1	3	1	2	3	2	1	3	1	3	1	3	34	2.94
91.	96	Sugar House Creek	tc	MR	2	1	2	2	3	1	1	1	2	2	2	2	3	2	3	2	3	34	2.94

Table 28 continued.

Ranking of the 95 tidal tributaries, 36 SWIM sites, and 7 HDR sites (total 36).

Number	Map Ref	SITE	Type	Bay Segment	Ranking Criteria																	Total	Rank
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
105.		Peanut Lake II	SS	MTB	2	2	1	1	3	1	3	1	3	2	3	2	3	2	3	1	1	34	2.94
114.		Dug Creek	SS	HB	3	2	2	3	1	1	3	1	2	3	2	2	3	1	2	1	2	34	2.94
1.	7	Long Bayou	tc	BCB	3	3	3	3	1	1	1	1	2	2	2	2	3	1	2	1	2	33	3.03
4.	10	S. Joe's Creek	tc	BCB	3	3	3	3	1	1	1	1	2	2	2	2	3	1	3	1	2	33	3.03
7.	13	Double Clam Creek	tc	BCB	2	3	3	3	1	1	1	1	2	2	2	2	3	1	3	1	2	33	3.03
23.	77	Piney Point Creek	tc	MTB	2	3	3	1	1	1	3	1	1	2	2	1	3	2	3	1	2	33	3.03
62.	58	S. Archie Creek	tc	HB	3	2	2	3	3	1	1	1	1	2	1	2	3	2	3	1	3	33	3.03
67.	63	Bullfrog Creek	tc	HB	2	2	2	3	1	1	1	1	1	2	2	2	3	2	3	2	3	33	3.03
86.	91	Branches Hammock Cr.	tc	MR	3	1	2	2	1	1	1	1	2	2	2	2	3	2	3	2	3	33	3.03
113.		Allen's Creek	SS	OTB	2	1	2	3	3	1	3	1	3	3	2	1	2	1	2	1	2	33	3.03
138.		City Incinerator	HDR	HB	3	2	2	3	3	3	1	1	3	3	3	1	1	1	1	1	1	33	3.03
29.	23	Mullet Creek	tc	OTB	3	1	2	3	3	1	1	1	2	3	2	1	3	1	2	1	2	32	3.13
39.	33	Brushy Creek	tc	OTB	2	1	2	3	1	1	1	1	2	3	2	2	3	2	3	1	2	32	3.13
42.	36	Sweetwater Creek	tc	OTB	3	1	2	3	3	3	1	1	2	3	1	1	3	1	3	1	3	32	3.13
55.	51	Palm Creek	tc	HB	3	2	2	3	1	1	1	1	1	2	2	2	1	3	1	3	1	32	3.13
90.	95	Jeffs Cowpen Creek	tc	MR	2	1	2	2	1	1	1	1	2	2	2	2	3	2	3	2	3	32	3.13
103.		Mobby Bay	SS	OTB	2	1	2	3	3	1	1	1	2	2	3	2	3	1	2	1	2	32	3.13
121.		Del Oro Tract	SS		3	1	2	3	3	1	1	1	3	3	1	1	1	1	3	1	3	32	3.13
16.	70	Beaver Creek	tc	MTB	3	3	3	1	1	1	1	1	2	2	2	1	2	2	3	1	2	31	3.23
19.	73	Wildcat Creek	tc	MTB	3	3	3	1	1	1	1	1	1	2	1	2	3	2	3	1	2	31	3.23
20.	74	Muench Creek	tc	MTB	2	3	3	1	1	1	1	1	2	2	1	1	3	2	3	1	3	31	3.23
37.	31	Dick Creek	tc	OTB	2	1	2	3	1	1	1	1	2	3	2	1	3	2	3	1	2	31	3.23
40.	34	Woods Creek	tc	OTB	2	1	2	3	1	1	1	1	2	2	2	2	3	2	3	1	2	31	3.23
41.	35	Peppermound Creek	tc	OTB	3	1	2	3	1	1	1	1	3	2	3	1	2	1	3	1	2	31	3.23
61.	57	N. Archie Creek	tc	HB	3	2	2	3	3	1	1	1	1	2	1	1	2	2	3	1	2	31	3.23
70.	66	Kitchen Branch	tc	HB	2	2	2	3	1	1	1	1	2	2	2	2	3	1	3	1	2	31	3.23
80.	85	Gamble Creek	tc	MR	3	1	2	2	1	1	1	1	2	2	2	3	3	2	2	1	2	31	3.23
88.	93	Williams Creek	tc	MR	3	1	2	2	1	1	1	1	2	2	2	2	3	2	3	1	2	31	3.23
89.	94	Estevez Creek	tc	MR	3	1	2	2	1	1	1	1	2	2	2	2	3	2	3	1	2	31	3.23
125.		U.S. 41 Fish Farm	SS		3	2	2	3	1	1	1	1	2	3	1	3	1	3	1	2	31	3.23	
5.	11	Boca Ciega Creek	tc	BCB	2	3	3	3	1	1	1	1	2	2	2	1	2	1	2	1	2	30	3.33
6.	12	Bear Creek	tc	BCB	2	3	3	3	1	1	1	1	2	2	2	1	2	1	2	1	2	30	3.33
9.	15	Reese Creek	tc	BCB	2	3	3	3	1	1	1	1	2	2	2	1	2	1	2	1	2	30	3.33
18.	72	Curiosity Creek	tc	MTB	3	3	3	1	1	1	1	1	2	2	2	1	2	1	3	1	2	30	3.33
21.	75	Andrews Creek	tc	MTB	3	3	3	1	1	1	1	1	2	2	1	1	3	1	3	1	2	30	3.33
31.	25	Lake Tarpon	tc	OTB	3	1	2	3	1	1	1	1	2	3	3	1	2	1	2	1	2	30	3.33
52.	48	Brandon Creek	tc	HB	3	2	2	3	1	1	1	1	2	2	2	1	3	1	3	1	1	30	3.33

Table 28 continued.

Ranking of the 95 tidal tributaries, 30 swimm sites, and 7 HUR sites (total 59).

Number	Map Ref	SITE	Type	Bay Segment	Ranking Criteria																	Total	Rank	
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
53.	49	Tampa Creek	lc	HB	3	2	2	3	1	1	1	1	1	2	2	2	1	3	1	3	1	1	30	3.33
54.	50	Pine Creek	lc	HB	3	2	2	3	1	1	1	1	1	2	2	2	1	3	1	3	1	1	30	3.33
63.	59	East Tampa Creek	lc	HB	3	2	2	3	1	1	1	1	1	2	2	2	1	2	1	3	1	2	30	3.33
66.	62	Gibson Creek	lc	HB	3	2	2	3	1	1	1	1	1	2	2	2	1	3	1	2	1	2	30	3.33
72.	81	Frog Creek	lc	TCB	3	2	1	1	1	1	1	1	1	2	2	2	2	3	2	3	1	2	30	3.33
81.	86	Mill Creek	lc	MR	3	1	2	2	1	1	1	1	1	2	2	2	2	3	2	2	1	2	30	3.33
82.	87	Gates Creek	lc	MR	3	1	2	2	1	1	1	1	1	2	2	2	2	3	2	2	1	2	30	3.33
96.		Clam Bayou I	SS	BCB	2	3	3	3	3	1	1	1	1	1	2	2	1	2	1	2	1	1	30	3.33
112.		Cooper's Point	SS	OTB	2	1	2	3	1	1	3	1	3	2	2	2	1	3	1	2	1	1	30	3.33
122.		Port Redwing	SS	HB	2	2	2	3	1	1	3	1	3	2	3	1	2	1	1	1	1	1	30	3.33
126.		MacDill AFB III	SS	MTB	2	1	3	1	1	1	3	1	3	2	3	2	3	1	1	1	1	1	30	3.33
129.		Kitchen Tracts	SS	HB	2	2	2	3	1	1	1	1	2	2	3	1	3	1	2	1	2	1	30	3.33
8.	14	Frenchman Creek	lc	BCB	1	3	3	3	1	1	1	1	1	2	3	3	1	2	1	1	1	1	29	3.45
25.	19	Grassy Creek	lc	OTB	3	1	2	3	1	1	1	1	1	2	2	2	2	2	1	2	1	2	29	3.45
33.	27	Mobby Creek	lc	OTB	3	1	2	3	1	1	1	1	1	2	2	3	1	2	1	2	1	2	29	3.45
34.	28	Boat Creek	lc	OTB	2	1	2	3	1	1	1	1	1	2	2	2	1	2	2	3	1	2	29	3.45
64.	60	Otter Creek	lc	HB	3	2	2	3	1	1	1	1	1	2	2	2	1	2	1	2	1	2	29	3.45
74.	83	Terra Ceia River	lc	TCB	2	2	1	1	1	1	1	1	1	2	2	2	2	3	2	3	1	2	29	3.45
83.	88	Manatee Creek	lc	MR	3	1	2	2	1	1	1	1	1	2	2	2	2	2	2	1	2	2	29	3.45
84.	89	Tarpon Creek	lc	MR	3	1	2	2	1	1	1	1	1	2	2	2	2	2	2	1	2	2	29	3.45
85.	90	Cypress Stand	lc	MR	3	1	2	2	1	1	1	1	1	2	2	2	2	2	2	1	2	2	29	3.45
93.	78	Redfish Creek Ditch	lc	LTB	3	2	2	1	1	1	1	1	1	3	2	3	1	2	1	3	1	1	29	3.45
97.		AFB II McDill	SS	MTB	2	2	1	1	3	1	1	1	1	3	2	3	1	3	1	2	1	1	29	3.45
101.		Emerson Point	SS	MR	1	2	2	3	1	1	3	1	2	2	2	1	1	3	1	2	1	2	29	3.45
102.		Braden R. II	SS	MR	3	2	2	3	1	1	1	1	2	2	2	1	1	3	1	2	1	2	29	3.45
127.		Clam Bayou II	SS	BCB	2	3	3	3	1	1	1	1	1	2	2	1	2	3	1	1	1	1	29	3.45
128.		Dick Creek	SS	OTB	3	1	2	3	1	1	1	1	1	2	2	1	2	3	1	2	1	2	29	3.45
10.	16	Salt Creek	lc	MTB	3	3	3	1	1	1	1	1	1	2	2	2	1	2	1	2	1	1	28	3.57
11.	17	Booker Creek	lc	MTB	3	3	3	1	1	1	1	1	1	2	2	2	1	2	1	2	1	1	28	3.57
14.	68	Jackson Branch	lc	MTB	2	3	3	1	1	1	1	1	1	2	2	2	1	2	1	2	1	2	28	3.57
15.	69	Newman Branch	lc	MTB	2	3	3	1	1	1	1	1	1	2	2	2	1	2	1	2	1	2	28	3.57
24.	18	Tinney Creek	lc	OTB	3	1	2	3	1	1	1	1	1	2	2	2	1	2	1	2	1	2	28	3.57
26.	20	Long Branch	lc	OTB	3	1	2	3	1	1	1	1	1	2	2	2	1	2	1	2	1	2	28	3.57
32.	25	Moccasin Creek	lc	OTB	3	1	2	3	1	1	1	1	1	2	2	2	1	2	1	2	1	2	28	3.57
48.	44	Playa Creek	lc	HB	3	2	2	3	1	1	1	1	1	2	2	2	1	2	1	2	1	1	28	3.57
49.	45	Platt Creek	lc	HB	3	2	2	3	1	1	1	1	1	2	2	2	1	2	1	2	1	1	28	3.57
50.	46	Hillsborough Creek	lc	HB	3	2	2	3	1	1	1	1	1	2	2	2	1	2	1	2	1	1	28	3.57

Setting Priorities:

Table 28 concluded.

Ranking of the 95 tidal tributaries, 36 SWIM sites, and 7 HDR sites (total 138).

Number	Map Ref	SITE	Type	Bay Segment	Ranking Criteria -----																	Total	Rank
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
65.	61	Rice Creek	tc	HB	3	2	2	3	1	1	1	1	2	2	2	1	2	1	2	1	1	28	3.57
68.	64	Little Bullfrog Creek	tc	HB	3	2	2	3	1	1	1	1	1	1	2	2	1	2	1	2	1	28	3.57
108		Bartlett Park	SS	OTB	3	1	2	3	1	1	1	1	1	3	2	3	1	2	1	1	1	28	3.57
130		Tarpon Outfall Canal	SS	OTB	3	1	2	3	1	1	1	1	1	3	2	3	1	2	1	1	1	28	3.57
131.		Cargill Property	SS	HB	2	2	2	3	1	1	1	1	1	1	2	3	1	3	1	2	1	28	3.57
30.	24	Bishop Creek	tc	OTB	2	1	2	3	1	1	1	1	1	2	2	2	1	2	1	2	1	27	3.70
46.	40	Picnic Island Creek	tc	OTB	1	1	2	3	1	1	1	1	1	3	2	3	1	2	1	2	1	27	3.70
71.	67	Sims Branch	tc	HB	1	2	2	3	1	1	1	1	1	2	2	2	1	2	1	2	1	27	3.70
106.		South Skyway	SS	LTB	1	2	2	1	1	1	3	1	3	2	3	1	2	1	1	1	1	27	3.70
107.		Little Manatee River	SS	MTB	3	2	1	1	1	1	3	1	2	2	2	1	2	1	2	1	1	27	3.70
109.		Howard W. Frankland	SS	OTB	2	1	2	3	1	1	1	1	1	3	2	3	1	2	1	1	1	27	3.70
117.		Terra Ceia Isles	SS	TCB	1	2	1	1	1	1	3	1	2	2	2	1	1	3	1	3	1	27	3.70
47.	43	Spanish Creek	tc	HB	3	2	2	3	1	1	1	1	1	2	2	2	1	1	1	1	1	26	3.85
73.	82	Cabbage Slough	tc	TCB	3	2	1	1	1	1	1	1	1	2	2	2	1	2	1	2	1	26	3.85
123.		Kracker Road	SS	HB	3	2	2	3	1	1	1	1	1	1	2	1	3	1	1	1	1	26	3.85
79.	101	Peterson Creek	tc	TCB	1	2	1	1	1	1	1	1	1	2	2	2	1	2	1	3	1	25	4.00
92.	97	Wares Creek	tc	MR	1	1	2	2	1	1	1	1	1	2	2	2	1	2	1	3	1	25	4.00
95.	80	Clark Creek	tc	LTB	2	2	2	1	1	1	1	1	1	2	2	2	1	2	1	2	1	25	4.00
100.		TECO Rock Ponds	SS	MTB	3	2	1	1	1	1	3	1	1	1	1	1	2	3	1	1	1	25	4.00
115.		Port Manatee Isle	SS	MTB	1	2	1	1	1	1	1	1	3	1	3	2	2	2	1	1	1	24	4.17
120.		Apollo Beach	SS	MTB	2	1	3	1	1	1	1	1	2	2	2	2	1	2	1	1	1	24	4.17
44.	38	John Creek	tc	OTB	2	1	2	3	1	1	1	1	1	1	2	2	1	1	1	1	1	23	4.35
45.	39	Gun Creek	tc	OTB	2	1	2	3	1	1	1	1	1	1	2	2	1	1	1	1	1	23	4.35
75.	84	McMullen Creek	tc	TCB	1	2	1	1	1	1	1	1	1	2	2	2	1	2	1	2	1	23	4.35
76.	98	Memphis Creek	tc	TCB	1	2	1	1	1	1	1	1	1	2	2	2	1	2	1	2	1	23	4.35
77.	99	King Creek	tc	TCB	1	2	1	1	1	1	1	1	1	2	2	2	1	2	1	2	1	23	4.35
78.	100	Palmetto Creek	tc	TCB	1	2	1	1	1	1	1	1	1	2	2	2	1	2	1	2	1	23	4.35

LEGEND:

BCB Boca Ciega Bay
 MTB Middle Tampa Bay
 OTB Old Tampa Bay
 HB Hillsborough Bay
 TCB Terra Ceia Bay
 MR Manatee River
 LTB Lower Tampa Bay

tc tidal creek
 SS SWIM site
 HDR HDR Engineering, Inc.

NOTE: some sites are listed more than once due to multiple site type classification.

Table 29. Proposed criteria and ranking system for emergent wetland restoration.¹

CRITERION	NUMERICAL VALUE TO BE ASSIGNED		
	1	2	3
1. Existing salinity regime	15–35 ppt	11–19 ppt	2–15 ppt
2. Percent loss of all emergent wetlands by bay segment	OTB, MTB	LTB, MR, TCB, HB	BCB
3. Acreage loss of all emergent wetlands by bay segment	TCB	MR, OTB, LTB, HB	BCB, MTB
4. Presence of dams on tidal streams in bay segment	NO (MTB, LTB, TCB)	N/A	YES (MR, HB, OTB, BCB)
5. Drainage improvements planned?	NO	unknown	YES
6. Drainage improvements funded?	NO	unknown	YES
7. Restoration/protection plan exists?	NO	unknown	YES
8. Restoration/protection plan funded?	NO	unknown	YES
9. Public ownership of shoreline? (percent)	0	1–49% or unknown	50–100%
10. Drainage easements exist?	NO	unknown	YES
11. Contiguous with public lands or public conservation easement	NO	unknown	YES
12. Existing habitat value for the 10 guilds	LOW	MEDIUM	HIGH
13. Habitat value potential for the 10 guilds after restoration	LOW	MEDIUM	HIGH
14. Water quality protection value (existing)	LOW	MEDIUM	HIGH
15. Water quality improvement value after restoration	LOW	MEDIUM	HIGH
16. Existing upstream flood attenuation value	LOW	MEDIUM	HIGH
17. Potential upstream flood attenuation value after restoration	LOW	MEDIUM	HIGH

¹Alternative criteria and ranking schemes have been suggested by reviewers; see Appendixes A and F.

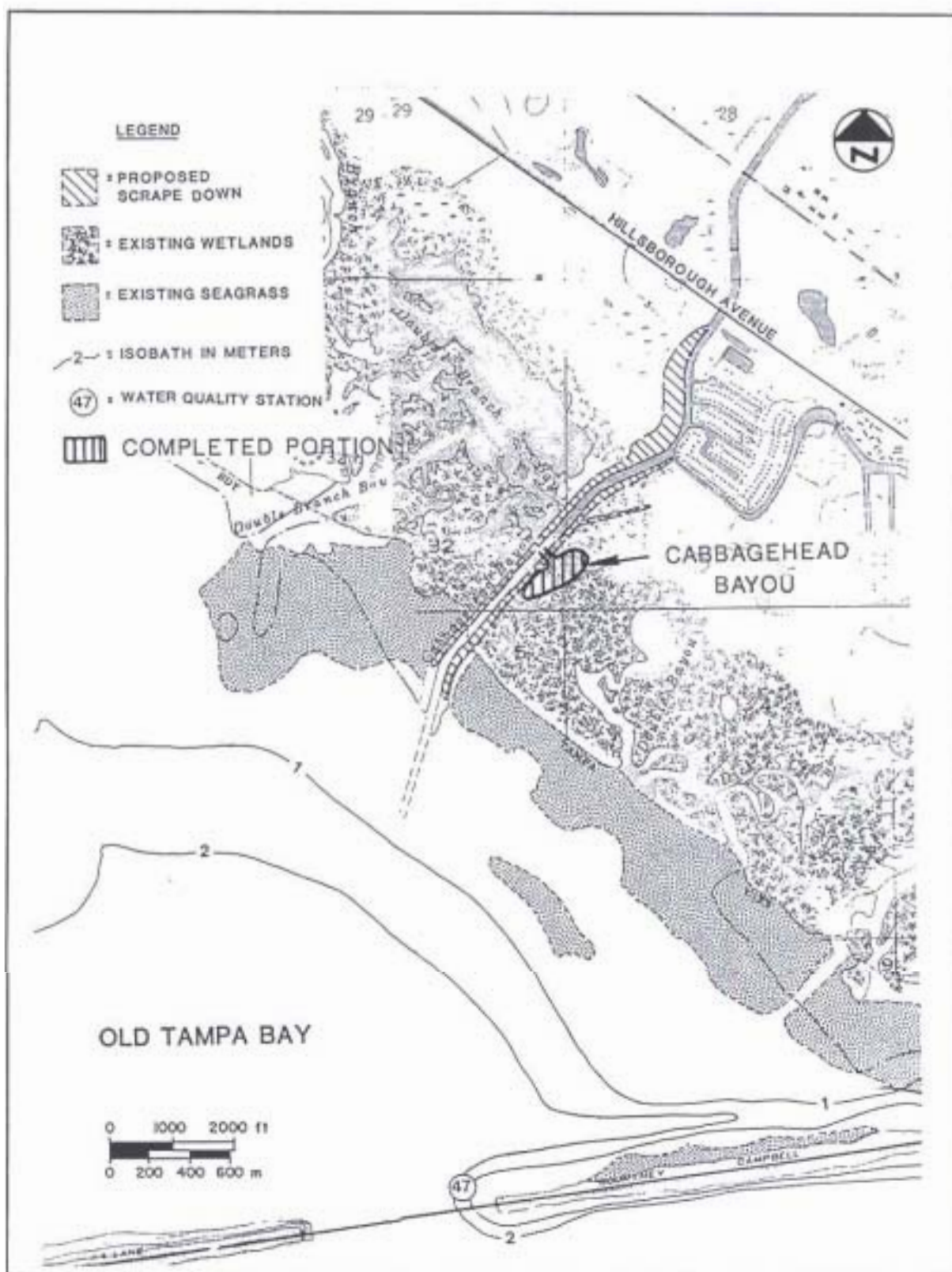


Figure 30. Proposed Channel A mitigation site, showing completed portion (from Dial and Deis 1986).

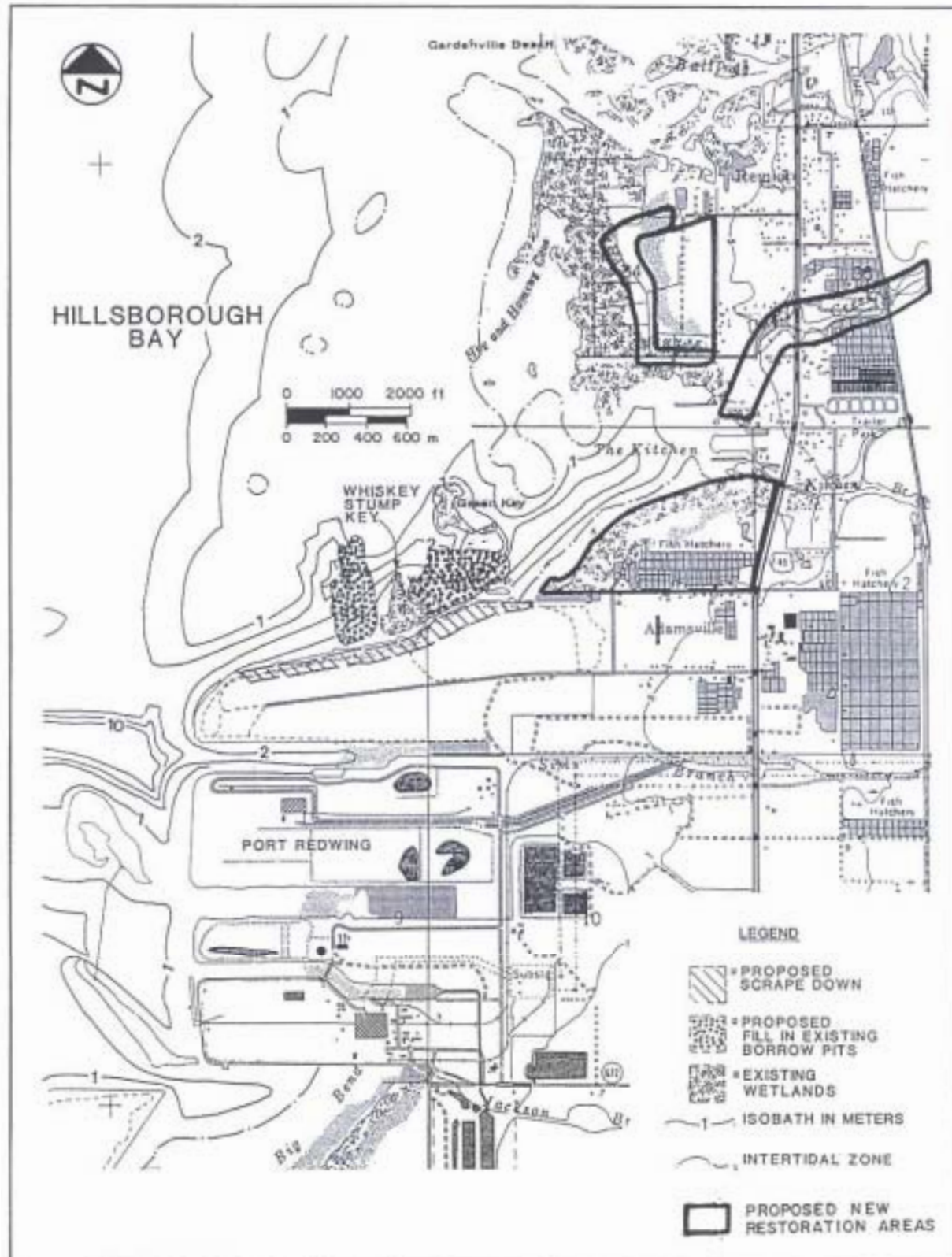


Figure 31. Proposed Port Redwing mitigation sites with proposed additions (from Dial and Deis 1989).

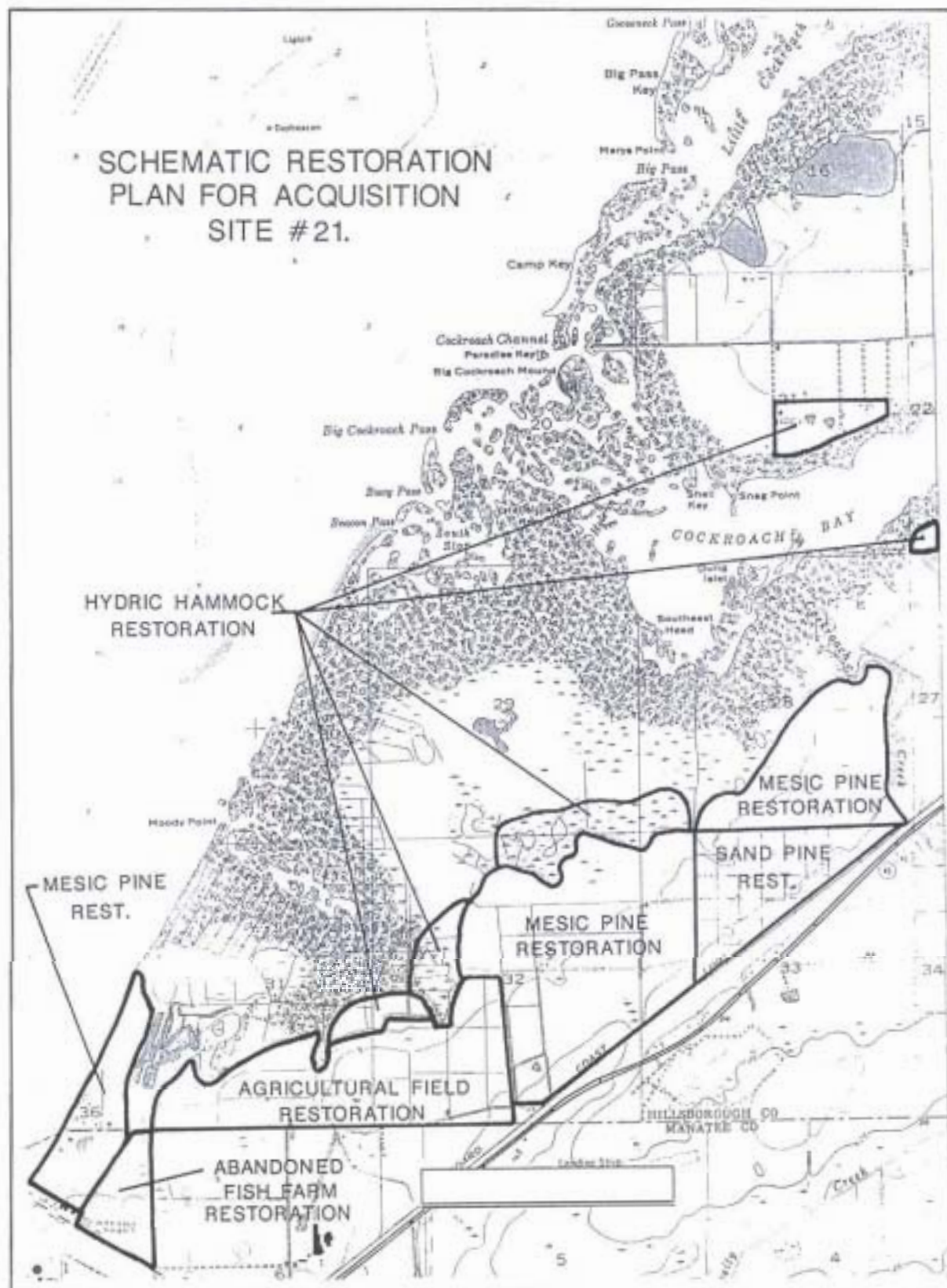


Figure 32. Schematic restoration plan for acquisition site 21.

of feeding ranges represent particularly important priority areas for public umbrella protection and restoration. The TECO Port Manatee property (site 21, Figure 24) and Terra Ceia Isles (site 22, Figure 25) appear to be very high priority areas, based on this criterion. The associated coastal upland strategy will concentrate on hydric hammocks and uplands contiguous with existing coastal wetlands. It will largely follow the recommendations of Beever (1995) and areas targeted in Figure 14.

Potential Cost of the Emergent Marine Wetland Restoration Plan Alternatives

Table 30 lists the four alternative restoration plans with defined acreage targets and the calculated costs of restoration. They range from \$311,594,868 to \$34,987,390 (not including any inflation factors) over a period of 100 years. Given the fact that the combined efforts of SWIM and FDEP have been able to restore 86 acres of wetlands in the last five years (Table 8) at a cost of approximately \$25,000/acre or \$2,150,000, it is felt that the lowest cost option with the lowest target acreage figure (1,786 acres) is the most viable option given the realities of budgets in the '90s and beyond. The target of 100 acres of restoration every five years is equivalent to the current rate of restoration of wetlands. Adding in the planned additional efforts to target more seasonal marsh restoration and assistance with exotic plant control on purchased parcels seems to make the proposed efforts a reasonable *minimum* effort. If additional monies are available, the general plan of targeting tidal stream restoration should be expanded. Appendix G (from Hazen and Sawyer 1995) summarizes estimates of baywide expenditures on habitat protection and restoration programs. These figures indicate that available funds are adequate to support the suggested minimum program.

This redirection to implement the "Restoring the Balance" paradigm recommends that the target acreage be divided into four categories as listed in Table 30, Option E. The target of 150 acres of salt barren restoration is best achieved by blocking man-made mosquito control ditches that enter existing salt barrens and allowing these areas to revert to their previous hypersaline character. This is estimated to cost \$5,000 per acre of salt barren restored. The 1,636 acres of needlerush marsh is divided into three categories. The largest (50%) is allocated for instream tidal marsh restoration, that is restoring existing streams where channelization and exotic plant invasion have modified the biological and water cleansing characteristics of the system. The remaining 50% is allocated to offstream needlerush marsh restoration, that is actual excavation and replanting of areas of previous needlerush marshes associated with tidal streams. This latter effort is estimated to be equally divided between contract restoration at \$50,000 per acre and in-house restoration at \$25,000 per acre.

An example of this type of restoration is shown in Figures 33 and 34. This is the planned restoration of a needlerush and tidal stream in Pinellas County in the oligohaline portions of Allen's Creek. It is a cooperative project with the initial site identified as part of the Allen's Creek Watershed Management Plan (Lewis Environmental Services 1995). The land purchase has been completed by Pinellas County at a cost of \$80,000, and the restoration is being done by the SWIM Program at budgeted cost of \$40,000. The plan includes the removal of Brazilian peppers, excavation of historical fill, and planting.

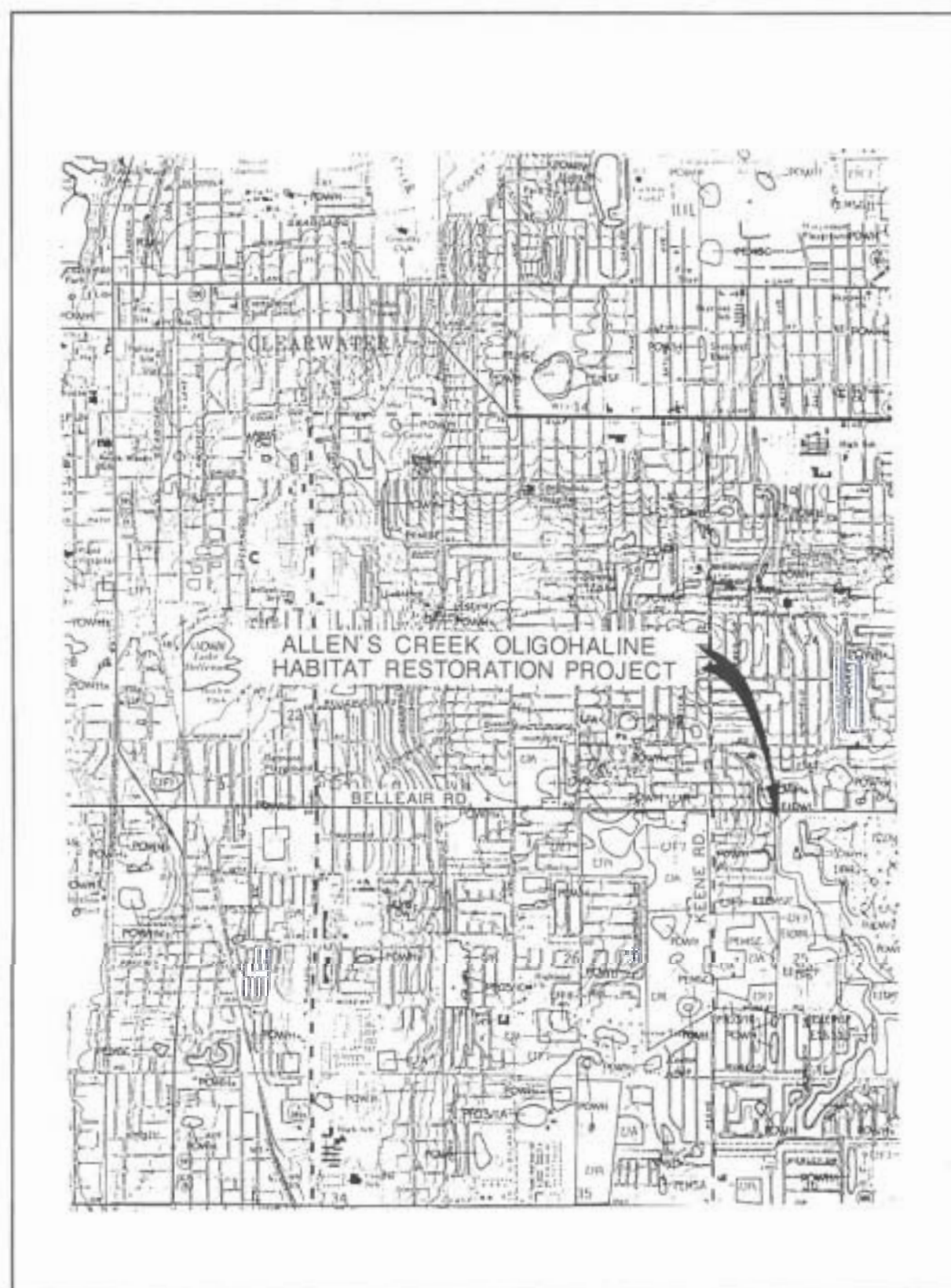


Figure 33. Site location map, Allen's Creek oligohaline restoration project.

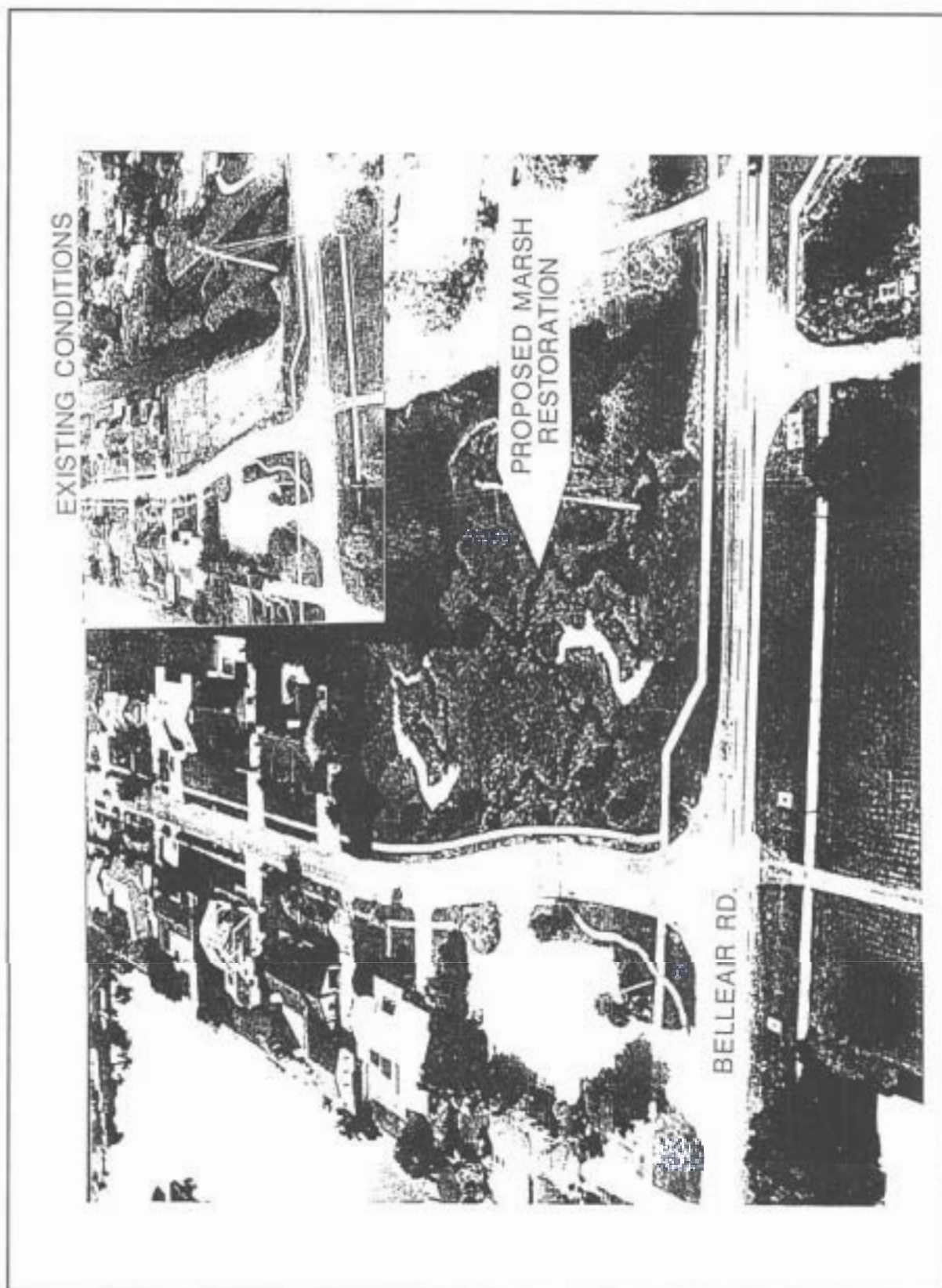


Figure 34. Allen's Creek oligohaline restoration project.

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The concept of instream restoration is designed to restore large linear portions of the smaller tidal streams. TBRPC (1986b) reports that 15 cross-sections of three tidal streams (Frog Creek, Delaney Creek and Allen's Creek) ranged from 33' to 200' with a mean of 96.9'. Using 100' as an average width (top-of-bank to top-of-bank), and assuming 50% of that is open water and 50% is (or was) vegetated with native marsh plants, the target acreage figure of 818 acres would require 35,632,080 square feet of combined open water and marsh. One-half of this (17,816,040 sq. ft.) would be open water, and the other half would be marsh. A 25'-wide strip of marsh on both sides for a distance of 356,320 linear feet would achieve this acreage. Dividing by 5,280 gives 67.5 linear miles of tidal stream restoration. The combined length of the 37 tidal creeks listed on page 68 in TBRPC (1986b) is 168.8 miles. With the addition of 68 additional tidal streams as a result of this study, there appears to be adequate, if not more than adequate, stream-miles to work with.

Table 30. Estimated costs (total and annual over 100 years) for the four emergent marine wetland restoration options A, B, D and E with specific acreage targets.

OPTION		MANGROVE / TIDAL MARSH		TIDAL STREAMS	SALT BARREN	TOTAL	PER YEAR over 100 yrs
		\$50,000/ac	\$25,000/ac	\$4,355/ac	\$5,000/ac		
A	acres	3,714.25	3,714.25	7,428.5	135.0	14,992	
	cost	\$185,712,500	92,856,250	32,351,118	675,000	\$311,594,868	\$3,116,000
B	acres	1,158.5	1,158.5	2,317.0	494.0	5,128	
	cost	\$57,925,000	28,962,500	10,090,535	2,470,000	\$99,448,035	\$995,000
D	acres	2,618.75	2,618.75	5,237.5	0	10,475	
	cost	\$130,937,500	65,468,750	22,809,312	0	\$219,215,562	\$2,192,000
E	acres	409.0*	409.0*	818	150	1,786	
	cost	\$20,450,000	10,225,000	3,562,390	750,000	\$34,987,390	\$349,873

*tidal marsh only, no mangroves

An example of instream restoration is the current volunteer effort to restore Marsh Creek adjacent to the Ruskin Public Library (Figure 35). During preparation of this report, SWIM was asked to participate in this effort by local citizens who have raised \$4,000 toward the effort. The plan is simple: remove the exotic vegetation on public shoreline (and private shorelines where owners are cooperative), and supplement natural revegetation with native plantings both at the water's edge and at top-of-bank to prevent recolonization by exotics.

Permitting for this type of restoration project should require a minimum of time, cost and field review, since Brazilian peppers can be killed in place and only the upper trunk and branches need be removed if aesthetics dictate. Otherwise the trees can be left in place to naturally decay. No disturbance of the shoreline is typically needed. As the letters in Appendix H

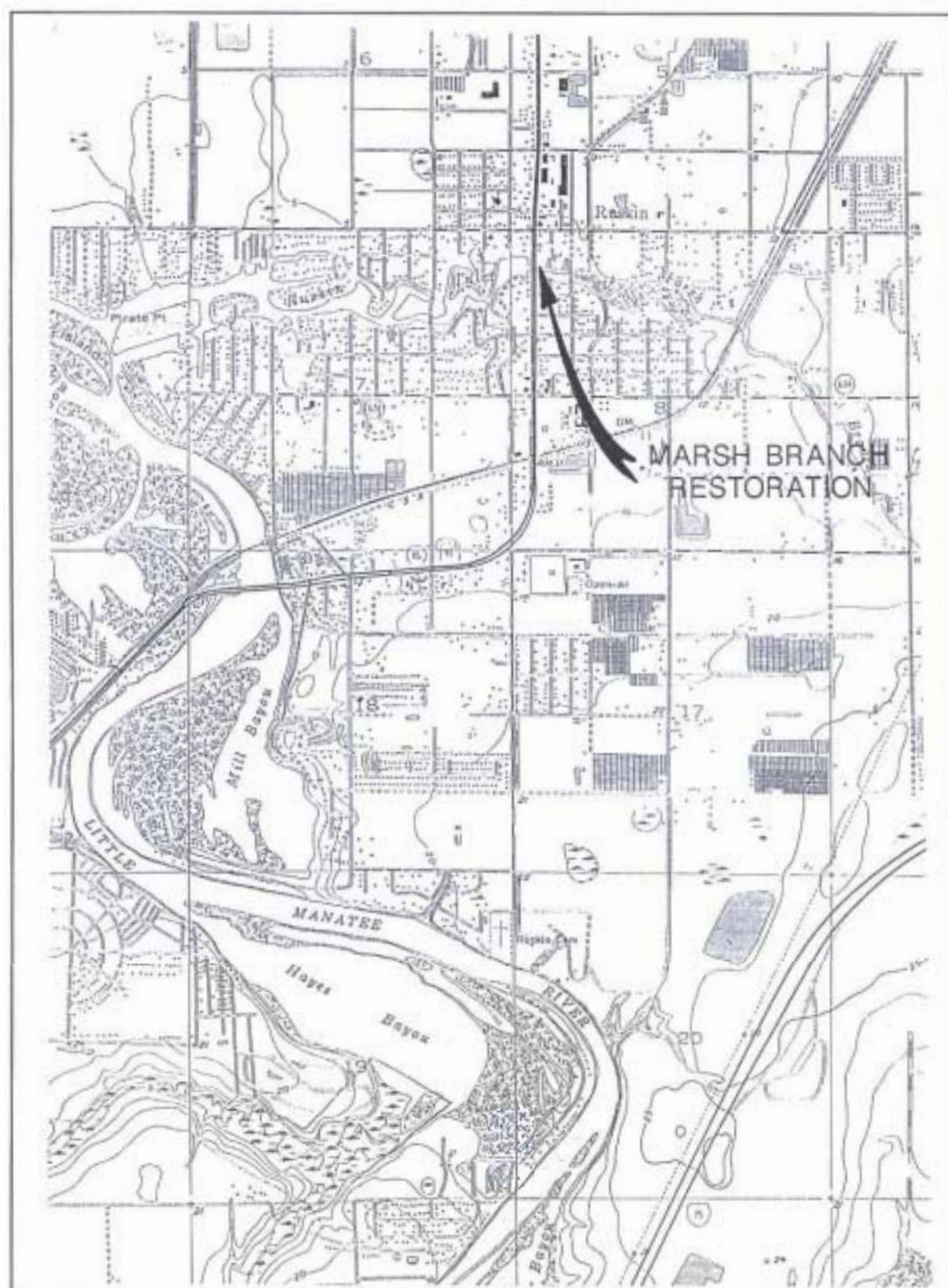


Figure 35. Site location map, Marsh Branch restoration project.

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illustrate, however, it is not that simple, and considerable delay was experienced by the volunteers working at Marsh Creek waiting for someone to bless their project. It is recommended that participants in the proposed Workshop address the coordination and streamlining of permitting for restoration projects as an element of their agenda.

Special Issues

Protection and Restoration of Seasonal Freshwater Wetlands

As a Management Tool for White Ibis and Similar Species

This portion of the plan envisions four management strategies. The first, as recommended by FGFWFC (1994, p. 16), is the identification and protection of all potential white ibis foraging habitat within the 9.3-mile diameter circles shown in Figure 13. The second is the creation of a wetland mitigation bank system in the Tampa Bay area that creates or restores seasonal marshes within the foraging areas prior to the need arising for mitigation of unavoidable impacts to existing marshes. On-site mitigation should not be recommended where development activities and the resulting residential or commercial structures are going to be located adjacent to or near such mitigation marshes. Upland buffers are important to provide the natural environment where feeding birds are not subject to harassment by humans or their cared-for or feral pets. Beever (1995, p. 138) notes that "continued policy of wetland regulatory agencies of establishing small isolated preserve sites within the developing urban landscape contributes to the process of habitat fragmentation. Without a coherent plan and in isolation, these small preserve efforts will not provide the wildlife values and functions sought" (page 138). An ideal place for such a bank would be the combined TECO and Reeder Farms property south of Cockroach Bay where three of the white ibis foraging zones overlap (Figure 13).

The third strategy is the creation or restoration of marshes within current publicly owned land parcels. Approximately 65 acres of seasonal marshes and shallow lacustrine marshes are planned for restoration at the Cockroach Bay ELAPP site by SWIM (see Appendix D). Additional acreage can be restored adjacent to the borrow pits on the Sun City Scrub property. Beever (pers. comm.) recommends every habitat restoration project include a minimum percentage of freshwater marsh restoration.

Finally, specific targeted acquisition of new parcels of privately owned land for the purpose of habitat protection and restoration in general and seasonal marsh restoration in particular are recommended. Several of these are shown on the maps in Appendix D. These parcels include two abandoned fish farms where restoration to seasonal marshes would be fairly easy after removal of the dominant cover of Brazilian pepper.

Coastal Upland Protection and Restoration Plan

With the limited time and funding for this project we were unable to identify all the critical uplands associated with wetlands on Tampa Bay. We believe this effort is now best handled as an effort within the NOAA Coastal Change Analysis Program (C-CAP) described in the following section on monitoring. The implementation of the program of land acquisition and restoration recommended by Beever (1994) and included here (Figures 15–16) will preserve the majority of the larger areas until more detailed mapping is available.

Potential Role of Mitigation Banking

On November 28, 1995, the U. S. Army Corps of Engineers (in conjunction with the U.S. Environmental Protection Agency, Natural Resources Conservation Service, Fish and Wildlife Service and National Marine Fisheries Service) published in the Federal Register (Vol. 60, No. 228, pages 58605-58614) (Appendix I), final policy guidance regarding the establishment, use and operation of mitigation banks for the purposes of providing wetland mitigation under the permit requirements of the Clean Water Act Section 404. The effective date of this guidance, which had previously been circulated as a draft document for national comment on March 6, 1995, was December 28, 1995. For purposes of this document, a mitigation bank was defined as "a site where wetlands and/or other aquatic resources are restored, created, enhanced, or in exceptional circumstances, preserved expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources" (page 58614).

Previously, the State of Florida had adopted a mitigation banking rule in 1993 as section 17-342 of the Florida Administrative Code (FAC) (Appendix I). In 1995, the final efforts to reorganize the environmental agencies resulted in the adoption of the Environmental Resource Permit process whereby the Florida Department of Environmental Protection and the five water management districts combine their permitting processes to process and issue a single combined permit. The water management districts have adopted mitigation banking rules essentially the same as those previously adopted by the FDEP. Mitigation banks are defined by the State of Florida as "a project undertaken to provide for the withdrawal of mitigation credits to offset adverse impacts" (17-342.200 (8) FAC).

As of January 1, 1996, there were no permitted and operational public mitigation banks in the Tampa Bay area, although several informal combined offsite mitigation projects had either been designed or attempted by several governmental agencies. These are typically "single user" sites that do not satisfy needs of permit applicants other than the individual applicant managing a combined offsite mitigation project.

The implementation of large mitigation banks in the Tampa Bay watershed has the potential to satisfy much of the need for "restoring the balance" of lost habitat types, as long as the completed mitigation more than offsets the permitted losses that typically are mitigated for in a bank. Thus the philosophy becomes "more than no net loss" instead of just "no net loss." Several major landowners are conducting feasibility studies at the current time, and it is recommended that the TBNEP support their applications for permits to the extent that the permit applications reflect an effort to preserve critical habitats or to create or restore critical habitats described here and achieve a net gain in all habitat types in the Tampa Bay ecosystem.

Recommended Implementation Program

This specific plan as it addresses the needs of the ten guilds listed in Table 1 is but one component of a larger plan needed for those species that are acknowledged to be in need of protection but which do not fit into one of the ten guilds (i.e. land mammals, passerine birds). It is therefore recommended that the Tampa Bay National Estuary Program convene a one-

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day workshop to assist local governments with the preparation of a baywide "Fish and Wildlife Habitat Protection and Restoration Plan". The intent of the workshop should be the identification of any gaps in existing plans and the establishment of a single committee representing the fish and wildlife management agencies and the habitat acquisition and restoration agencies to implement coordination of individual efforts and available funds directed towards priority land management, land acquisition and habitat restoration programs.

The workshop should be held as early as possible in 1996 with the committee beginning its work no later than May 1. The first task of the committee should be to ensure that a common GIS-based map base at a scale no less resolute than 1:24,000 (1" = 2,000 ft) be established for the entry of various layers of information regarding fish and wildlife resources, and that hard copy and computer data be available to local governments and citizens alike at minimal cost.

During the course of this project it has become obvious that such a database is essential for rational management. Such data has not been available in a timely and cost-effective manner to the principal researchers and has compromised some portions of this study as a result. In particular, the inability to retrieve polygons showing existing public ownership and overlay them on such layers as existing wetlands to define areas in need of acquisition and protection has proved frustrating. It has required a six-month effort to locate, retrieve and enter the information on a common usable database. This is obviously much too long a timeframe to produce what should be only a matter of a few keystrokes away. Other examples of essential information are completed restoration projects and their associated documentation and priority acquisition projects of each local government. The establishment of this essential database should not delay the coordination of manpower and money to embark upon an agreed-upon agenda of habitat acquisition, restoration and management.

Recommended Monitoring Program

The monitoring of progress toward the goals defined in this document is an essential part of all the documents being prepared for eventual inclusion in the CCMP. For this *Habitat Protection and Restoration Masterplan*, three components of a monitoring program are essential.

The first is the establishment of a c. 1995 map base that provides the level of detail necessary to support change analysis at a future date. We would recommend that TBNEP initiate a program to ensure that all of its data becomes part of the national C-CAP program as outlined in Dobson et al (1995 p. 5) with the following modifications:

1. The C-CAP Coastal Land Use Cover Classification System (pages 8-9 in Dobson et al (1995) be modified to accurately reflect the diversity of wetland and upland habitats of interest to Tampa Bay researchers and managers. In particular, the division of emergent estuarine wetlands into haline (salt marsh, salinities greater than 30 ppt) and mixohaline (brackish marsh, salinities between 0.5 and 30 ppt) would need to be modified.
2. Because many of the more important wetland systems identified in this TBNEP study are small (diameters of 30-200 feet) the scale at which some of the mapping is done will need to reflect a detection limit to encompass these areas.

Despite all the mapping efforts to date there does not exist a map series at an appropriate scale that depicts the important, smaller wetlands. Without such maps, change analysis cannot be done. Equally important, while high resolution color and black-and-white vertical aerial photography going back to the mid-1930s is available, it has never been used to provide the necessary information to accurately describe the conditions of the wetlands and uplands that existed then and do not exist now. As described in some detail in the introductory parts of this document, effective long-term fish and wildlife management requires both a look to the future as well as a look to the past in order to understand how we got to where we are today.

The second component is the biological monitoring of the guilds to determine if the recommended efforts are achieving the desired goals of protecting and allowing increases in their populations. As previously mentioned, Weller (1995) has recommended the use of guilds of wading birds to evaluate the effectiveness of the attempts to restore the Kissimmee River. He notes (p. 220), relative to wading birds, that "... Numerical analysis of before-and-after data on all species will provide estimates of total populations, distributions of colonies and species richness. Variations in wader populations have been great ... , however, and cause-and-effect relationships may be obscured by population shifts as well as numbers." We would add that weather in general and rainfall in particular have to be factored into any measurement of "success" in restoring foraging habitat for the wading bird guild. Similar cautions must be stated for other measures of wildlife abundance

Because fish and marine invertebrates are a major part of the target guilds, the Fisheries-Independent Monitoring Program of the Florida Department of Environmental Regulation's Marine Research Institute, and the input by the associated fisheries professionals (see Appendix C) are the third essential part of the monitoring program. Their input should be solicited to determine what kind of monitoring they would recommend to determine the success of this proposed program. At a minimum, monitoring of modified tidal streams before and after restoration to determine if restoration "works" for specific target species is needed. It is equally important for those supporting the NEP program to ensure that adequate funding is in place to allow an expansion of their sampling program if this is deemed an important monitoring tool. It is too easy to ask for "more sampling" without making sure the staff, boats, and equipment are available to allow the work to be done.

All three of these monitoring tools will require additional funding. We do not at this time have figures on what those amounts are. The TBNEP program should request cost estimates from the Marine Research Institute through its representative on the management committee, and through a direct request to the National Audubon Society's Tampa Bay Sanctuary Program and the Florida Game and Fresh Water Fish Commission.



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APPENDIX A
SWIM Comments



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July 14, 1995

Mr. Robin Lewis
Lewis Environmental Services
P.O. Box 20005
Tampa, Florida 33622-0005

Subject: SWIM Restorators' Review of Draft Habitat
Restoration and Land Acquisition Priorities
Process Document

Dear Robin:

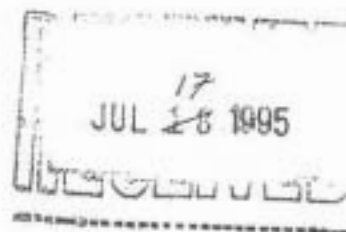
The SWIM Department wishes to thank you for the opportunity to review your draft Habitat Restoration and Land Acquisition Priorities Process Document. Pursuant to our TBNEP committee meeting of June 22, the SWIM restorators were unable to meet as a group until July 5. Enclosed please find the collective comments from our group. SWIM restorators include: B. Henningsen, Tom Ries, Carl Giovenco, Ray Kurz, Rob Fenwick, and Judy Fouts. The restorators took their reviews seriously, and comments among reviewers were remarkably similar.

Although I was prepared to deliver my personal critique on June 22, you indicated that you thought it would be more productive for a single, comprehensive review from SWIM staff. I apologize for this delay, but the holiday, travel out of town, and conflicting responsibilities have prevented me from forwarding this review until now; I hope this delay has or will not present a problem.

Enclosed please find our annotated review of your draft. Comments are written throughout the draft (if you have problems deciphering my handwriting, please call). All comments are intended to help you craft the best document and plan possible.

In general, we fully support the concept of identifying target percentages per habitat type for establishment and maintenance for the estuary and portions of the watershed. As noted in comment #13 on page 19, the

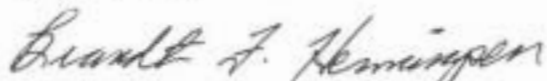
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group feels strongly that this document needs a clearly defined focus for the reader, providing a succinct listing(s) of goals of this document and its implementation. As a planning document based on historical acreages of habitats, our habitat percentage goals should be based on the best available data; these data and/or their derivations should be clearly identified/explained. As this is the introductory section, we encourage you to keep the narrative as brief as possible, clearly setting the stage for the most important sections of the plan which follow. Aside from all the other comments written on your draft, we encourage you to include in the narrative the idea that this 100 year plan must be a living, dynamic document, subject to reasonable adjustment to meet future needs and opportunities (and, heaven forbid, setbacks).

I (and, as appropriate, other SWIM staff) look forward to continue working with you and your staff on this important plan. I caution us not to rush this plan just to meet the September (?) deadline; I would hope NEP would bless additional time as warranted to insure a quality plan that we can all embrace and implement. If you have any comments or questions, please call me at (813) 985-7481 extension 2202.

Sincerely,



Brandt F. Henningsen, Ph.D.
Sr. Environmental Scientist
Surface Water Improvement and
Management (SWIM) Department

cc: Michael J. Perry, Director, SWIM Dept., SWFWMD
Tom Ries, Envir. Scientist, SWIM Dept., SWFWMD
C. Giovenco, Envir. Scientist, SWIM Dept., SWFWMD
Ray Kurz, Envir. Scientist, SWIM Dept., SWFWMD
Rob Fenwick, Eco. Intern, SWIM Dept., SWFWMD
J. Fouts, Envir. Scien. Intern, SWIM Dept., SWFWMD
Holly Greening, TBNEP Scientist

Filing Code: TBNEP Habitat Rest. Subcommittee



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August 22, 1995

Mr. Robin Lewis
Lewis Environmental Services
P.O. Box 20005
Tampa, Florida 33622-0005

Subject: SWIM Restorators' Recommendations for
Prioritizing Habitat Restoration and Land
Acquisition Properties

Dear Robin:

The SWIM restorators met yesterday in response to your request for recommendations on criteria to be used to prioritize sites for habitat restoration and land acquisition. SWIM restorators include: B. Henningsen, Tom Ries, Carl Giovenco, Ray Kurz, and Rob Fenwick. This topic is one that we have wrestled with since the first days of SWIM. We have attempted to develop criteria that can be evaluated in both qualitative and quantitative ways (e.g., scoring criteria on a weighted scale). We have never developed a weighted (quantitative) evaluation that we were satisfied did justice for ranking sites; hence, our selections have relied heavily on qualitative evaluations of our criteria, tempered by economic realities of each site and annual fiscal constraints (i.e., annual budgets appropriated by the State and the District).

Further discussion of our criteria yesterday did not yield any new simple solutions to the ranking dilemma. Any ranking system would/will be subject to intense debate, with no clear absolutes as to the "correct" way to rank sites. Accordingly, we have chosen to group our criteria as "most important" (highlighted by asterisks), followed by "less important" yet nonetheless significant criteria that should be considered when ranking sites. We hope the following recommendations for criteria will be useful for site prioritization:

*1. Habitat diversity/complexity: This is applicable for acquisition tracts as stand-alone habitats and in

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the evaluation of the potential of the acquisition tract if it is to be restored. For tracts only under consideration for restoration, one should consider the habitat diversity/complexity issue for the restored tract (i.e., habitat potential). More weight/points should be given in correlation to the better the condition of existing and/or potential habitats. Using the assumption that the more diverse the habitats, the greater the potential productivity for many different populations, higher rankings should be given to sites with better developed habitat mosaics or possess the potential for establishment of complex, diverse mosaics. In addition, more weight/points should be given to sites that complement adjacent viable habitats. Freshwater sources on site also should raise the weight/point values, but lower weight/points should be given to sites where one might have to "push" habitat restoration, enhancement, and/or creation (e.g., expensive cleanup of contaminants prior to restoration, cutting down 10' to an intertidal elevation, etc.)

*2. Cost/benefit ratios: Relatively self explanatory. Important to weigh the pros/cons of purchasing the tract and/or restoring it within an economic reality. Does the end justify the means? In the short term? In the long term? This criteria, unfortunately, is a very important one. One must include all costs here to weight the benefits: land acquisition, design, permitting, construction, management, etc.

*3. Size of parcel: In general, we feel bigger is better, yet we recognize the importance and cumulative benefits to be realized from small sites. Cost/benefit ratios become increasingly important here as related to design, permitting, and construction costs (lower per acre cost with increasing size). For restoration purposes, we have defined "small" sites as ≤ 1 acre, "medium" sites ranging from 1-15 acres, and "large" sites as ≥ 15 acres.

*4. Freshwater source: The opportunity to establish salinity gradients ranging from freshwater/oligohaline to meso/polyhaline should be an important consideration. The gradient can be vital to establish a variety of habitats (mosaics). Is the freshwater influenced and/or contaminated by stormwater runoff? Can stormwater attributes (i.e., polishing vs full treatment) be included in a habitat restoration project (i.e., two functions, one project)?

*5. Management issues: Who will assume management of site after purchase and/or restoration? What are the costs? Management difficulties? Short-term vs long-term?

6. Ownership of parcel: For restoration, public parcels have taken priority over private parcels for various reasons. Reasons include (also applicable when considering land acquisition): public access, perception of public, conservation easement overlays or donation/sale of property to public sector. Specifically related to restoration of private lands (and co-related to public perception) is the actual increase in property values of the

private landowner (both the subject parcel as well as adjacent lands not specifically restored but still benefiting from the restoration, e.g., vistas, wildlife values, fishing, etc.).

7. Cooperative involvement: Level of cooperation from partners in the land acquisition, restoration, and post sale/project management. For restoration projects, the greater the level of cooperation, the higher our review score, but one should not exclude a site just because a cooperator has few to no resources to bring to the deal.

8. Access: Public and construction access. Depending on the site, easy access by the public can provide mixed blessings. We recognize and appreciate that these projects are being paid for with public dollars, and that the public should reap the benefits of the project. Nonetheless, typically, the more human traffic on a site, the lower the viability of the system. This also has to be balanced with the idea of "public visibility", so that the public can see how their tax dollars are being spent and perhaps reap some direct benefits (e.g., catch a fish, etc.). The aspect of public access as an educational opportunity cannot be overlooked. Public education is critically important to the long term success of these programs and our environment (see #11 below). Lastly, construction access for restoration projects is not a minor issue; inaccessibility can significantly raise construction problems and costs, bringing us back to the issue of cost/benefit ratios.

9. Permittability: This issue really deals only with restoration projects, but must be kept in mind when buying tracts with the intent of doing restoration. The ease vs complexity of securing permits for the project must be considered and obviously will be tied to the project design. In addition, design costs generally are positively correlated with design complexity and project size, again bringing one back to the issue of cost/benefit ratios.

10. Location within the Tampa Bay ecosystem: What bay segment is the tract located and how does the acquisition/restoration fit into the segment's needs? Have our acquisitions and restorations addressed all bay segments, and are they being distributed fairly throughout our estuarine system? Reality has and will probably dictate that it will be infeasible to have equal acquisition and restoration of habitats throughout bay segments in direct correlation to habitats lost within that segment. Accordingly, we will probably have to distribute land acquisitions and restorations within the framework of what is available and what we can afford (i.e., in part, sites of opportunity scenario). Lastly, what are the lands surrounding the acquisition/restoration site? Will the target site complement existing quality habitats or are adjacent lands severely degraded, built-out, etc.?

11. Public visibility: See #8 above. This is an important criteria, with many pros and cons. The aspect of environmental education is critical to the long term success of all these

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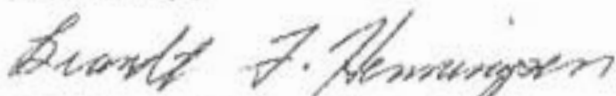
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programs.

This letter was written very quickly in an attempt to summarize discussions by SWIM restorators. We hope we have covered the main points adequately and provided the feedback that you requested August 17. We will be meeting Monday, August 28 to discuss and provide feedback on your revised Priorities Processing Document. If you have any comments or questions, please call me at (813) 985-7481 extension 2202.

Sincerely,



Brandt F. Henningsen, Ph.D.
Sr. Environmental Scientist
Surface Water Improvement and
Management (SWIM) Department

cc: Michael J. Perry, Director, SWIM Dept., SWFWMD
Tom Ries, Envir. Scientist, SWIM Dept., SWFWMD
C. Giovenco, Envir. Scientist, SWIM Dept., SWFWMD
Ray Kurz, Envir. Scientist, SWIM Dept., SWFWMD
Rob Fenwick, Eco. Intern, SWIM Dept., SWFWMD
Holly Greening, TBNEP Scientist

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Lewis Environmental Services, Inc.

24 AUG 95

Brandt H. Henningsen
Senior Environmental Scientist
SWIM Department
Southwest Florida Water Management District
7601 Highway 301 North
Tampa, FL 33637-6759

Re: Your Letter of 22 AUG 95, TBNEP Habitat Protection and Restoration Plan

Dear Brandt:

Thank you for your letter on ranking criteria. I had one question and one request.

The question is whether the listed criteria are in order of importance (1= most important, 11= least important)?

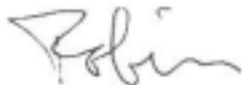
The request is to ask your group whether the specific concept of removing Brazilian peppers from the sides of channelized tidal streams such as Sweetwater Creek and Lower Delaney Creek, and restoring the channel edges to upland, transitional and marsh habitats, and ensuring peppers don't return, would represent a "high priority" restoration goal based upon the discussion in the "Priorities" document? The assumption is that Hillsborough County (or any county where such a project might be proposed) has a drainage easement which would allow access to the sides of the channel. Such projects, and the acquisition of such areas for restoration, may be a major recommendation in the final report. Such projects may have limited diversity in terms of habitat, but the idea is that they have been differentially lost, and therefore need to be preferentially restored.

The sites would generally be small in size since a narrow linear band of vegetation on either side of a tidal stream would be restored. Cost would be in the range of \$10 per linear foot, or \$20 per foot for the length of the stream (both sides including planting). Earthmoving would probably be limited to bank reshaping, and coordination with the county drainage departments to avoid future drainage problems would be essential.

Let me know what your group thinks.

Page 2 - Brandt Henningsen

Sincerely yours,

A handwritten signature in black ink, appearing to read "Robin", with a stylized, flowing script.

Roy R. "Robin" Lewis, III
President

cc: Holly Greening
Doug Robison
File 293



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November 16, 1995

Mr. Robin Lewis
Lewis Environmental Services
P.O. Box 20005
Tampa, Florida 33622-0005

Holly Greening
TBNEP
111 7th Ave. So.
St. Petersburg, Fla 33701

Subject: SWIM Review of First Complete Draft of "Setting
Priorities for Habitat Protection and Restoration:
Restoring the Balance"

Dear Robin and Holly:

SWIM staff dedicated to habitat restoration for Tampa Bay have reviewed the initial complete draft of "Setting Priorities for Habitat Protection and Restoration: Restoring the Balance" and we have the following comments:

1. In general, we again fully support the concept of identifying target percentages per habitat type for establishment and maintenance for the estuary and portions of the watershed. We agree with Dick Eckenrod's proposal that, upon plan consensus and adoption, governmental agencies (that ultimately will probably perform most of the work meeting the plan's goals) will attempt to implement at least a portion of this plan each year until completion. Cooperation and coordination among agencies will be imperative.

2. We again urge you (and your committee) to revisit our three previous review letters/annotated drafts and incorporate our suggested changes to this document. Accordingly, this review will not reiterate previous comments; please refer to our responses to you of July 14, August 22, and September 5, 1995. We feel that incorporation of these suggestions will result in a better, more complete, and more accurate document. In addition, we encourage you to include this and our September 5, 1995 letter in Appendix B.

3. Concerning Tables 19 and 24 (ranking criteria for land acquisition and restoration), please see our suggested revisions for site evaluations. In general, you will see that we have deleted criteria that we felt were inappropriate, unnecessary or otherwise addressed by other criteria, and we have suggested additional criteria for consideration. We also strongly urge the ranking system to be weighted according to the importance of the particular

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criterion. We also have indicated criteria that we rank as the most important and their weighted point values correspond to their relative significance. Enclosed please find our suggested changes and weighted scoring for Tables 19 and 24. Accordingly, we recommend that rankings per site be recalculated, perhaps by use of more in-depth collective knowledge of sites offered by a (sub)committee. As a start, enclosed please find reviews of 40 proposed SWIM sites (see #4 below for more explanation). Perhaps a one or two day workshop of a committee could re-score proposed acquisition and restoration sites.

4. We have enclosed a (essentially) final copy of our SWIM five year plan for habitat restoration projects that is about to be submitted to FDEP. Please note that our plan has changed from the draft site plan forwarded you during early summer 1995. The enclosed document include site reviews and projected restoration opportunities, cooperators, potential problems, etc. Please note that the plan now contains 40 sites, not 38 as noted on page 6 of "Priorities". In addition, please revise Table 9 to accurately reflect these 40 sites.

5. Please note corrections to SWIM entries for Table 8 (enclosed). In addition, please check your calculation of total wetland acreage restored for Tampa Bay (page 87), as your number appears to be low. Obviously, acreages have increased since Bob Whitman and I summarized total restored acreages (see BASIS II), and further documentation should be available from Holly and NEP's contract with King Engineering to summarize existing restoration sites and total acreages. Nonetheless, the SWIM restoration total alone is 90.6 acres, with approximately 82 acres being wetland (remainder upland/island hammock; note: 10 acres of that total includes the joint SWIM-FDEP-Port Manatee project at Peanut Lake). Coupled with FDEP's projects, private projects, etc., the total should be greater than your quoted 86 acres of wetland restoration. In addition, your calculation of 18 acres of wetland restoration per year may be reasonably accurate, but it probably would be worth mentioning that acreage per year has been steadily increasing since 1989, and, with the completion of numerous large scale projects (e.g., Cockroach Bay, Wolf Branch Creek, Emerson Point, Howard Frankland West, Little Manatee River, etc.), the cumulative yearly average value will increase significantly.

6. Also concerning Table 8 and land holdings already in public ownership, there does not appear to be any citations for lands owned by local governments (e.g., City of Tampa, St. Petersburg, etc.), the District, Hillsborough County (outside of ELAPP), or Pinellas County.

7. The proposed list of parcels suggested for acquisition could probably be expanded (perhaps significantly) from the 28 listed in Table 18. Hopefully, other committee members have contacted you with suggestions, and we assume that you contacted all the local land acquisition programs for their input and master acquisition plans. Perhaps your or a new (sub)committee could meet and review/revise this list. As examples of sites presently not on the list for consideration, five quickly jump to mind: the "Madison Avenue" or Delaney Pop-off Canal fish farm site (south side), Mobbly Bay area, McKay Bay tracts, Dug Creek fish farm site, Reeder Farms/borrow pits (Port Manatee area). Also, we feel the plan should better stress options that might be employed if acquisition is impossible (e.g., will not sell) or impractical (e.g., too costly); these options could include less-than-acquisition (mentioned on page 48), conservation easements, land donations, and revisions to tax codes that would promote these

options.

8. As discussed at our NEP committee meeting of October 31, estimated acquisition costs per proposed land parcel (or, at a minimum, an overall total for the whole proposed list) would be useful for planning purposes.

9. The issue of land management for both acquisition and restoration is very important for the long term attainment/maintenance of our goals. A separate section on management may be in order.

10. Concerning restoration sites, it would be worthwhile to explore the topic of promoting/allowing mitigation banking to pay for some restoration projects and/or even land acquisition.

11. While recognizing the social and political delicacies of this suggestion (as well as logistical problems), we recommend the listing of Lake Maggiore, Lake Seminole, and Lake Tarpon as potential marine restoration sites. These sites hold tremendous potential as intertidal systems.

12. Figures 32 and 33 and Tables 25, 26, and 27 list acreage scenarios for marine wetland communities. During several NEP committee meetings, we all discussed the importance of not neglecting coastal upland communities; could a section be included, at least briefly, discussing this topic and need? In addition, while we support setting target acreage goals for each bay segment, we feel that the plan should also stress the importance of attaining bay-wide acreages as feasible. If one segment falls short on a habitat type, hopefully the difference can be made up in another bay segment. Stress that we are searching to establish/maintain a balance of habitats giving many species opportunities.

13. Table 23 (listing of tidal tributaries and potential restoration sites) appears to have some sites duplicated (e.g., Wolf Branch Creek); a double check or better site delineation could address this.

14. On page 91, the discussion of the Marsh Creek-Ruskin Public Library site states that SWIM has been asked to participate in the restoration project. To the best of our knowledge, SWIM has not been formally asked to participate although it is a possibility if we were to be approached. We have supplied Barbara Waddell information on exotic plant removal and control, but this was related to her subdivision and not the library project.

15. We encourage you also to use SWIM and FDEP restoration cost estimates per acre for local examples (Appendix D); although I cannot speak for FDEP, SWIM has provided this information to you via Sally Treat.

16. Please note the timeframe for Figure 8. Table 10, item 10 should read "within".

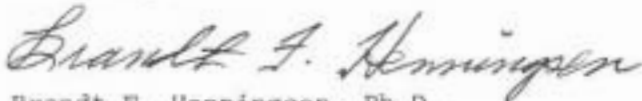
17. As SWIM and the remainder of the NEP committee were asked to comment on this draft over a relatively short time period, we feel that additional review and discussion is warranted for such an important plan. At a minimum, at least one more collective meeting should be held for the next generation of this document. Holly has informed me of an upcoming meeting to revisit the ranking criteria, etc. I am unsure if that is after "final" publication of this plan or if it

represents input/review prior to this plan's final edition.

18. With #17 in mind, this brings us to our final point (previously stated in other reviews and meetings) that this document needs to be a living, dynamic document. We feel that it must be stressed that this is a planning document (i.e., "normative forecasting"), establishing goals that we all can strive for, but that we recognize that reality will dictate what actually gets done, with reality being dominated by political, regulatory, economic, and opportunistic variables. To meet our goals, an entity needs to assume responsibility for coordinating this 100 year plan, orchestrating regular (every five years?) updates, and evaluating the effectiveness of plan implementation. While no single entity may wish to commit themselves for 100 years, this topic needs to be discussed and at least some preliminary decisions made as to who this overseer might be.

I (and, as appropriate, other SWIM staff) look forward to continue working with you, your staff, and TBNEP on this important plan. If you have any comments or questions, please call me at (813) 985-7481 extension 2202.

Sincerely,



Brandt F. Henningsen, Ph.D.
Sr. Environmental Scientist
Surface Water Improvement and
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enclosures

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TBNEP Habitat Protection and Restoration Subcommittee

Filing Code: TBNEP Habitat Rest. Subcommittee

- 1) * Indicates particularly important
2) See recommended weighted point values per criterion

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Table 19. Criteria for acquisition matrix and ranking.

CRITERION	NUMERICAL VALUE TO BE ASSIGNED			
	NO	N/A	YES	
ACQUISITION, PROTECTION, MANAGEMENT AND RESTORATION (IF NEEDED) WILL:	<i>For all categories {</i> -1 0 1 ↓ ↓ ↓			<i>unless otherwise noted</i>
* 1. Lead to improved water quality	1	2	~~3~~	
2. Improve groundwater recharge in a water resource caution area	1	2	3	
* 3. Improve quality, quantity, and timing of freshwater input into a marine estuarine or freshwater system	1	2	~~3~~	
4. Help achieve the minimum flows and levels of an aquatic system	1	2	3	
5. Restore or improve tidal circulation	1	2	3	
6. Re-establish natural hydroperiod	1	2	3	
* 7. Contribute to recovery of a natural community or population	1	2	~~3~~	
* 8. Enhance and protect natural community populations which have been identified by state or federal agencies as severely limited, endangered or threatened in Florida	1	2	~~3~~	~~4~~
* 9. Contribute to native species diversity in the region	1	2	~~3~~	
10. Eliminate or significantly reduce a source of exotic plant species infestation and seed source	1	2	3	
11. Enhance a unique, regionally scarce or imperiled community	1	2	3	
* 12. Prevent continued habitat loss or damage due to pollution or environmental degradation	1	2	~~3~~	
13. Improve a wildlife corridor fragmented by alteration	1	2	3	
SITE WILL PROVIDE ECOLOGICAL LINK TO, CREATE BUFFER FOR, OR RECONNECT FRAGMENTED SYSTEMS ASSOCIATED WITH:				
14. State identified ecosystems	1	2	3	
15. SWIM designated water bodies with approved plans	1	2	3	
16. National Estuary Program designated areas	1	2	3	
17. Public lands	1	2	3	
18. Aquatic Preserves	1	2	3	
19. Outstanding Florida Waters	1	2	3	
20. Shellfish harvesting areas	1	2	3	
21. Areas of Critical State Concern	1	2	3	
SITE IS LOCATED WITHIN:				
22. Nine miles (15 km) of existing white ibis nesting site	0	—	3	
23. Overlap of feeding range zones of existing white ibis nesting sites	two zones 2		three zones 3	
* 24. Cost/benefit ratio	-2 hi/low	0 mod/mod	5 low/reasonable/hi	
* 25. (Funding for) Proper mgmt of site	-2	0	4	
* 26. Bay segment	1 OTB, MTB	2 LTB, MR TCB, HB	3 BCB	
* 27. Possibility of less than fee acquisition or conservation easement if purchase impossible	-1 none	0 mod	3 hi	

very similar
redundant?

- 1) ~~*~~ Indicates of particularly important
- 2) See recommended weighted point values per criterion

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Table 24. Proposed criteria and ranking system for emergent wetland restoration.

CRITERION	NUMERICAL VALUE TO BE ASSIGNED		
	~~1~~	~~3~~	~~5~~
~~*~~ 1. Existing salinity regime	15-35 ppt	6-14 ppt	0.5-5 ppt
~~*~~ 2. Percent loss of all emergent wetlands by bay segment	OTB, MTB	LTB, MR, TCB, HB	BCB
3. Acreage loss of all emergent wetlands by bay segment	TCB	MR, OTB, LTB, HB	BCB, MTB
4. Presence of dams on tidal streams in bay segment	NO (MTB, LTB, TC)	N/A	YES (MR, HB, OTB, BCB)
5. Drainage improvements planned?	NO	unknown	YES
6. Drainage improvements funded?	NO	unknown	YES
7. Restoration/protection plan exists?	NO	unknown	YES
8. Restoration/protection plan funded? (Cooperators available)	NO	unknown	YES
9. Public ownership of shoreline? (percent)	0	1-49% or unknown	50-100%
10. Drainage easements exist?	NO	unknown	YES
11. Contiguous with public lands or public conservation easement	NO	unknown	YES
~~*~~ 12. Existing habitat value for the 10 guilds	LOW	MEDIUM	HIGH
~~*~~ 13. Habitat value potential for the 10 guilds after restoration	LOW	MEDIUM	HIGH
14. Water quality protection value (existing)	LOW	MEDIUM	HIGH
~~*~~ 15. Water quality improvement value after restoration	LOW	MEDIUM	HIGH
16. Existing upstream flood attenuation value	LOW	MEDIUM	HIGH
17. Potential upstream flood attenuation value after restoration	LOW	MEDIUM	HIGH
~~*~~ Cost/benefit ratio	hi/low	med/med	low/reasonable/hi
~~*~~ Post project management	0 none low	2 med	3 hi
~~*~~ Historical hydrology restored	0 no min.	2 mod.	3 restored

Table 8. Restoration projects, completed and in progress, by SWIM and FDEP, protected land acquisitions, Hillsborough and Manatee Counties.
EVC - exotic vegetation control; C - completed; IP - in progress; UD - under design & permitting; NCA - no current activity.

LEAD AGENCY	SITE NAME	STATUS	BAY SEGMENT	SIZE (ac)	HABITAT	COOP. AGENCIES	MANAGEMENT RESPONSIBILITY	MANAGEMENT PLAN EXISTS	IS FUNDED
FDEP	Osgood Point	C	BCB	9.0	salt marsh, mangroves, dunes	SWIM, City of Gulfport	City of Gulfport	N	N
	South Parcel	C	HB	25.0 wetland, 300 total	wetland	SWIM, Cargill Fertilizer, Inc.	Cargill Fertilizer, Inc.	N	N
	Foch Lake	C	Pinellas Co.	4.0	tidal pond	City of St. Petersburg	City of St. Petersburg	N	N
	Gandy North	C	OTB	1.0	wetland	Marine Corps	not specified	N	N
	Gandy South	C	OTB	2.0	wetland	FDOT, SWIM, TBNEP, BAEAT	not specified	N	N
	Peanut Lake / Hendry site	C	LTB	10.0	tidal lagoons, creeks	SWIM, Port Manatee	potentially FDEP Bureau of Coastal & Aquatic Managed Areas	N	N
	Cockroach Bay EVC	C	MTB	80.0	ditch banks, abandoned farm fields, disturbed saltmarsh, hammock	EPC, HOC	Hillsborough County Parks & Recreation	Y	N
	Joe's Creek	C	BCB	60.0 reconnect, 10.0 created	tidal creeks, wetlands	Pinellas County	not specified	N	N
SWIM	Hendry Delta	C	LTB	3.0	saltmarsh	DNR	not specified	N	N
	South Bayshore	C	HB	1.5	marsh & upland plantings	City of Tampa	none specified	N	N
	E.G. Simmons Park I	C	MTB	14.0	13.0 ac wetlands, 1.0 ac hammock	Hillsborough County	Hillsborough County Parks Dept.	N	N
	Polaris Park I	C	OTB	10.0 ^{1 by State standards}	tidal ponds, wetlands, upland	13 others, public and private	Tampa Parks Dept.	N	N
	NE McKay Bay	C	HB	4.0	tidal stream, marsh	not specified	City of Tampa	N	N
	Mangrove Bay	C	OTB	13.5	intertidal creeks, 0.5 ac salt marsh	City of St. Petersburg	City of St. Petersburg	N	N
	Boca Circa I	C	BCB	3.5 ^{1.5 ac to be removed}	fresh & oligohaline wetlands	Pinellas County	Pinellas County	N	N
	Little Bayou	C	MTB	3.0 of 13.4 total	oligohaline tidal creek	City of St. Petersburg	City of St. Petersburg (TBAEP maintain)	N	N

(continued)

Table 8 continued.

LEAD AGENCY	SITE NAME	STATUS	BAY SEGMENT	SIZE (ac)	HABITAT	COOP. AGENCIES	MANAGEMENT RESPONSIBILITY	MANAGEMENT PLAN EXISTS	IS FUNDED
(SWIM)	Tarpon Outfall Canal I	?	OTB	1.0	no further information provided			N	N
	Boca Ciega II	UD	BCB	1.0	as Phase I 7			N	N
	Picnic Island	C	OTB	8.0	tidal channels, marsh platform	City of Tampa	City of Tampa	N	N
	E.G. Simmons Park II	UD	MTB	1.0	hammock, improve tidal flow	Hillsborough County Parks & Recreation	Hillsborough County	N	N
	Gandy Park (Phase II - info on Ph II)	C	OTB	2.0 of ~~2.0~~	tidal marsh	City of Tampa	not specified	N	N
	Terra Ceia Causeway	C	TCB	2.2	EVR, marsh planting	FDOT	not specified	N	N
	Jungle Prada Park	C	BCB	1.0 of ~~1.0~~	intertidal wetland, riprap (hard bottom)	City of St. Petersburg	City of St. Petersburg	N	N
	Harbor Palms	C	OTB	4.4 of ~~4.4~~	intertidal marsh, salterns, island hammocks	City of Oldsmar	not specified	N	N
	Howard Frankland east	C	OTB	3.0	not specified	FDOT	not specified (maintenance by FDOT & District)	N	N
	Joe's Creek IA	C	BCB	0.5	not specified	Pinellas County	not specified	N	N
	Tarpon Outfall Canal II	UD	OTB	1.0	no further information provided			N	N
	Long / Cross Bayou	UD	BCB	2.0	not specified	Pinellas County	not specified	N	N
ELAPP	Alafia River South Prong	UD	HB	800	—	—	Hillsborough County Parks Dept.	N	N
	Alderman's Ford Addition	UD	—	1,000	—	—	Hillsborough County Parks Dept.	N	N
	Balm-Boyette Scrub	IP	—	4,916	—	—	Hillsborough County Parks Dept.	N	N
	Bolding Tract	NCA	—	65	—	—	Hillsborough County Parks Dept.	N	N
	Boy Scout	NCA	—	400	—	—	Hillsborough County Parks Dept.	N	N

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(continued)

Table 8 continued.

SWIM Restoration Sites Under Development

Note: You may have covered most/all of these by listing our 5yr plan - but a cross check is recommended.

APPENDIX B
Preliminary Cost Analysis

**PRELIMINARY COST ANALYSIS:
HABITAT RESTORATION & CREATION MASTER PLAN
FOR TAMPA BAY**

Introduction

For the purposes of habitat restoration and creation planning in the Tampa Bay area, a preliminary review of actual and hypothetical coastal wetland habitat restoration¹ costs has been conducted. Throughout this study, it has remained obvious that 1) there is substantial variability in costs, even among projects of similar types and size, and 2) costs are directly affected by the quality of the restoration effort in question. Although effective and desirable results can be obtained through relatively simple design and implementation approaches, such is rarely the case. In this discussion of wetland restoration costs, we will provide reminders of the multiple factors that can and will affect overall costs in individual circumstances.

Despite the increasingly large number of restoration projects that have been conducted in Tampa Bay and the rest of the state, few generalizations are possible. However, there are some trends and relationships that appear to be applicable to the majority of wetland restoration projects and which are useful in interpreting the results of this cost analysis.

Previous Studies

Analysis of wetland habitat restoration costs (excluding land acquisition costs) has been undertaken on a national level by King and Bohlen (1994). These authors presented point estimates and typical ranges of per-acre costs associated with nine different categories of wetland restoration projects. The categories used were developed on the basis of wetland characteristics that affect the tasks required to achieve restoration success, not on the basis of wetland functions and values. In this sense they are categories of project types, not categories of wetlands *per se*.

Two general sources of data were used by King and Bohlen (1994) in determining the values presented. Reports (published and unpublished), general trade literature, and various levels of government databases were used to provide what is referred to as secondary data. Primary data was obtained from engineering and cost-accounting details provided by leading wetland experts in the United States. Lewis Environmental Services, Inc. provided a substantial amount of the information on wetland restoration projects in Florida.

For various reasons, the authors disregarded the majority of the secondary data and based their estimates principally on the primary data obtained. Most of the projects from which the secondary data was obtained were federal programs focusing on restoration of agricultural land back to wetlands. These projects typically involved restoring altered hydrology. While inexpensive and usually successful, this approach is not representative of restoration of structurally and biologically more complex wetlands, and does not take into account the problems associated with habitat restoration within an urban or suburban context.

The primary data was drawn almost entirely from wetland restoration projects conducted as mitigation for wetland impacts regulated under Section 404 of the Clean Water Act.

¹the term "restoration" as used here also includes habitat creation; see Lewis 1990 for definitions of terms.

The available data from these projects revealed a "persistent pattern of low cost and poor success rates" (p. 3). The authors note that this trend results from market conditions that provide rewards for low cost, not high quality restoration. Consequently, cost data drawn from past mitigation projects have a significant downward bias (are unrealistically low) and are not indicative of the costs of completing medium or high quality restoration projects.

In the course of obtaining data, King and Bohlen (1994) recognized several assumptions and limitations that are important to note in any discussion of wetland restoration costs. Many projects reviewed involved volunteer efforts, which often exclude the opportunity cost of contributed labor and other "in kind" contributions, leading to underestimates of cost. The costs of government-subsidized projects may also be similarly underestimated because the cost of the restoration project is simply included in the cost of running the government. Other factors affecting the cost estimates include the costs of permitting prior to any actual project implementation, project size (extremely small project sizes can produce extremely high project costs), and the types of projects themselves.

Preliminary analysis of the data revealed that 1) an inverse relationship does seem to exist between cost per acre and project size for wetland mitigation projects (in both the primary and secondary databases) and 2) for each 10% increase in project size, costs per acre declined by 3.5% (primary database, non-agricultural projects).

The following table summarizes the results obtained by King and Bohlen (1994) for the three types of wetland habitats of concern here. Land acquisition costs are not included.

Table 1. Cost estimates and allocations by task and input category for saltmarsh, mangrove and aquatic bed (=seagrass) habitat restoration projects (from King and Bohlen 1994).

		SALTMARSH		MANGROVE		SEAGRASS	
Project Costs (thousands)	Average	\$18.1		\$18.0		\$19.5	
	Minimum	1.0		2.1		18.3	
	Maximum	43.6		42.8		21.7	
	Median	10.2		13.6		18.6	
	Sample size	9		4		3	
By Tasks*	Preconstruction	\$2.9	16%	\$2.3	13%	\$3.3	17%
	Construction	13.2	73	11.9	66	12.3	63
	Postconstruction	2.0	11	3.8	21	3.9	20
By Input Category*	Labor	\$9.4	52%	\$9.2	51%	\$11.3	58%
	Materials	4.9	27	3.8	21	1.6	8
	Equipment	3.6	20	5.0	28	6.6	34
	Other	0.4	2	0	0	0	0

*costs are percent of average

At this point, it is probably worthwhile to note that the different tasks as listed above can each contain some activities which are highly variable in terms of cost. Preconstruction includes planning, permitting and design phases. These are somewhat dependent on

project size, but can be drastically affected by project complexity. The costs of permitting a project which is in any way innovative, untested, or experimental can be very high. (However, these costs may be outweighed by significant savings during the construction phase if the project has been designed by an experienced wetlands scientist and a professional engineer.)

The construction phase includes both site preparation and actual installation of plant material. Site preparation can range from none at all (e.g., seagrass planting) to extensive earthwork involving both wet and dry dredging of large volumes of material, incurring disposal costs as well. Earthwork can be the single most expensive task within a wetland restoration budget, and is difficult to avoid as unaltered land appropriate for wetland restoration is increasingly unavailable. The costs of plant installation are relatively constant on a per-acre basis, and depend more on the type of material being installed (seeds, seedlings, grasses, trees, etc.) than on any other factors.

Post-construction costs are likely to include some kind of monitoring program, and perhaps a regular or periodic schedule of maintenance. Monitoring is minimally dependent on project size and associated costs can be projected at the time of permit issuance, since the monitoring regime is typically specified as a permit condition. If conducted early and frequently, maintenance costs can be kept at a minimum. Post-construction costs may be the most predictable expenses associated with wetland restoration.

Actual Projects Conducted in the Tampa Bay and Florida West Coast Area

Saltmarshes

Although some projects conducted in the Tampa Bay area were included in King and Bohlen's (1994) primary data, data for the saltmarsh projects listed in the following table was not. The per-acre costs of the three projects are considerably higher than the average calculated by King and Bohlen (1994). Two hypothetical saltmarsh projects for which costs were estimated by Lewis Environmental Services and data provided to King and Bohlen averaged from \$442/acre (for restoration via re-establishment of tidal connection) to \$25,700/acre (saltmarsh creation, of which \$10,000/acre is for earthwork).

Table 2. Actual saltmarsh habitat restoration projects, Tampa Bay area.

SALTMARSH PROJECTS		South Parcel	Delaney Creek	One-Acre
Project Costs, per acre (thousands)		\$98.0	\$32.5	\$82.5
By Tasks	Preconstruction	18%	—	—
	Construction	82%	—	—
	Postconstruction	not incl. above	—	—

Detailed information regarding costs of the South Parcel project is available for the construction phase. However, the costs shown for the other two projects are educated estimates at best. A substantial portion of the Delaney Creek project was conducted by

state government agencies, and records of consultant costs are not public information or otherwise available to us. The relatively high cost of the One-Acre Marsh project is attributable to the large volume of earthwork required.

Mangroves

Information on the mangrove projects listed below was provided for King and Bohlen's (1994) study, but it is not known if any or all of it is included in their calculations.

Table 3. Actual mangrove habitat restoration projects, Tampa Bay area.

MANGROVE PROJECTS		Windstar	Thunderbay
Project Costs, per acre (thousands)		\$20.4	\$31.3
By Tasks (percent)	Preconstruction	6	47
	Construction	93	26
	Postconstruction	1	27
By Input Category (percent)	Labor	20	85
	Expenses	80	15

Summarizing this information in the manner shown can be somewhat misleading, as suggested by the percentages for labor and expenses shown for these two mangrove projects. In one case, expenses account for 80% of the total cost, but they account for only 15% in the other case. This kind of variability is not unusual, and is readily explained by the particular conditions of each project. The Windstar project entailed 15 acres of planting of red mangrove propagules on one-meter centers, in an area that had to be graded to appropriate elevations prior to planting. Thunderbay, on the other hand, was an area of mixed restoration activities, including re-establishment of tidal connections, transplanting of desirable vegetation, and allowing natural recolonization by white mangroves. The nature of the project and its associated restoration effort (conducted as mitigation) necessitated an unusually lengthy permitting process, accounting for relatively high preconstruction costs.

To illustrate what might be considered as a typical distribution of costs associated with mangrove or saltmarsh restoration, we developed the following detailed budget for a hypothetical 3-acre (*Spartina alterniflora*) or mangrove (*Rhizophora mangle*) habitat creation project in the Tampa Bay area. We are assuming 1) the project is local; 2) no boat travel is required; 3) similar natural habitat occurs nearby; and 4) the cost of vegetation is the same for cordgrass planting units and mangrove seeds or propagules.

Preconstruction —

Plans & Specifications — research; site assessment (soils & topo); field habitat mapping; concept plan; client meetings; construction plans, bid docs:

Hours			
23	Principal Ecologist @ \$150	\$3,450	
12	P.E. @ 150	1,800	
30	Ecologist @ 100	3,000	
16	CAD tech. @ 60	960	
10	Tech. Editor @ 60	600	
20	Draftsman @ 35	700	
8	Clerical @ 35	280	\$10,790

Jurisdictional & Permitting:

10	Principal Ecologist @ \$150	\$1,500	
3	P.E. @ 150	450	
52	Ecologist @ 100	5,200	
8	Reg. Land Surveyor @ 100	800	
26	CAD technician @ 60	1,560	
8	Eng. Intern @ 60	480	
11	Tech. Editor @ 60	660	
8	Draftsman @ 35	280	
10	Clerical @ 35	350	
8	3-man survey crew @ 125	1,000	\$12,280

Construction:

Earthwork (includes install cut stakes and as-built survey):

22	Ecologist @ \$100	\$2,200	
12	3-man survey crew @ 125	1,500	
16	Constr. Superv. @ 100	1,600	
4	Reg. Land Surveyor @ 100	400	
	Excavation — 2,420 cy/ac* @ \$4.15/cy	30,129	\$35,829
	*this would lower the elevation by 1.5'		

Planting:

	4,900 plants/acre @ 45¢/plant, less 10% for quantity, delivered to site	\$5,954	
40	Ecologist @ 100	4,000	
40	5-man planting crew @ 100	4,000	\$13,954

Postconstruction:

	Seven monitoring episodes @ \$1,500 ea. (time zero, 3, 6, 9, 12, 18 & 24 months) includes simultaneous maintenance	\$10,500
--	--	----------

Summary:	Plans & Specs	\$10,790
	Jurisdictional & Permitting	12,280
	Earthwork	35,829
	Planting	13,954
	Monitoring & Maintenance	10,500
	 Total	 \$83,353
	3% expense allowance for a local project	2,500
 Total, 3-acre created saltmarsh/mangrove habitat or \$28,618/acre		 \$85,853

These figures yield the following percentages by phase:

Preconstruction	27%
Construction	58%
Post-construction	12%



If no earthwork is necessary (**highly unlikely**),

reduce preconstruction by 25%, to	\$17,303
reduce site preparation by 95%, to	1,791
Planting remains the same	13,954
Mon. & Mtc. remains the same	10,500
 Subtotal, with no earthwork	 \$43,548
3% expense allowance	1,306
 Total, with no earthwork (highly unlikely)	 \$44,854

A one-acre project would probably cost 58% to 74% of the totals shown, because pre- and post-construction costs would be the same or nearly so. With excavation to reduce elevations by 1.5', a one-acre project would cost about \$50,164 (58% of 3-acre with excavation total). With no excavation (again, highly unlikely) and reduction in preconstruction costs as shown above for a 3-acre project without excavation, a one-acre project would cost about \$33,054 (74% of 3-acre without excavation total).

Cost Estimates Based on Actual Projects

Averaging the three saltmarsh projects (Table 2) with the two mangrove projects gives a mean cost per acre, excluding land costs, of \$52,940. This is nearly twice the per-acre cost estimated for the hypothetical 3-acre project, but in our experience the higher figure is more realistic. The only difference between tidal marsh and mangrove restoration projects

in terms of cost is the difference in planting unit cost, which is negligible. We would therefore recommend the use of a \$50,000/acre estimate.

Applying this figure to the requested project sizes yields the following:

- a) saltmarsh, 1-3 acres @ \$50,000/acre = \$50,000-150,000
- b) mangrove, 5-13 acres @ \$50,000/acre = \$250,000-650,000

Percentage of costs for specific work tasks are estimated at:

- 15% Preconstruction
- 65% Construction
- 20% Postconstruction

Applying these to the per-acre costs yields:

Saltmarsh/Mangrove	
Preconstruction	\$7,500
Construction	32,500
Postconstruction	10,000
Total, per acre	\$50,000

Land Acquisition Costs

The following is a compilation of actual land acquisition costs for habitat restoration projects conducted in Pinellas County. (Costs are in thousands.)

Table 4.

SITE	YEAR PURCHASED	TOTAL COST	ACREAGE	COST PER ACRE
Travatine Island	1989	\$2,025	38.6	\$52.4
Gandy Gateway	1984	3,000	699.0	4.3
Cooper's Point	1988	1,950	136.0	14.3
Largo Narrows	1985	1,800	33.1	54.3
Joe's Creek	1987-88	4,785	182.4	26.2
Panama Key	1988	164	5.0	32.9
Mobley Bay 1	1990	390	21.5	18.1
Mobley Bay 2	1992-94	382	68.6	5.6
Boca Ciega 1	1987	8,465	170.0	49.8
Boca Ciega 2	1990	490	13.5	36.4
Ozona	1989	100	5.3	18.9

The actual cost per acre of the above 11 projects is slightly over \$17,000, but the average is \$28,500 per acre.

To provide a more realistic projection of what land acquisition costs might be for smaller scale habitat restoration projects, the actual and average costs per acre have been recalculated. The three sites within the size range of 5 to 15 acres (total 23.8 acres) cost a total of \$754,000, or an actual cost of about \$32,000/acre. The average cost per acre of these projects is \$29,400. The three sites in the size range of 20 to 40 acres (93.2 acres total) cost \$4,215,000, or \$45,000/acre. They averaged \$41,600 per acre. Eliminating the largest project sites from consideration results in what we feel are more realistic land acquisition cost estimates, which we would recommend using.

On the basis of this data, larger areas do not necessarily result in lower per-acre costs. Factors which may affect land acquisition costs include market conditions, potential developability of site, motivation of seller, and neighborhood.

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APPENDIX C
FMRI Comments No. 1



#293

Lewis Environmental Services, Inc.

Kevin Peters
Florida Marine Research Institute
100 8th Ave. SE
St. Petersburg, FL 33701-5095

June 13, 1995

Re: Recent Discussions of Restoring Fisheries Habitats

Dear Kevin:

I would appreciate your critical review of the enclosed document which is being circulated by TBNEP (and myself) for review. In particular, I would request your comments on the concept of targeting critical fish nursery habitats for emphasis as preservation and restoration sites instead of the "random restoration" we currently have. Also, how small is "too small to be concerned about", with reference to potential nursery habitats?

You mentioned you might have prepared some updated graphics to better illustrate the true range of fish nursery habitats (particularly for snook) in Tampa Bay, and I would certainly include or substitute them for the existing Figures 2 and 3 with due credit to their origin if you can supply them. Alternatively, if you want to simply mark up the existing figures and return them with your other comments, I will have them redrafted, again with due credit to their source.

Please feel free to call with any questions.

Sincerely,

Roy R. Lewis III, CEP
President/Principal Ecologist

cc w/enc: D. Crewz

cc w/o enc: H. Greening, D. Robison, D. Savercool, file 293

RRL/sft



Department of Environmental Protection

JUN 21 1995

Lawton Chiles
Governor

Florida Marine Research Institute
100 Eighth Avenue S.E.
St. Petersburg, Florida 33701-5095

Virginia B. Wetherell
Secretary

Robin Lewis
Lewis Environmental Services, Inc.
P.O. Box 20005
Tampa, FL 33622-0005
(813) 889-9684

19 June 1995

Dear Robin;

I would like to respond to your request in great detail. However, time limits a full discussion here, so I will touch on a few important topics I think deserve consideration and you may contact me if you require additional information on these topics.

The first issue was questions regarding "targeting critical fish nursery habitats for emphasis as preservation and restoration sites" and "how small is too small" for potential fish nursery habitats. My general answer regarding size is that no area is too small. We are talking here about fish that spawn inshore and whose larvae move from the pelagic water to shallow nursery areas at 6-8 mm SL. Hundreds can fit along a few hundred yards of proper shoreline. Estimates of water surface area for some of our snook and red drum study sites ranges from a low of 0.5 acres up to about 15 or 20 acres. Remember that while some species can withstand and even require the high energy environment of the surf zone (gulf kingfish, pompano, and permit), many species depend on the area being relatively small and having quiet waters (snook, tarpon, black drum, striped mullet). Of course, the smaller areas are critically tied and change rapidly according to habitat and conditions both upland and in nearby waterways.

I think the discussion about targeting critical nursery habitats was derived from this same concept. People have begun to recognize broad categories of habitat types such as "seagrass" and the ones you list in your text--mangroves, tidal marsh, oligohaline wetlands, and salt barrens. However, the more we learn about individual species of fishes, the more we learn that many are much more particular than accepting just seagrass or just mangroves. These systems are subdivided within the ecosystem into many smaller habitat types. Seagrasses can be any of several species, each with it's own requirements of nutrients, light, sediment, depth, salinity, and wave and current energy. Mangroves are the same way. Many small fishes and the early stages of larger fishes have specialized to individual types of seagrass, mangroves, marsh grass, or whatever. These individual habitat types are much

smaller in area than even the remaining seagrasses and mangroves plotted on wetlands maps. Some include the types of emergent habitats you are writing about and as we both know, these areas are often the most impacted.

A second issue was updating the graphic of snook nursery habitats. I don't have a specific graphic for Tampa Bay (Ron Taylor had one made for the east coast), but I think I can describe to you my concern such that you can modify the existing graphic. The current graphic indicates that all young snook move far up river systems. This is not true. Probably as many use nursery sites at the edge of the bay, while others move shorter distances up the rivers. For example, we find early juvenile stages of snook in lagoons of Terra Ceia Bay and Critical Bayou, in canals of Cockroach Bay and Bishop Harbor, and in lagoons, secondary creeks, and canals scattered along the length of the Little Manatee River. In Tampa Bay, the use of once-disturbed sites includes the canals of Cockroach and Bishop Harbor, the borrow pits of north St. Pete, and the spillway below Lake Seminole (and then there's Gilmore's mosquito impoundment studies of the east coast). The point is that their salinity tolerance is wide and that additional characteristics define their nursery habitat requirements (small water basins with little wave or current energy; proper bottom slope; shaded canopy; underwater structure). If we don't define, acknowledge, and preserve these areas, we may lose half the fishery. (I know it doesn't help the case for preserving, say, oligohaline river habitats, but it's the truth as we know it today.)

For tarpon, I'm not as familiar with their specific requirements, except that the young inshore stages are generally found in isolated, stagnant pools--the kind most people would probably fill, ditch, or spray for mosquitoes. As far as specific areas, I have captured a few tarpon leptos in Cockroach Bay as well as the Little Manatee River. Roy Crabtree's assistant says they have found metamorphic tarpon in the Indian River mosquito impoundments and backwater areas of Collier-Seminole State Park, so they don't require low salinity any more than snook. Assuming they are somewhat similar to ladyfish would lead us to believe they might be attracted to areas such as Bob and I's Alafia River sites, Lake Seminole spillway, and the city borrow pits. For the graphic, you should change the lepto from an eel to a tarpon and better indicate that tarpon move further offshore for spawning.

The two examples you use represent fish using oligohaline nursery habitats. I will reiterate the theme of my Coastal Workshop talk which was that there are many habitat divisions that we don't even think about and different fisheries species and forage species are specialized to use each type. And, as you mention, these systems are all tied together from the uplands to the ocean. Putting them back in their approximate historic proportion is the only relatively unbiased approach of returning the complexity that once existed.

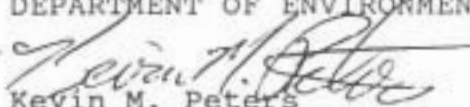
A concern I have, which I'm sure you've heard from Dave as well, is that many sites targeted for restoration are places that have been degraded but which are now somewhat naturalized. Many of these areas (the Alafia mouth tidal creek, the canals beneath the Alafia power lines) are very productive for valuable fisheries species. These are certainly not logical areas for extensive restoration and one could even argue against enhancement on the chance that we could destroy the existing balance since we really don't know the details of why these systems are productive. Efforts should concentrate on cleaning up runoff to existing habitat and limit restoration to habitats where damage has been severe or none currently exists. In my mind, this would include filter marshes and pollution control of runoff, and enhancement/restoration of spillways, areas with dredge and fill, hardened shorelines, etc.

An additional comment I have is that Pinellas drainage systems don't seem to be addressed. There are numerous small drainage creeks and ditches entering small basins scattered around this peninsular county, but many are extensively altered or degraded. Because Pinellas has such a long coastline and receives abundant recruitment of larval fishes, preservation or restoration of these areas would be of great benefit to area fisheries. I have already alluded to one situation and that is the spillways which foreshorten the amount of oligohaline shoreline and shallow-water lagoons for the young fish. Fish are attracted to these areas through a combination of factors that include current and odor trails, but most spillways have just a dredged channel with deep water, steep banks, and little shallow nursery habitat. The same goes for storm drains that often dump directly into a deep harbor--no habitat. The drainage systems that are above ground and could (and do to an extent) offer bird and fish habitat are usually used for runoff and flood control. Joe's Creek, for example, drains a good portion of the city, has steep sides that either slough off sediment or are hardened, and rapidly transfers it's load to the Cross Bayou/Long Bayou area, thus stressing that somewhat preserved area.

I could go on, but I think you get the idea. We should be concerned about these small divisions of habitat types in Pinellas and throughout the developed areas of the state. They provide the specialized habitats required by the specialized fisheries species we find desirable for food and sport.

Sincerely;

DEPARTMENT OF ENVIRONMENTAL PROTECTION


Kevin M. Peters

Assoc. Res. Sci.

Florida Marine Research Institute

APPENDIX D
Public Land Ownership Maps

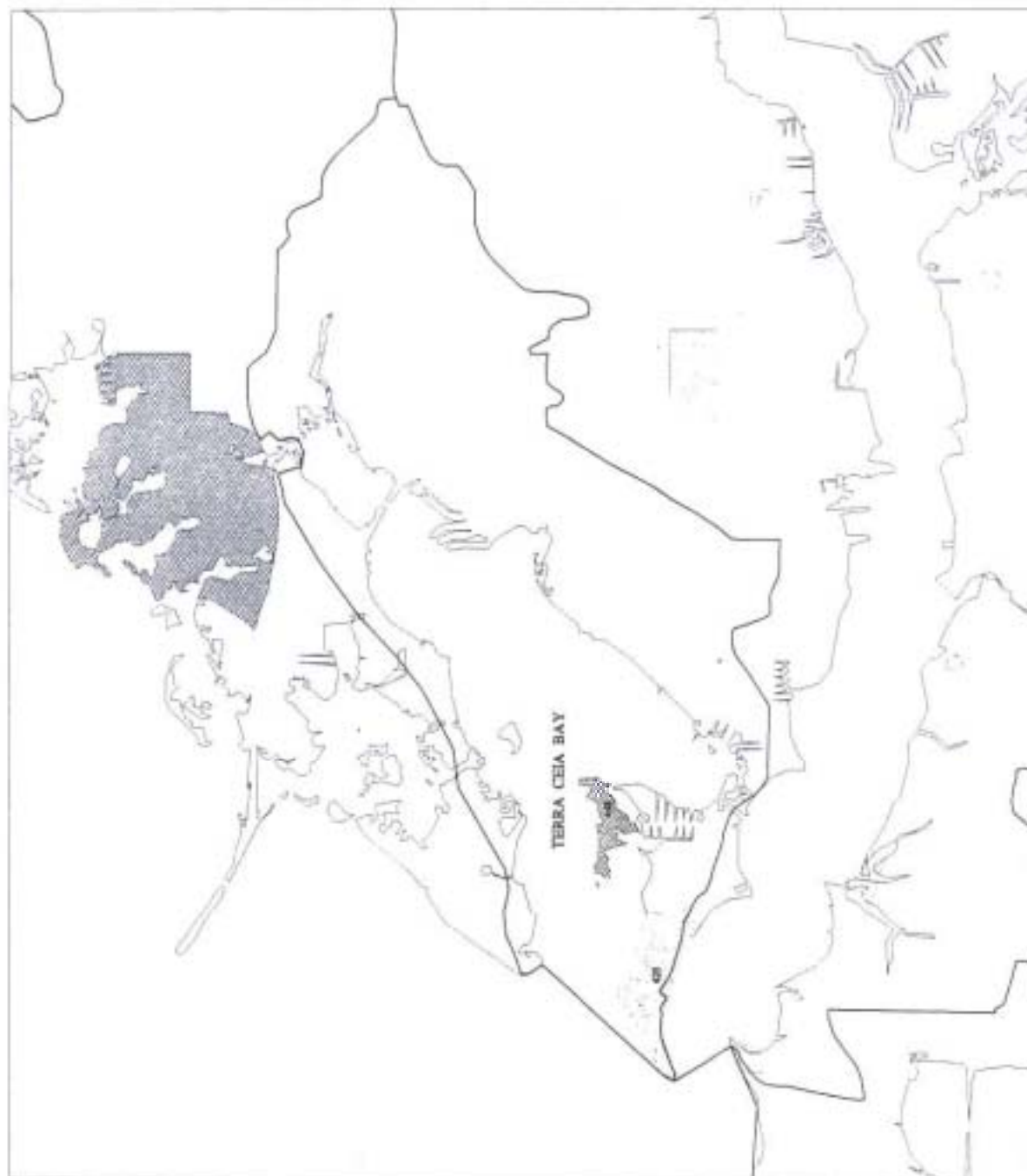
TERRA CEIA BAY EXISTING AND PROPOSED PUBLICLY-OWNED RECREATION, CONSERVATION AND PRESERVATION LANDS

Existing Publicly-Owned Conservation Lands
Conservation Lands Approved/Submitted for Public Purchase
Other Publicly-Owned Lands
Privately-Owned Conservation Lands

Drainage Basins (USGS/BRHP (1981))
County Boundaries (ES&S; AUCUSA)



Scale 1:60,000
Projection UTM, Zone 17
Datum NAD83 1983
Copyright Environmental, Inc.
Map Publication No. 30112802



HILLSBOROUGH BAY EXISTING AND PROPOSED PUBLICLY-OWNED RECREATION, CONSERVATION AND PRESERVATION LANDS

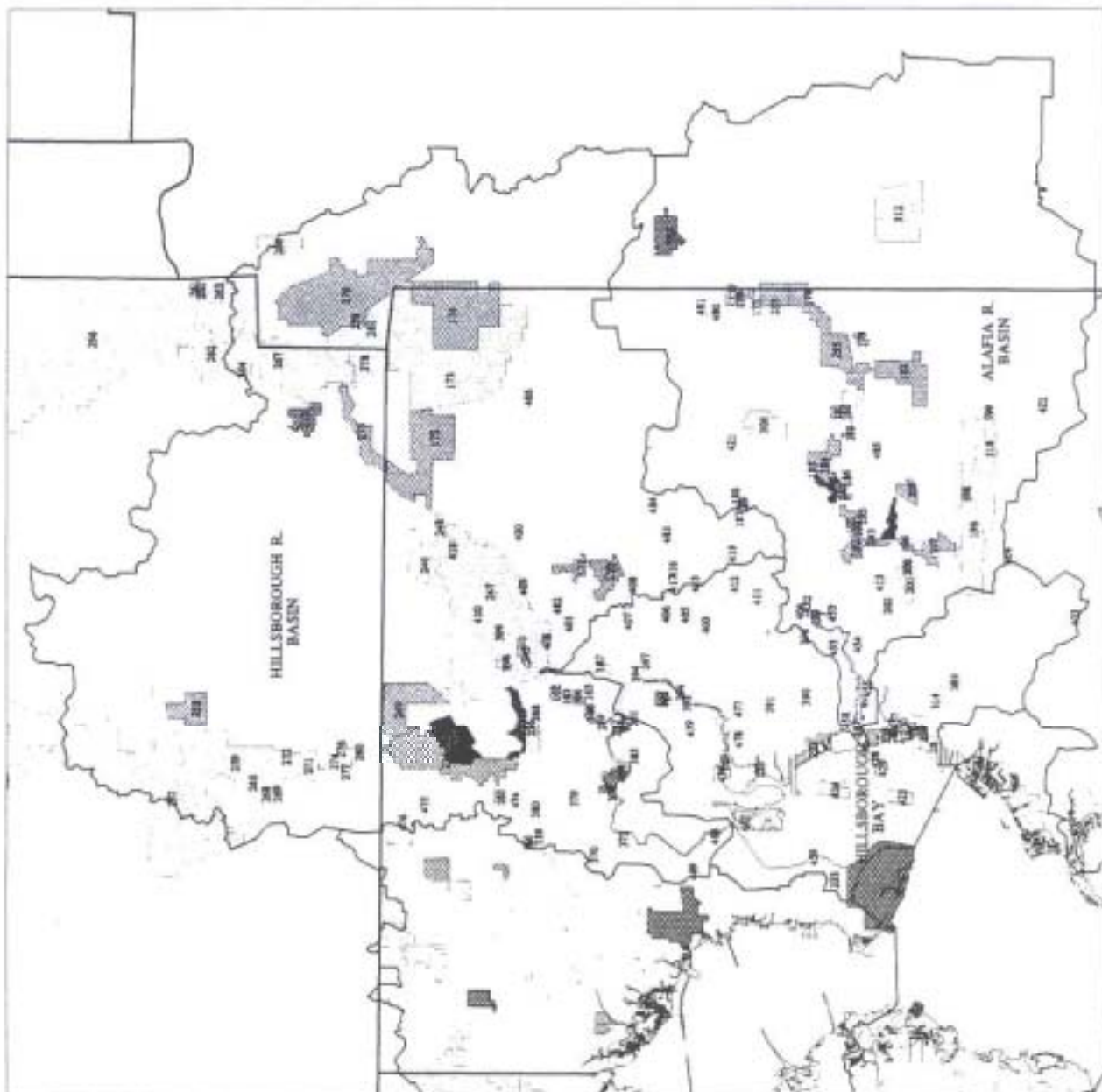
Existing Publicly-Owned Conservation Lands
Conservation Lands Approved/Notified for Public Purchase
Other Publicly-Owned Lands
Privately-Owned Conservation Lands

Drainage Basins (USGS/TINELP 1993)
County Boundaries (ESRI: Arc/USA)

Location of
Hillsborough Bay
within Tampa Bay
Watershed



Scale 1:100,000
Projection UTM, Zone 17
Datum NAD-1983
Coastal Environmental, Inc.
Map Publication No. 1701201

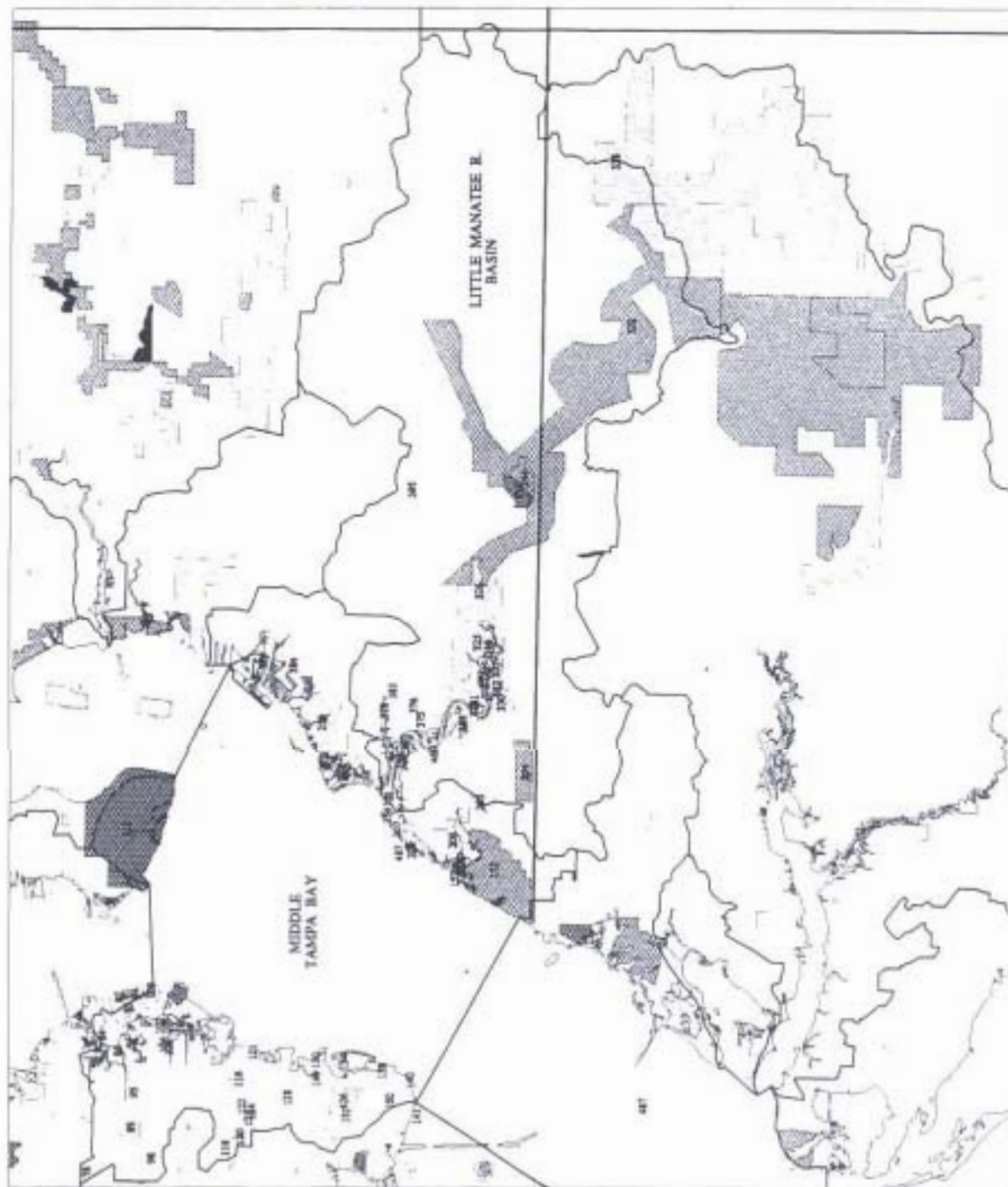


MIDDLE TAMPA BAY EXISTING AND PROPOSED PUBLICLY-OWNED RECREATION, CONSERVATION AND PRESERVATION LANDS

- Existing Publicly-Owned Conservation Lands
- Conservation Lands Approved/Nominated for Public Purchase
- Other Publicly-Owned Lands
- Privately-Owned Conservation Lands
- Drainage Basins (USGS/TNMEP 1993)
- County Boundaries (ESRI: ArcUSA)



Scale 1:240,000
Projection UTM, Zone 17
Datum NAD-1983
Coastal Environmental, Inc.
Map Production No. 3037255



MANATEE RIVER EXISTING AND PROPOSED PUBLICLY-OWNED RECREATION, CONSERVATION AND PRESERVATION LANDS

Existing Publicly-Owned Conservation Lands
Conservation Lands Approved/Nominated for Public Purchase
Other Publicly-Owned Lands
Privately-Owned Conservation Lands

Drainage Basins (USGS/TRIMEP 1993)
County Boundaries (ESRI, ArcUSA)

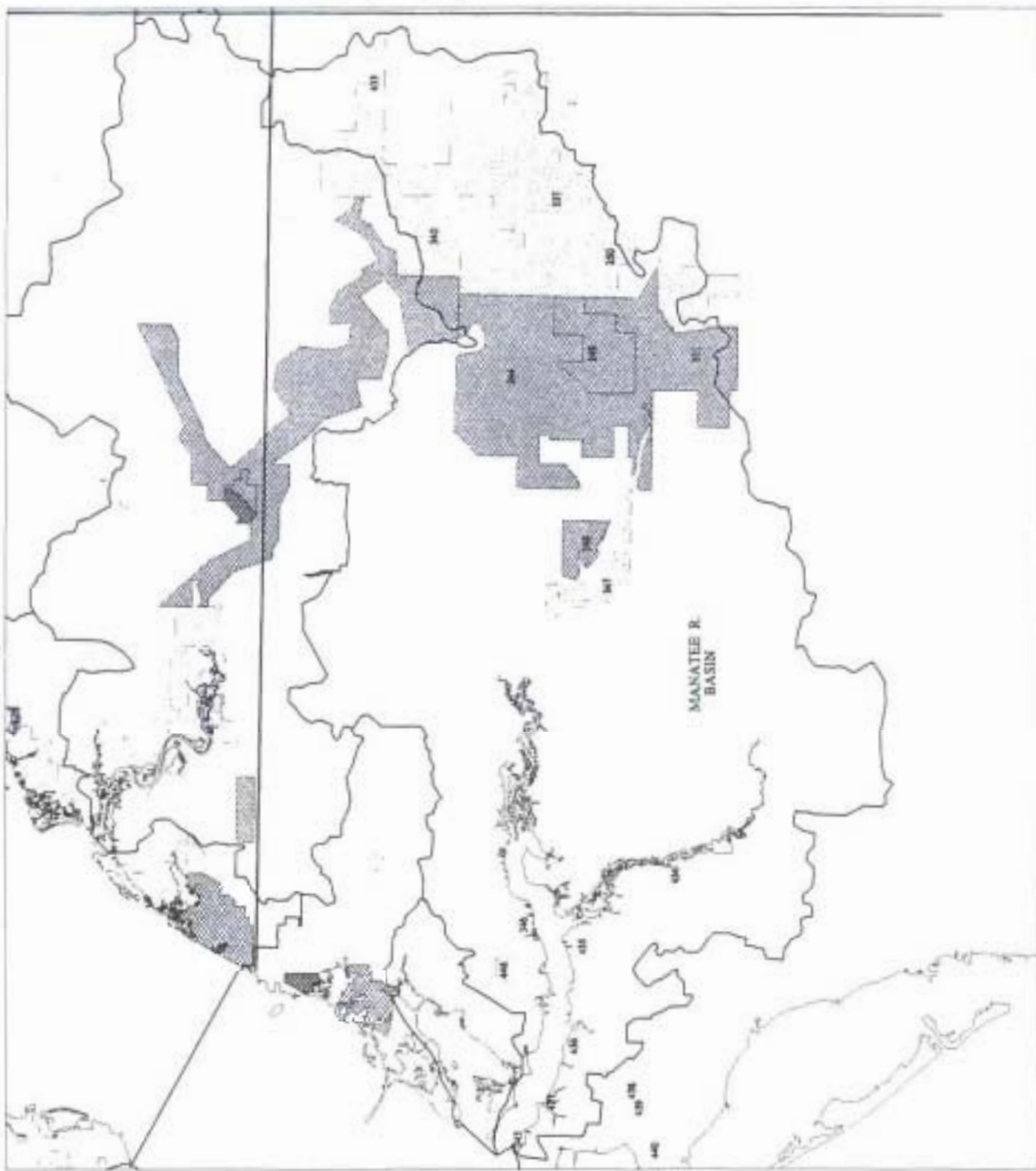


Location of
Manatee R. Basin
within Tampa Bay
Watershed



National Estuary Program

Scale 1:250,000
Projection UTM, Zone 17
Datum NAD-1983
Contour Elevation, Inc.
Map Publication No. 33531961



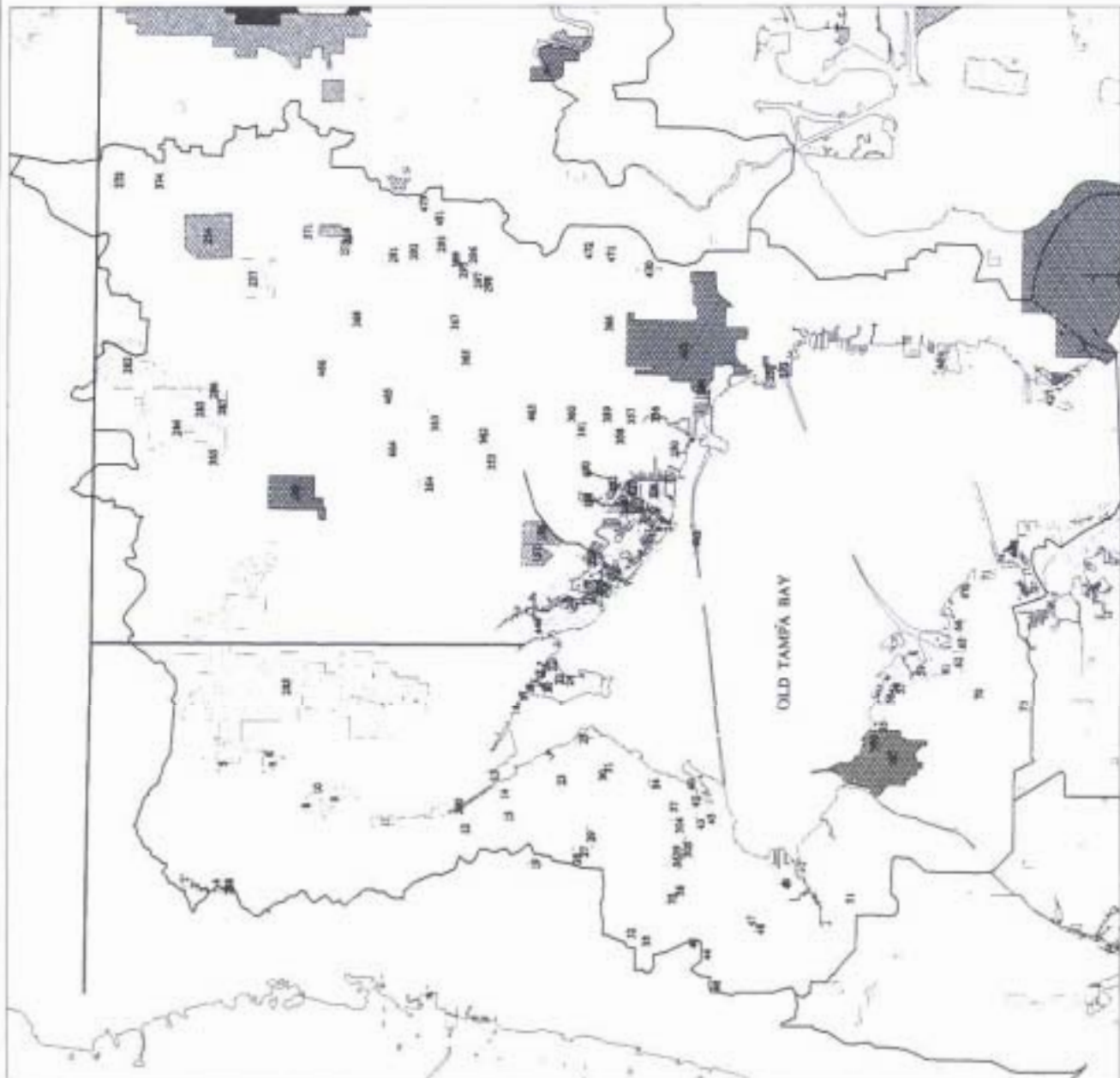
OLD TAMPA BAY EXISTING AND PROPOSED PUBLICLY-OWNED RECREATION, CONSERVATION AND PRESERVATION LANDS

Existing Publicly-Owned Conservation Lands
Conservation Lands Approved/Nominated for Public Purchase
Other Publicly-Owned Lands
Privately-Owned Conservation Lands

Drainage Basins (USGS/TBNEP 1993)
County Boundaries (ESRI: ArcUSA)



Scale 1:165,000
Projection UTM, Zone 17
Datum NAD-1983
Coastal Environmental, Inc.
Map Publication No. 2002055



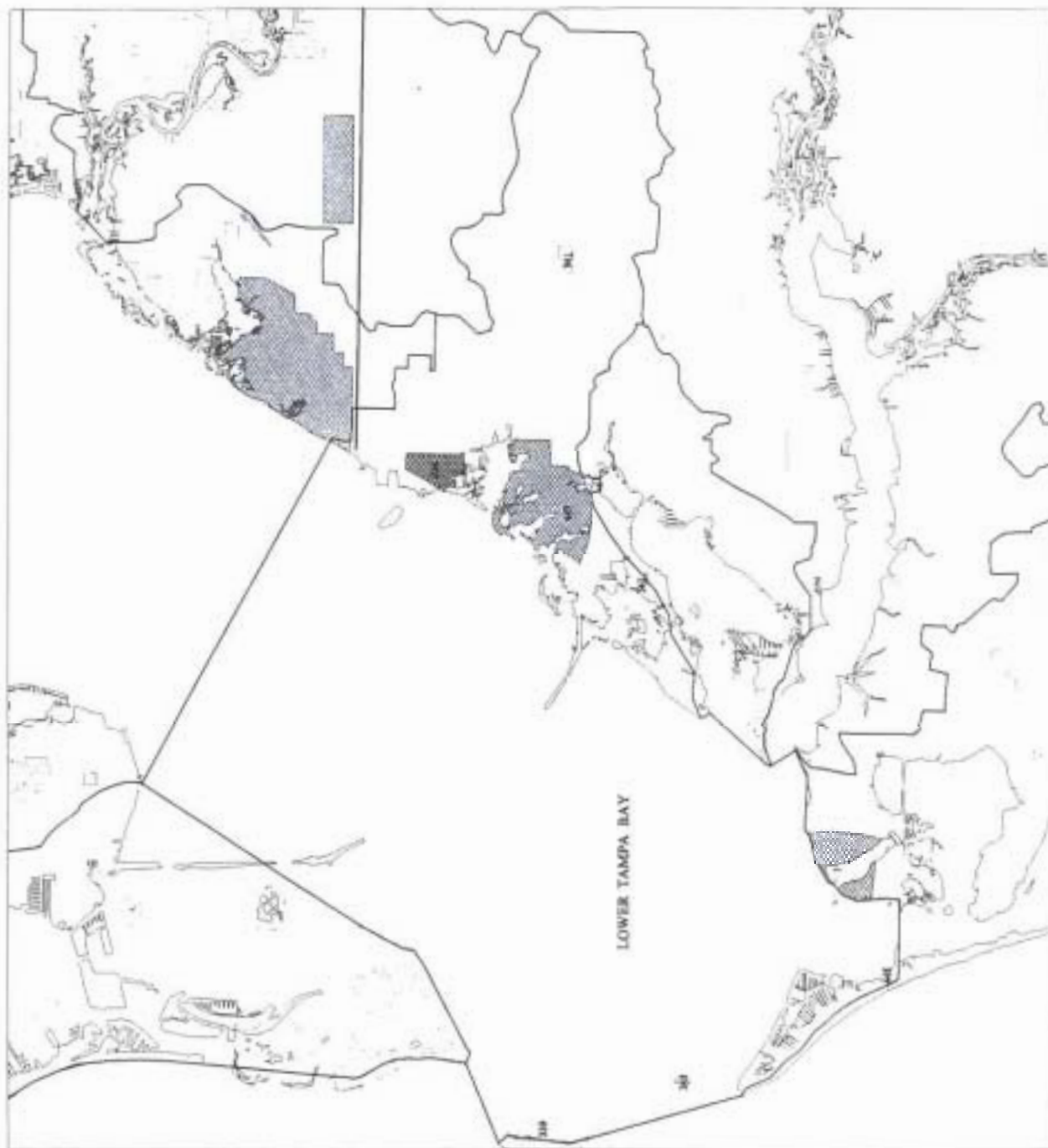
LOWER TAMPA BAY EXISTING AND PROPOSED PUBLICLY-OWNED RECREATION, CONSERVATION AND PRESERVATION LANDS

Existing Publicly-Owned Conservation Lands
Conservation Lands Approved/Submitted for Public Purchase
Other Publicly-Owned Lands
Privately-Owned Conservation Lands

Delaware Basin (USGS/TINER 1993)
County Boundaries (ESRI: ArcUSA)



Scale 1:100,000
Projection UTM, Zone 17
Datum NAD 83 1983
Coastal Environmental, Inc.
Map Definition No. 2003/061



BOCA CIEGA BAY EXISTING AND PROPOSED PUBLICLY-OWNED RECREATION, CONSERVATION AND PRESERVATION LANDS

Existing Publicly-Owned Conservation Lands
Conservation Lands Approved/Submitted for Public Purchase
Other Publicly-Owned Lands
Privately-Owned Conservation Lands

Drainage Basins (USGS/FBI/NEP 1993)
County Boundaries (ES&E, AUCUSA)



Scale 1:150,000
Projection UTM, Zone 17
Datum NAD-1983
Contour Interval 100 feet
Map Publication No. 30527201



PARCEL NO.	PARCEL NAME	OWNERSHIP	LAND USE	ACRES	LONG			LAT			MAP
					D	M	S	D	M	S	
1	A.L. Anderson Pl	Pinellas County	Passive Recreation	32.06	82	44	8	28	8	25	1
2	A.L. Anderson Pl	Pinellas County	Passive Recreation	9.8	82	44	15	28	8	13	1
3	A.L. Anderson Pl	Pinellas County	Passive Recreation	15.32	82	44	21	28	8	1	1
4	A.L. Anderson Pl	Pinellas County	Passive Recreation	28.91	82	44	17	28	7	41	1
5	Brooker Creek	Pinellas County	Passive Recreation	34.33	82	41	30	28	7	42	1
6	Brooker Creek	Pinellas County	Passive Recreation	25.59	82	41	16	28	6	46	1
7	Brooker Creek	Pinellas County	Passive Recreation	64.96	82	41	30	28	8	40	1
8	Piney Point-Pridents Landing	Fl. Int. Imp. Trust Fund	Preservation/Conservation	74.79	82	42	26	28	8	1	1
9	John Chestnut Sr. Park	Pinellas County	Passive Recreation	223.39	82	42	16	28	5	27	1
10	unnamed/unknown	Pinellas County	Preservation/Conservation	23.87	82	42	2	28	5	47	1
11	Lk. Tarpon Outfall Canal	Pinellas County	Passive Recreation	87.76	82	42	48	28	4	26	1
12	Bentley Park	City of Clearwater	Preservation/Conservation	20.79	82	42	59	28	2	50	1
13	Lk. Tarpon Outfall Canal	City of Odessa	Passive Recreation-Isdai	35.39	82	41	41	28	2	17	1
14	unnamed/unknown	City of Clearwater	Preservation/Conservation	5.11	82	42	8	28	2	4	1
15	Countryside Golf & Tennis Club	City of Clearwater	Passive Recreation	12.42	82	42	37	28	1	58	1
16	Odessa Park	City of Odessa	Passive Recreation-Isdai	8.69	82	40	11	28	1	52	1
17	Olds Park	Private	Passive Recreation-Isdai	6.35	82	39	54	28	1	44	3
18	unnamed/unknown	City of Odessa	Preservation/Conservation-Isdai	9.41	82	39	44	28	1	38	1
19	Countryside Community Park	City of Clearwater	Passive Recreation	23.57	82	43	41	28	1	26	1
20	Florida Power	City of Odessa	Electric Power assessment-Isdai	5.06	82	39	42	28	1	15	1
21	Mobby Bayou	Pinellas County	Preservation/Conservation-Isdai	23.62	82	39	13	28	1	18	1
22	Mobby Bayou	City of Odessa	Preservation/Conservation-Isdai	19.92	82	39	30	28	1	1	1
23	North City Park	City of Safety Harbor	Passive Recreation	5.2	82	41	46	28	0	56	1
24	Mobby Bayou	Pinellas County	Preservation/Conservation-Isdai	9	82	39	32	28	0	48	1
25	Philippe Park	Pinellas County	Passive Recreation - Isdai	23.38	82	40	50	28	0	30	1
26	Lake Chautauque Park	City of Clearwater	Passive Recreation	27.01	82	43	33	28	0	36	1
27	Lake Chautauque Park	Pinellas County	Preservation/Conservation	6.72	82	43	24	28	0	27	1
28	Port Redwing	SATWMD	Preservation/Conservation	268.52	82	33	55	27	48	37	1
29	Camp Soule (Boy Scouts)	City of Clearwater	Passive Recreation	42	82	43	3	28	0	19	1
30	Lincoln Park	City of Safety Harbor	Passive Recreation	5.85	82	41	39	28	0	7	1
31	Rigby Recreation Center	City of Safety Harbor	Preservation/Conservation	5.18	82	41	29	28	0	1	1
32	Frank Trask Park	City of Clearwater	Passive Recreation	16.78	82	45	13	27	58	30	1
33	Lake Lucile Park	Pinellas County	Preservation/Conservation	7.87	82	45	23	27	58	11	1
34	Safety Harbor City Park	City of Safety Harbor	Passive Recreation	27.48	82	41	51	27	58	3	1

PARCEL NO.	PARCEL NAME	OWNERSHIP	LAND USE	ACRES	LONG			LAT			MAP
					D	M	S	D	M	S	
35	The Center Education & Rec. Complex	City of Clearwater	Passive Recreation	10.07	82	44	25	27	58	41	1
36	Moccasin Lake Park	City of Clearwater	Passive Recreation	50.7	82	43	35	27	58	30	1
37	Alligator Creek	Pinellas County	Passive Recreation	5.58	82	42	21	27	58	41	1
38	Carpenter Field Phil. Phil. Training	City of Clearwater	Passive Recreation	18.04	82	44	14	27	58	32	1
39	Coff Stephens Park	City of Clearwater	Passive Recreation	15.32	82	43	28	27	58	28	1
40	Bayshore Blvd.	City of Clearwater	Passive Recreation-Isd	8.58	82	41	50	27	58	21	1
41	Courtesy Recreation Center	City of Clearwater	Passive Recreation	5.02	82	45	24	27	58	15	1
42	Chesapeake Park	City of Clearwater	Passive Recreation	22.05	82	42	13	27	58	15	1
43	E.C. Moore Rec. Complex	City of Clearwater	Passive Recreation	34.98	82	42	44	27	58	8	1
44	Luckett Park	City of Clearwater	Passive Recreation	9	82	45	39	27	57	58	1
45	Kapok Campgrounds	City of Clearwater	Passive Recreation	5.17	82	42	38	27	57	58	1
46	Coast Lake Park	City of Clearwater	Passive Recreation	37.94	82	48	22	27	57	47	1
47	unnamed/unknown	Pinellas County	Preservation/Conservation	14.58	82	45	1	27	56	59	1
48	unnamed/unknown	City of Clearwater	Preservation/Conservation	5.78	82	45	5	27	56	55	1
49	unnamed/unknown	Florida Power Corp	Electric Power Co./sewer-Isd	8.86	82	44	3	27	56	24	3
50	Highland Recreational Complex	City of Largo	Passive Recreation	32.18	82	48	22	27	55	15	1
51	Lake Club Park	City of Largo	Passive Recreation	5.87	82	44	21	27	55	7	1
52	Schools/Largo Central Park	City of Largo	Passive Recreation	14.02	82	47	18	27	54	53	1
53	unnamed/unknown	City of Largo	Passive Recreation	33.84	82	48	55	27	54	47	1
54	Gateway	FL Int. Imp. Trust Fund	Preservation/Conservation-Isd	100.58	82	39	38	27	54	26	1
55	Gateway	Pinellas County	Preservation/Conservation-Isd	10.58	82	40	29	27	54	31	1
56	Gateway	Pinellas County	Preservation/Conservation-Isd	5.77	82	38	51	27	54	28	1
57	Gateway	Pinellas County	Preservation/Conservation-Isd	10.8	82	38	38	27	54	12	1
58	Jake Rush Little League Park	City of Largo	Passive Recreation	9.11	82	45	41	27	54	9	1
59	Gateway	FL Int. Imp. Trust Fund	Preservation/Conservation-Isd	77.62	82	38	13	27	53	48	1
60	Northwest Park	FDOT	Passive Recreation	8.02	82	47	58	27	53	28	1
61	Gateway	FL Int. Imp. Trust Fund	Preservation/Conservation-Isd	104.13	82	39	11	27	53	19	1
62	Gateway	FL Int. Imp. Trust Fund	Preservation/Conservation-Isd	81.48	82	39	1	27	53	4	1
63	Taylor Reservoir Park	City of Largo	Passive Recreation	39.15	82	48	8	27	53	8	1
64	Monterey Park - soccer complex	Pinellas County	Preservation/Conservation-Isd	5.38	82	45	18	27	53	8	1
65	Gateway	FL Int. Imp. Trust Fund	Preservation/Conservation-Isd	66.03	82	38	35	27	52	59	1
66	Gateway	FL Int. Imp. Trust Fund	Preservation/Conservation-Isd	44.25	82	38	11	27	53	4	1
67	Gateway	City of Clearwater	Preservation/Conservation	1.04	82	37	27	27	52	57	1
68	unknown/unnamed	FDOT	Passive Recreation	6.78	82	47	58	27	52	24	1

PARCEL NO.	PARCEL NAME	OWNERSHIP	LAND USE	ACRES	LONG			LAT			MAP
					D	M	S	D	M	S	
69	Recreation Ground	City of Pinellas Park	Passive Recreation	5.28	82	44	14	27	52	39	1
70	unknown/unnamed	Pinellas County	Preservation/Conservation	19.53	82	39	44	27	52	38	1
71	Gateway	City of Clearwater	Preservation/Conservation	105.23	82	37	2	27	52	32	1
72	Weslingham	Pinellas County	Preservation/Conservation-Isd	6.86	82	50	0	27	52	12	1
73	Weslingham Park (undevel)	Pinellas County	Passive Recreation	0.29	82	49	38	27	52	5	1
74	Gandy Bridge	City of Clearwater	Passive Recreation-Isd	0.58	82	36	40	27	52	13	1
75	Gandy Bridge	Florida Power Corp.	Passive Recreation-Isd	38.24	82	36	21	27	51	58	3
76	unknown/unnamed	FDOT	Passive Recreation	7.29	82	48	13	27	51	31	1
77	unknown/unnamed	City of St. Petersburg	Passive Recreation	37.54	82	39	56	27	51	43	1
78	Freedom Lake Park	City of Pinellas Park	Preservation/Conservation	19.56	82	41	52	27	51	44	1
79	Little League Park	Pinellas County	Passive Recreation	106.34	82	48	36	27	51	36	1
80	Islen S. Howard Park	City of Pinellas Park	Passive Recreation	95.99	82	43	28	27	51	32	1
81	Snug Harbor Fl. Pow	Pinellas County	Preservation/Conservation-Isd	8.93	82	37	30	27	51	28	1
82	Seminole Youth Complex	Pinellas County	Preservation/Conservation	9.75	82	48	23	27	51	19	1
83	Seminole Park	Seminole Special	Passive Recreation	19.34	82	48	25	27	51	18	1
84	Weedon Island/Rio Vista Park	Pinellas County	Preservation/Conservation-Isd	19.47	82	37	5	27	51	21	1
85	Weedon Island	Pinellas County	Passive Recreation	527.14	82	38	8	27	50	35	1
86	Rio Vista	City of St. Petersburg	Preservation/Conservation-Isd	11.21	82	37	36	27	50	53	1
87	Bergeron Island	City of Clearwater	Passive Recreation-Isd	5.68	82	35	47	27	50	52	1
88	Lake Seminole Park	Pinellas County	Passive Recreation	134.91	82	48	27	27	50	33	1
89	Sawgrass Lake	SWFWMD	Passive Recreation	296.38	82	40	11	27	50	28	1
90	Park Blvd. Boat Ramp	Pinellas County	Passive Recreation-Isd	5.76	82	50	20	27	50	30	1
91	Snakes Island	City of Clearwater	Passive Recreation-Isd	6.24	82	35	41	27	50	41	1
92	Park Blvd. Park - The Narrows	Pinellas County	Preservation/Conservation-Isd	13.24	82	50	2	27	50	14	1
93	Leach Park	City of Seminole	Passive Recreation	10.47	82	48	2	27	50	22	1
94	Christmas Island	FL Int. Imp. Trust Fund	Preservation/Conservation-Isd	11.79	82	36	40	27	50	24	1
95	Meadowland Park	City of St. Petersburg	Passive Recreation	11.57	82	38	59	27	50	23	1
96	unknown/unnamed	Pinellas County	Preservation/Conservation-Isd	13.94	82	44	31	27	49	55	1
97	Nature Preserve	Pinellas County	Passive Recreation-Isd	34.41	82	45	3	27	49	45	1
98	unknown/unnamed	City of Pinellas Park	Passive Recreation	9.9	82	41	12	27	49	51	1
99	Tripled Key	FL Int. Imp. Trust Fund	Preservation/Conservation-Isd	9.29	82	45	48	27	49	43	1
100	Nature Preserve/Blossom Lake	City of Seminole	Passive Recreation	8.74	82	47	2	27	49	42	1
101	Lake Kirby	City of Seminole	Preservation/Conservation	5.74	82	48	50	27	49	32	1
102	unknown/unnamed	City of St. Petersburg	Preservation/Conservation	8.24	82	36	43	27	49	40	1

PARCEL NO.	PARCEL NAME	OWNERSHIP	LAND USE	ACRES	LONG			LAT			MAP
					D	M	S	D	M	S	
100	Ross Island	Fl. Int. Imp. Trust Fund	Preservation/Conservation-Isd	122.48	82	35	33	27	49	50	1
104	Northeast Park	City of St. Petersburg	Preservation/Conservation-Isd	12.79	82	37	22	27	49	32	1
105	unknown/unnamed	City of St. Petersburg	Preservation/Conservation-Isd	9.09	82	36	43	27	49	28	1
106	Jack Puryear Park	City of St. Petersburg	Passive Recreation	26.15	82	37	38	27	49	22	1
107	Denver Park	City of St. Petersburg	Passive Recreation	10.05	82	36	30	27	49	20	1
108	Bay Pines Wildlife Area	Pinellas County	Passive Recreation-Isd	121.75	82	46	23	27	49	13	1
109	Abercrombie Park	City of St. Petersburg	Passive Recreation-Isd	5.2	82	45	21	27	49	23	1
110	unknown/unnamed	FDOT	Passive Recreation	5.79	82	44	32	27	49	8	1
111	unknown/unnamed	City of St. Petersburg	Preservation/Conservation	38.38	82	44	55	27	47	57	1
112	Walter Fuller Park	City of St. Petersburg	Passive Recreation	66.48	82	44	45	27	47	50	1
113	Leslie Lane Park	City of St. Petersburg	Passive Recreation	5.26	82	41	36	27	47	46	1
114	Northwest Youth Center/Tyrene Park	City of St. Petersburg	Passive Recreation	33.57	82	42	52	27	47	36	1
115	Ayres Park	City of St. Petersburg	Passive Recreation	34.73	82	44	22	27	47	11	1
116	Crescent Lake Park	City of St. Petersburg	Passive Recreation	47.81	82	38	25	27	47	18	1
117	Lake Louise	City of St. Petersburg	Passive Recreation	7.73	82	41	27	27	47	25	1
118	Herndon Lake	City of St. Petersburg	Passive Recreation	8.24	82	41	1	27	47	34	1
119	Elmer Island	City of Treasure Island	Preservation/Conservation-Isd	14.19	82	40	25	27	47	13	1
120	Emerald Lake	City of St. Petersburg	Passive Recreation	26.25	82	40	28	27	47	14	1
121	Northshore Park	City of St. Petersburg	Passive Recreation - Isd	38.07	82	37	34	27	46	53	1
122	Woodawn Park	City of St. Petersburg	Passive Recreation	26.06	82	39	25	27	47	11	1
123	Boston Creek Park	City of St. Petersburg	Passive Recreation	16.73	82	39	48	27	46	59	1
124	Sprague Park	City of St. Petersburg	Passive Recreation	7.37	82	39	35	27	46	54	1
125	Eagle Crest Park	City of St. Petersburg	Passive Recreation	10.32	82	43	47	27	46	43	1
126	St. Pete Municipal Beach	City of Treasure Island	Passive Recreation - Isd	54.96	82	46	24	27	46	14	1
127	Orion Lake Park	City of St. Petersburg	Passive Recreation	10.87	82	42	52	27	46	19	1
128	Campbell Park	City of St. Petersburg	Passive Recreation	32.41	82	39	5	27	45	50	1
129	Childs Park Lake	City of St. Petersburg	Passive Recreation	6.15	82	41	35	27	45	28	1
130	Leaning Beach & Park	City of St. Petersburg	Passive Recreation - Isd	2.88	82	37	49	27	45	2	1
131	Boyd Hill Nature Park & Lake Maggior	City of St. Petersburg	Passive Recreation	451.96	82	39	41	27	44	7	1
132	Cogod Pond Park	Town of Gulfport	Passive Recreation-Isd	16.14	82	41	38	27	44	22	1
133	Nature Preserve/Glen Bayou Park	City of St. Petersburg	Passive Recreation-Isd	6.13	82	41	25	27	44	16	1
134	Cogline Key Park	City of St. Petersburg	Passive Recreation-Isd	15.41	82	37	52	27	44	11	1
135	Gulfport Middle Ground	Fl. Int. Imp. Trust Fund	Preservation/Conservation-Isd	23.2	82	43	26	27	43	47	1
136	Gulfport Middle Ground	Fl. Int. Imp. Trust Fund	Preservation/Conservation-Isd	23.96	82	43	14	27	43	23	1

PARCEL NO.	PARCEL NAME	OWNERSHIP	LAND USE	ACRES	LONG			LAT			MAP
					D	M	S	D	M	S	
137	St. Pete Beach Access Park	Pinellas County	Passive Recreation-Isd	5.14	82	44	27	27	43	15	1
138	Little Bayou/Bahama Shores	City of St. Petersburg	Passive Recreation-Isd	5.51	82	38	8	27	43	6	1
139	Maximo Park	City of St. Petersburg	Passive Recreation-Isd	21.96	82	40	57	27	42	36	1
140	Bay Vista Park	City of St. Petersburg	Passive Recreation-Isd	4.98	82	38	26	27	42	14	1
141	Pinellas Point Park	City of St. Petersburg	Passive Recreation-Isd	6.68	82	39	17	27	42	2	1
142	Tierra Verde	Pinellas County	Preservation/Conservation-Isd	33.06	82	43	38	27	40	14	1
143	unknown/unnamed	FDOT	Preservation/Conservation-Isd	7.22	82	43	16	27	39	35	1
144	Sawyer City	Pinellas County	Preservation/Conservation-Isd	33.94	82	43	42	27	39	32	1
145	Summer Resort Key	Pinellas County	Preservation/Conservation-Isd	47.43	82	44	10	27	39	21	1
146	Fl. DeSoto	Pinellas County	Passive Recreation-Isd	1096.30	82	42	55	27	37	21	1
147	Pinellas Park Boys Club	City of Pinellas Park	Passive Recreation	13.38	82	43	2	27	50	27	1
148	Pinellas Park	City of Pinellas Park	Passive Recreation	5.15	82	42	5	27	50	4	1
149	Bartlett Park	City of St. Petersburg	Passive Recreation	34.64	82	38	28	27	45	0	1
150	Lake Vista Park	City of St. Petersburg	Passive Recreation	26.74	82	39	9	27	42	49	1
151	Cockroach Bay Islands	Hills Co. ELAPP	Preservation/Conservation-Isd	22.01	82	29	3	27	43	2	1
152	Cockroach Bay Islands	Hills Co. ELAPP	Preservation/Conservation-Isd	7.51	82	31	42	27	41	1	1
153	Cockroach & Piney Point Creeks	Hills Co. ELAPP	Preservation/Conservation-Isd	2645.46	82	31	23	27	39	52	2
154	Cockroach Bay Islands	Hills Co. ELAPP	Preservation/Conservation-Isd	52.21	82	29	36	27	43	3	1
155	Cockroach Bay Islands	Hills Co. ELAPP	Preservation/Conservation-Isd	180.57	82	37	48	27	42	38	1
156	Sheldon Site	Hills Co. ELAPP	Preservation/Conservation-Isd	220.82	82	36	13	26	1	25	2
157	Sheldon Site	Hills Co. ELAPP	Preservation/Conservation	182.01	82	36	42	26	1	30	2
158	Dick Creek	Hills Co. ELAPP	Preservation/Conservation	47.38	82	35	28	26	0	30	2
159	Hammer Tower	Hills Co. ELAPP	Preservation/Conservation	9.8	82	28	7	26	4	11	2
160	Hammer Tower	Hills Co. ELAPP	Preservation/Conservation	58.92	82	28	25	26	4	22	2
161	Flynn Lake	Hills Co. ELAPP	Preservation/Conservation	161.43	82	26	20	26	5	43	2
162	Cow House Creek Ranch	Hills Co. ELAPP	Preservation/Conservation	118.85	82	21	38	26	3	32	2
163	Sewer Packard	Hills Co. ELAPP	Preservation/Conservation	19.25	82	21	48	26	3	8	2
164	Sewer Packard	Hills Co. ELAPP	Preservation/Conservation	80.33	82	21	50	26	2	41	2
165	Florida College	Hills Co. ELAPP	Preservation/Conservation	82.17	82	21	50	26	2	29	1
166	Florida College	Hills Co. ELAPP	Preservation/Conservation	133.6	82	22	26	26	2	10	2
167	Wilkins Road	Hills Co. ELAPP	Preservation/Conservation	34.14	82	20	17	26	1	50	2
168	Greenwood	Hills Co. ELAPP	Preservation/Conservation	173.46	82	25	11	26	0	58	2
169	McKay Bay	Hills Co. ELAPP	Preservation/Conservation-Isd	54.72	82	34	42	27	36	53	1
170	Baker Creek & Tributaries	Hills Co. ELAPP	Preservation/Conservation	231.4	82	18	15	26	1	27	2

PARCEL NO.	PARCEL NAME	OWNERSHIP	LAND USE	ACRES	LONG			LAT			MAP LEGEND
					D	M	S	D	M	S	
171	Baker Creek & Tributaries	Hills Co. ELAPP	Preservation/Conservation	1417.04	82	18	3	28	2	36	2
172	Blackwater Creek	Hills Co. ELAPP	Preservation/Conservation	4511.29	82	10	30	28	6	29	2
173	Blackwater Creek	Hills Co. ELAPP	Preservation/Conservation	12673.75	82	7	40	28	7	54	1
174	Cane Ranch Addition	Hills Co. ELAPP	Preservation/Conservation	5648.18	82	4	51	28	7	51	2
175	English Creek	Hills Co. ELAPP	Preservation/Conservation	207.72	82	3	52	27	55	40	1
176	English Creek	Hills Co. ELAPP	Preservation/Conservation	360.46	82	4	4	27	56	25	2
177	English Creek	Hills Co. ELAPP	Preservation/Conservation	102.78	82	3	42	27	56	44	1
178	North Prong Portion - SHWC	Hills Co. ELAPP	Preservation/Conservation	1146.13	82	3	57	27	53	44	2
179	Alderman's Ford South Prong Add.	Hills Co. ELAPP	Preservation/Conservation	153.06	82	5	48	27	51	35	2
180	Alderman's Ford Addition	Hills Co. ELAPP	Preservation/Conservation	1141.78	82	9	2	27	52	8	1
181	North Prong Portion - SHWC	Hills Co. ELAPP	Preservation/Conservation	144.17	82	9	1	27	52	32	2
182	Alderman's Ford South Prong Add. S	Hills Co. ELAPP	Preservation/Conservation	2415.15	82	7	13	27	49	55	1
183	North Prong Portion - SHWC	Hills Co. ELAPP	Preservation/Conservation	96.72	82	9	58	27	52	0	2
184	Boyscout Portion - SHWC	Hills Co. ELAPP	Preservation/Conservation	961.39	82	11	23	27	53	1	2
185	Boyscout Portion - SHWC	Hills Co. ELAPP	Preservation/Conservation	240.30	82	11	36	27	53	20	1
186	Boyscout Portion - SHWC	Hills Co. ELAPP	Preservation/Conservation	296.44	82	11	57	27	52	9	1
187	Valrico Fire Tower	Hills Co. ELAPP	Preservation/Conservation	32.73	82	13	20	27	56	22	2
188	Valrico Fire Tower	Hills Co. ELAPP	Preservation/Conservation	18.78	82	13	3	27	56	19	2
189	Valrico Fire Tower	Hills Co. ELAPP	Preservation/Conservation	3.1	82	13	13	27	56	11	2
190	Bloomington/Buckhorn Creek	Hills Co. ELAPP	Preservation/Conservation	177.05	82	16	10	27	53	18	2
191	Lithia Springs Addition	Hills Co. ELAPP	Preservation/Conservation	39.64	82	14	3	27	51	58	1
192	River Crossing Estates/Lithia Springs	Hills Co. ELAPP	Preservation/Conservation	1167.38	82	15	5	27	51	44	2
193	Lithia Springs	Hills Co. ELAPP	Preservation/Conservation	15.63	82	10	40	27	51	28	1
194	River Crossing Estates	Hills Co. ELAPP	Preservation/Conservation	83.89	82	14	12	27	51	30	1
195	Triple Creek	Hills Co. ELAPP	Preservation/Conservation	143.26	82	14	52	27	48	46	2
196	Bain Boyette Portion - SHWC	Hills Co. ELAPP	Preservation/Conservation	5146.91	82	14	13	27	47	3	1
197	Triple Creek	Hills Co. ELAPP	Preservation/Conservation	738.06	82	14	57	27	48	38	2
198	Simmers	Hills Co. ELAPP	Preservation/Conservation	119.33	82	12	38	27	47	21	2
199	Gray Road	Hills Co. ELAPP	Preservation/Conservation	86.53	82	8	0	27	46	30	2
200	Rhodine Road	Hills Co. ELAPP	Preservation/Conservation	106.96	82	15	56	27	49	40	2
201	Rhodine Road	Hills Co. ELAPP	Preservation/Conservation	610.48	82	16	42	27	49	36	1
202	Steele Downs	Hills Co. ELAPP	Preservation/Conservation	79.74	82	17	37	27	50	26	1
203	Fish Hawk Portion/SHWC	Hills Co. ELAPP	Preservation/Conservation	481.62	82	12	28	27	49	31	2
204	Valley Road	Hills Co. ELAPP	Preservation/Conservation	715.38	82	28	7	27	38	59	2

PARCEL NO.	PARCEL NAME	OWNERSHIP	LAND USE	ACRES	LONG			LAT			MAP LEGEND
					D	M	S	D	M	S	
205	Sun City Scrub	Hills Co. ELAPP	Preservation/Conservation	46.37	82	39	8	27	40	18	2
206	Cockroach Bay Add. Fulkerson Rd.	Hills Co. ELAPP	Preservation/Conservation-Idol	1080.55	82	30	24	27	41	6	1
207	Cockroach Bay Islands	Hills Co. ELAPP	Preservation/Conservation-Idol	0.6	82	30	4	27	42	44	1
208	Cockroach Bay Islands	Hills Co. ELAPP	Preservation/Conservation-Idol	55.82	82	30	40	27	42	18	1
209	Cockroach Bay Islands	Hills Co. ELAPP	Preservation/Conservation-Idol	1.07	82	30	31	27	42	10	1
210	Cockroach Bay Islands	Hills Co. ELAPP	Preservation/Conservation-Idol	0.23	82	31	48	27	40	38	1
211	Cockroach Bay Islands	Hills Co. ELAPP	Preservation/Conservation-Idol	0.39	82	31	39	27	40	49	1
212	Cockroach Bay Islands	Hills Co. ELAPP	Preservation/Conservation-Idol	0.26	82	31	38	27	40	47	1
213	Cockroach Bay Islands	Hills Co. ELAPP	Preservation/Conservation-Idol	2.7	82	31	42	27	40	51	1
214	Cockroach Bay Islands	Hills Co. ELAPP	Preservation/Conservation-Idol	0.28	82	31	36	27	40	43	1
215	Cockroach Bay Islands	Hills Co. ELAPP	Preservation/Conservation-Idol	1.14	82	31	48	27	40	52	1
216	Cockroach Bay Islands	Hills Co. ELAPP	Preservation/Conservation-Idol	17.79	82	31	18	27	40	50	2
217	Wolf Branch	Hills Co. ELAPP	Preservation/Conservation-Idol	19.71	82	27	53	27	44	57	2
218	E.G. Simmons Park	Hills Co. Parks & Rec.	Preservation/Conservation-Idol	603.6	82	28	11	27	44	29	1
219	Wolf Branch	Hills Co. Parks & Rec.	Preservation/Conservation-Idol	1488.80	82	26	35	27	44	57	1
220	Bulldog/Kitchen/Gibson	Hills Co. ELAPP	Preservation/Conservation-Idol	6.54	82	22	59	27	48	32	2
221	Bulldog/Kitchen/Gibson	Hills Co. ELAPP	Preservation/Conservation-Idol	33.22	82	23	8	27	48	25	1
222	CSX/Delaney Creek Pop-Off	Hills Co. ELAPP	Preservation/Conservation-Idol	612.49	82	24	4	27	53	23	2
223	McKay Bay Causeway	Hills Co. ELAPP	Preservation/Conservation-Idol	59.02	82	24	58	27	55	38	2
224	Howell Road	Hills Co. ELAPP	Preservation/Conservation	163.18	82	26	37	28	5	23	2
225	Marina Point	Hills Co. ELAPP	Preservation/Conservation-Idol	2426.5	82	37	26	28	0	15	1
226	Bulldog/Kitchen/Gibson/Troydale Rd?	Hills Co. ELAPP	Preservation/Conservation	14.48	82	35	14	27	59	11	2
227	Troydale Road	Hills Co. ELAPP	Preservation/Conservation-Idol	47.47	82	35	11	27	59	38	2
228	Troydale Road	Hills Co. ELAPP	Preservation/Conservation-Idol	34.82	82	35	37	27	59	48	2
229	Marina Point	Hills Co. ELAPP	Preservation/Conservation-Idol	58.23	82	38	48	28	0	25	2
230	Pepper Mount Creek	Hills Co. ELAPP	Preservation/Conservation-Idol	4.58	82	34	18	27	58	48	1
231	Cypress Street	Hills Co. ELAPP	Preservation/Conservation-Idol	78.68	82	32	33	27	56	55	2
232	Brackins Tract	Hills Co. ELAPP	Preservation/Conservation-Idol	24.15	82	32	30	27	56	39	1
233	South MacDell 48	Hills Co. ELAPP	Preservation/Conservation	44.68	82	29	56	27	52	27	1
234	Cypress Creek	Hills Co. ELAPP	Preservation/Conservation	4013.30	82	34	43	28	7	54	2
235	Cow House Creek Ranch/Cypress Cr.	Hills Co. ELAPP	Preservation/Conservation	962.85	82	33	55	28	4	52	3
236	Cow House Creek Ranch/Cypress Cr.	Hills Co. ELAPP	Preservation/Conservation	796.27	82	33	12	28	4	32	1
237	Lake Park	Hills Co. ELAPP	Preservation/Conservation	529.89	82	30	35	28	7	16	1
238	Bulldog/Kitchen/Gibson	Hills Co. ELAPP	Preservation/Conservation-Idol	875.4	82	23	24	27	50	31	2

PARCEL NO.	PARCEL NAME	OWNERSHIP	LAND USE	ACRES	LONG			LAT			MAP LEGEND
					D	M	S	D	M	S	
239	Bulfinch/Kitchen/Gibson	Hills Co. ELAPP	Preservation/Conservation	133.38	82	23	17	27	48	0	2
240	Boyscout Park - SHWC	Hills Co. ELAPP	Preservation/Conservation	256.45	82	12	34	27	52	17	2
241	Boyscout Park - SHWC	Private	Preservation/Conservation	422.57	82	12	15	27	52	41	3
242	Off Boyette Road	Private	Preservation/Conservation	471.5	82	13	53	27	50	18	3
243	Fish Hawk Park - SHWC	Hills Co. ELAPP	Preservation/Conservation	150.33	82	14	35	27	51	9	1
244	Safford Road	Hills Co. ELAPP	Preservation/Conservation	370.53	82	18	20	27	38	8	1
245	Cow House Creek Ranch	Hills Co. ELAPP	Preservation/Conservation	270.53	82	18	58	28	4	48	2
246	Oakridge	Hills Co. ELAPP	Preservation/Conservation	1005.4	82	18	1	28	8	48	1
247	Hillsborough County River State Park	Hills Co. ELAPP	Passive Recreation	1768.48	82	17	10	28	8	13	1
248	Dairy Farm	Hills Co. ELAPP	Preservation/Conservation	386.27	82	14	21	28	8	15	1
249	Cypress Creek	Hills Co. ELAPP	Preservation/Conservation	2453.32	82	22	27	28	9	47	2
250	Cypress Creek	Hills Co. ELAPP	Preservation/Conservation	2529.86	82	23	48	28	7	34	3
251	Riverhills Park Addition	Hills Co. ELAPP	Preservation/Conservation	61.31	82	22	57	28	0	50	2
252	Riverhills Park Addition	Hills Co. ELAPP	Preservation/Conservation	17.94	82	23	10	28	1	11	1
253	North Prong Portion - SHWC	Hills Co. ELAPP	Preservation/Conservation	849.8	82	3	49	27	55	6	2
254	Genoa Property	Hills Co. ELAPP	Preservation/Conservation	673.7	82	29	38	28	8	11	2
255	North Prong Portion - SHWC	Hills Co. ELAPP	Preservation/Conservation	1365.7	82	6	15	27	52	35	2
256	Green Swamp Riverine Cor. (GSFDA)	SWFWMD	Preservation/Conservation	37501.96	82	6	2	28	32	4	1
257	Pasco 1	SWFWMD	Preservation/Conservation	22734.24	82	26	34	28	18	41	1
258	St. Pete Wetfield	City of St. Petersburg	Preservation/Conservation	1319.88	82	22	27	28	17	47	1
259	Cypress Creek FDA (Reservoir)	SWFWMD	Preservation/Conservation	5698.12	82	24	58	28	18	13	1
260	Little Gator Creek State Park	Fl. Int. Imp. Trust Fund	Passive Recreation	573.54	82	3	51	28	17	47	1
261	Green Swamp Riverine Cor. (GSFDA)	SWFWMD	Preservation/Conservation	40.22	82	3	44	28	18	4	1
262	Green Swamp	SWFWMD	Preservation/Conservation	1962.64	82	8	58	28	17	22	1
263	Green Swamp	SWFWMD	Preservation/Conservation	323.53	82	3	52	28	17	8	1
264	Wetlands/Hills Riverine Corridor-D	SWFWMD	Preservation/Conservation	3.25	82	7	20	28	18	8	1
265	Unknown/Unnamed	SWFWMD	Preservation/Conservation	3.66	82	25	48	28	15	30	1
266	Green Swamp	Fl. Int. Imp. Trust Fund	Preservation/Conservation	1298.96	82	1	53	28	14	44	1
267	Wetlands/Hills Riverine Corridor (GSFDA)	SWFWMD	Preservation/Conservation	6817.36	82	8	54	28	14	43	1
268	Cypress Creek	SWFWMD	Preservation/Conservation	3.66	82	26	18	28	14	58	1
269	Cypress Creek	SWFWMD	Preservation/Conservation	4.38	82	26	17	28	14	45	1
270	Alston Tract	SWFWMD	Preservation/Conservation	8407.47	82	4	1	28	12	4	1
271	Cypress Creek	SWFWMD	Preservation/Conservation	550.51	82	25	0	28	13	18	1
272	Cypress Creek	SWFWMD	Preservation/Conservation	14.63	82	24	36	28	14	11	1

PARCEL NO.	PARCEL NAME	OWNERSHIP	LAND USE	ACRES	LONG			LAT			MAP LEGEND
					D	M	S	D	M	S	
273	Zephyrhills Mun. Airport	Hills Co.	Passive Recreation	845.3	82	9	34	28	13	38	5
274	Cypress Creek FDA (Reservoir)	SWFWMD	Preservation/Conservation	1150.37	82	24	47	28	12	5	1
275	Hillsborough Riverine Corridor-C	SWFWMD	Preservation/Conservation	1306.65	82	10	5	28	11	23	1
276	Cypress Creek	SWFWMD	Preservation/Conservation	35.97	82	24	14	28	12	3	1
277	Cypress Creek	SWFWMD	Preservation/Conservation	42.71	82	25	17	28	11	51	1
278	Alston Tract	SWFWMD	Preservation/Conservation	1257.57	82	7	0	28	11	17	1
279	Alston Tract	SWFWMD	Preservation/Conservation	26.3	82	6	8	28	11	40	1
280	Cypress Creek	SWFWMD	Preservation/Conservation	139.23	82	24	23	28	11	19	1
281	Alston Tract	SWFWMD	Preservation/Conservation	2750.3	82	6	27	28	11	3	1
282	Brooker Creek Headwaters	SWFWMD	Preservation/Conservation	882.1	82	32	34	28	9	44	1
283	Brooker Creek Headwaters	SWFWMD	Preservation/Conservation	952.28	82	33	32	28	8	17	1
284	Brooker Creek Headwaters	SWFWMD	Preservation/Conservation	534.28	82	33	57	28	8	44	1
285	Brooker Creek	Pinellas County	Preservation/Conservation	5843.94	82	38	45	28	8	28	1
286	Brooker Creek Headwaters	SWFWMD	Preservation/Conservation	46.58	82	33	7	28	8	1	1
287	Brooker Creek Headwaters	SWFWMD	Preservation/Conservation	20.07	82	33	29	28	7	50	1
288	Lake Tarpon Sink Enclosure	SWFWMD	Preservation/Conservation	10.14	82	44	18	28	7	32	1
289	Lake Rogers	SWFWMD	Preservation/Conservation	559.44	82	35	22	28	6	21	5
290	Lake Tarpon Outfall Canal	SWFWMD	Preservation/Conservation	216.85	82	42	34	28	2	58	1
291	Sweetwater Creek Watershed	SWFWMD	Preservation/Conservation	0.94	82	30	1	28	4	28	1
292	Sweetwater Creek Watershed	SWFWMD	Preservation/Conservation	0.18	82	28	58	28	4	4	1
293	Sweetwater Creek Watershed	SWFWMD	Preservation/Conservation	0.31	82	28	48	28	3	30	1
294	Tampa Cypress Canal	SWFWMD	Preservation/Conservation	1381.34	82	21	34	27	58	37	1
295	Sweetwater Creek Watershed	SWFWMD	Preservation/Conservation	0.39	82	30	20	28	3	4	1
296	Sweetwater Creek Watershed	SWFWMD	Preservation/Conservation	1.56	82	30	23	28	3	52	1
297	Sweetwater Creek Watershed	SWFWMD	Preservation/Conservation	0.22	82	30	23	28	2	46	1
298	Sweetwater Creek Watershed	SWFWMD	Preservation/Conservation	2.72	82	30	26	28	2	34	1
299	ELAPP #3	Hills Co. ELAPP	Preservation/Conservation	14.66	82	22	55	28	1	45	1
300	Rowlett Park	Hills Co.	Passive Recreation	396.06	82	25	38	28	1	19	5
301	ELAPP #1	Hills Co. ELAPP	Preservation/Conservation	9.96	82	22	45	28	0	42	1
302	Tampa International Airport	City of Tampa	Airport Right of Way	3486.94	82	32	6	27	58	39	5
303	Lakeland Municipal Airport	Polk County	Airport Right of Way	1161.00	82	1	15	27	59	14	5
304	Alligator Creek	SWFWMD	Passive Recreation	11.80	82	42	48	27	58	34	1
305	Alligator Creek	SWFWMD	Passive Recreation	34.23	82	43	18	27	58	33	1
306	Medford Park	SWFWMD	Passive Recreation	1284.18	82	9	37	27	56	27	1

PARCEL NO.	PARCEL NAME	OWNERSHIP	LAND USE	ACRES	LONG			LAT			MAP
					D	M	S	D	M	S	
307	USCG Air Station	Department of Defense	Military Base	1179.17	82	41	11	27	54	20	5
308	YMCA	SWFWMD	Passive Recreation	50.95	82	48	37	27	54	48	1
309	Sunny Lake	SWFWMD	Preservation/Conservation	18.56	82	48	18	27	54	38	1
310	St. Pete. CMT. Airport	Pinellas Co.	Passive Recreation-Idle	7.40	82	40	31	27	54	41	5
311	MacDill Air Force Base	Department of Defense	Military Base	5803.15	82	30	10	27	50	42	5
312	Bird Branch Headwaters	FL Int. Imp. Trust Fund	Preservation/Conservation	3382.87	82	8	11	27	50	12	1
313	Book Cliffs Bay Park	Pinellas Co.	Passive Recreation-Idle	129.06	82	48	46	27	50	3	1
314	Golden Aster Scrub	FL Int. Imp. Trust Fund	Preservation/Conservation	1195.73	82	21	50	27	48	30	1
315	Jones Creek	SWFWMD	Preservation/Conservation	8.71	82	41	34	27	48	58	1
316	Jones Creek	SWFWMD	Preservation/Conservation	8.34	82	40	52	27	48	53	1
317	Jones Creek	SWFWMD	Preservation/Conservation	10.7	82	40	9	27	48	43	1
318	Balm Doyette Scrub	Hills. Co. - ELAPP	Preservation/Conservation	1316.86	82	10	36	27	48	29	1
319	Bird Key	Department of Interior	Preservation/Conservation-Idle	66.74	82	41	30	27	42	4	1
320	Little Manatee River	SWFWMD	Preservation/Conservation	15262.86	82	13	18	27	36	0	1
322	Little Manatee River	SWFWMD	Preservation/Conservation	239.94	82	28	2	27	40	29	1
323	Little Manatee River	SWFWMD	Preservation/Conservation	799.76	82	28	33	27	40	48	1
324	Little Bird Key	Department of Interior	Preservation/Conservation-Idle	1.43	82	43	1	27	41	5	1
325	Little Manatee River	SWFWMD	Preservation/Conservation	1652.3	82	23	49	27	40	25	1
326	Little Manatee River State Res. Area	FL Int. Imp. Trust Fund	Passive Recreation	1262.31	82	22	7	27	40	23	1
327	Little Manatee River	SWFWMD	Preservation/Conservation	796.14	82	25	5	27	40	11	1
328	Tarpon Key	Department of Interior	Preservation/Conservation-Idle	281.41	82	41	27	27	38	59	1
329	Jackson Key	Department of Interior	Preservation/Conservation-Idle	3.53	82	43	3	27	40	7	1
330	Little Manatee River	SWFWMD	Preservation/Conservation	235.75	82	25	51	27	39	41	1
331	unknown/unnamed	SWFWMD	Preservation/Conservation	2.06	82	24	44	27	39	51	1
332	Cunningham Key	Department of Interior	Preservation/Conservation-Idle	1.22	82	43	4	27	39	40	1
333	Cunningham Key	Department of Interior	Preservation/Conservation-Idle	2.8	82	43	5	27	39	33	1
334	Sun City Center Airport	Hills. Co.	Airport Right of Way	366.78	82	18	47	27	39	15	5
335	Pt. DeSoto	Pinellas County	Passive Recreation-Idle	21.57	82	44	34	27	38	48	1
336	unknown/unnamed	SWFWMD	Preservation/Conservation-Idle	315.89	82	33	29	27	37	23	5
337	Dudley Park	Manatee County	Preservation/Conservation	2098.16	82	9	14	27	36	40	1
338	unknown/unnamed	SWFWMD	Preservation/Conservation	94.91	82	7	47	27	36	31	1
339	Egmont Key	Department of Interior	Preservation/Conservation-Idle	262	82	45	48	27	35	29	1
340	unknown/unnamed	SWFWMD	Preservation/Conservation	5569.33	82	10	26	27	34	2	1
341	unknown/unnamed	SWFWMD	Preservation/Conservation	75.55	82	29	42	27	35	18	1

PARCEL NO.	PARCEL NAME	OWNERSHIP	LAND USE	ACRES	LONG			LAT			MAP
					D	M	S	D	M	S	
342	Madras Bickel Mound Historic Site	FL Int. Imp. Trust Fund	Passive Recreation-Idle	13.38	82	35	32	27	33	57	1
343	Passage Key	Department of Interior	Preservation/Conservation-Idle	17.62	82	44	32	27	33	15	1
344	Lake Manatee Lower Watershed	SWFWMD	Preservation/Conservation	20903.53	82	14	42	27	31	53	1
345	DeSoto National Memorial	Department of Interior	Passive Recreation-Idle	34.61	82	36	36	27	31	24	1
346	Gamble Plantation State Historic Site	FL Int. Imp. Trust Fund	Passive Recreation	13.04	82	31	36	27	31	20	1
347	Lake Manatee State Res. Area	FL Int. Imp. Trust Fund	Passive Recreation	1407.05	82	21	9	27	29	9	1
348	unknown/unnamed	SWFWMD	Preservation/Conservation	3343.99	82	13	59	27	29	40	1
349	Lake Manatee Lower Watershed	SWFWMD	Preservation/Conservation	1213.99	82	19	51	27	29	45	1
350	unknown/unnamed	SWFWMD	Preservation/Conservation	79.93	82	10	54	27	29	10	1
351	Lake Manatee Lower Watershed	SWFWMD	Preservation/Conservation	2432.84	82	12	17	27	26	49	1
352	Church	Hills. Co. Parks & Rec.	Passive Recreation	5.75	82	35	6	28	0	1	1
353	Northwest Landfill	Hills. Co.	Preservation/Conservation	5.27	82	34	38	28	2	27	1
354	Sheldon Road	Hills. Co.	Preservation/Conservation	53.03	82	35	9	28	3	41	1
355	Keystone	Hills. Co.	Passive Recreation	19.54	82	34	36	28	6	0	1
356	Gray & Chelsea	Hills. Co.	Preservation/Conservation	19.06	82	33	32	27	59	11	1
357	Dickerson	Hills. Co. Parks & Rec.	Passive Recreation	8.39	82	33	34	27	59	40	1
358	Westgate	Hills. Co.	Passive Recreation	5.93	82	34	1	27	59	53	1
359	Town N' Country	Hills. Co.	Passive Recreation	5.89	82	33	33	28	0	9	1
360	Shenberger	Hills. Co.	Passive Recreation	1.37	82	33	32	28	0	52	1
361	Canal Trails	Hills. Co.	Preservation/Conservation	5.41	82	33	53	28	0	40	1
362	Logan Gate	Hills. Co.	Preservation/Conservation	27.29	82	34	3	28	2	37	1
363	Suganwood	Hills. Co.	Passive Recreation	12.52	82	33	47	28	3	35	1
364	Skyway	Hills. Co.	Passive Recreation	17.26	82	32	54	27	58	17	2
365	Country Run	Hills. Co.	Preservation/Conservation	7.7	82	32	19	28	3	0	1
366	Alexander	Hills. Co.	Passive Recreation	5.11	82	31	30	28	0	9	1
367	Timberlin	Hills. Co.	Passive Recreation	7.8	82	31	31	28	3	13	1
368	Country Place	Hills. Co.	Passive Recreation	4.72	82	31	28	28	3	11	1
369	Carrollwood	Hills. Co.	Passive Recreation	8.75	82	30	7	28	3	13	1
370	Forest Hills	Hills. Co.	Passive Recreation	18.39	82	29	10	28	2	13	1
371	Northlake	Hills. Co.	Passive Recreation	24.87	82	28	31	28	6	11	1
372	Lutz Athletic	FOOT	Passive Recreation	42.36	82	28	24	28	9	50	1
373	Lowy	City of Tampa	Passive Recreation	66.2	82	28	12	28	0	50	1
374	Lutz Memorial	Hills. Co.	Passive Recreation	19.37	82	28	25	28	9	9	1
375	Dunwoody	FOOT	Passive Recreation	8.57	82	26	26	27	42	3	1

PARCEL NO.	PARCEL NAME	OWNERSHIP	LAND USE	ACRES	LONG			LAT			MAP
					D	M	S	D	M	S	
376	Baudett	Hills Co.	Passive Recreation	14.7	82	25	58	27	42	17	1
377	Hay 41 Fishing Pier	Hills Co.	Passive Recreation-Isd	13.52	82	27	11	27	42	30	1
378	Ruskin Commons/Golf	Hills Co.	Passive Recreation	1.4	82	26	10	27	43	8	1
379	Capeand	City of Tampa	Passive Recreation	8.88	82	26	22	28	2	49	1
380	Marl, Unit #1	Hills Co.	Passive Recreation	15.34	82	26	54	28	4	20	1
381	Wildcat Creek	SWFWMD	Passive Recreation	33.58	82	25	51	27	46	28	1
382	Sundance	SWFWMD	Preservation/Conservation	100.88	82	25	23	27	39	49	1
383	Ruskin School	Hills Co.	Passive Recreation	4.29	82	25	29	27	42	53	1
384	Apollo Beach	Hills Co.	Passive Recreation	15.38	82	24	40	27	45	50	1
385	Mucilo	Hills Co.	Passive Recreation	8.31	82	24	26	28	0	27	1
386	Summer Acres	Hills Co.	Preservation/Conservation	49.37	82	24	0	27	40	5	1
387	Williams	FL Int. Imp. Trust Fund	Passive Recreation-Isd	5.34	82	23	6	27	51	37	1
388	Lafure Lake	SWFWMD	Passive Recreation	93.09	82	22	31	28	4	20	1
389	Bulhog Creek	Hills Co.	Passive Recreation	70.15	82	20	58	27	47	46	1
390	Progress Village	Hills Co.	Passive Recreation	9.53	82	21	42	27	53	39	1
391	Simmers/Bowers	Hills Co.	Passive Recreation	9.81	82	22	4	27	55	4	1
392	Veterans Memorial	SWFWMD	Passive Recreation	13.17	82	22	2	27	58	22	1
393	Kings Forest	FL State Fair Auth.	Passive Recreation	192.2	82	21	51	27	59	14	5
394	Eureka Springs	Hills Co.	Passive Recreation	18.33	82	20	44	28	0	25	1
395	Wimauma	Hills Co.	Passive Recreation	35.54	82	18	48	27	42	25	1
396	Providence	Hills Co.	Passive Recreation	6.69	82	19	2	27	53	43	1
397	East Point Construction	FDOT	Preservation/Conservation	6.95	82	20	11	28	0	1	1
398	Trout Creek	SWFWMD	Passive Recreation	170.23	82	20	18	28	5	32	1
399	Maria Bridge	SWFWMD	Passive Recreation	36.92	82	18	58	28	5	50	1
400	Livonia	Hills Co.	Passive Recreation	8.95	82	18	33	27	57	39	1
401	Thornhollow Elementary	Hills Co.	Passive Recreation	19.09	82	18	32	28	3	5	1
402	Sterling Heights	SWFWMD	Passive Recreation	117.46	82	19	20	28	3	54	1
403	Dethune	Hills Co.	Passive Recreation	5.93	82	18	3	27	43	0	1
404	J.C. Handy	Hills Co.	Passive Recreation	46.35	82	17	53	27	53	55	1
405	Mid Lake Park	Hills Co. Parks & Rec.	Passive Recreation	8.8	82	18	6	27	58	28	1
406	Mango	Hills Co.	Passive Recreation	5.81	82	18	5	27	59	14	1
407	Hilatorough Heights	Hills Co.	Preservation/Conservation	79.01	82	17	54	28	0	44	1
408	Evans	Hills Co.	Passive Recreation	14.27	82	16	48	28	0	34	1
409	First Creek	SWFWMD	Passive Recreation	55.74	82	16	58	28	4	54	1

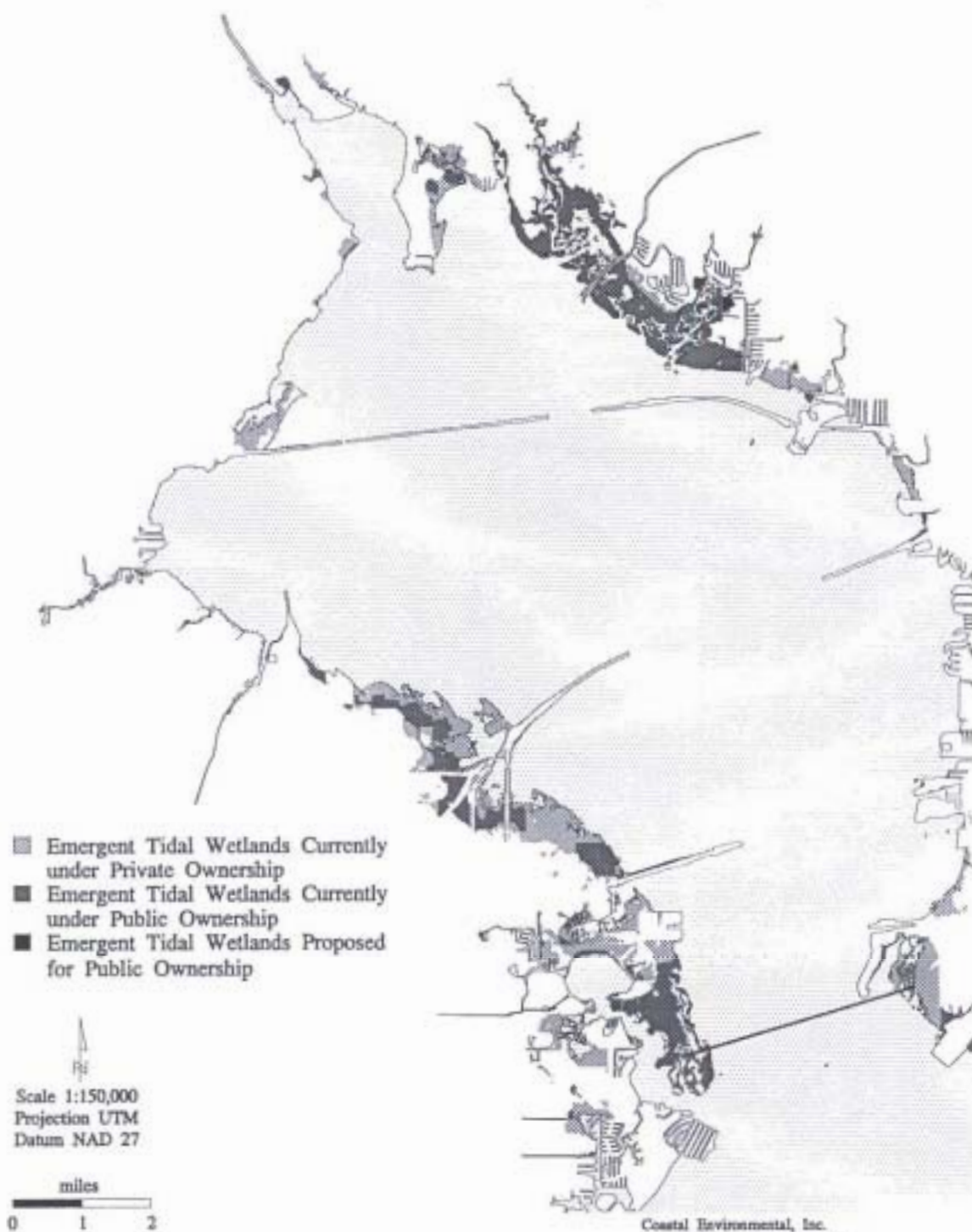
PARCEL NO.	PARCEL NAME	OWNERSHIP	LAND USE	ACRES	LONG			LAT			MAP
					D	M	S	D	M	S	
410	Flat Woods	SWFWMD	Passive Recreation	5.79	82	18	11	28	6	41	1
411	Clayton	Hills Co.	Passive Recreation	18.02	82	17	18	27	55	38	1
412	Brandon	Hills Co.	Passive Recreation	4.95	82	16	45	27	56	32	1
413	North Brandon	Hills Co.	Passive Recreation	16.8	82	16	44	27	58	5	1
414	Bain	Hills Co.	Passive Recreation	9.3	82	15	22	27	45	43	1
415	Shadow Run	Hills Co.	Preservation/Conservation	96.29	82	16	37	27	50	47	1
416	Lake Weeks	Hills Co.	Passive Recreation	13.95	82	16	7	27	58	59	1
417	Selfner	Hills Co.	Passive Recreation	18.08	82	16	13	27	58	58	1
418	Deer River	SWFWMD	Passive Recreation	122.84	82	15	23	28	7	43	1
419	Valrico	Hills Co.	Passive Recreation	5.87	82	15	22	27	56	38	1
420	Ardoch	Hills Co.	Passive Recreation	19.53	82	14	31	28	5	7	1
421	Turkey Creek	Hills Co.	Passive Recreation	9.53	82	10	25	27	56	44	1
422	Thacher	Hills Co.	Passive Recreation	20.72	82	8	37	27	44	33	1
423	Island 2D	Tampa Port Authority	Preservation/Conservation-Isd	394.31	82	26	10	27	49	50	1
424	Island 3D	Tampa Port Authority	Preservation/Conservation-Isd	552.62	82	25	51	27	52	29	1
425	Emerson Pt.	SWFWMD	Passive Recreation-Isd	243.43	82	37	58	27	32	3	1
426	Lx, Maguire	City of St. Petersburg	Passive Recreation	378.51	82	39	11	27	44	11	1
427	Phonix Island	City of Tampa	Passive Recreation-Isd	143.85	82	33	2	27	51	19	1
428	Alafia Bank W.	National Audubon Soc.	Preservation/Conservation-Isd	10.85	82	24	28	27	50	55	1
429	Alafia Bank E.	National Audubon Soc.	Preservation/Conservation-Isd	37.32	82	24	53	27	50	50	1
430	DeSoto Park	City of Bradenton	Passive Recreation-Isd	58.38	82	25	12	27	56	59	1
431	Clear Bayou	City of St. Petersburg	Preservation/Conservation-Isd	6.17	82	41	21	27	44	34	1
432	Gulfport Mun. Bch.	City of Gulfport	Passive Recreation-Isd	55.67	82	42	29	27	44	19	1
433	P2000 Manatee Co.	SWFWMD	Preservation/Conservation	1256.32	82	5	38	27	35	43	1
434	SR 75 Swm Braden River	Manatee Co.	Preservation/Conservation	136.07	82	30	1	27	27	11	1
435	Manatee Co. PK.	Manatee Co.	Passive Recreation-Isd	10.96	82	32	16	27	29	43	1
436	Lewis Park	Manatee Co.	Passive Recreation-Isd	10.99	82	35	22	27	29	54	1
437	Warrers Bayou Pk	Manatee Co.	Passive Recreation-Isd	40.05	82	37	7	27	30	30	1
438	Fifty First St. Pk	Manatee Co.	Passive Recreation	10.99	82	38	43	27	28	17	1
439	G.T. Gray Park	Manatee Co.	Passive Recreation	55.91	82	37	15	27	28	5	1
440	Palma Sole Park	Manatee Co.	Passive Recreation	10.99	82	38	33	27	27	37	1
441	Palma Sole South	Manatee Co.	Passive Recreation-Isd	119.85	82	40	17	27	29	25	1
442	Laffa Key	SRNEP	Passive Recreation-Isd	14.88	82	41	21	27	27	8	1
443	Palma Island	Manatee Co.	Preservation/Conservation-Isd	147.95	82	40	59	27	30	28	2

PARCEL NO.	PARCEL NAME	OWNERSHIP	LAND USE	ACRES	LONG			LAT			MAP LEGEND
					O	M	S	D	M	S	
444	Palma Sola Tip	Manatee Co.	Preservation/Conservation-Isd	389.09	82	40	14	27	30	46	2
445	Manatee Co. Sch.	Manatee Co.	Passive Recreation - Isd	45.05	82	42	38	27	29	48	1
446	Borrow Pit	Manatee Co.	Passive Recreation	158.54	82	33	2	27	31	52	1
447	Terra Cotta Isle	SWFARM	Passive Recreation-Isd	1528.18	82	34	15	27	35	15	2
448	Garland Trust Property	Manatee Co.	Passive Recreation-Isd	94.06	82	36	35	27	32	26	2
449	Upper Tampa Bay	Hills, Co. Parks & Rec.	Passive Recreation-Isd	254.63	82	38	17	28	1	28	1
450	Jackson Springs	Hills, Co. Parks & Rec.	Preservation/Conservation	18.62	82	34	46	28	0	34	1
451	Gandy	Hills, Co. Parks & Rec.	Passive Recreation	12.03	82	29	11	28	3	34	1
452	Kingsway	Hills, Co. Parks & Rec.	Passive Recreation	7.81	82	17	34	27	53	38	1
453	Alafia River	Hills, Co. Parks & Rec.	Passive Recreation	43.09	82	17	58	27	52	36	1
454	Riverview	Hills, Co. Parks & Rec.	Passive Recreation	13.96	82	18	20	27	51	37	1
455	Riverview Elementary	Hills, Co. Parks & Rec.	Passive Recreation	7.2	82	19	30	27	52	35	1
456	J.B. Gibson	Hills, Co. Parks & Rec.	Passive Recreation-Isd	21.86	82	21	18	27	51	12	1
457	Gardenville	Hills, Co. Parks & Rec.	Passive Recreation-Isd	23.18	82	22	43	27	50	5	1
458	Gardenier	Hills, Co. Parks & Rec.	Passive Recreation-Isd	8.15	82	22	58	27	51	49	1
459	Salced Point	City of Tampa	Passive Recreation-Isd	21.63	82	28	55	27	53	18	1
460	Little Manatee	Hills, Co. Parks & Rec.	Passive Recreation	15.34	82	27	34	27	41	41	1
461	Roy Hayes	Hills, Co. Parks & Rec.	Passive Recreation-Isd	51.04	82	32	15	27	53	21	1
462	Courtney Campbell (Ben T. Davis)	Hills, Co. Parks & Rec.	Passive Recreation-Isd	66.83	82	36	18	27	58	20	1
463	Deerfield	Hills, Co. Parks & Rec.	Passive Recreation	9.81	82	35	31	26	1	40	1
464	Cirrus	Hills, Co. Parks & Rec.	Passive Recreation	49.44	82	34	22	28	4	26	1
465	Candlewood Meadows	Hills, Co. Parks & Rec.	Passive Recreation	15.82	82	33	12	28	4	32	1
466	Country Place West	Hills, Co. Parks & Rec.	Preservation/Conservation	13.81	82	32	35	28	5	52	1
467	Davis Island	Hills, Co. Parks & Rec.	Passive Recreation-Isd	40.81	82	27	25	27	56	3	1
468	Riverfront	City of Tampa	Passive Recreation-Isd	15.33	82	28	1	27	57	14	1
469	MacFadden	City of Tampa	Passive Recreation	14.65	82	29	37	27	58	3	1
470	Al Lupton	City of Tampa	Passive Recreation	40.32	82	30	18	27	59	21	1
471	Buika Street	Hills, Co. Parks & Rec.	Passive Recreation	6.52	82	29	56	28	0	8	1
472	Egypt Lake	Hills, Co. Parks & Rec.	Passive Recreation	16.13	82	29	52	28	0	34	1
473	Jean	Hills, Co. Parks & Rec.	Passive Recreation	12.03	82	28	52	28	3	52	1
474	Mot	Hills, Co. Parks & Rec.	Passive Recreation	12.94	82	26	27	28	5	7	1
475	Nye	Hills, Co. Parks & Rec.	Passive Recreation	18.44	82	26	43	28	8	43	1
476	Bulard	Hills, Co. Parks & Rec.	Passive Recreation	18.44	82	27	47	28	9	34	1
477	Winston	Hills, Co. Parks & Rec.	Passive Recreation	18.72	82	22	15	27	56	20	1

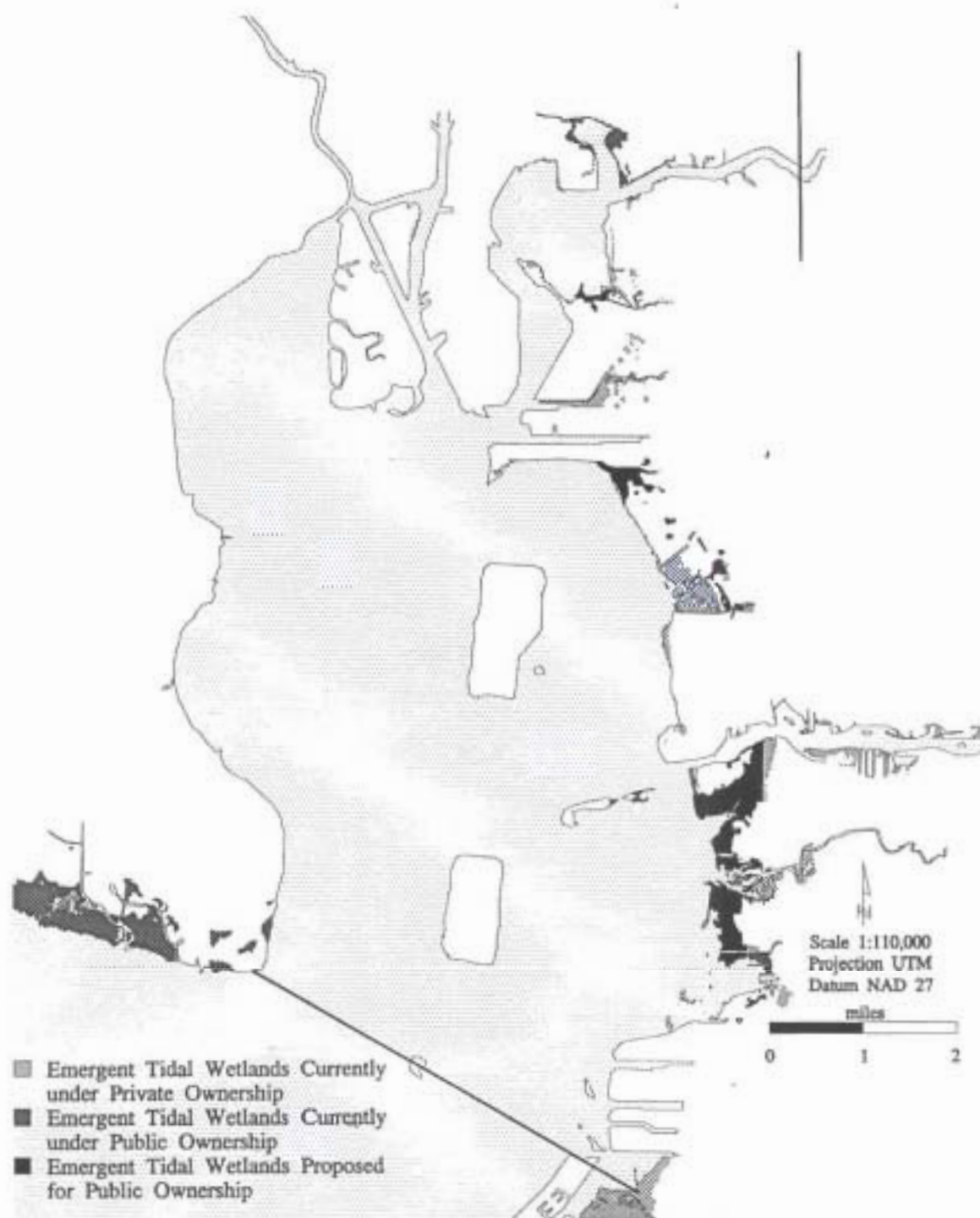
PARCEL NO.	PARCEL NAME	OWNERSHIP	LAND USE	ACRES	LONG			LAT			MAP LEGEND
					O	M	S	D	M	S	
478	Palin River	Hills, Co. Parks & Rec.	Passive Recreation	16.53	82	23	38	27	56	21	1
479	Karly	Hills, Co. Parks & Rec.	Passive Recreation	18.86	82	23	10	27	58	15	1
480	Deerfield	Hills, Co. Parks & Rec.	Passive Recreation	29.37	82	4	37	27	57	24	1
481	Springhead	Hills, Co. Parks & Rec.	Passive Recreation	7.82	82	4	22	27	56	1	1
482	Thonotosassa	Hills, Co. Parks & Rec.	Passive Recreation	13.58	82	17	45	28	3	32	1
483	Dover District	Hills, Co. Parks & Rec.	Passive Recreation	22.15	82	14	34	27	59	15	1
484	Dover	Hills, Co. Parks & Rec.	Passive Recreation	11.33	82	13	14	27	58	49	1
485	Little Clubhouse	Hills, Co. Parks & Rec.	Passive Recreation	32.1	82	10	43	27	50	57	1
486	Knight/Giffin	Hills, Co. Parks & Rec.	Passive Recreation	7.96	82	8	29	28	4	47	1
487	Aquatic Preserve	FL Int. Imp. Trust Fund	Preservation/Conservation-Isd	366720.24	82	55	48	27	55	36	4
487	Aquatic Preserve	FL Int. Imp. Trust Fund	Preservation/Conservation-Isd	4305.23	82	30	52	27	42	26	4
487	Aquatic Preserve	FL Int. Imp. Trust Fund	Preservation/Conservation-Isd	21914.77	82	39	12	27	35	7	4

APPENDIX E
Emergent Tidal Wetlands in Public Ownership

EXISTING AND PROPOSED PUBLICLY-OWNED EMERGENT TIDAL WETLANDS Old Tampa Bay

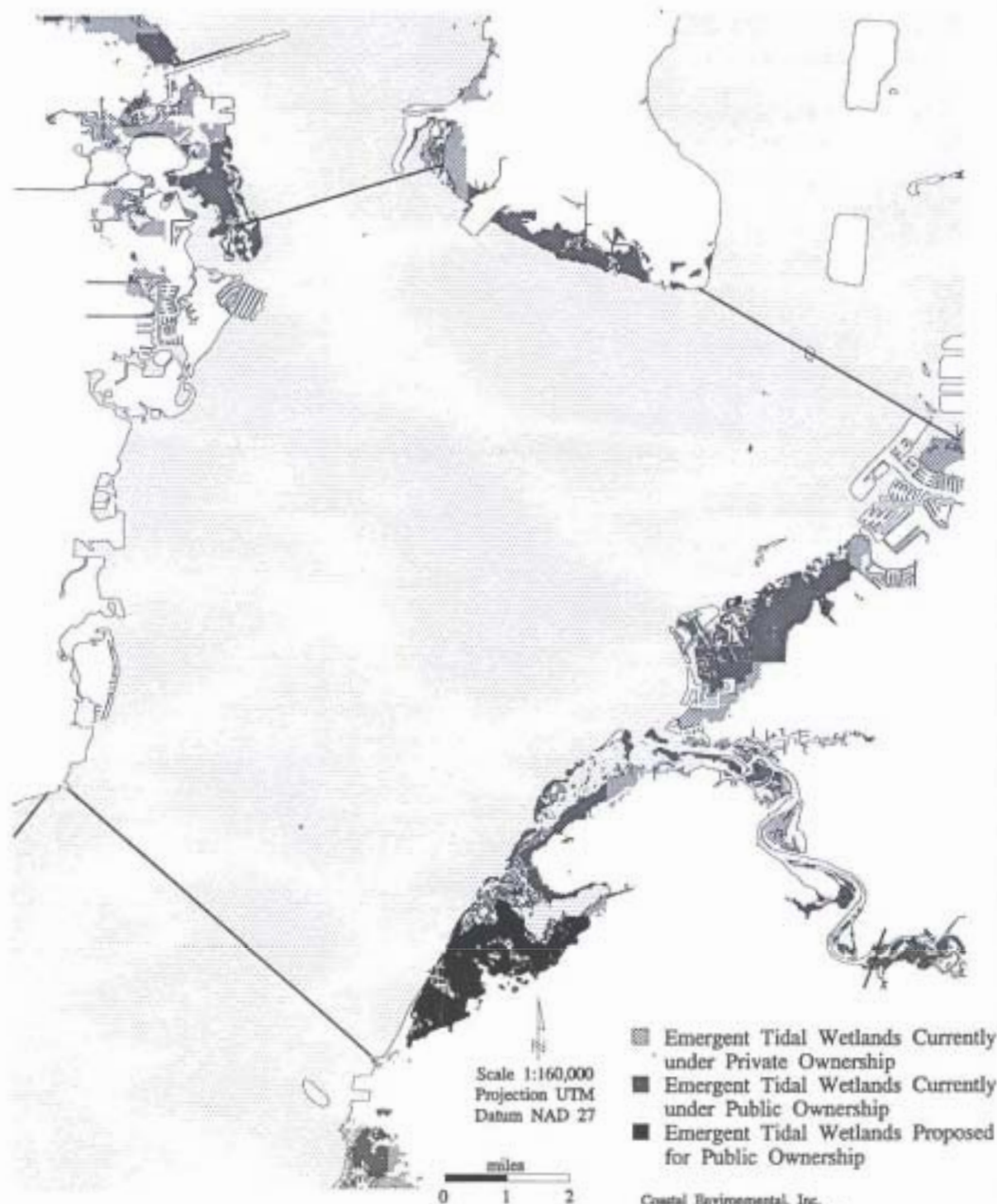


EXISTING AND PROPOSED PUBLICLY-OWNED
EMERGENT TIDAL WETLANDS
Hillsborough Bay



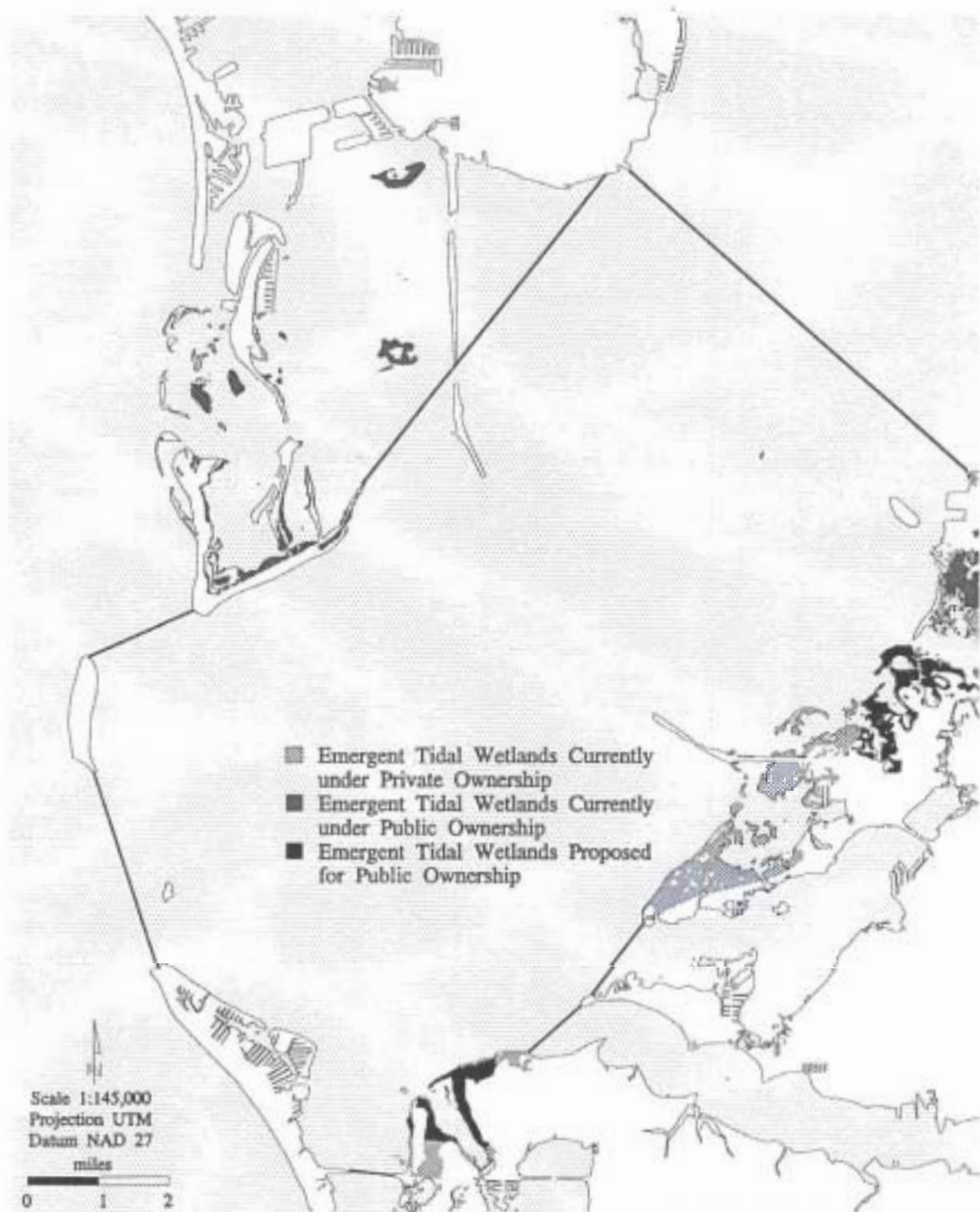
Coastal Environmental, Inc.
Map Publication No: S9538001

EXISTING AND PROPOSED PUBLICLY-OWNED
EMERGENT TIDAL WETLANDS
Middle Tampa Bay



EXISTING AND PROPOSED PUBLICLY-OWNED EMERGENT TIDAL WETLANDS

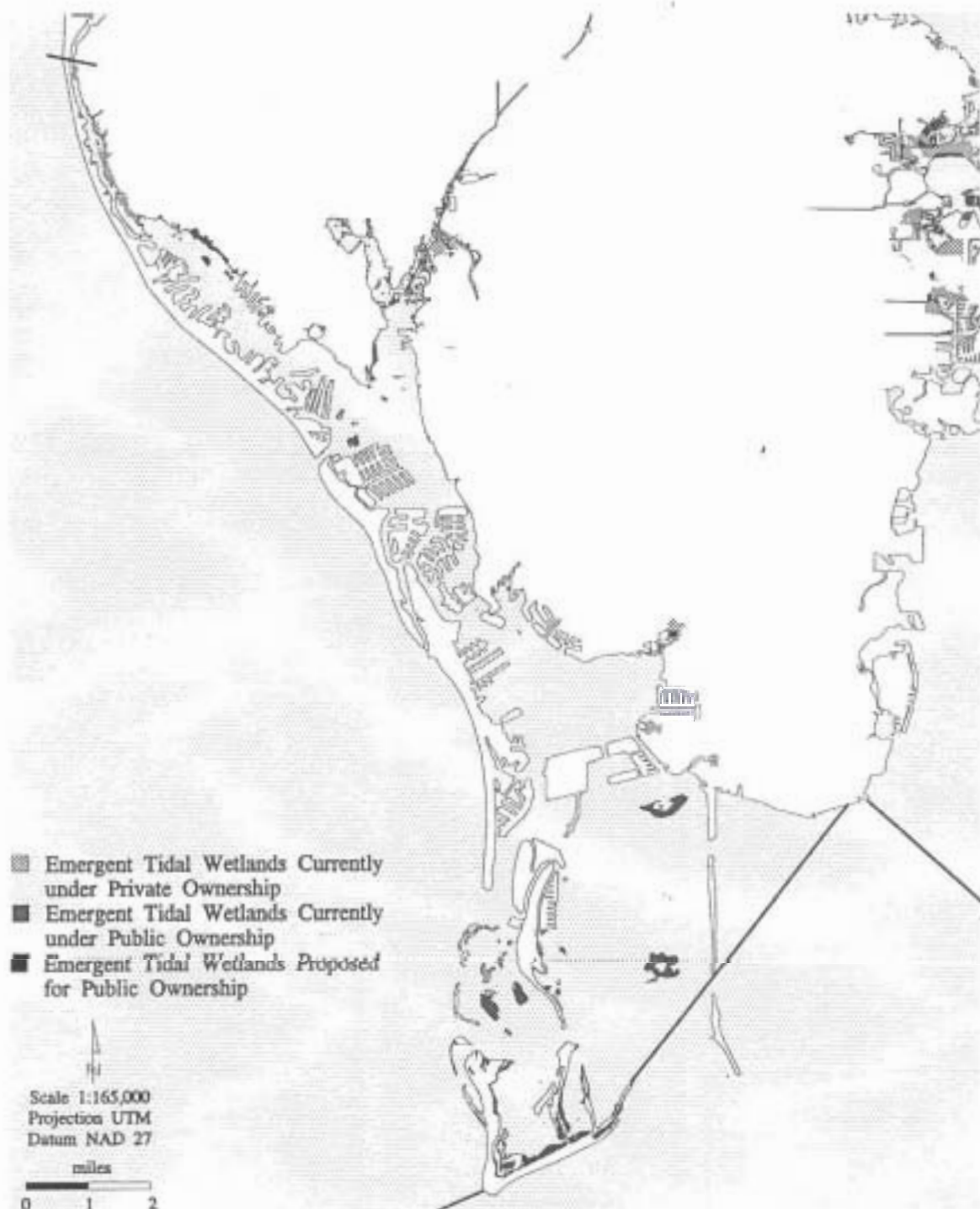
Lower Tampa Bay



Coastal Environmental, Inc.
Map Publication No: 59538201

EXISTING AND PROPOSED PUBLICLY-OWNED EMERGENT TIDAL WETLANDS

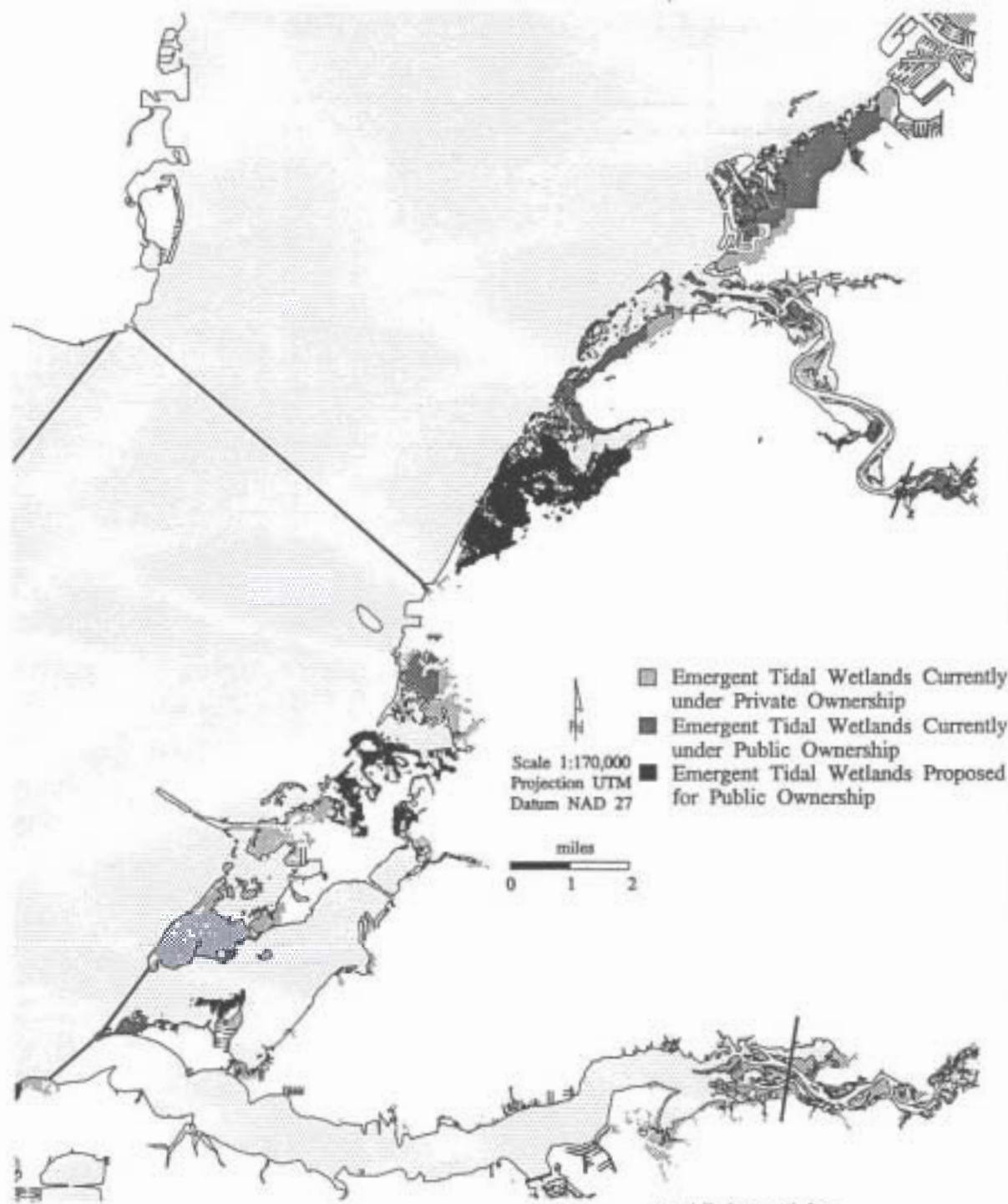
Boca Ciega Bay



Coastal Environmental, Inc.
Map Publication No: 59538301

EXISTING AND PROPOSED PUBLICLY-OWNED EMERGENT TIDAL WETLANDS

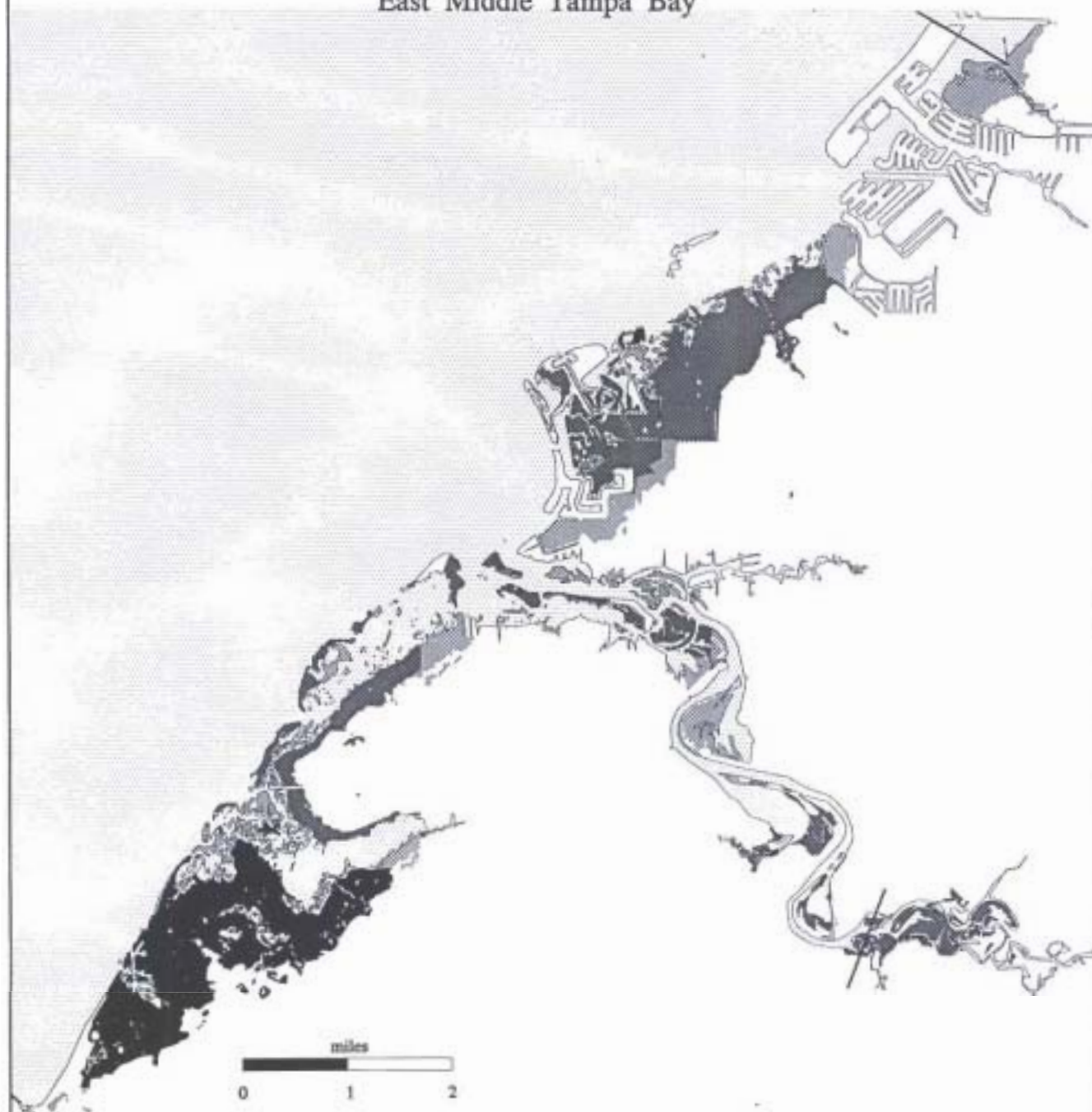
Terra Ceia Bay and Manatee River



Coastal Environmental, Inc.
Map Publication No: 59538401

EXISTING AND PROPOSED PUBLICLY-OWNED EMERGENT TIDAL WETLANDS

East Middle Tampa Bay



Scale 1:95,000
Projection UTM
Datum NAD 27

- Emergent Tidal Wetlands Currently under Private Ownership
- Emergent Tidal Wetlands Currently under Public Ownership
- Emergent Tidal Wetlands Proposed for Public Ownership

Coastal Environmental, Inc.
Map Publication No: 89538501

APPENDIX F
FDEP Comments



Department of Environmental Protection

Lawton Chiles
Governor

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

Virginia B. Wetherall
Secretary

Date: November 14, 1995

To: Holly Greening, Senior Scientist

From: Stormy Ingold, Environmental Specialist

Subject: Habitat Protection and Restoration Plan

On behalf of the FDEP, I would like to thank you for the opportunity to review the TBNEP's final draft report for habitat protection and restoration. Please consider the following comments:

1. The "criteria for acquisition matrix and ranking" in Table 19 are neither adequate nor appropriate for the purpose to which they have been applied. These criteria were extracted from the draft provisions for the Florida Pollution Recovery Program and were intended to be used to aid the FDEP's restoration staff in evaluating proposals for pollution recovery and restoration projects from state and local governments. The criteria apply only to that particular program, not to other ecosystem management activities, and do not address acquisition. While the criteria have been revised and the provisions redrafted and adopted as FDEP policy, they still do not adequately speak to acquisition. (I have included a copy of the new provisions for your information, however.)

It is my suggestion that the plan should attempt to consolidate the criteria used by various state and local acquisition programs, such as Save Our Rivers, CARL, and SLAPP. It is also preferable that these criteria be sifted through and the restoration subcommittee and/or any other qualified people (the contractors, for example) add/delete/modify as they see fit.

2. I believe any committee will find it difficult to assign an objective score to each criteria. The ability to weight the scores and be reasonably subjective may be necessary.

For example, as valued in Table 19, a site could earn more points

for all "not applicable" criteria than to have several "yes" criteria, no matter how strong a yes it is. This just doesn't make sense. And averaging the scores individual team members give sites will result in a list of sites with all average scores. We tried it and it happens. If final decisions about acquisitions are made by committee, the members will balance each other and end up with a good ranking.

3. It is preferable that the tables and figures in the report include titles that fully describe the information contained therein. I believe this is appropriate for technical writing and is extremely convenient for the reader.

4. On that same note, it is preferable that references to tables and figures in the text accurately discuss the information therein. For example, the last paragraph on page six briefly mentions SWIM projects in Tables 8 and 9, when more information (such as FDEP and ELAPP projects) is listed. This is confusing and understates the amount of completed and developing restoration projects.

5. In general, the FDEP is in support of a restoration master plan such as the one being developed here. It should be a useful tool for all entities engaged in restoration and acquisition. But I wish to point out that due to the nature of the FDEP's restoration program, i.e. local and state governments submit proposals to us for consideration, we may not always have the option of focusing primarily on systems this plan deems most desirable. However, we can try to prompt other governmental entities to sponsor and work with them to develop these types of projects before proposal submittal.

4.(3) **ELIGIBILITY DETERMINATION.** Program eligibility of the applicant and project is determined pursuant to the following:

4.(3)(a) **Applicant Eligibility.** Following closure of a preapplication or application submission period, Department staff shall review each applicant's eligibility pursuant to these provisions, and, when applicable, notify the applicant of its ineligibility.

4.(3)(b) **Project Eligibility.** After determining the eligibility of an applicant, District staff shall review the project described in the preapplication or application for program eligibility pursuant to these provisions, especially as identified in Section 3.(6) and Section 403.165, F.S. When applicable, Department staff shall notify the applicant of an ineligible project.

4.(3)(c) **Application Resubmittal.** If an eligible applicant submits a preapplication or complete application in sufficient time for district staff to determine the eligibility of the project prior to closure of the announced application submission period and the project is determined ineligible by district staff, the applicant may submit another eligible application prior to termination of the announced applicant submission period.

4.(4) **APPLICATION ASSISTANCE.** District staff may, depending on staff availability and at the request of an applicant, provide technical assistance to an eligible applicant completing an eligible project application prior to closure of the Department announced application submission period. After closure of the submission period, district staff may establish a date for the applicant to submit deficient application information. If the deficient information is not submitted by or on the prescribed date, the application shall be declared ineligible for funding consideration.

4.(5) **MAXIMUM AWARD REQUEST.** The Department may announce the maximum funds that an applicant may request in a FPRP application when publicizing the establishment of an application submission period.

4.(6) **NUMBER OF APPLICATIONS.** An applicant may submit no more than three applications during each announced application submission period. Applicants shall prioritize multiple applications.

4.(7) **APPLICATION FORM.** The FPRP Preapplication Form, FPS-A015, effective 9/95, and FPRP Application Form, FPS-A016, effective date 9/95, are hereby incorporated by reference and are available from the district office or the Department's Bureau of Design and Construction, Division of Recreation and Parks, 3900 Commonwealth Boulevard, Mail Station 520, Tallahassee, Florida 32399-3000.

4.(8) **APPLICATION SELECTION.** Each eligible application shall be evaluated, assigned a total point score and ranked on the basis of the information provided in the application and in accordance with Section 5.0 of these provisions.

4.(9) NOTIFICATION. After the funding status of all eligible applications is determined, the Department will notify all applicants.

5.0 APPLICATION EVALUATION AND SELECTION. Eligible applications shall be evaluated and ranked by Department evaluation teams pursuant to the following:

5.(1) PRIORITY RANKING. Eligible applications within each district shall be ranked pursuant to subsections 5.(4) - 5.(6).

5.(2) DISTRICT EVALUATION TEAM. Each district director shall appoint up to a five-member district team to evaluate and score all eligible district applications.

5.(3) PROGRAM EVALUATION COMMITTEE. The deputy secretary shall appoint up to a five-member program evaluation committee to review all eligible applications to provide oversight and assure statewide consistency for FPRP. If the committee determines that implementation procedures have not been properly followed, the committee shall recommend changes to the district ranked list to correct any improperly ranked applications. The director or designate of the Office of Ecosystem Planning and Coordination shall serve as a committee member. Any Department division submitting projects for funding is not eligible to participate on the overview committee. Committee approved district recommended application priority lists shall be submitted to the Secretary for approval.

5.(4) SELECTION CRITERIA. Eligible applications shall be ranked to the extent to which they are found to meet the selection criteria in this subsection. A score shall be assigned to each eligible application. Applications shall be scored for ecosystem restoration criteria or air quality criteria. All applications shall be scored for applicant criteria, public benefit criteria, and time constraints criteria. Scores shall be determined as follows:

5.(4)(a) Ecosystem Restoration Criteria - up to 30 total points. As ecosystem management is the Department's overriding strategy for protecting and managing Florida's environment, how a project restores, integrates with, or protects its surrounding ecosystem shall be given significant consideration. Ecosystem management includes the preservation of ecosystem integrity through the restoration or protection of its natural communities and processes. Projects will be assigned up to 30 points based on their consistency with meeting the following objectives:

5.(4)(a)1. Environmental Restoration - meaning the degree to which a site can be restored to a state that best provides restored or enhanced functions to the ecosystem - will be assigned up to 15 points based on consistency with meeting the following objectives:

5.(4)(a)1.a. Restoration will lead to improved water quality.

- 5.(4)(a)1.b. Restoration will significantly improve ground water recharge.
- 5.(4)(a)1.c. Groundwater recharge improvement is in a water resource caution area.
- 5.(4)(a)1.d. Restoration will increase groundwater protection for a first magnitude spring.
- 5.(4)(a)1.e. Restoration will improve quality, quantity and timing of freshwater input into a marine, estuarine, or freshwater system.
- 5.(4)(a)1.f. Restoration will help achieve the minimum flows and levels of an aquatic system.
- 5.(4)(a)1.g. Restoration will re-establish natural hydroperiod.
- 5.(4)(a)1.h. Restoration will contribute to recovery of a natural community or population and may include, but not be limited to, contributing to native species diversity or reducing a source for exotic infestation. Communities or populations which have been identified by state and federal agencies as severely limited, threatened or endangered may be given priority.
- 5.(4)(a)2. Ecosystem integration - meaning the relative importance of the site in relation to the surrounding ecosystem - will be assigned up to 10 points based on consistency with the following objectives:
 - 5.(4)(a)2.a. Restoration sites will be ecologically linked to, create buffer for, or reconnect fragmented systems within:
 - 5.(4)(a)2.a.i. State identified ecosystem management areas, as recognized by the Department of Environmental Protection.
 - 5.(4)(a)2.a.ii. SWIM designated water bodies with approved plans,
 - 5.(4)(a)2.a.iii. National Estuarine Program designated areas,
 - 5.(4)(a)2.a.iv. Public lands,
 - 5.(4)(a)2.a.v. Aquatic preserves,
 - 5.(4)(a)2.a.vi. Outstanding Florida Waters,
 - 5.(4)(a)2.a.vii. Shellfish harvesting areas,
 - 5.(4)(a)2.a.viii. Areas of Critical State Concern,

5.(4)(a)2.a.ix. National Estuarine Research Reserve,

5.(4)(a)2.a.x. National Marine Sanctuary, or

5.(4)(a)2.a.xi. Other significant ecosystems or special management areas.

5.(4)(a)2.b. Restoration will improve a wildlife corridor fragmented by alteration.

5.(4)(a)3. Environmental Protection - meaning preventing existing or potential threats of loss or damage to a site through pollution or environmental degradation - will be assigned up to 5 points based on consistency with the following objectives:

5.(4)(a)3.a. Pollution prevention achieved through source reduction, waste minimization, or on-site recycling.

5.(4)(a)3.b. Protection through reducing or elimination of the generation and use of toxic and hazardous substances.

5.(4)(a)3.c. Protection through addressing media transfer of pollutants and minimizing the transfer of pollutants from one medium to another.

5.(4)(a)3.d. Protection through pollution source investigation.

5.(4)(a)3.e. Protection through monitoring.

5.(4)(b) Air Quality Criteria - up to 30 total points. As air quality violations are elusive by nature but penalties collected from air violations contribute significantly to the Pollution Recovery Fund, the Department will give special consideration to air quality projects based on protection and management criteria as well as how the project integrates with the surrounding area and ecosystem. In general, air quality projects should provide for the prevention of air pollution which may be harmful or injurious to human health or welfare, animal or plant life, or property, including outdoor recreation. Projects will be assigned up to 30 points based on their consistency with meeting the following objectives:

5.(4)(b)1. Air quality protection - meaning the degree to which the ambient air quality of a site or location can be improved or maintained - will be assigned up to 15 points based on consistency with meeting the following objectives:

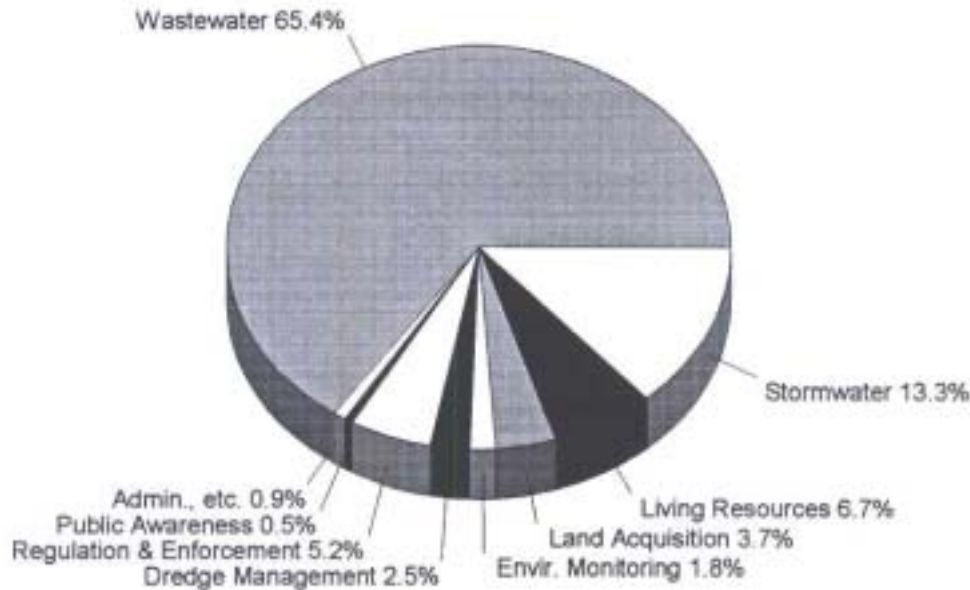
5.(4)(b)1.a. Protection through energy conservation to include energy efficiency and utilization for both mobile and stationary sources that will lead to improved air quality.

5.(4)(b)1.b. Protection through the reduction of criteria pollutants (ozone, sulfur dioxide, carbon monoxide, nitrogen oxides, lead, particulate matter PM-10) that will lead to improved air quality.

APPENDIX G
Budget Summary
Tampa Bay Living Resources
(Hazen and Sawyer 1995)

Relative Program Budgets

Tampa Bay Restoration Programs



(from Hazen and Sawyer 1995)

Budget summary, Tampa Bay living resources, habitat preservation and restoration programs (from Hazen and Sawyer 1995).

	FTEs	BUDGET FY 94-95
U.S. Army Corps of Engineers (primarily shore protection, i.e. beach renourishment)	N/A	\$12,214,600
Florida Department of Environmental Protection	9.5	1,058,715
Florida Game and Fresh Water Fish Commission	0.35	17,850
Southwest Florida Water Management District	N/A	1,473,600
Hillsborough County	22	1,126,200
Manatee County	4.1	291,500
Pinellas County	0.2	39,180
City of Clearwater	N/A	130,000
City of St. Petersburg	N/A	198,000
Tampa Port Authority	1	1,000,000
TOTAL		\$17,549,645

Budget summary, Tampa Bay land acquisition programs (from Hazen and Sawyer 1995).

	FTEs	BUDGET FY 94-95
Florida Game and Fresh Water Fish Commission	0.6	\$ 635,970
Hillsborough County	3	6,130,000
Pinellas County	N/A	3,065,100
TOTAL		\$9,831,070

Summary of government agency FY 94-95 budgets for all Bay restoration and management activities (from Hazen and Sawyer 1995)

LEVEL OF GOVERNMENT	AGENCY	FTEs	BUDGET FY 94-95
Federal	U.S. Environmental Protection Agency	N/A	\$ 768,500
	U.S. Army Corps of Engineers	N/A	18,614,600
	U.S. Coast Guard	43	1,034,000
	TOTAL, Federal Agencies		\$20,417,100
State	Florida Dept. of Environmental Protection	10	\$7,063,415
	Florida Game & Fresh Water Fish Commission	10	1,215,370
	TOTAL, State Agencies		\$8,278,785
Regional	Southwest Florida Water Management District (non-SWIM)	6	\$35,023,700
	Southwest Florida Water Management District (SWIM)	N/A	2,688,500
	Tampa Port Authority	9	2,360,000
	Tampa Bay Regional Planning Council	1.23	95,000
	Tampa Bay National Estuary Program	N/A	1,346,667
	TOTAL, Regional Agencies		\$41,513,867
Local	Hillsborough County	409.5	\$55,995,700
	Manatee County	151.6	23,516,500
	Pinellas County	104	12,506,952
	City of St. Petersburg	N/A	19,751,600
	City of Tampa	501	70,916,500
	City of Clearwater	N/A	8,995,100
	TOTAL, Local Agencies		\$191,682,352
TOTAL Tampa Bay Restoration and Management Budgets, FY 94-95			\$261,892,104

APPENDIX H

Letter dated May 9, 1995 from FDEP to B. Waddell

Letter dated June 29, 1995 from HCEPC to J. Stines



Department of Environmental Protection

Lawton Chiles
Governor

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

Virginia B. Wetherell
Secretary

May 9, 1995

Barbara Waddell
2026 Bayou Drive S.
Ruskin, FL 33570

File No: 292697393
County: Hillsborough

Dear Ms. Waddell:

This is to acknowledge receipt of your application, File No. 292697393 on March 29, 1995, for authorization to remove Brazilian Pepper in Ruskin Inlet, Section 7, Township 32S, Range 19E, in Ruskin, Hillsborough County.

At this time no permit is required by this Department for your project. Any modifications in your plans should be submitted for review, as changes might result in permits being required. This letter does not relieve you from the need to obtain any other permits (local, state or federal) which might be required.

This document does not authorize the disposal of projected related debris within waters or wetlands of the State. Additionally, this document does not authorize you to conduct the above described project without the consent of the owner, lessee, or record easement holder of the property on which the proposed project is to be undertaken.

A person whose substantial interests are affected by the Department's proposed decision may petition for an administrative proceeding (hearing) under Section 120.57 of the Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permit applicant and the parties listed below must be filed within fourteen days of receipt of this intent. Petitions filed by other persons must be filed within fourteen days of publication of the public notice or within fourteen days of their receipt of this intent, whichever first occurs. (The petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of

Page Two
Waddell, Barbara

filing.) Failure to file a petition within this time period shall constitute a waiver of any right that such a person may have to request an administrative determination (hearing) under section 120.57 of the Florida Statutes.

The Petition shall contain the following information:

- (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department file number, and the county in which the proposed project would be located;
- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by the petitioner, if any;
- (e) A statement of facts that the petitioner contends warrant reversal or modification of the Department's action or proposed action;
- (f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and
- (g) A statement of the relief sought by petitioner, stating precisely the action that the petitioner wants the Department to take with respect to the Department's action or proposed action.

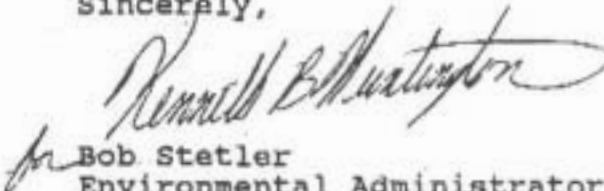
If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within fourteen days of receipt of this notice in the Office of General Counsel at the Department's address set forth above. Failure to petition within the allowed time frame constitutes a waiver of any right that such a person has to request a hearing under section 120.57 of the Florida Statutes and to participate as a party to this

Page Three
Waddell, Barbara

proceeding. Any later intervention will only be at the approval of the presiding officer on motion filed under rule 28-5.207, P.A.C.

If you have any questions, please contact Ken Huntington (Ext. 330) of this office. When referring to this project, please use the file number listed above.

Sincerely,


for Bob Stetler
Environmental Administrator
Submerged Lands and
Environmental Resources Program

RS/er
cc: Corps of Engineers

COMMISSION

DOTTIE BERGER
PHYLLIS BUSANSKY
JOE CHILLURA
CHRIS HART
JIM NORMAN
ED TURANCHIK
SANDRA WILSON

EXECUTIVE DIRECTOR

ROGER P. STEWART



47331
ADMINISTRATIVE OFFICES, LEGAL &
WATER MANAGEMENT DIVISION
1900 - 9TH AVENUE
TAMPA, FLORIDA 33605
TELEPHONE (813) 272-5960
FAX (813) 272-5157

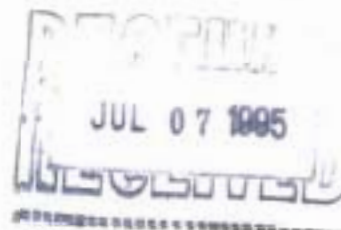
AIR MANAGEMENT DIVISION
TELEPHONE (813) 272-5530

WASTE MANAGEMENT DIVISION
TELEPHONE (813) 272-5788

WETLANDS MANAGEMENT DIVISION
TELEPHONE (813) 272-7104

June 29, 1995

Mr. Joe Stines
Ruskin Public Library
7 Dickman Drive, S.E.
Ruskin, FL 33570



SUBJECT: EPC REVIEW OF AN APPLICATION TO PERFORM MISCELLANEOUS ACTIVITIES IN WETLANDS/ NUISANCE VEGETATION REMOVAL FOR HILLSBOROUGH COUNTY AT THE RUSKIN PUBLIC LIBRARY AT 7 DICKMAN DRIVE S.E., RUSKIN/ APPLICATION RECEIVED JUNE 12, 1995/ STR 8-32-19

Dear Mr. Stines:

The Environmental Protection Commission (EPC) of Hillsborough County has conducted an environmental review on the subject application. EPC staff will authorize the subject activity with the following conditions:

1. The only vegetation authorized for removal at this time are the Brazilian pepper trees (Schinus terebinthifolius), lead trees (Leucaena leucocephala), and Australian pine trees (Casuarina sp.). To prevent potential erosion problems, the trees shall be cut down at their base, leaving the root systems intact. To prevent resprouting, treatment of the freshly cut bases with an EPA approved herbicide will be recommended. For those trees likely to come in contact with waters from the Ruskin Inlet, Rodeo would be a good choice to treat the trees. For those plants outside of the range of the tidal waters, Garlon 4 or Arsenal would be more effective.

The use of any herbicide waterward of the Mean Higher High Tide line will require a permit from the Florida Department of Environmental Protection.

2. All the removed vegetation must be deposited outside of the wetland within an acceptable upland location.

To facilitate the establishment of more desirable native species, and to help prevent revegetation of the nuisance species from within the areas targeted for removal, EPC staff will recommend voluntary plantings within these areas.

Mr. Joe Stines
June 29, 1995
page two

For the areas at the upper reaches of the tidal influence, the following species are among the recommended:

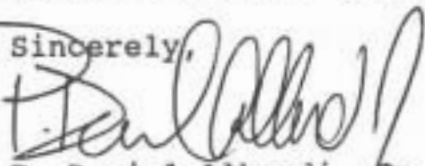
salt meadow cordgrass	-	<u>Spartina patens</u>
sand cordgrass	-	<u>Spartina bakeri</u>
sea oxeye daisy	-	<u>Borrichia frutescens</u>
leather fern	-	<u>Acrostichum danaeifolium</u> .

Outside of the areas of tidal influence, within the upland portion of the property, the following species are recommended:

sea oats	-	<u>Uniola paniculata</u>
beach sunflower	-	<u>Helianthus debilis</u>
muhly grass	-	<u>Muhlenbergia capillaris</u>
railroad vine	-	<u>Ipomea pes-carpae</u>
sea grape	-	<u>Coccoloba uvifera</u>
painted daisy	-	<u>Gaillardia pulchella</u> .

There are many other attractive native species which should thrive in the environment found along the banks of the inlet. If you have any questions or concerns, or would like some planting advice, please feel free to contact EPC staff at 272-7104.

Sincerely,



P. Daniel Alberdi, Jr.
Environmental Scientist II
Environmental Protection Commission
of Hillsborough County

cc: Barbara Waddell
Stan Maloy, EPC

APPENDIX I
Mitigation Banking
Rules and Guidelines



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019



REPLY TO
ATTENTION OF

Construction-Operations Division
Regulatory Branch

PUBLIC NOTICE

10 JAN 1996

10 JAN 1996

FEDERAL GUIDANCE FOR THE ESTABLISHMENT, USE AND OPERATION OF MITIGATION BANKS

On November 28, 1995, the U.S. Army Corps of Engineers (Corps), Environmental Protection Agency (EPA), National Resources Conservation Service (NRCS), Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) issued final policy guidance in the Federal Register (Volume 60, Number 228, Pages 58605-58614) regarding the establishment, use and operation of mitigation banks for the purpose of providing compensation for adverse impacts to wetlands and other aquatic resources. The full text of the guidance is attached for your convenience. The guidance is also available via the Internet World Wide Web by accessing the Regulatory Branch Home Page at

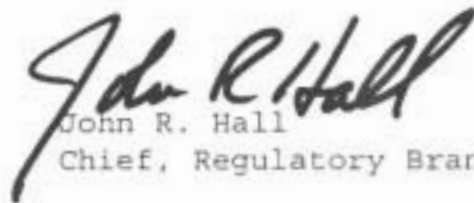
<http://www.saj.usace.army.mil/~gns/regulatory.html>

This Public Notice is being released to the Jacksonville District's full mailing list in Florida, Puerto Rico, and the U.S. Virgin Islands.

A key element of the guidance is the interagency team approach to the evaluation of mitigation bank proposals. Representatives from the Corps, EPA, FWS, NMFS and NRCS, as appropriate given the projected use for the bank, will typically comprise the Mitigation Bank Review Team (MBRT). In addition, it is appropriate for representatives from state, tribal and local regulatory and resource agencies to participate where an agency has authorities and/or mandates directly affecting or affected by the establishment, use, or operation of a bank. In view of the mitigation banking program implemented in the State of Florida by the Department of Environmental Protection (DEP), and the Water Management Districts (WMD's), efforts are underway to integrate, to the extent possible, the State and Federal evaluation of mitigation bank proposals. A Mitigation Bank Prospectus

Guidelines checklist, which was developed jointly by the DEP, WMD's and the Corps, is also attached to aid mitigation bankers in the preparation of a prospectus. As the joint process further develops, additional information will be provided through subsequent Public Notices. A similar initiative will be pursued in Puerto Rico and the U.S. Virgin Islands.

Any questions regarding mitigation banking should be directed to Mr. Graham N. Story by writing to the letterhead address or by telephone at (904) 232-1682.


John R. Hall
Chief, Regulatory Branch

been approved and may be used for reference in future. File is informational in nature and action does not result therefrom.

AUTHORITY FOR MAINTENANCE OF THE SYSTEM:

10 U.S.C. 8013, Secretary of the Air Force: powers and duties; delegation by and 8074 Commands: Territorial organization.

PURPOSE(S):

Used by Command Awards Branch for reference.

ROUTINE USES OF RECORDS MAINTAINED IN THE SYSTEM, INCLUDING CATEGORIES OF USERS AND THE PURPOSES OF SUCH USES:

In addition to those disclosures generally permitted under 5 U.S.C. 552a(b) of the Privacy Act, these records or information contained therein may specifically be disclosed outside the DoD as a routine use pursuant to 5 U.S.C. 552a(b)(3) as follows:

The 'Blanket Routine Uses' published at the beginning of the Air Force's compilation of record system notices apply to this system.

POLICIES AND PRACTICES FOR STORING, RETRIEVING, ACCESSING, RETAINING, AND DISPOSING OF RECORDS IN THE SYSTEM:

STORAGE:

Maintained in file folders.

RETRIEVABILITY:

Retrieved by name.

SAFEGUARDS:

Records are accessed by person(s) responsible for servicing the record system in performance of their official duties and by authorized personnel who are properly screened and cleared for need-to-know. Records are stored in locked rooms and cabinets.

RETENTION AND DISPOSAL:

Retained in office files until superseded, obsolete, no longer needed for reference, or on inactivation, then destroyed by tearing into pieces, shredding, pulping, macerating, or burning.

SYSTEM MANAGER(S) AND ADDRESS:

Director of Personnel, Headquarters Air Combat Command, 114 Douglas Street, Suite 214, Langley Air Force Base, VA 23665-2773.

NOTIFICATION PROCEDURE:

Individuals seeking to determine whether this system of records contains information on them should address inquiries to the Director of Personnel, Headquarters Air Combat Command, 114 Douglas Street, Suite 214, Langley Air Force Base, VA 23665-2773.

RECORD ACCESS PROCEDURES:

Individuals seeking to access records about themselves contained in this system should address requests to the Director of Personnel, Headquarters Air Combat Command, 114 Douglas Street, Suite 214, Langley Air Force Base, VA 23665-2773.

CONTESTING RECORD PROCEDURES:

The Air Force rules for accessing records and for contesting contents and appealing initial agency determinations are published in Air Force Instruction 37-132; 32 CFR part 806b, or may be obtained from the system manager.

RECORD SOURCE CATEGORIES:

Information obtained from previous employers and source documents such as reports.

EXEMPTIONS CLAIMED FOR THE SYSTEM:

None.

[FR Doc. 95-29004 Filed 11-27-95; 8:45 am]
BILLING CODE 5000-04-F

Department of the Army

Board of Visitors, United States Military Academy

AGENCY: United States Military Academy, West Point, New York.

ACTION: Notice of Open Meeting.

SUMMARY: In accordance with Section 10(a)(20) of the Federal Advisory Committee Act (P.L. 92-463), announcement is made of the following meeting:

Name of Committee: Board of Visitors, United States Military Academy.

Date of Meeting: 7 December 1995.

Place of Meeting: Russell Senate Office Building, Room 412, Washington, D.C.

Start Time of Meeting: 9:00 a.m.

Proposed Agenda: Preparation of Report to President; Commandant's Assessment of the Corps of Cadets, Report on Enhancing Teaching and Performance at USMA. All proceedings are open.

FOR FURTHER INFORMATION CONTACT:

Lieutenant Colonel John J. Luther, United States Military Academy, West Point, NY 10996-5000, (914) 938-5870.

SUPPLEMENTARY INFORMATION: Please note that the Board of Visitors, United States Military Academy Meeting previously announced for 17 November at West Point, New York, was canceled due to the government shutdown.

Gregory D. Showalter,

Army Federal Register Liaison Officer.

[FR Doc. 95-28950 Filed 11-27-95; 8:45 am]

BILLING CODE 3710-06-M

DEPARTMENT OF DEFENSE

Department of the Army

Corps of Engineers

ENVIRONMENTAL PROTECTION AGENCY

DEPARTMENT OF AGRICULTURE

Natural Resources Conservation Service

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

Federal Guidance for the Establishment, Use and Operation of Mitigation Banks

AGENCIES: Corps of Engineers, Department of the Army, DOD; Environmental Protection Agency; Natural Resources Conservation Service; Agriculture; Fish and Wildlife Service; Interior; and National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Commerce.

ACTION: Notice.

SUMMARY: The Army Corps of Engineers (Corps), Environmental Protection Agency (EPA), National Resources Conservation Service (NRCS), Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) are issuing final policy guidance regarding the establishment, use and operation of mitigation banks for the purpose of providing compensation for adverse impacts to wetlands and other aquatic resources. The purpose of this guidance is to clarify the manner in which mitigation banks may be used to satisfy mitigation requirements of the Clean Water Act (CWA) Section 404 permit program and the wetland conservation provisions of the Food Security Act (FSA) (i.e., "Swampbuster" provisions). Recognizing the potential benefits mitigation banking offers for streamlining the permit evaluation process and providing more effective mitigation for authorized impacts to wetlands, the agencies encourage the establishment and appropriate use of mitigation banks in the Section 404 and "Swampbuster" programs.

DATES: The effective date of this Memorandum to the Field is December 28, 1995.

FOR FURTHER INFORMATION CONTACT: Mr. Jack Chowning (Corps) at (202) 761-

1781; Mr. Thomas Kelsch (EPA) at (202) 260-8795; Ms. Sandra Byrd (NRCS) at (202) 690-3501; Mr. Mark Miller (FWS) at (703) 358-2183; Ms. Susan-Marie Stedman (NMFS) at (301) 713-2325.

SUPPLEMENTARY INFORMATION: Mitigating the environmental impacts of necessary development actions on the Nation's wetlands and other aquatic resources is a central premise of Federal wetlands programs. The CWA Section 404 permit program relies on the use of compensatory mitigation to offset unavoidable damage to wetlands and other aquatic resources through, for example, the restoration or creation of wetlands. Under the "Swampbuster" provisions of the FSA, farmers are required to provide mitigation to offset certain conversions of wetlands for agricultural purposes in order to maintain their program eligibility.

Mitigation banking has been defined as wetland restoration, creation, enhancement, and in exceptional circumstances, preservation undertaken expressly for the purpose of compensating for unavoidable wetland losses in advance of development actions, when such compensation cannot be achieved at the development site or would not be as environmentally beneficial. It typically involves the consolidation of small, fragmented wetland mitigation projects into one large contiguous site. Units of restored, created, enhanced or preserved wetlands are expressed as "credits" which may subsequently be withdrawn to offset "debits" incurred at a project development site.

Ideally, mitigation banks are constructed and functioning in advance of development impacts, and are seen as a way of reducing uncertainty in the CWA Section 404 permit program or the FSA "Swampbuster" program by having established compensatory mitigation credit available to an applicant. By consolidating compensation requirements, banks can more effectively replace lost wetland functions within a watershed, as well as provide economies of scale relating to the planning, implementation, monitoring and management of mitigation projects.

On August 23, 1993, the Clinton Administration released a comprehensive package of improvements to Federal wetlands programs which included support for the use of mitigation banks. At that same time, EPA and the Department of the Army issued interim guidance clarifying the role of mitigation banks in the Section 404 permit program and providing general guidelines for their

establishment and use. In that document it was acknowledged that additional guidance would be developed, as necessary, following completion of the first phase of the Corps Institute for Water Resources national study on mitigation banking.

The Corps, EPA, NRCS, FWS and NMFS provided notice [60 FR 12286; March 6, 1995] of a proposed guidance on the policy of the Federal government regarding the establishment, use and operation of mitigation banks. The proposed guidance was based, in part, on the experiences to date with mitigation banking, as well as other environmental, economic and institutional issues identified through the Corps national study. Over 130 comments were received on the proposed guidance. The final guidance is based on full and thorough consideration of the public comments received.

A majority of the letters received supported the proposed guidance in general, but suggested modifications to one or more parts of the proposal. In response to these comments, several changes have been made to further clarify the provisions and make other modifications, as necessary, to ensure effective establishment and use of mitigation banks. One key issue on which the agencies received numerous comments focused on the timing of credit withdrawal. In order to provide additional clarification of the changes made to the final guidance in response to comments, the agencies wish to emphasize that it is our intent to ensure that decisions to allow credits to be withdrawn from a mitigation bank in advance of bank maturity be made on a case-by-case basis to best reflect the particular ecological and economic circumstances of each bank. The percentage of advance credits permitted for a particular bank may be higher or lower than the 15 percent example included in the proposed guidance. The final guidance is being revised to eliminate the reference to a specific percentage in order to provide needed flexibility. Copies of the comments and the agencies' response to significant comments are available for public review. Interested parties should contact the agency representatives for additional information.

This guidance does not change the substantive requirements of the Section 404 permit program or the FSA "Swampbuster" program. Rather, it interprets and provides internal guidance and procedures to the agency field personnel for the establishment, use and operation of mitigation banks consistent with existing regulations and

policies of each program. The policies set out in this document are not final agency action, but are intended solely as guidance. The guidance is not intended, not can it be relied upon, to create any rights enforceable by any party in litigation with the United States. The guidance does not establish or affect legal rights or obligations, establish a binding norm on any party and it is not finally determinative of the issues addressed. Any regulatory decisions made by the agencies in any particular matter addressed by this guidance will be made by applying the governing law and regulations to the relevant facts. The purpose of the document is to provide policy and technical guidance to encourage the effective use of mitigation banks as a means of compensating for the authorized loss of wetlands and other aquatic resources.

John H. Zirschky,

Acting Assistant Secretary (Civil Works),
Department of the Army.

Robert Perciasepe,

Assistant Administrator for Water,
Environmental Protection Agency.

James R. Lyons,

Assistant Secretary, Natural Resources and
Environment, Department of Agriculture.

George T. Frampton, Jr.,

Assistant Secretary for Fish and Wildlife and
Parks, Department of the Interior.

Douglas K. Hall,

Assistant Secretary for Oceans and
Atmosphere, Department of Commerce.

Memorandum to the Field

Subject: Federal Guidance for the
Establishment, Use and Operation of
Mitigation Banks

I. Introduction

A. Purpose and Scope of Guidance

This document provides policy guidance for the establishment, use and operation of mitigation banks for the purpose of providing compensatory mitigation for authorized adverse impacts to wetlands and other aquatic resources. This guidance is provided expressly to assist Federal personnel, bank sponsors, and others in meeting the requirements of Section 404 of the Clean Water Act (CWA), Section 10 of the Rivers and Harbors Act, the wetland conservation provisions of the Food Security Act (FS) (i.e., "Swampbuster"), and other applicable Federal statutes and regulations. The policies and procedures discussed herein are consistent with current requirements of the Section 10/404 regulatory program and "Swampbuster" provisions and are intended only to clarify the applicability of existing requirements to mitigation banking.

The policies and procedures discussed herein are applicable to the establishment, use and operation of public mitigation banks, as well as privately-sponsored mitigation banks, including third party banks (e.g. entrepreneurial banks).

B. Background

For purposes of this guidance, mitigation banking means the restoration, creation, enhancement and, in exceptional circumstances, preservation of wetlands and/or other aquatic resources expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources.

The objective of a mitigation bank is to provide for the replacement of the chemical, physical and biological functions of wetlands and other aquatic resources which are lost as a result of authorized impacts. Using appropriate methods, the newly established functions are quantified as mitigation "credits" which are available for use by the bank sponsor or by other parties to compensate for adverse impacts (i.e., "debits"). Consistent with mitigation policies established under the Council on Environmental Quality Implementing Regulations (CEQ regulations) (40 CFR Part 1508.20), and the Section 404(b)(1) Guidelines (Guidelines) (40 CFR Part 230), the use of credits may only be authorized for purposes of complying with Section 10/404 when adverse impacts are unavoidable. In addition, for both the Section 10/404 and "Swampbuster" programs, credits may only be authorized when on-site compensation is either not practicable or use of a mitigation bank is environmentally preferable to on-site compensation. Prospective bank sponsors should not construe or anticipate participation in the establishment of a mitigation bank as ultimate authorization for specific projects, as excepting such projects from any applicable requirements, or as preauthorizing the use of credits from that bank for any particular project.

Mitigation banks provide greater flexibility to applicants needing to comply with mitigation requirements and can have several advantages over individual mitigation projects, some of which are listed below:

1. It may be more advantageous for maintaining the integrity of the aquatic ecosystem to consolidate compensatory mitigation into a single large parcel or contiguous parcels when ecologically appropriate;

2. Establishment of a mitigation bank can bring together financial resources, planning and scientific expertise not

practicable to many project-specific compensatory mitigation proposals. This consolidation of resources can increase the potential for the establishment and long-term management of successful mitigation that maximizes opportunities for contributing to biodiversity and/or watershed function;

3. Use of mitigation banks may reduce permit processing times and provide more cost-effective compensatory mitigation opportunities for projects that qualify;

4. Compensatory mitigation is typically implemented and functioning in advance of project impacts, thereby reducing temporal losses of aquatic functions and uncertainty over whether the mitigation will be successful in offsetting project impacts;

5. Consolidation of compensatory mitigation within a mitigation bank increases the efficiency of limited agency resources in the review and compliance monitoring of mitigation projects, and thus improves the reliability of efforts to restore, create or enhance wetlands for mitigation purposes.

6. The existence of mitigation banks can contribute towards attainment of the goal for no overall net loss of the Nation's wetlands by providing opportunities to compensate for authorized impacts when mitigation might not otherwise be appropriate or practicable.

II. Policy Considerations

The following policy considerations provide general guidance for the establishment, use and operation of mitigation banks. It is the agencies' intent that this guidance be applied to mitigation bank proposals submitted for approval on or after the effective date of this guidance and to those in early stages of planning or development. It is not intended that this policy be retroactive for mitigation banks that have already received agency approval. While it is recognized that individual mitigation banking proposals may vary, it is the intent of this guidance that the fundamental precepts be applicable to future mitigation banks.

For the purposes of Section 10/104, and consistent with the CEQ regulations, the Guidelines, and the Memorandum of Agreement Between the Environmental Protection Agency (EPA) and the Department of the Army Concerning the Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines, mitigation means sequentially avoiding impacts, minimizing impacts, and compensating for remaining unavoidable impacts.

Compensatory mitigation, under Section 10/404, is the restoration, creation, enhancement, or in exceptional circumstances, preservation of wetlands and/or other aquatic resources for the purpose of compensating for unavoidable adverse impacts. A site where wetlands and/or other aquatic resources are restored, created, enhanced, or in exceptional circumstances, preserved expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources is a mitigation bank.

A. Authorities

This guidance is established in accordance with the following statutes, regulations, and policies. It is intended to clarify provisions within these existing authorities and does to establish any new requirements.

1. Clean Water Act Section 404 (33 U.S.C. 1344).
2. Rivers and Harbors Act of 1899 Section 10 (33 U.S.C. 403 *et seq.*)
3. Environmental Protection Agency, Section 404(b)(1) Guidelines (40 CFR Part 230). Guidelines for Specification of Disposal Sites for Dredged or Fill Material.
4. Department of the Army, Section 404 Permit Regulations (33 CFR Parts 320-330). Policies for evaluating permit applications to discharge dredged or fill material.
5. Memorandum of Agreement between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines (February 6, 1990).
6. Title XII Food Security Act of 1985 as amended by the Food, Agriculture, Conservation and Trade Act of 1990 (16 U.S.C. 3801 *et seq.*).
7. National Environmental Policy Act (42 U.S.C. 4321 *et seq.*), including the Council on Environmental Quality's implementing regulations (40 CFR Parts 1500-1508).
8. Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*).
9. Fish and Wildlife Service Mitigation Policy (46 FR pages 7644-7663, 1981).
10. Magnuson Fishery Conservation and Management Act (16 U.S.C. 1801 *et seq.*).
11. National Marine Fisheries Service Habitat Conservation Policy (48 FR pages 53142-53147, 1983).

The policies set out in this document are not final agency action, but are intended solely as guidance. The guidance is not intended, nor can it be relied upon, to create any rights

enforceable by any party in litigation with the United States. This guidance does not establish or affect legal rights or obligations, establish a binding norm on any party and it is not finally determinative of the issues addressed. Any regulatory decisions made by the agencies in any particular matter addressed by this guidance will be made by applying the governing law and regulations to the relevant facts.

B. Planning Considerations

1. Goal Setting

The overall goal of a mitigation bank is to provide economically efficient and flexible mitigation opportunities, while fully compensating for wetland and other aquatic resource losses in a manner that contributes to the long-term ecological functioning of the watershed within which the bank is to be located. The goal will include the need to replace essential aquatic functions which are anticipated to be lost through authorized activities within the bank's service area. In some cases, banks may also be used to address other resource objectives that have been identified in a watershed management plan or other resource assessment. It is desirable to set the particular objectives for a mitigation bank (i.e., the type and character of wetlands and/or aquatic resources to be established) in advance of site selection. The goal and objectives should be driven by the anticipated mitigation need; the site selected should support achieving the goal and objectives.

2. Site Selection

The agencies will give careful consideration to the ecological suitability of a site for achieving the goal and objectives of a bank, i.e., that it possess the physical, chemical and biological characteristics to support establishment of the desired aquatic resources and functions. Size and location of the site relative to other ecological features, hydrologic sources (including the availability of water rights), and compatibility with adjacent land uses and watershed management plans are important factors for consideration. It also is important that ecologically significant aquatic or upland resources (e.g., shallow sub-tidal habitat, mature forests), cultural sites, or habitat for Federally or State-listed threatened and endangered species are not compromised in the process of establishing a bank. Other significant factors for consideration include, but are not limited to, development trends (i.e., anticipated land use changes), habitat status and trends, local or regional goals

for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality and floodplain management goals, and the relative potential for chemical contamination of the wetlands and/or other aquatic resources.

Banks may be sited on public or private lands. Cooperative arrangements between public and private entities to use public lands for mitigation banks may be acceptable. In some circumstances, it may be appropriate to site banks on Federal, state, tribal or locally-owned resource management areas (e.g., wildlife management areas, national or state forests, public parks, recreation areas). The siting of banks on such lands may be acceptable if the internal policies of the public agency allow use of its land for such purposes, and the public agency grants approval. Mitigation credits generated by banks of this nature should be based solely on those values in the bank that are supplemental to the public program(s) already planned or in place, that is, baseline values represented by existing or already planned public programs, including preservation value, should not be counted toward bank credits.

Similarly, Federally-funded wetland conservation projects undertaken via separate authority and for other purposes, such as the Wetlands Reserve Program, Farmer's Home Administration fee title transfers or conservation easements, and Partners for Wildlife Program, cannot be used for the purpose of generating credits within a mitigation bank. However, mitigation credit may be given for activities undertaken in conjunction with, but supplemental to, such programs in order to maximize the overall ecological benefit of the conservation project.

3. Technical Feasibility

Mitigation banks should be planned and designed to be self-sustaining over time to the extent possible. The techniques for establishing wetlands and/or other aquatic resources must be carefully selected, since this science is constantly evolving. The restoration of historic or substantially-degraded wetlands and/or other aquatic resources (e.g., prior-converted cropland, farmed wetlands) utilizing proven techniques increases the likelihood of success and typically does not result in the loss of other valuable resources. Thus, restoration should be the first option considered when siting a bank. Because of the difficulty in establishing the correct hydrologic conditions associated with many creation projects and the

tradeoff in wetland functions involved with certain enhancement activities, these methods should only be considered where there are adequate assurances to ensure success and that the project will result in an overall environmental benefit.

In general, banks which involve complex hydraulic engineering features and/or questionable water sources (e.g., pumped) are most costly to develop, operate and maintain, and have a higher risk of failure than banks designed to function with little or no human intervention. The former situations should only be considered where there are adequate assurances to ensure success. This guidance recognizes that in some circumstances wetlands must be actively managed to ensure their viability and sustainability. Furthermore, long-term maintenance requirements may be necessary and appropriate in some cases (e.g., to maintain fire-dependent plant communities in the absence of natural fire; to control invasive exotic plant species).

Proposed mitigation techniques should be well-understood and reliable. When uncertainties surrounding the technical feasibility of a proposed mitigation technique exist, appropriate arrangements (e.g., financial assurances, contingency plans, additional monitoring requirements) should be in place to increase the likelihood of success. Such arrangements may be phased-out or reduced once the attainment of prescribed performance standards is demonstrated.

4. Role of Preservation

Credit may be given when existing wetlands and/or other aquatic resources are preserved in conjunction with restoration, creation or enhancement activities, and when it is demonstrated that the preservation will augment the functions of the restored, created or enhanced aquatic resource. Such augmentation may be reflected in the total number of credits available from the bank.

In addition, the preservation of existing wetlands and/or other aquatic resources in perpetuity may be authorized as the sole basis for generating credits in mitigation banks only in exceptional circumstances, consistent with existing regulations, policies and guidance. Under such circumstances, preservation may be accomplished through the implementation of appropriate legal mechanisms (e.g., transfer of deed, deed restrictions, conservation easement) to protect wetlands and/or other aquatic resources, accompanied by

implementation of appropriate changes in land use or other physical changes as necessary (e.g., installation of restrictive fencing).

Determining whether preservation is appropriate as the sole basis for generating credits at a mitigation bank requires careful judgment regarding a number of factors. Consideration must be given to whether wetlands and/or other aquatic resources proposed for preservation (1) perform physical or biological functions, the preservation of which is important to the region in which the aquatic resources are located, and (2) are under demonstrable threat of loss or substantial degradation due to human activities that might not otherwise be expected to be restricted. The existence of a demonstrable threat will be based on clear evidence of destructive land use changes which are consistent with local and regional land use trends and are not the consequence of actions under the control of the bank sponsor. Wetlands and other aquatic resources restored under the Conservation Reserve Program or similar programs requiring only temporary conservation easements may be eligible for banking credit upon termination of the original easement if the wetlands are provided permanent protection and it would otherwise be expected that the resources would be converted upon termination of the easement. The number of mitigation credits available from a bank that is based solely on preservation should be based on the functions that would otherwise be lost or degraded if the aquatic resources were not preserved, and the timing of such loss or degradation. As such, compensation for aquatic resource impacts will typically require a greater number of acres from a preservation bank than from a bank which is based on restoration, creation or enhancement.

5. Inclusion of Upland Areas

Credit may be given for the inclusion of upland areas occurring within a bank only to the degree that such features increase the overall ecological functioning of the bank. If such features are included as part of a bank, it is important that they receive the same protected status as the rest of the bank and be subject to the same operational procedures and requirements. The presence of upland areas may increase the per-unit value of the aquatic habitat in the bank. Alternatively, limited credit may be given to upland areas protected within the bank to reflect the functions inherently provided by such areas (e.g., nutrient and sediment filtration of stormwater runoff, wildlife habitat

diversity) which directly enhance or maintain the integrity of the aquatic ecosystem and that might otherwise be subject to threat of loss or degradation. An appropriate functional assessment methodology should be used to determine the manner and extent to which such features augment the functions of restored, created or enhanced wetlands and/or other aquatic resources.

6. Mitigation Banking and Watershed Planning

Mitigation banks should be planned and developed to address the specific resource needs of a particular watershed. Furthermore, decisions regarding the location, type of wetlands and/or other aquatic resources to be established, and proposed uses of a mitigation bank are most appropriately made within the context of a comprehensive watershed plan. Such watershed planning efforts often identify categories of activities having minimal adverse effects on the aquatic ecosystem and that, therefore, could be authorized under a general permit. In order to reduce the potential cumulative effects of such activities, it may be appropriate to offset these types of impacts through the use of a mitigation bank established in conjunction with a watershed plan.

C. Establishment of Mitigation Banks

1. Prospectus

Prospective bank sponsors should first submit a prospectus to the Army Corps of Engineers (Corps) or Natural Resources Conservation Service (NRCS)¹ to initiate the planning and review process by the appropriate agencies. Prior to submitting a prospectus, bank sponsors are encouraged to discuss their proposal with the appropriate agencies (e.g., pre-application coordination).

It is the intent of the agencies to provide practical comments to the bank sponsors regarding the general need for and technical feasibility of proposed banks. Therefore, bank sponsors are encouraged to include in the prospectus sufficient information concerning the objectives for the bank and how it will be established and operated to allow the agencies to provide such feedback. Formal agency involvement and review is initiated with submittal of a prospectus.

¹ The Corps will typically serve as the lead agency for the establishment of mitigation banks. Bank sponsors proposing establishment of mitigation banks solely for the purpose of complying with the "Swampbuster" provisions of FSA should submit their prospectus to the NRCS.

2. Mitigation Banking Instruments

Information provided in the prospectus will serve as the basis for establishing the mitigation banking instrument. All mitigation banks need to have a banking instrument as documentation of agency concurrence on the objectives and administration of the bank. The banking instrument should describe in detail the physical and legal characteristics of the bank, and how the bank will be established and operated. For regional banking programs sponsored by a single entity (e.g., a state transportation agency), it may be appropriate to establish an "umbrella" instrument for the establishment and operation of multiple bank sites. In such circumstances, the need for supplemental site-specific information (e.g., individual site plans) should be addressed in the banking instrument. The banking instrument will be signed by the bank sponsor and the concurring regulatory and resource agencies represented on the Mitigation Bank Review Team (section II.C.2). The following information should be addressed, as appropriate, within the banking instrument:

- Bank goals and objectives;
- Ownership of bank lands;
- Bank size and classes of wetlands and/or other aquatic resources proposed for inclusion in the bank, including a site plan and specifications;
- Description of baseline conditions at the bank site;
- Geographic service area;
- Wetland classes or other aquatic resource impacts suitable for compensation;
- Methods for determining credits and debits;
- Accounting procedures;
- Performance standards for determining credit availability and bank success;
- Reporting protocols and monitoring plan;
- Contingency and remedial actions and responsibilities;
- Financial assurances;
- Compensation ratios;
- Provisions for long-term management and maintenance.

The terms and conditions of the banking instrument may be amended, in accordance with the procedures used to establish the instrument and subject to agreement by the signatories.

In cases where initial establishment of the mitigation bank involves a discharge into waters of the United States requiring Section 10/404 authorization, the banking instrument will be made part of a Department of the Army permit for that discharge. Submittal of an

individual permit application should be accompanied by a sufficiently-detailed prospectus to allow for concurrent processing of each. Preparation of a banking instrument, however, should not alter the normal permit evaluation process timeframes. A bank sponsor may proceed with activities for the construction of a bank subsequent to receiving the Department of the Army authorization. It should be noted, however, that a bank sponsor who proceeds in the absence of a banking instrument does so at his/her own risk.

In cases where the mitigation bank is established pursuant to the FSA, the banking instrument will be included in the plan developed or approved by NRCS and the Fish and Wildlife Service (FWS).

3. Agency Roles and Coordination

Collectively, the signatory agencies to the banking instrument will comprise the Mitigation Bank Review Team (MBRT). Representatives from the Corps, EPA, FWS, National Marine Fisheries Service (NMFS) and NRCS, as appropriate given the projected use for the bank, should typically comprise the MBRT. In addition, it is appropriate for representatives from state, tribal and local regulatory and resource agencies to participate where an agency has authorities and/or mandates directly affecting or affected by the establishment, use or operation of a bank. No agency is required to sign a banking instrument; however, in signing a banking instrument, an agency agrees to the terms of that instrument.

The Corps will serve as Chair of the MBRT, except in cases where the bank is proposed solely for the purpose of complying with the FSA, in which case NRCS will be the MBRT Chair. In addition, where a bank is proposed to satisfy the requirements of another Federal, state, tribal or local program, it may be appropriate for the administering agency to serve as co-Chair of the MBRT.

The primary role of the MBRT is to facilitate the establishment of mitigation banks through the development of mitigation banking instruments. Because of the different authorities and responsibilities of each agency represented on the MBRT, there is a benefit in achieving agreement on the banking instrument. For this reason, the MBRT will strive to obtain consensus on its actions. The Chair of the MBRT will have the responsibility for making final decisions regarding the terms and conditions of the banking instrument where consensus cannot otherwise be reached within a reasonable timeframe (e.g., 90 days from the date of submittal

of a complete prospectus). The MBRT will review and seek consensus on the banking instrument and final plans for the restoration, creation, enhancement, and/or preservation of wetlands and other aquatic resources.

Consistent with its authorities under Section 10/404, the Corps is responsible for authorizing use of a particular mitigation bank on a project-specific basis and determining the number and availability of credits required to compensate for proposed impacts in accordance with the terms of the banking instrument. Decisions rendered by the Corps must fully consider review agency comments submitted as part of the permit evaluation process. Similarly, the NRCS, in consultation with the FWS, will make the final decision pertaining to the withdrawal of credits from banks as appropriate mitigation pursuant to FSA.

4. Role of the Bank Sponsor

The bank sponsor is responsible for the preparation of the banking instrument in consultation with the MBRT. The bank sponsor should, therefore, have sufficient opportunity to discuss the content of the banking instrument with the MBRT. The bank sponsor is also responsible for the overall operation and management of the bank in accordance with the terms of the banking instrument, including the preparation and distribution of monitoring reports and accounting statements/ledger, as necessary.

5. Public Review and Comment

The public should be notified of and have an opportunity to comment on all bank proposals. For banks which require authorization under an individual Section 10/404 permit or a state, tribal or local program that involves a similar public notice and comment process, this condition will typically be satisfied through such standard procedures. For other proposals, the Corps or NRCS, upon receipt of a complete banking prospectus, should provide notification of the availability of the prospectus for a minimum 21-day public comment period. Notification procedures will be similar to those used by the Corps in the standard permit review process. Copies of all public comments received will be distributed to the other members of the MBRT and the bank sponsor for full consideration in the development of the final banking instrument.

6. Dispute Resolution Procedure

The MBRT will work to reach consensus on its actions in accordance with this guidance. It is anticipated that

all issues will be resolved by the MBRT in this manner.

a. Development of the Banking Instrument

During the development of the banking instrument, if any agency representative considers that a particular decision raises concern regarding the application of existing policy or procedures, an agency may request, through written notification, that the issue be reviewed by the Corps District Engineer, or NRCS State Conservationist, as appropriate. Said notification will describe the issue in sufficient detail and provide recommendations for resolution. Within 20 days, the District Engineer or State Conservationist (as appropriate) will consult with the notifying agency(ies) and will resolve the issue. The resolution will be forwarded to the other MBRT member agencies. The bank sponsor may also request the District Engineer or State Conservationist review actions taken to develop the banking instrument if the sponsor believes that inadequate progress has been made on the instrument by the MBRT.

b. Application of the Banking Instrument

As previously stated, the Corps and NRCS are responsible for making final decisions on a project-specific basis regarding the use of a mitigation bank for purposes of Section 10/404 and FSA, respectively. In the event an agency on the MBRT is concerned that a proposed use may be inconsistent with the terms of the banking instrument, that agency may raise the issue to the attention of the Corps or NRCS through the permit evaluation process. In order to facilitate timely and effective consideration of agency comments, the Corps or NRCS, as appropriate, will advise the MBRT agencies of a proposed use of a bank. The Corps will fully consider comments provided by the review agencies regarding mitigation as part of the permit evaluation process. The NRCS will consult with FWS in making its decisions pertaining to mitigation.

If, in the view of an agency on the MBRT, an issued permit or series of permits reflects a pattern of concern regarding the application of the terms of the banking instrument, that agency may initiate review of the concern by the full MBRT through written notification to the MBRT Chair. The MBRT Chair will convene a meeting of the MBRT, or initiate another appropriate forum for communication, typically within 20 days of receipt of notification, to resolve concerns. Any such effort to address concerns

regarding the application of a banking instrument will not delay any decision pending before the authorizing agency (e.g., Corps or NRCS).

D. Criteria for Use of a Mitigation Bank

1. Project Applicability

All activities regulated under Section 10/404 may be eligible to use a mitigation bank as compensation for unavoidable impacts to wetlands and/or other aquatic resources. Mitigation banks established for FSA purposes may be debited only in accordance with the mitigation and replacement provisions of 7 CFR Part 12.

Credits from mitigation banks may also be used to compensate for environmental impacts authorized under other programs (e.g., state or local wetland regulatory programs, NPDES program, Corps civil works projects, Superfund removal and remedial actions). In no case may the same credits be used to compensate for more than one activity; however, the same credits may be used to compensate for an activity which requires authorization under more than one program.

2. Relationship to Mitigation Requirements

Under the existing requirements of Section 10/404, all appropriate and practicable steps must be undertaken by the applicant to first avoid and then minimize adverse impacts to aquatic resources, prior to authorization to use a particular mitigation bank. Remaining unavoidable impacts must be compensated to the extent appropriate and practicable. For both the Section 10/404 and "Swampbuster" programs, requirements for compensatory mitigation may be satisfied through the use of mitigation banks when either on-site compensation is not practicable or use of the mitigation bank is environmentally preferable to on-site compensation.

It is important to emphasize that applicants should not expect that establishment of, or purchasing credits from, a mitigation bank will necessarily lead to a determination of compliance with applicable mitigation requirements (i.e., Section 404(b)(1) Guidelines or FSA Manual), or as excepting projects from any applicable requirements.

3. Geographic Limits of Applicability

The service area of a mitigation bank is the area (e.g., watershed, county) wherein a bank can reasonably be expected to provide appropriate compensation for impacts to wetlands and/or other aquatic resources. This area should be designated in the

banking instrument. Designation of the service area should be based on consideration of hydrologic and biotic criteria, and be stipulated in the banking instrument. Use of a mitigation bank to compensate for impacts beyond the designated service area may be authorized, on a case-by-case basis, where it is determined to be practicable and environmentally desirable.

The geographic extent of a service area should, to the extent environmentally desirable, be guided by the cataloging unit of the "Hydrologic Unit map of the United States" (USGS, 1980) and the ecoregion of the "Ecoregions of the United States" (James M. Omernik, EPA, 1986) or section of the "Descriptions of the Ecoregions of the United States" (Robert G. Bailey, USDA, 1980). It may be appropriate to use other classification systems developed at the state or regional level for the purpose of specifying bank service areas, when such systems compare favorably in their objectives and level of detail. In the interest of the integrating banks with other resource management objectives, bank service areas may encompass larger watershed areas if the designation of such areas is supported by local or regional management plans (e.g., Special Area Management Plans, Advance Identification), State Wetland Conservation Plans or other Federally sponsored or recognized resource management plans. Furthermore, designation of a more inclusive service area may be appropriate for mitigation banks whose primary purpose is to compensate for linear projects that typically involve numerous small impacts in several different watersheds.

4. Use of a Mitigation Bank vs. On-Site Mitigation

The agencies' preference for on-site mitigation, indicated in the 1990 Memorandum of Agreement on mitigation between the EPA and the Department of the Army, should not preclude the use of a mitigation bank when there is no practicable opportunity for on-site compensation, or when use of a bank is environmentally preferable to on-site compensation. On-site mitigation may be preferable where there is a practicable opportunity to compensate for important local functions including local flood control functions, habitat for a species or population with a very limited geographic range or narrow environmental requirements, or where local water quality concerns dominate.

In choosing between on-site mitigation and use of a mitigation bank, careful consideration should be given to

the likelihood for successfully establishing the desired habitat type, the compatibility of the mitigation project with adjacent land uses, and the practicability of long-term monitoring and maintenance to determine whether the effort will be ecologically sustainable, as well as the relative cost of mitigation alternatives. In general, use of a mitigation bank to compensate for minor aquatic resource impacts (e.g., numerous, small impacts associated with linear projects; impacts authorized under nationwide permits) is preferable to on-site mitigation. With respect to larger aquatic resource impacts, use of a bank may be appropriate if it is capable of replacing essential physical and/or biological functions of the aquatic resources which are expected to be lost or degraded. Finally, there may be circumstances warranting a combination of on-site and off-site mitigation to compensate for losses.

5. In-kind vs. Out-of-kind Mitigation Determinations

In the interest of achieving functional replacement, in-kind compensation of aquatic resource impacts should generally be required. Out-of-kind compensation may be acceptable if it is determined to be practicable and environmentally preferable to in-kind compensation (e.g., of greater ecological value to a particular region). However, non-tidal wetlands should typically not be used to compensate for the loss or degradation of tidal wetlands. Decisions regarding out-of-kind mitigation are typically made on a case-by-case basis during the permit evaluation process. The banking instrument may identify circumstances in which it is environmentally desirable to allow out-of-kind compensation within the context of a particular mitigation bank (e.g., for banks restoring a complex of associated wetland types). Mitigation banks developed as part of an area-wide management plan to address a specific resource objective (e.g., restoration of a particularly vulnerable or valuable wetland habitat type) may be such an example.

6. Timing of Credit Withdrawal

The number of credits available for withdrawal (i.e., debiting) should generally be commensurate with the level of aquatic functions attained at a bank at the time of debiting. The level of function may be determined through the application of performance standards tailored to the specific restoration, creation or enhancement activity at the bank site or through the use of an appropriate functional assessment methodology.

The success of a mitigation bank with regard to its capacity to establish a healthy and fully functional aquatic system relates directly to both the ecological and financial stability of the bank. Since financial considerations are particularly critical in early stages of bank development, it is generally appropriate, in cases where there is adequate financial assurance and where the likelihood of the success of the bank is high, to allow limited debiting of a percentage of the total credits projected for the bank at maturity. Such determinations should take into consideration the initial capital costs needed to establish the bank, and the likelihood of its success. However, it is the intent of this policy to ensure that those actions necessary for the long-term viability of a mitigation bank be accomplished prior to any debiting of the bank. In this regard, the following minimum requirements should be satisfied prior to debiting: (1) banking instrument and mitigation plans have been approved; (2) bank site has been secured; and (3) appropriate financial assurances have been established. In addition, initial physical and biological improvements should be completed no later than the first full growing season following initial debiting of a bank. The temporal loss of functions associated with the debiting of projected credits may justify the need for requiring higher compensation ratios in such cases. For mitigation banks which propose multiple-phased construction, similar conditions should be established for each phase.

Credits attributed to the preservation of existing aquatic resources may become available for debiting immediately upon implementation of appropriate legal protection accompanied by appropriate changes in land use or other physical changes, as necessary.

7. Crediting/Debiting/Accounting Procedures

Credits and debits are the terms used to designate the units of trade (i.e., currency) in mitigation banking. Credits represent the accrual or attainment of aquatic functions at a bank; debits represent the loss of aquatic functions at an impact or project site. Credits are debited from a bank when they are used to offset aquatic resource impacts (e.g., for the purpose of satisfying Section 10/404 permit or FSA requirements).

An appropriate functional assessment methodology (e.g., Habitat Evaluation Procedures, hydrogeomorphic approach to wetlands functional assessment, other regional assessment methodology) acceptable to all signatories should be

used to assess wetland and/or other aquatic resource restoration, creation and enhancement activities within a mitigation bank, and to quantify the amount of available credits. The range of functions to be assessed will depend upon the assessment methodology identified in the banking instrument. The same methodology should be used to assess both credits and debits. If an appropriate functional assessment methodology is impractical to employ, acreage may be used as a surrogate for measuring function. Regardless of the method employed, the number of credits should reflect the difference between site conditions under the with- and without-bank scenarios.

The bank sponsor should be responsible for assessing the development of the bank and submitting appropriate documentation of such assessments to the authorizing agency(ies), who will distribute the documents to the other members of the MBRT for review. Members of the MBRT are encouraged to conduct regular (e.g., annual) on-site inspections, as appropriate, to monitor bank performance. Alternatively, functional assessments may be conducted by a team representing involved resources and regularly agencies and other appropriate parties. The number of available credits in a mitigation bank may need to be adjusted to reflect actual conditions.

The banking instrument should require that bank sponsors establish and maintain an accounting system (i.e., ledger) which documents the activity of all mitigation bank accounts. Each time an approved debit/credit transaction occurs at a given bank, the bank sponsor should submit a statement to the authorizing agency(ies). The bank sponsor should also generate an annual ledger report for all mitigation bank accounts to be submitted to the MBRT Chair for distribution to each member of the MBRT.

Credits may be sold to third parties. The cost of mitigation credits to a third party is determined by the bank sponsor.

Party Responsible for Bank Success

The bank sponsor is responsible for assuring the success of the debited restoration, creation, enhancement and preservation activities at the mitigation bank, and it is therefore extremely important that an enforceable mechanism be adopted establishing the responsibility of the bank sponsor to develop and operate the bank properly. Where authorization under Section 10/404 and/or FSA is necessary to establish the bank, the Department of the Army

permit or NRCS plan should be conditioned to ensure that provisions of the banking instrument are enforceable by the appropriate agency(ies). In circumstances where establishment of a bank does not require such authorization, the details of the bank sponsor's responsibilities should be delineated by the relevant authorizing agency (e.g., the Corps in the case of Section 10/404 permits) in any permit in which the permittee's mitigation obligations are met through use of the bank. In addition, the bank sponsor should sign such permits for the limited purpose of meeting those mitigation responsibilities, thus confirming that those responsibilities are enforceable against the bank sponsor if necessary.

E. Long-Term Management, Monitoring and Remediation

1. Bank Operational Life

The operational life of a bank refers to the period during which the terms and conditions of the banking instrument are in effect. With the exception of arrangements for the long-term management and protection in perpetuity of the wetlands and/or other aquatic resources, the operational life of a mitigation bank terminates at the point when (1) Compensatory mitigation credits have been exhausted or banking activity is voluntarily terminated with written notice by the bank sponsor provided to the Corps or NRCS and other members of the MBRT, and (2) it has been determined that the debited bank is functionally mature and/or self-sustaining to the degree specified in the banking instrument.

2. Long-term Management and Protection

The wetlands and/or other aquatic resources in a mitigation bank should be protected in perpetuity with appropriate real estate arrangements (e.g., conservation easements, transfer of title to Federal or State resource agency or non-profit conservation organization). Such arrangements should effectively restrict harmful activities (i.e., incompatible uses²) that might otherwise jeopardize the purpose of the bank. In exceptional circumstances, real estate arrangements may be approved which dictate finite protection for a bank (e.g., for coastal protection projects which prolong the ecological viability of

² For example, certain silvicultural practices (e.g., clear cutting and/or harvests on short-term rotations) may be incompatible with the objectives of a mitigation bank. In contrast, silvicultural practices such as long-term rotations, selective cutting, maintenance of vegetation diversity, and undisturbed buffers are more likely to be considered a compatible use.

the aquatic system). However, in no case should finite protection extend for a lesser time than the duration of project impacts for which the bank is being used to provide compensation.

The bank sponsor is responsible for securing adequate funds for the operation and maintenance of the bank during its operational life, as well as for the long-term management of the wetlands and/or other aquatic resources, as necessary. The banking instrument should identify the entity responsible for the ownership and long-term management of the wetlands and/or other aquatic resources. Where needed, the acquisition and protection of water rights should be secured by the bank sponsor and documented in the banking instrument.

3. Monitoring Requirements

The bank sponsor is responsible for monitoring the mitigation bank in accordance with monitoring provisions identified in the banking instrument to determine the level of success and identify problems requiring remedial action. Monitoring provisions should be set forth in the banking instrument and based on scientifically sound performance standards prescribed for the bank. Monitoring should be conducted at time intervals appropriate for the particular project type and until such time that the authorizing agency(ies), in consultation with the MBRT, are confident that success is being achieved (i.e., performance standards are attained). The period for monitoring will typically be five years; however, it may be necessary to extend this period for projects requiring more time to reach a stable condition (e.g., forested wetlands) or where remedial activities were undertaken. Annual monitoring reports should be submitted to the authorizing agency(ies), who is responsible for distribution to the other members of the MBRT, in accordance with the terms specified in the banking instrument.

4. Remedial Action

The banking instrument should stipulate the general procedures for identifying and implementing remedial measures at a bank, or any portion thereof. Remedial measures should be based on information contained in the monitoring reports (i.e., the attainment of prescribed performance standards), as well as agency site inspections. The need for remediation will be determined by the authorizing agency(ies) in consultation with the MBRT and bank sponsor.

5. Financial Assurances

The bank sponsor is responsible for securing sufficient funds or other financial assurances to cover contingency actions in the event of bank default or failure. Accordingly, banks posing a greater risk of failure and where credits have been debited, should have comparatively higher financial sureties in place, than those where the likelihood of success is more certain. In addition, the bank sponsor is responsible for securing adequate funding to monitor and maintain the bank throughout its operational life, as well as beyond the operational life if not self-sustaining. Total funding requirements should reflect realistic cost estimates for monitoring, long-term maintenance, contingency and remedial actions.

Financial assurances may be in the form of performance bonds, irrevocable trusts, escrow accounts, casualty insurance, letters of credit, legislatively-enacted dedicated funds for government operate banks or other approved instruments. Such assurances may be phased-out or reduced, once it has been demonstrated that the bank is functionally mature and/or self-sustaining (in accordance with performance standards).

F. Other Considerations

1. In-lieu-fee Mitigation Arrangements

For purposes of this guidance, in-lieu-fee, fee mitigation, or other similar arrangements, wherein funds are paid to a natural resource management entity for implementation of either specific or general wetland or other aquatic resource development projects, are not considered to meet the definition of mitigation banking because they do not typically provide compensatory mitigation in advance of project impacts. Moreover, such arrangements do not typically provide a clear timetable for the initiation of mitigation efforts. The Corps, in consultation with the other agencies, may find there are circumstances where such arrangements are appropriate so long as they meet the requirements that would otherwise apply to an offsite, prospective mitigation effort and provides adequate assurances of success and timely implementation. In such cases, a formal agreement between the sponsor and the agencies, similar to a banking instrument, is necessary to define the conditions under which its use is considered appropriate.

2. Special Considerations for "Swampbuster"

Current FSA legislation limits the extent to which mitigation banking can be used for FSA purposes. Therefore, if a mitigation bank is to be used for FSA purposes, it must meet the requirements of FSA.

III. Definitions

For the purposes of this guidance document the following terms are defined:

A. *Authorizing agency.* Any Federal, state, tribal or local agency that has authorized a particular use of a mitigation bank as compensation for an authorized activity; the authorizing agency will typically have the enforcement authority to ensure that the terms and conditions of the banking instrument are satisfied.

B. *Bank sponsor.* Any public or private entity responsible for establishing and, in most circumstances, operating a mitigation bank.

C. *Compensatory mitigation.* For purposes of Section 10/404, compensatory mitigation is the restoration, creation, enhancement, or in exceptional circumstances, preservation of wetlands and/or other aquatic resources for the purpose of compensating for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

D. *Consensus.* The term consensus, as defined herein, is a process by which a group synthesizes its concerns and ideas to form a common collaborative agreement acceptable to all members. While the primary goal of consensus is to reach agreement on an issue by all parties, unanimity may not always be possible.

E. *Creation.* The establishment of a wetland or other aquatic resource where one did not formerly exist.

F. *Credit.* A unit of measure representing the accrual or attainment of aquatic functions at a mitigation bank; the measure of function is typically indexed to the number of wetland acres restored, created, enhanced or preserved.

G. *Debit.* A unit of measure representing the loss of aquatic functions at an impact or project site.

H. *Enhancement.* Activities conducted in existing wetlands or other aquatic resources which increase one or more aquatic functions.

I. *Mitigation.* For purposes of Section 10/404 and consistent with the Council on Environmental Quality regulations, the Section 404(b)(1) Guidelines and the Memorandum of Agreement Between

the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines, mitigation means sequentially avoiding impacts, minimizing impacts, and compensating for remaining unavoidable impacts.

J. *Mitigation bank*. A mitigation bank is a site where wetlands and/or other aquatic resources are restored, created, enhanced, or in exceptional circumstances, preserved expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources. For purposes of Section 10/404, use of a mitigation bank may only be authorized when impacts are unavoidable.

K. *Mitigation Bank Review Team (MBRT)*. An interagency group of Federal, state, tribal and/or local regulatory and resource agency representatives which are signatory to a banking instrument and oversee the establishment, use and operation of a mitigation bank.

L. *Practicable*. Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

M. *Preservation*. The protection of ecologically important wetlands or other aquatic resources in perpetuity through the implementation of appropriate legal and physical mechanisms. Preservation may include protection of upland areas adjacent to wetlands as necessary to ensure protection and/or enhancement of the aquatic ecosystem.

N. *Restoration*. Re-establishment of wetland and/or other aquatic resource characteristics and function(s) at a site where they have ceased to exist, or exist in a substantially degraded state.

O. *Service area*. The service area of a mitigation bank is the designated area (e.g., watershed, county) wherein a bank can reasonably be expected to provide appropriate compensation for impacts to wetlands and/or other aquatic resources.

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MITIGATION BANK PROSPECTUS GUIDELINES

These guidelines list the information that the Mitigation Bank Review Team (MBRT) would prefer to receive in a prospectus. This listing is intended to be at a level where the prospective banker can provide the basic information needed to understand the project without a detailed application. However, the more information that is provided, the more guidance that can be provided by the MBRT. The state rules on mitigation banking do not require that a prospectus be submitted nor that this information be completely supplied initially. However, submittal of a prospectus to the Corps initiates formal agency action at the Federal level.

_____ Narrative overview of the project describing how the resulting increase in ecological value at the site will improve conditions in the regional watershed (or the proposed mitigation service area).

_____ Be sure to include a discussion of the current ecological value, the proposed ecological value, and how the difference between these will be quantified. Relevant to this discussion is presence of special biological resources, adjacent landowners and land uses.

_____ Aerial photography of the project site.

_____ Types of mitigation proposed: Restoration, Enhancement, Creation and/or Preservation.

_____ Types of mitigation and how the mitigation will be accomplished.

e.g.: Hydrologic restoration via filling ditch network,
Re-establishment of fire regime,
Re-establishment of native vegetative communities via (name activity proposed),
Other.

_____ Existing vegetative community types and target native community types.

_____ Acreages of each type of work: Restoration, Enhancement, Creation, and/or Preservation.

_____ What interest in the property do you have and will you maintain?

Fee simple ownership?
Lease or use agreement?
Other?

_____ What is the proposed Mitigation Service Area?

_____ Who are the anticipated customers?

_____ What is the anticipated schedule for completion of the bank

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the mitigation will yield long-term, sustainable, regional ecological benefits. Mitigation Banks should be consistent with Department endorsed watershed management objectives and emphasize restoration and enhancement of degraded ecosystems and the preservation of uplands and wetlands as intact ecosystems rather than alteration of landscapes to create wetlands. The establishment and use of Mitigation Banks in or adjacent to areas of national, state, or regional ecological significance is encouraged, provided the area in which the Mitigation Bank is proposed to be located is determined appropriate for mitigation banking and the Mitigation Bank meets all applicable permitting criteria.

(4) Nothing in this section shall affect the mitigation requirements set forth in any mitigation bank agreement or any permit issued pursuant to Chapter 84-79, Laws of Florida, or Part IV of Chapter 373, F.S., prior to the effective date of this section. If a permittee wishes to substantially modify a mitigation bank previously established by agreement or permit, the permittee must comply with this section. This section does not prohibit an applicant from proposing project-specific, pre-construction mitigation, or off-site mitigation, without establishing a Mitigation Bank pursuant to this section.

Specific Authority: 373.4135, 373.418, 403.061, F.S.
Law Implemented: 373.4135, F.S.
History: New 02-02-94.

17-342.200 Definitions.

Terms used in this chapter shall have the meanings specified below.

- (1) "Banker" means an entity that creates, operates, manages, or maintains a Mitigation Bank pursuant to a Mitigation Bank Permit.
- (2) "Department" means the Department of Environmental Protection.
- (3) "District" means a water management district as established in Chapter 373, F.S.
- (4) "Ecological Value" means the value of functions performed by wetlands and other environmentally sensitive areas. These functions include providing habitat for wildlife, corridors for wildlife movement, food chain support, groundwater recharge, water storage and flow attenuation, and water quality enhancement.
- (5) "Mitigation Credit" means a unit of measure which represents the increase in ecological value resulting from restoration, enhancement, preservation, or creation activities.

17-342.100(3) (cont'd.) - 17-342.200(5)

- 17-342.100 Intent.
- 17-342.200 Use of a Mitigation Bank.
- 17-342.300 Criteria for Establishing a Mitigation Bank.
- 17-342.400 Mitigation Bank Permit Applications.
- 17-342.470 Establishment of Mitigation Credits.
- 17-342.500 Contribution of Funds.
- 17-342.550 Mitigation Service Area.
- 17-342.600 Land Use Restrictions on Mitigation Banks.
- 17-342.700 Financial Responsibility.
- 17-342.750 Mitigation Bank Permit and Mitigation Bank Conceptual Approval.
- 17-342.800 Surrender, Transfer, or Modification of Mitigation Bank Permits.
- 17-342.850 Water Management District Mitigation Banks.

17-342.100 Intent.

(1) The Environmental Reorganization Act of 1993 directs the Department to adopt rules governing the creation and use of mitigation banks to offset adverse impacts caused by activities regulated under Part IV of Chapter 373, F.S. This section, in addition to other rules promulgated under Part IV of Chapter 373, F.S., is intended to meet this requirement.

(2) The Department recognizes that, in certain instances, adverse impacts of activities regulated under Part IV of Chapter 373, F.S., can be offset through participation in a Mitigation Bank. This rule provides criteria for this mitigation alternative to complement existing mitigation criteria and requirements. This section does not supersede any other criteria and requirements in rules promulgated under Part IV of Chapter 373, F.S.

(3) The Department intends that Mitigation Banks be used to minimize mitigation uncertainty associated with traditional mitigation practices and provide greater assurance of mitigation success. It is anticipated that the consolidation of multiple mitigation projects into larger contiguous areas will provide greater assurance that

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(6) "Mitigation Service Area" means the geographic area within which Mitigation Credits from a Mitigation Bank may be used to offset adverse impacts of activities regulated under Part IV of Chapter 373, F.S.

(7) "Mitigation Bank Permit" means a permit issued to a banker to construct, operate, manage and maintain a Mitigation Bank.

(8) "Mitigation Bank" means a project undertaken to provide for the withdrawal of mitigation credits to offset adverse impacts.

(9) "Success" means when a Mitigation Bank meets the success criteria provided in Rule 17-312.350, F.A.C. and in the Mitigation Bank Permit.

Specific Authority: 373.4135, 373.418, 403.061, F.S.

Law Implemented: 373.4135, F.S.

History: New 02-02-94.

17-342.300 Use of a Mitigation Bank.

(1) Use of a Mitigation Bank is appropriate, desirable, and a permittable mitigation option when the Mitigation Bank will offset the adverse impacts of the project; and

(a) on-site mitigation opportunities are not expected to have comparable long-term viability due to such factors as unsuitable hydrologic conditions or ecologically incompatible existing adjacent land uses or future land uses identified in a local comprehensive plan adopted according to Chapter 163, F.S.; or

(b) use of the Mitigation Bank would provide greater improvement in ecological value than on-site mitigation.

(2) In some cases, a combination of on-site mitigation and participation in a Mitigation Bank will be appropriate to offset adverse impacts of a project.

Specific Authority: 373.4135, 373.418, 403.061, F.S.

Law Implemented: 373.4135, F.S.

History: New 02-02-94.

17-342.400 Criteria for Establishing a Mitigation Bank.

The following criteria shall be set to establish a Mitigation Bank:

(1) The banker shall provide reasonable assurance that the proposed Mitigation Bank will:

(a) improve ecological conditions of the regional watershed;

(b) provide viable and sustainable ecological and hydrological functions for the proposed mitigation service area;

(c) be effectively managed in the long term;

(d) not destroy areas with high ecological value;

(e) achieve mitigation success; and

17-342.200(c) - 17-342.400(1)(e)

(f) be adjacent to lands which will not adversely affect the long-term viability of the Mitigation Bank due to unsuitable land uses or conditions.

(2) A Mitigation Bank may be implemented in phases if each phase independently meets the requirements of subsection 17-342.400(1) above.

(3) The banker shall:

(a) have sufficient legal or equitable interest in the property to meet the requirements of section 17-342.650; and

(b) meet the financial responsibility requirements of section 17-342.700.

Specific Authority: 373.4135, 373.418, 403.061, F.S.

Law Implemented: 373.4135, F.S.

History: New 02-02-94.

17-342.450 Mitigation Bank Permit Applications.

Any person or entity proposing to establish a Mitigation Bank must apply for a Mitigation Bank Permit. An application for a Mitigation Bank Permit shall also constitute an application for any required permit authorized under Part IV of Chapter 373, F.S.

Mitigation Bank Permit applications shall be processed according to Chapter 120, F.S. To provide the Department with reasonable assurances that the proposed Mitigation Bank will meet the criteria in this section, each Mitigation Bank permit application submitted to the Department shall include the information required pursuant to Part IV of Chapter 373, F.S., and the information specified below as appropriate for the project:

(1) A description of the location of the proposed Mitigation Bank which shall include:

(a) a map at regional scale showing the project area in relation to the regional watershed and proposed mitigation service area;

(b) a vicinity map showing the project area in relation to adjacent lands and offsite areas of ecologic or hydrologic significance which could affect the long term viability or ecological value of the bank;

(c) an aerial photograph identifying boundaries of the project area;

(d) a highway map showing points of access to the Mitigation Bank for site inspection; and

(e) a legal description of the proposed Mitigation Bank.

(2) A description of the ecological significance of the proposed Mitigation Bank to the regional watershed in which it is located.

(3) A description and assessment of current site conditions which shall include:

17-342.400(1)(f) - 17-342.450(3)

- (a) a soils map of the project area;
- (b) a topographic map of the project area and adjacent hydrologic contributing and receiving areas;
- (c) a hydrologic features map of the project area and adjacent hydrologic contributing and receiving areas;
- (d) current hydrologic conditions in the project area;
- (e) a vegetation map of the project area;
- (f) ecological benefits currently provided to the regional watershed by the project area;
- (g) adjacent lands, including existing land uses and conditions, projected land uses according to comprehensive plans adopted pursuant to Chapter 163, F.S., by local governments having jurisdiction, and any special designations or classifications associated with adjacent lands or waters; and
- (h) a disclosure by the applicant of any material fact which would affect the contemplated use of the property.
- (4) A mitigation plan describing the actions proposed to establish, construct, operate, manage and maintain the Mitigation Bank which shall include:
 - (a) construction-level drawings detailing proposed topographic alterations and all structural components associated with proposed activities;
 - (b) proposed construction activities, including a detailed schedule for implementation;
 - (c) the proposed vegetation planting scheme and detailed schedule for implementation;
 - (d) measures to be implemented during and after construction to avoid adverse impacts related to proposed activities;
 - (e) a detailed long term management plan comprising all aspects of operation and maintenance, including water management practices, vegetation establishment, exotic and nuisance species control, fire management, and control of access; and
 - (f) a proposed monitoring plan to demonstrate mitigation success.
- (5) An assessment of improvement or changes in ecological value anticipated as a result of proposed mitigation actions which shall include:
 - (a) a description of anticipated site conditions in the Mitigation Bank after the mitigation plan is successfully implemented;
 - (b) a comparison of current fish and wildlife habitat to expected habitat after the mitigation plan is successfully implemented; and
 - (c) a description of the expected ecological benefits to the regional watershed.

17-342.450(3)(a) - 17-342.450(5)(c)

- (6) Evidence of sufficient legal or equitable interest in the property which is to become the Mitigation Bank to meet the requirements of section 17-342.650.
 - (7) Draft documentation of financial responsibility meeting the requirements of section 17-342.700.
 - (8) Any additional information which may be necessary to evaluate whether the proposed Mitigation Bank meets the criteria of this section.
- Specific Authority: 373.4135, 373.418, 403.061, F.S.
 Law Implemented: 373.4135, F.S.
 History: New 02-02-94.

17-342.470 Establishment of Mitigation Credits.

- (1) Based upon the information submitted by the applicant, and an assessment of the proposed Mitigation Bank pursuant to the criteria in this section, the Department will assign a number of Mitigation Credits to the proposed Mitigation Bank, or phases thereof.
- (2) A Mitigation Credit is a unit of measure which represents the increase in ecological value resulting from restoration, enhancement, preservation, or creation activities. For purposes of establishing a standard unit of measure, one Mitigation Credit is equivalent to the ecological value gained by the successful creation of one acre of wetland. Mitigation Credits assigned for enhancement, restoration or preservation of wetlands or uplands will be based on the extent of improvement in ecological value resulting from these activities relative to that obtained by successfully creating one acre of wetland. In determining the degree of improvement in ecological value, the following factors will be considered:
 - (a) The extent to which target hydrologic regimes can be achieved and maintained.
 - (b) The extent to which management activities promote natural ecological conditions, including natural fire patterns.
 - (c) The proximity to areas of national, state, or regional ecological significance, such as national or state parks, Outstanding National Resource Waters, and Outstanding Florida Waters, and other regionally significant ecological resources or habitats, such as lands acquired or to be acquired through governmental or non-profit land acquisition programs for environmental conservation, and the establishment of corridors to those resources or habitats.
 - (d) The quality and quantity of wetland or upland restoration, enhancement, preservation, or creation.
 - (e) The ecological and hydrological relationship between wetlands and uplands in the Mitigation Bank.
 - (f) The extent to which the Mitigation Bank provides

17-342.450(6) - 17-342.470(2)(f)

habitat for fish and wildlife, especially habitat for species listed as threatened, endangered or of special concern, or provides habitats which are unique for that mitigation service area.

(g) The extent to which the lands that are to be preserved are already protected by existing state, local or federal regulations or land use restrictions.

(h) The extent that lands to be preserved would be adversely affected if they were not preserved.

(i) Any special designation or classification of the affected waters and lands.

(3) No credit shall be available for freshwater wetland creation until the success of the created wetlands is demonstrated.

(4) Some Mitigation Credits may be withdrawn prior to meeting all of the performance criteria specified in the Mitigation Bank Permit. The number of credits and schedule for release shall be determined based upon the performance criteria for the Mitigation Bank, and the success criteria for each mitigation activity. A Mitigation Bank will be credited with its maximum number of Mitigation Credits only after meeting the mitigation success criteria specified in the permit. However, no credits shall be released until the requirements of Section 17-342.650 are met.

(5) Mitigation Credits available for withdrawal may be transferred, sold or used subject to the provisions of this section.

(6) If at any time the banker is not in material compliance with the terms of the Mitigation Bank Permit, no Mitigation Credits may be withdrawn. Mitigation Credits shall again be available for withdrawal if the banker comes back into compliance.

(7) The Mitigation Bank Permit shall contain a ledger listing the number and type of Mitigation Credits in the Mitigation Bank. The ledger will provide the maximum number and type of Mitigation Credits which would be available for withdrawal when the Mitigation Bank meets all of the performance criteria in the permit.

(8) Mitigation Credits may be sold whole or in part at the banker's discretion. Mitigation Credits may be sold or resold until they are used to offset adverse impacts.

(9) The Department shall maintain a ledger of the Mitigation Credits available in each Mitigation Bank. Mitigation Credits shall be withdrawn as a minor modification of the Mitigation Bank Permit. To withdraw Mitigation Credits the impact permit applicant must submit to the agency permitting the impact, documentation from the banker demonstrating that Mitigation Credits have been reserved, sold or transferred to the permit applicant, and requesting that the Mitigation Credits be withdrawn from

17-342.470(2)(f) (cont'd.) - 17-342.470(9)

the Mitigation Bank. If the agency permitting the impact determines that use of the Mitigation Credits proposed by the applicant is appropriate to offset the adverse impacts, it shall notify the Department. Upon receipt of this notice, the Department shall determine if a sufficient number and type of Mitigation Credits are available, withdraw the Mitigation Credits, and notify the agency permitting the impact and the banker by letter of the withdrawal of the Mitigation Credits and the remaining balance of Mitigation Credits.

(10) When the Department or the District is the banker, each agency shall maintain its own ledger. The District shall annually submit a report of the Mitigation Credits sold, transferred, or used from its Mitigation Bank to the Department.

Specific Authority: 373.4135, 373.418, 403.061, F.S.
Law Implemented: 373.4135, F.S.
History: New 02-2-94.

17-342.500 Contribution of Lands.

A permit applicant may contribute land to a Mitigation Bank if:

(1) the adverse impacts to be offset by the land donation are within the Mitigation Service Area of the Mitigation Bank, except as provided in Section 17-342.600(4);

(2) the land will offset adverse impacts of the proposed project;

(3) the land is adjacent to or will become a Department approved Mitigation Bank;

(4) the land will improve or enhance the ecological value of a Department approved Mitigation Bank;

(5) the land will be encumbered with a conservation easement or conveyed in fee simple pursuant to the requirements of section 17-342.650; and

(6) the grantees of the conservation easement or fee simple interest agrees to accept such conveyance.

Specific Authority: 373.4135, 373.418, 403.061, F.S.
Law Implemented: 373.4135, F.S.
History: New 02-2-94.

17-342.550 Contribution of Funds.

Funds may be contributed to a Mitigation Bank by purchasing Mitigation Credits from the banker. The cost per Mitigation Credit from a Department Mitigation Bank shall be set by the Department, but shall not exceed the higher of:

(1) the estimated cost, at the time of final permit processing, of creating one acre of wetland on the project site, including the current fair market value, established

17-342.470(9) (cont'd.) - 17-342.550(1)

by independent appraisal, of lands at or abutting the project site to be used for mitigation, and construction, operation, monitoring, and management costs; or

(2) the Department's estimated costs per credit for acquisition, design, construction, operation, monitoring and management of the Mitigation Bank.

Specific Authority: 373.4135, 373.418, 403.061, F.S.
Law Implemented: 373.4135, F.S.
History: New 02-02-94.

17-342.600 Mitigation Service Area.

(1) A Mitigation Service Area will be established for each Mitigation Bank in the Mitigation Bank Permit. Except as provided herein, Mitigation Credits may only be withdrawn to offset adverse impacts in the Mitigation Service Area. The extent of the Mitigation Service Area will depend upon whether adverse impacts within the Mitigation Service Area can be adequately offset by the Mitigation Bank.

(2) A Mitigation Service Area may be larger than the regional watershed if adverse impacts to wetlands outside the regional watershed could be adequately offset by the Mitigation Bank because of local ecological or hydrological conditions. A Mitigation Service Area may be smaller than a regional watershed, such as in an aquatic preserve, Outstanding Florida Water, or Area of Critical State Concern, if adverse impacts throughout the regional watershed could not be offset by the Mitigation Bank because of local ecological or hydrological conditions.

(3) Mitigation Service Areas may overlap and multiple Mitigation Service Areas may be approved for a regional watershed.

(4) In addition to projects located wholly within the Mitigation Service Area of a Mitigation Bank, the following projects are eligible to use a Mitigation Bank if the requirements in section 17-342.300 are met:

- Projects with adverse impacts partially located within the Mitigation Service Area.
- Linear projects, such as roadways, transmission lines, distribution lines, pipelines, or railways.
- Projects with total adverse impacts of less than one-half acre in size.
- When Mitigation Credits are applied to offset adverse impacts within the regional watershed, the Mitigation Credit requirement shall be the same as that specified for mitigation on the project site.
- When Mitigation Credits are applied to offset adverse impacts outside the regional watershed, the Mitigation Credit requirement may be higher than that specified for mitigation on the project site, except for

17-342.550(10)(cont'd.) - 17-342.600(6)

linear projects, as referenced in (4)(b) above, when the impact being offset is within the Mitigation Service Area of the Mitigation Bank to be used.

Specific Authority: 373.4135, 373.418, 403.061, F.S.
Law Implemented: 373.4135, F.S.
History: New 02-02-94.

17-342.650 Land Use Restrictions on Mitigation Banks.

(1) Before Mitigation Credits may be used from a Mitigation Bank or any phase of a Mitigation Bank, the banker shall either (1) cause a fee interest to be conveyed to the Board of Trustees of the Internal Improvement Trust Fund ("Board of Trustees"), or (2) cause a conservation easement to be conveyed to both the Department and the District. The grantor may convey a conservation easement to additional grantees upon Department approval. Mitigation Banks on Federally owned land shall be encumbered in perpetuity by conservation easements or other mechanisms ensuring preservation in accordance with the Mitigation Bank permit.

(2) All conservation easements shall be granted in perpetuity without encumbrances, unless such encumbrances do not adversely affect the ecological viability of the Mitigation Bank. All conservation easements shall be of a form and content acceptable to the Department, and shall, at a minimum, be consistent with all the requirements and restrictions of Section 704.05, F.S., except as provided in subsection 17-342.650(9); however, the Department shall require further restrictions in the conservation easement if necessary to ensure the ecological viability of the Mitigation Bank.

(3) All real property conveyances shall be in fee simple and by statutory warranty deed, special warranty deed, or other deed, without encumbrances that adversely affect the integrity of the bank and are acceptable to the Board of Trustees. The Board of Trustees may also accept a quit claim deed in order to aid in clearing minor title defects or otherwise resolve a boundary question in the Mitigation Bank.

(4) The grantor of the property or conservation easement shall provide the following unless the Department determines such items are not necessary to ensure the integrity of the Mitigation Bank:

- A survey of the property or the area within the conservation easement. The survey must be certified by a land surveyor registered in the State of Florida to meet the requirements of the Department, and the minimum technical standards set forth by the Florida Board of Professional Land Surveyors in Chapter 21 III-6, Florida Administrative Code, pursuant to Section 472.027, F.S.

17-342.600(6)(cont'd.) - 17-342.650(4)(a)

esement or property deed within 30 days of recording. Specific Authority: 373.4135, 373.418, 403.061, F.S. Law Implemented: 373.4135, F.S. History: New 02-02-94.

17-342.700 Financial Responsibility. (1) To provide reasonable assurances that the proposed Mitigation Bank will meet the requirements of this section and the associated permit conditions, non-governmental bankers shall provide proof of financial responsibility for: (1) the construction and implementation phase of the bank; and (2) the long term management of the bank, as required in this section. Governmental entities shall provide proof of financial responsibility pursuant to Section 17-342.700(8). The amount of financial responsibility provided in the mechanisms required in this section shall be based on the cost estimates determined pursuant to Section 17-342.700(6).

(2) Financial Responsibility Documentation. The applicant shall provide draft documentation of the required financial responsibility mechanisms described below with the permit application, and shall submit to the Department the executed or finalized documentation within the time frames specified in the permit. The provisions of this section shall also apply for any modifications to the Mitigation Bank Permit.

(3) General Terms for Financial Responsibility Mechanisms. In addition to the specific provisions regarding financial responsibility mechanisms for construction and implementation in subsection 17-342.700(4) and long term management in subsection 17-342.700(5), the following terms shall be complied with:

(a) The financial responsibility mechanisms shall name the Department as sole beneficiary or shall be payable to the Department. The financial responsibility mechanism shall be retained by the Department as appropriate.

(b) The financial responsibility mechanisms shall be established with a state or national bank, savings and loan association, or other financial institution, licensed in this state. In the case of letters of credit, the letter of credit must be issued by an entity which has authority to issue letters of credit and whose letter of credit operations are regulated and examined by a federal or state agency. In the case of a surety bond, the surety bond must be issued by a surety company registered with this state.

(c) No person shall withdraw or transfer any portion of the monies provided for financial responsibility without first obtaining prior written approval from the Department.

17-342.650(10) (cont'd.) - 17-342.700(3)(c)

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(b) A certified appraisal of the market value of the property or interest to be conveyed to determine the appropriate amount of title insurance.

(c) Assurance of the marketability of the interest in real property being acquired in the form of a marketable title commitment and owner's title policy (ALTA Form B) in an amount at least equal to the fair market value, as established in subsection 17-342.650(4)(b), of the real property. The coverage, form and exceptions of the title insurance policy shall be subject to Department approval in order to assure that the Department's interests are fully protected.

(d) If a fee simple interest is being conveyed, a Phase I environmental audit identifying any environmental problems which may affect the liability of the Department or Board of Trustees and any additional audits as determined necessary.

(5) The Department shall require additional documentation or actions from the grantor of the conservation easement or fee interest if such additional documentation or actions are necessary to adequately protect the Department's interest in, or the integrity of, the Mitigation Bank.

(6) The grantor shall pay the documentary revenue stamp tax and all other taxes or costs associated with the conveyance, including the cost of recording the deed or easement and any other recordable instruments required by the Department or Board of Trustees, unless prohibited or exempt by law, as a condition of the receipt of the conveyance.

(7) All real estate taxes and assessments which are or which may become a lien against the property shall be satisfied of record by the grantor before or at closing. If necessary, the grantor shall, in accordance with Section 196.295, F.S., place funds in escrow with the county tax collector.

(8) The grantor shall remove all abandoned personal property and solid waste from the property to satisfaction of the Board of Trustees and the Department as a condition of receipt of the conveyance.

(9) The grantor shall provide in the conservation easement that the banker and the Department shall have access to the property to perform all acts necessary to ensure compliance with the Mitigation Bank Permit and any permits issued under this Part.

(10) The banker shall record the conservation easement or property deed within 30 days of issuance of the Mitigation Bank Permit, or as otherwise required in the Mitigation Bank Permit. The banker shall submit to the Department a certified copy of the recorded conservation

17-342.650(4)(b) - 17-342.650(10)

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(d) The financial responsibility mechanisms shall not expire or terminate prior to completion of the applicable permit conditions.

(e) The financial responsibility mechanisms shall not be terminated or cancelled by the banker without prior written consent of the Department. Within 90 days of receipt of a notice of cancellation of a financial responsibility mechanism or other actual or constructive notice of cancellation, the banker shall provide an alternate financial responsibility mechanism which meets the requirements of this section, and obtain prior written approval of the mechanism from the Department.

(f) If the Mitigation Bank has failed to comply with the terms and conditions of the permit, the Department upon reasonable notice may draw upon the financial mechanism.

(4) Financial Responsibility for Construction and Implementation.

(a) No financial responsibility shall be required where the construction and implementation of the Mitigation Bank, or a phase thereof, is completed and successful prior to the withdrawal of any credits.

(b) Financial responsibility for the construction and implementation of each phase of the Mitigation Bank may be established by guarantee bonds, performance bonds, insurance certificates, irrevocable letters of credit, trust fund agreements, or securities. If bonds or an irrevocable letter of credit are used as the financial mechanism, a standby trust fund shall be established, in a form meeting standard industry practices, in which all payments under the bonds or irrevocable letter of credit shall be directly deposited.

(c) The amount of financial responsibility established shall equal the cost of construction and implementation of each phase of the Mitigation Bank which is being implemented, pursuant to Section 17-342.700(6). When a current phase has been deemed by staff to be completely constructed, implemented, and trending toward success in compliance with the permit, the respective amount of financial responsibility shall either be released, or transferred to the long term management financial responsibility mechanism.

(d) The financial responsibility mechanism shall become effective at least 60 days prior to initiation of construction of the next phase of the Mitigation Bank, or as otherwise required by the Mitigation Bank permit prior to initiation of implementation and construction of the subject phase.

(5) Financial Responsibility for the Long Term Management.

17-342.700(3)(d) - 17-342.700(5)

(a) A banker shall establish a trust fund agreement to provide financial responsibility for the long term management of the Mitigation Bank, or phase thereof. Trust fund agreements shall be submitted in a format approved by the Department and which meets standard industry practices. (b) The amount of financial responsibility shall equal the cost of long term management, pursuant to Section 17-342.700(6), for all previously constructed phases and the current phase for which credits have been approved for withdrawal.

(c) The trust fund agreement shall be effective and fully funded at least 60 days prior to the withdrawal of credits from the Mitigation Bank, or phase thereof, or as otherwise provided in the Mitigation Bank permit prior to the withdrawal of credits.

(6) Cost estimates.

(a) For the purposes of determining the amount of financial responsibility that is required in this section, the banker shall submit a detailed written estimate, in current dollars, of the total cost of construction and implementation and long term management of the Mitigation Bank.

(b) The cost estimate for construction and implementation shall include all costs associated with completing construction and implementation of the Mitigation Bank, or phase thereof, including earthmoving, planting, structure installation, consultant fees, monitoring activities and reports.

(c) The cost estimate for the long term management of the Mitigation Bank shall be based on the costs of maintaining and operating any structures, controlling nuisance or exotic species, fire management, consultant fees, monitoring activities and reports, and any other costs associated with long term management. The amount of financial responsibility shall equal the cost of long term management for all previously constructed phases and the current phase for which the withdrawal of credits is imminent.

(d) The banker shall submit the estimates, together with verifiable documentation, to the Department for approval along with the proof of financial responsibility.

(e) The costs shall be estimated based on a third party performing the work at the fair market value of services. The source of any cost estimates shall be indicated.

(7) Cost adjustments.

(a) The banker shall, every two years, adjust the amount of financial responsibility provided for

17-342.700(5)(a) - 17-342.700(7)(a)

construction, implementation, and long term management. Every two years the banker shall submit to the Department a cost adjustment statement accompanied by supporting documentation. Construction, implementation, and long term management costs shall be listed separately.

(b) At each cost adjustment, the banker shall revise the construction and implementation cost estimate for inflation and changes in the costs to complete the current phase of the Mitigation Bank.

(c) At each cost adjustment, the banker shall revise the long term management cost estimate for inflation and changes in the costs to carry out the long term management conditions of the permit.

(d) Revised cost estimates shall be used as the basis for modifying the financial mechanism. If the value of the financial mechanism is less than the total amount of the current construction and implementation and long term management cost estimates, the banker shall, upon Department approval, increase the value of the financial mechanism to reflect the new estimate within 60 days. If the value of the funding mechanism is greater than the total amount of the current cost estimate, the banker may reduce the value of the funding mechanism to reflect the new estimate upon receiving Department approval.

(e) The Department may require adjustment of the amount of financial responsibility provided for construction, implementation or long term management at times other than the cost adjustment period when the costs associated with the cost adjustment exceed the current amount of financial responsibility and such financial assurances are deemed necessary to ensure compliance with the permit conditions.

(8) Financial Responsibility for Governmental, Non-Department and Non-Water Management District, Mitigation Banks.

(a) Governmental entities other than the Department or Districts shall demonstrate financial responsibility for construction and implementation by any of the mechanisms in Section 17-342.700(4) above, or by other financial mechanisms acceptable to the Department which are sufficient to meet the requirements of this section.

(b) Governmental entities other than the Department or District shall establish a trust fund for the long term management of the Mitigation Bank in accordance with Section 17-342.700(5) above. The trust fund agreement for long term management may be funded as Mitigation Credits are withdrawn, provided that the trust fund agreement is fully funded when all Mitigation Credits are withdrawn.

17-342.700(7) (a) (cont'd) - 17-342.700(8) (b)

Governmental entities shall comply with the cost adjustment provisions in Section 17-342.700(7). Specific Authority: 373.4135, 373.418, 403.061, F.S. Law Implemented: 373.4135, F.S. History: New 02-02-94.

17-342.750 Mitigation Bank Permit and Mitigation Bank Conceptual Approval.

If the Mitigation Bank proposal meets the criteria in this section, the Department shall issue a Mitigation Bank Permit to the banker. An authorization under this section may be issued in two forms: a Mitigation Bank Permit or a Mitigation Bank Conceptual Approval.

(1) The Mitigation Bank Permit authorizes the implementation and operation of the Mitigation Bank and sets forth the rights and responsibilities of the banker and the Department for the implementation, management, maintenance and operation of the Mitigation Bank. The Mitigation Bank Permit shall include the following:

(a) A description of the Mitigation Service Area.
(b) The maximum number of Mitigation Credits available for use when the Mitigation Bank, or phase thereof, is deemed successful, the type of Mitigation Credits awarded, and the number and schedule of Mitigation Credits available for use prior to success.

(c) The success criteria by which the Mitigation Bank will be evaluated. "Success" means when a Mitigation Bank meets the success criteria provided in Rule 17-312.350, F.A.C., and in the Mitigation Bank Permit.

(d) The financial responsibility mechanism(s) which must be employed by the banker, including the procedure for drawing on the financial mechanisms by the Department, and provisions for adjustment of the financial responsibility mechanism.

(e) Requirements for the execution and recording of the conservation easement or conveyance of the fee interest as provided in section 17-342.650.

(f) A ledger listing Mitigation Credits available in the Mitigation Bank.

(g) A schedule for implementation of the Mitigation Bank, and any phases therein.

(h) The long term management requirements for the Mitigation Bank.

(2) A Mitigation Bank Permit shall automatically expire five years from the date of issuance if the banker has not recorded a conservation easement or conveyed fee simple interest, as appropriate, over the real property within the Mitigation Bank, or phase thereof, in accordance with the Mitigation Bank Permit; or, when no property interest is required to be recorded, the Mitigation Bank

17-342.700(8) (b) (cont'd.) - 17-342.750(2)

Permit shall automatically expire if no construction has been commenced pursuant thereto. Except as provided above, a Mitigation Bank Permit shall be perpetual unless revoked or modified.

(3) A Mitigation Bank Conceptual Approval estimates the legal and financial requirements necessary for the Mitigation Bank, information necessary for evaluation of the Mitigation Bank Permit application, and potential Mitigation Credits to be awarded pursuant to the Mitigation Bank Permit. The Mitigation Bank Conceptual Approval does not authorize the use or withdrawal of Mitigation Credits, or any construction within the Mitigation Bank. The level of detail provided in the Mitigation Bank Conceptual Approval will depend on the level of detail submitted with the application. A Mitigation Bank Conceptual Approval shall be valid for a term of five years from the date of issuance.

Specific Authority: 373.4135, 373.418, 403.061, F.S.
Law Implemented: 373.4135, F.S.
History: New 02-02-94.

17-342.800 Surrender, Transfer, or Modification of Mitigation Bank Permits.

(1) A banker may apply to surrender a Mitigation Bank permit, or permitted phase thereof, by submitting a written request to the Department. The written request must identify which phase of the Mitigation Bank will be surrendered, indicate the extent of mitigation work performed in that phase, and describe the conservation property interest encumbering that phase. The Department shall authorize release from a Mitigation Bank permit when no credits have been sold, and relinquishment of the phase would not compromise the ecological value of the remaining portions of the Mitigation Bank.

(2) If a property interest has been conveyed as provided in Section 17-342.650 for a Mitigation Bank permit which is surrendered as provided above, the Department shall convey the property interest back to the grantor of that interest.

(3) If a surface water management system has been constructed or altered within the Mitigation Bank, the banker shall obtain any permits required pursuant to Part IV of Chapter 373, F.S., to operate or abandon the surface water management system.

(4) To transfer a Mitigation Bank Permit, the banker shall meet the requirements of section 17-4.120, F.A.C., and the entity to whom the permit will be transferred must provide reasonable assurances that it can meet the requirements of sections 17-342.650 and 17-342.700.

17-342.750(2) (cont'd.) - 17-342.800(4)

(5) A Mitigation Bank Permit can be issued as a modification of a Mitigation Bank Conceptual Approval. Specific Authority: 373.4135, 373.418, 403.061, F.S.
Law Implemented: 373.4135, F.S.
History: New 02-02-94.

17-342.850 Water Management District Mitigation Banks.

The District may construct, operate, manage, and maintain a Mitigation Bank pursuant to this section after obtaining a Mitigation Bank Permit from the Department.

(1) The District may apply to establish a Mitigation Bank by submitting a Mitigation Bank plan, meeting the applicable permitting criteria of this section, in one of the following formats:

(a) A Mitigation Bank plan identifying one or more parcels of lands to be acquired for mitigation site(s).

(b) A Mitigation Bank plan identifying one or more parcels of land in which the District has a legal or equitable interest.

(2) Land Use Restrictions on District Mitigation Banks. The District shall maintain the land within the Regional Mitigation Bank pursuant to the terms of the Mitigation Bank Permit. Any change in the land use shall require a modification of the Mitigation Bank Permit.

(3) Notwithstanding any other provision of this chapter, the District may sell, transfer, or use Mitigation Credits prior to acquiring the proposed mitigation site as set forth in its Mitigation Bank Permit.

(4) District Financial Responsibility. A portion of the funds contributed to a District Mitigation Bank from the sale of credits shall be dedicated for the construction and implementation of the Mitigation Bank, and a portion of the funds shall be dedicated for the long-term management of the bank as set forth in the Mitigation Bank Permit.

Funds derived from the sale of Mitigation Credits which are not necessary for the construction, implementation, and long-term management of a District Regional Mitigation Bank shall be dedicated for the initiation of other District Mitigation Banks, or expansion of other District land acquisition or restoration projects which improve regional ecological conditions.

(5) Procedures for Establishment of Mitigation Banks. Mitigation Banks established by the Districts shall be permitted, as applicable, pursuant to the procedures in the Operating Agreements Concerning Management and Storage of Surface Waters Regulation, and Wetland Resource Regulation, as amended, between the St. Johns River, South Florida, Southwest Florida, and Suwannee River Water

17-342.800(5) - 17-342.850(5)

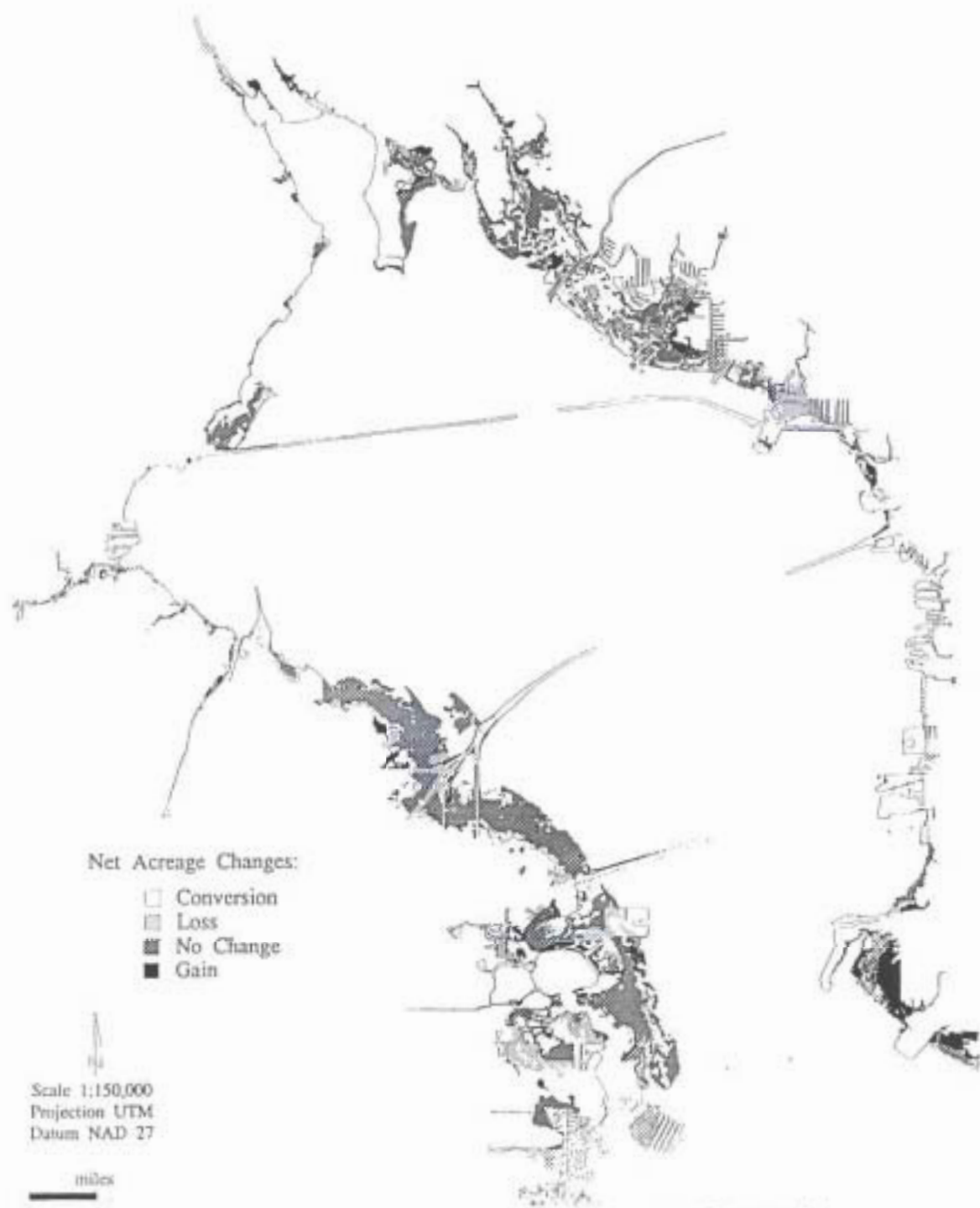
Management Districts and Department of Environmental Regulation and the Operating Agreement Concerning Mitigation Banking Between the Northwest Florida Water Management Districts and Department of Environmental Regulation.

(6) Each Water Management District is encouraged to establish at least two mitigation banks in the District not later than January 1, 1995, or report to the Secretary as to why such mitigation banks have not been established, any attendant problems to establishing such mitigation banks, and a proposed time frame for establishment of such banks. Specific Authority: 373.4135, 373.418, 403.061, F.S. Law Implemented: 373.4135, F.S. History: New 02-02-94.

17-342.850(5) (cont'd.) - 17-342.850(History)

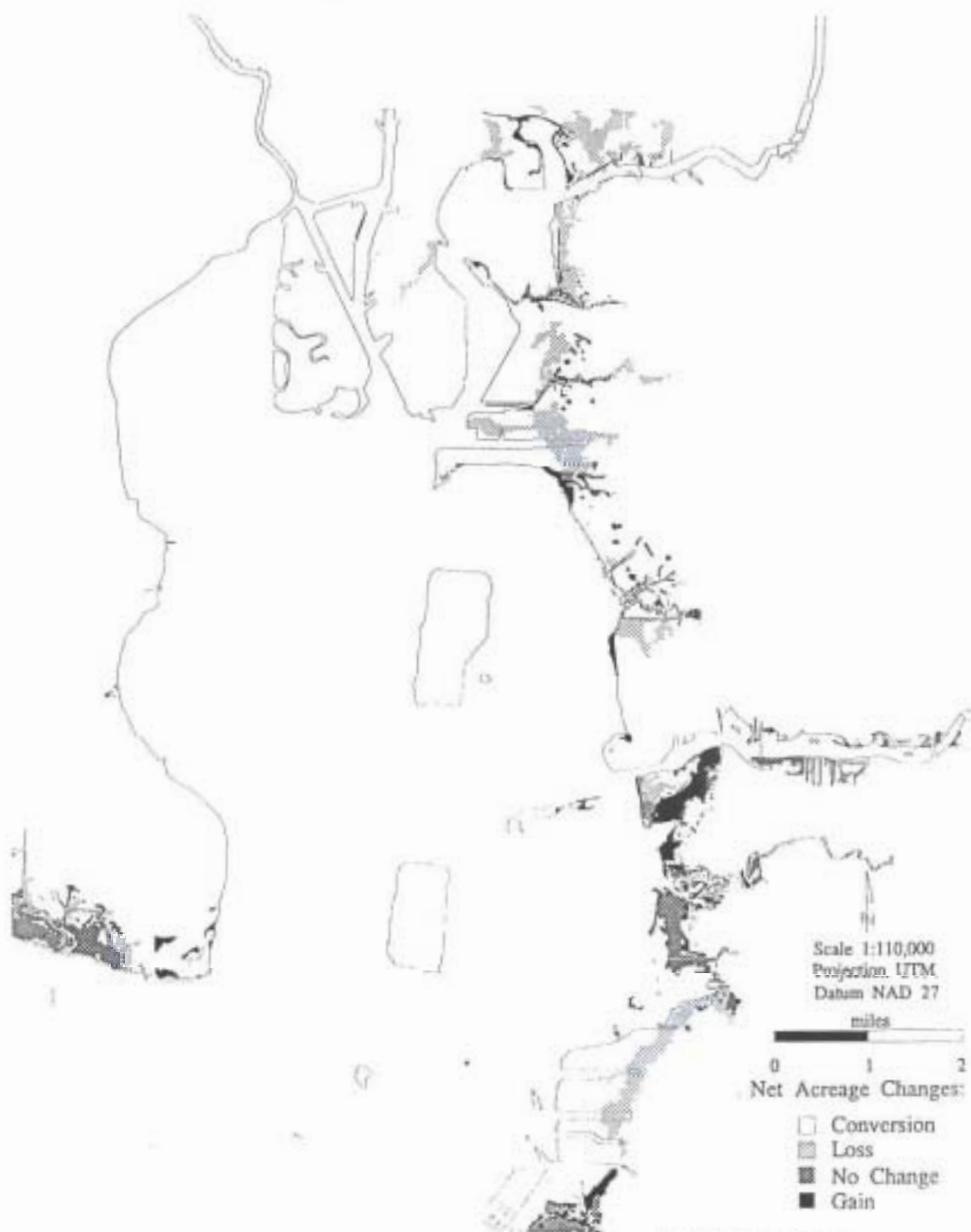
APPENDIX J
Emergent Wetland Changes
1950–1990

EMERGENT WETLAND CHANGES (1950-1990) Old Tampa Bay



Coastal Environmental, Inc.
Map publication No. 59536101

EMERGENT WETLAND CHANGES (1950-1990) Hillsborough Bay



Coastal Environmental, Inc.
Map Publication No: 59536201

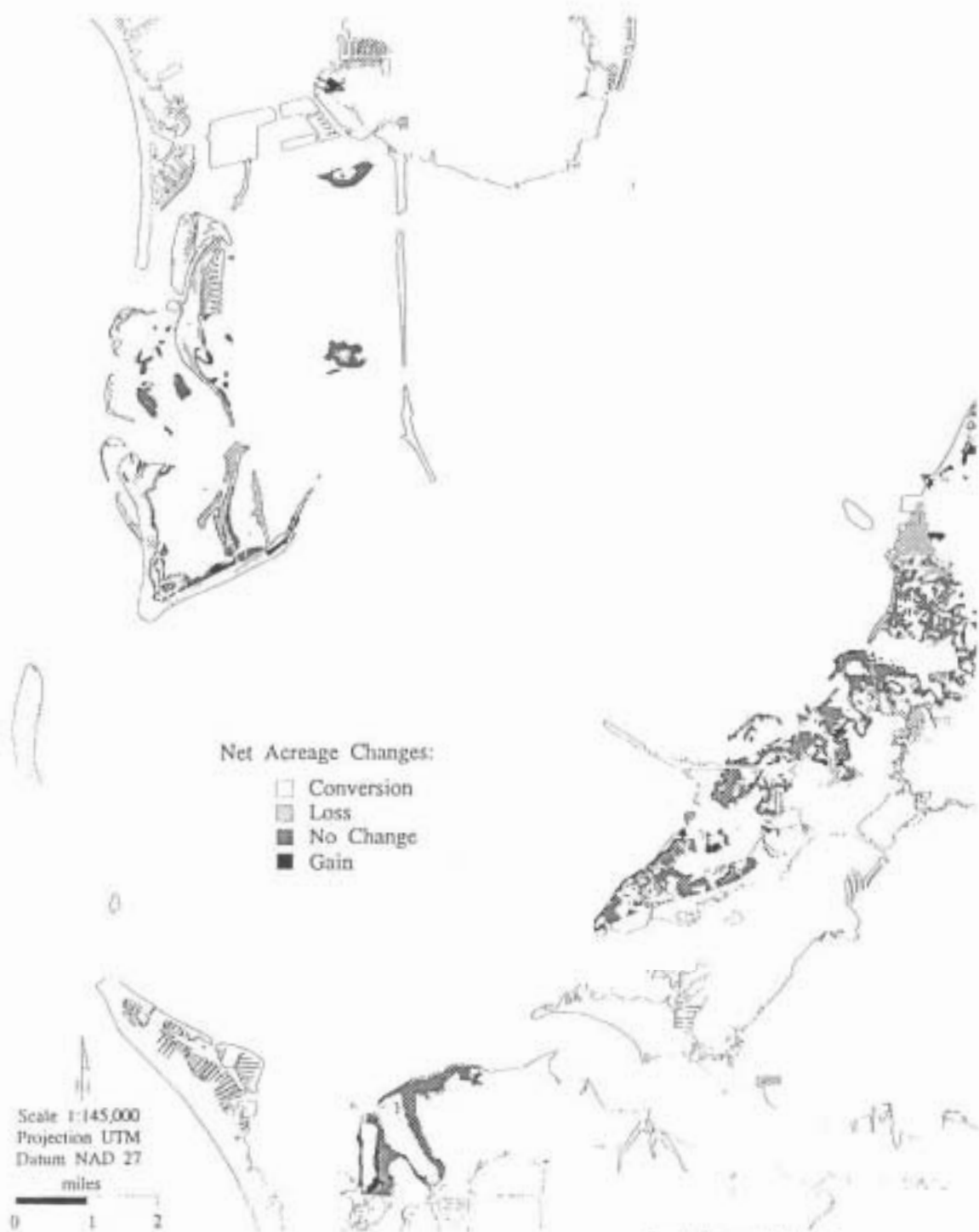
EMERGENT WETLAND CHANGES (1950-1990)

Middle Tampa Bay



EMERGENT WETLAND CHANGES (1950-1990)

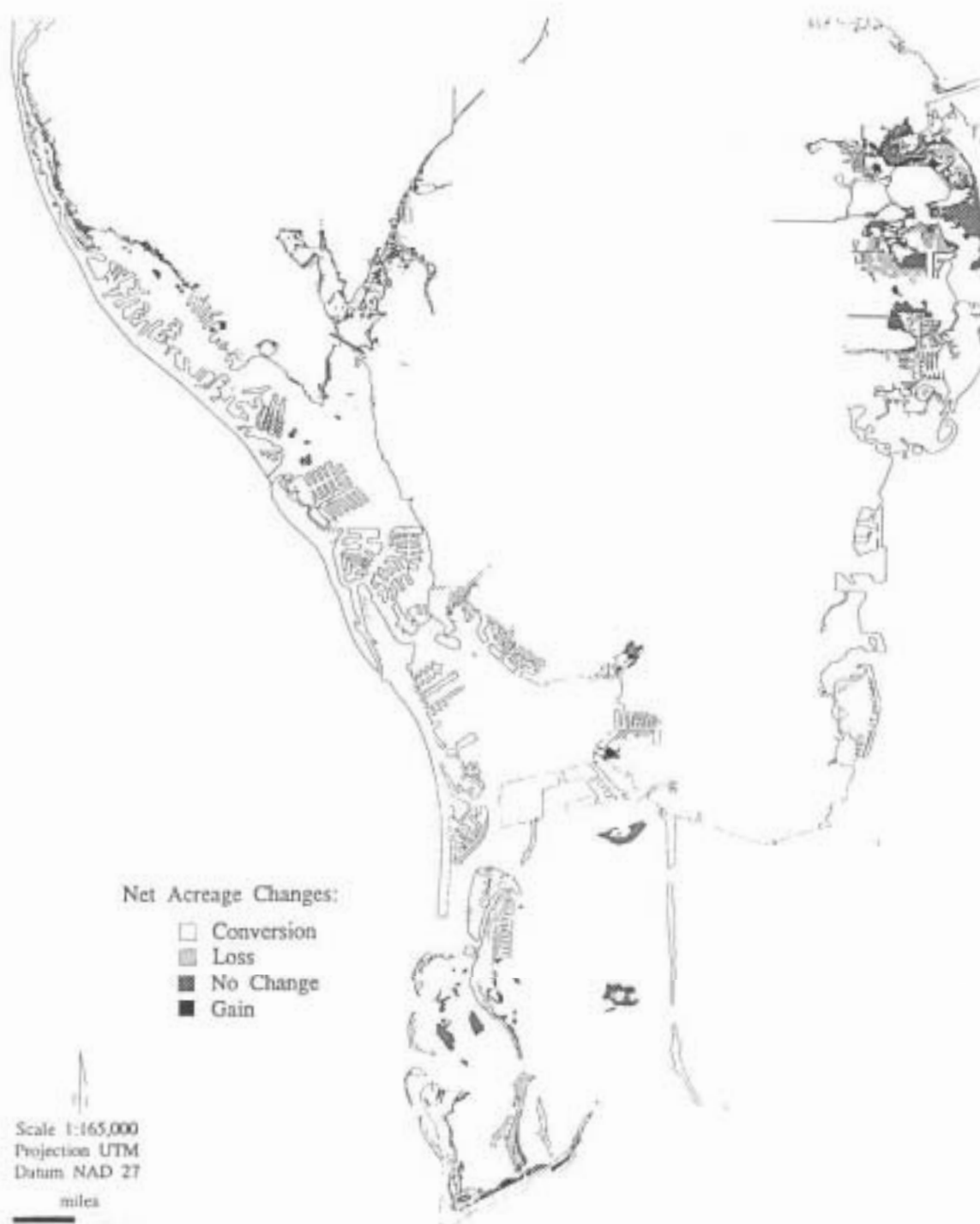
Lower Tampa Bay



Coastal Environmental, Inc.
Map Publication No. 59536401

EMERGENT WETLAND CHANGES (1950-1990)

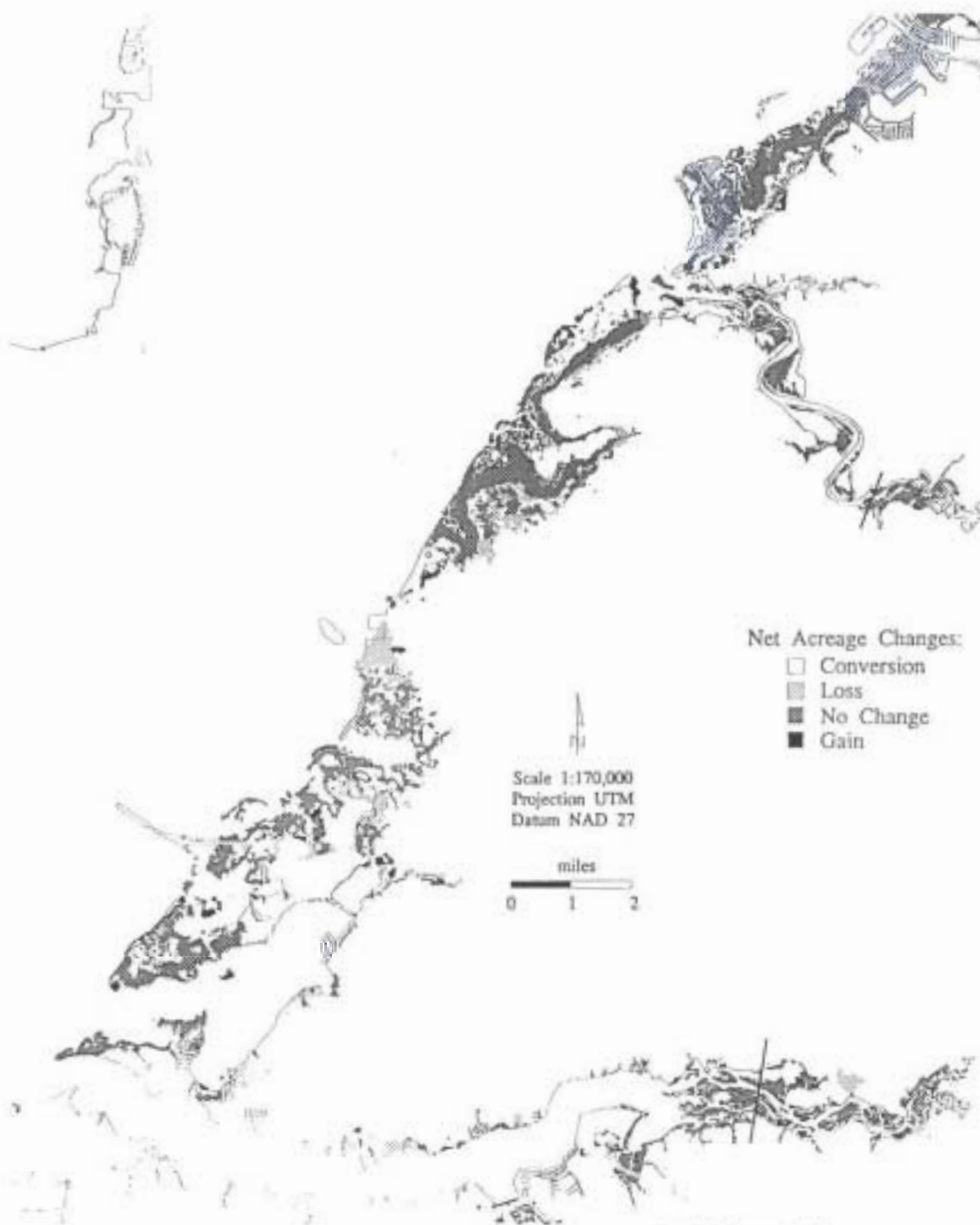
Boca Ciega Bay



Coastal Environmental, Inc.
Map Publication No. L59536501

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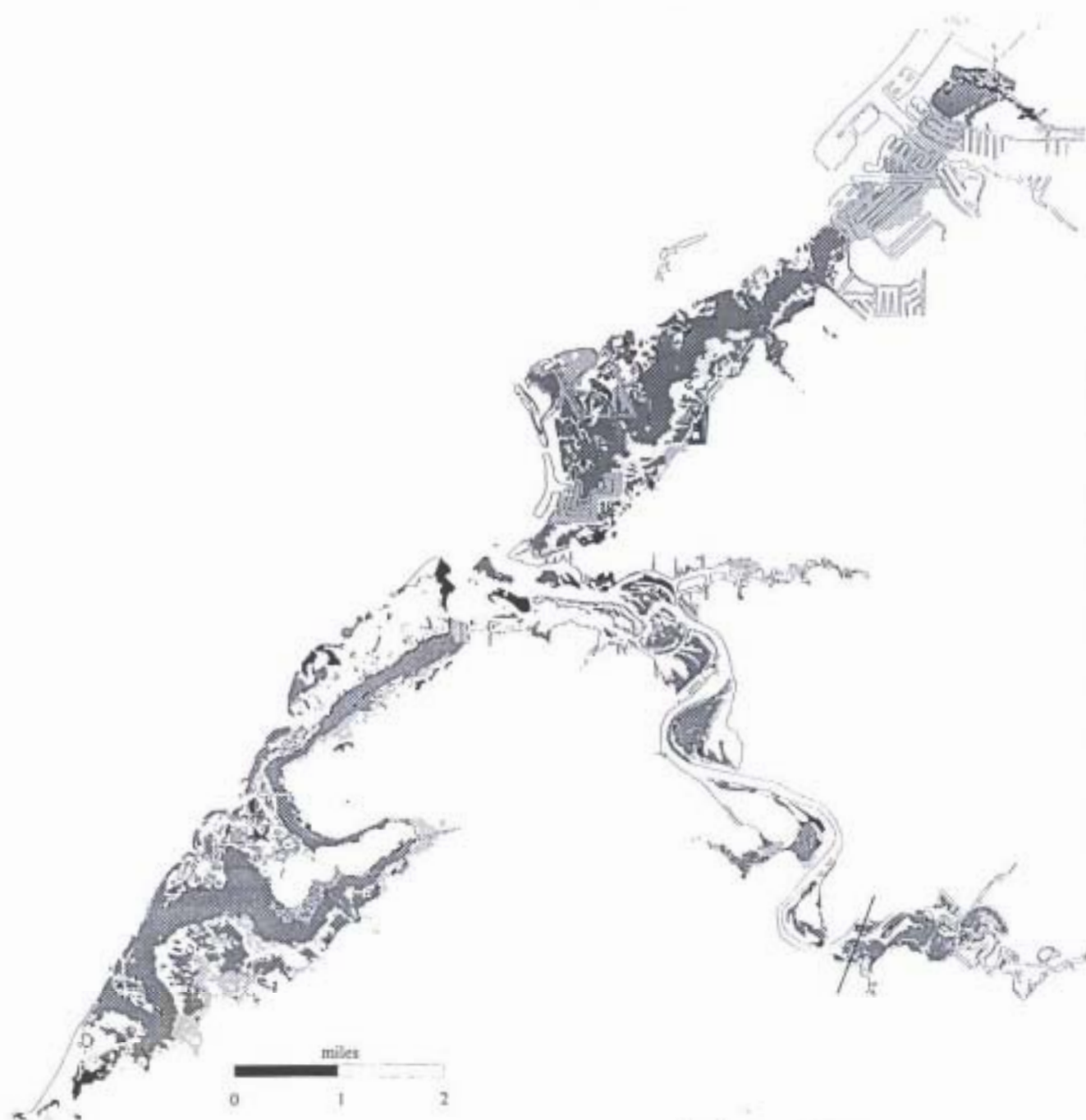
Terra Ceia Bay and Manatee River



Coastal Environmental, Inc.
Map Publication No. 89536601

EMERGENT WETLAND CHANGES (1950-1990)

East Middle Tampa Bay



Scale 1:95,000
Projection UTM
Datum NAD 27

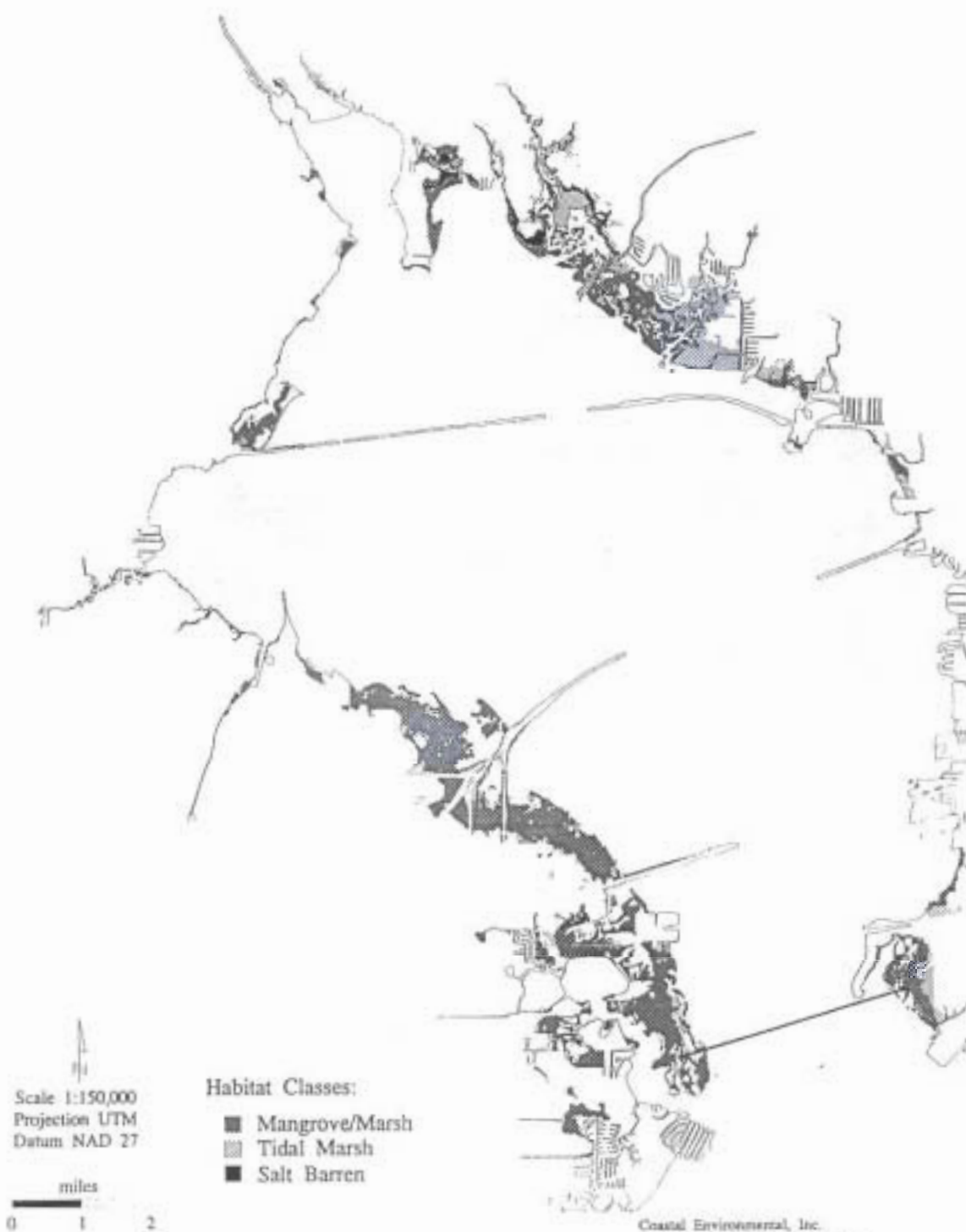
Net Acreage Changes

- Conversion
- ▨ Loss
- No Change
- Gain

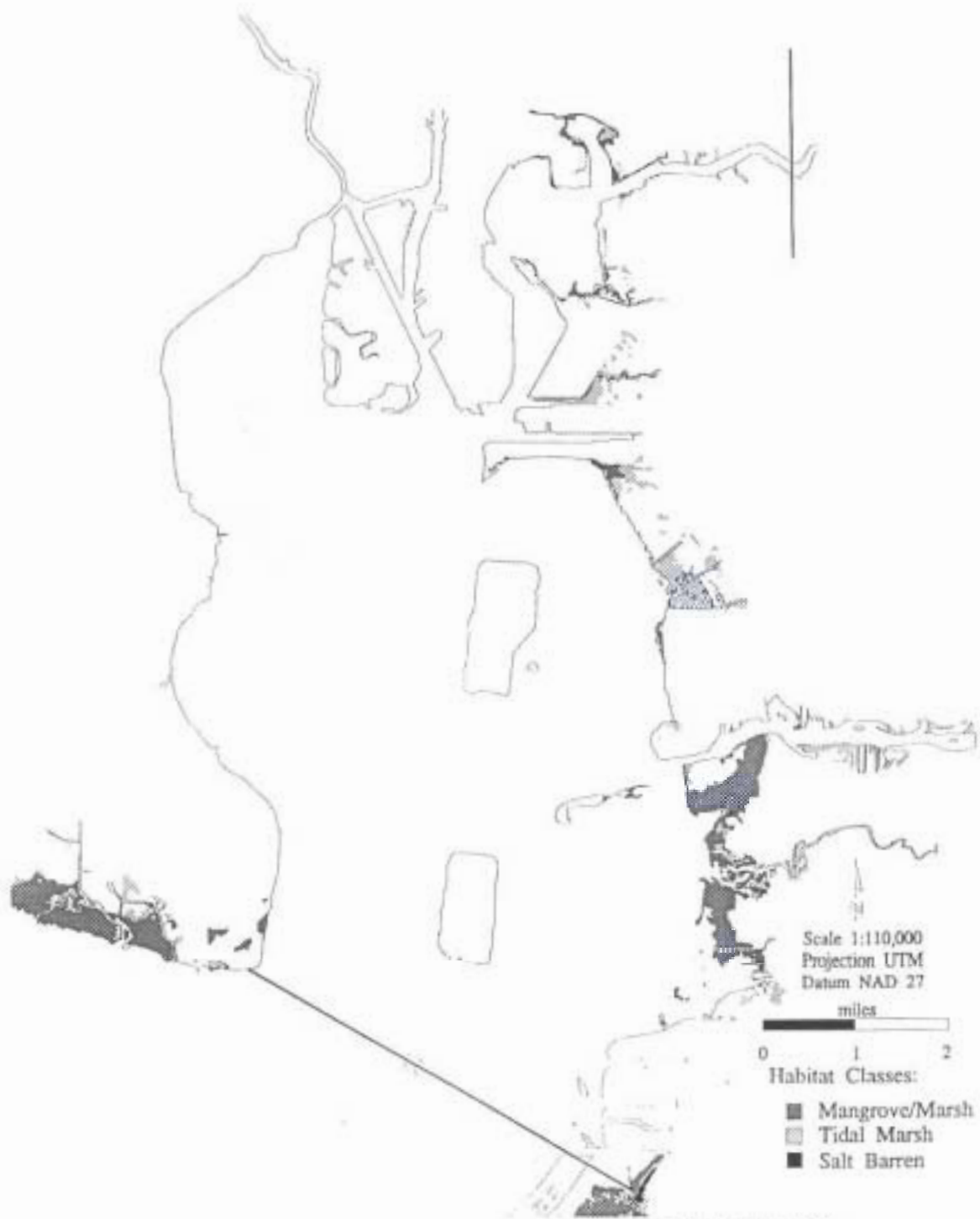
Coastal Environmental, Inc.
Map Publication No. 59536701

1990 EMERGENT WETLANDS

Old Tampa Bay



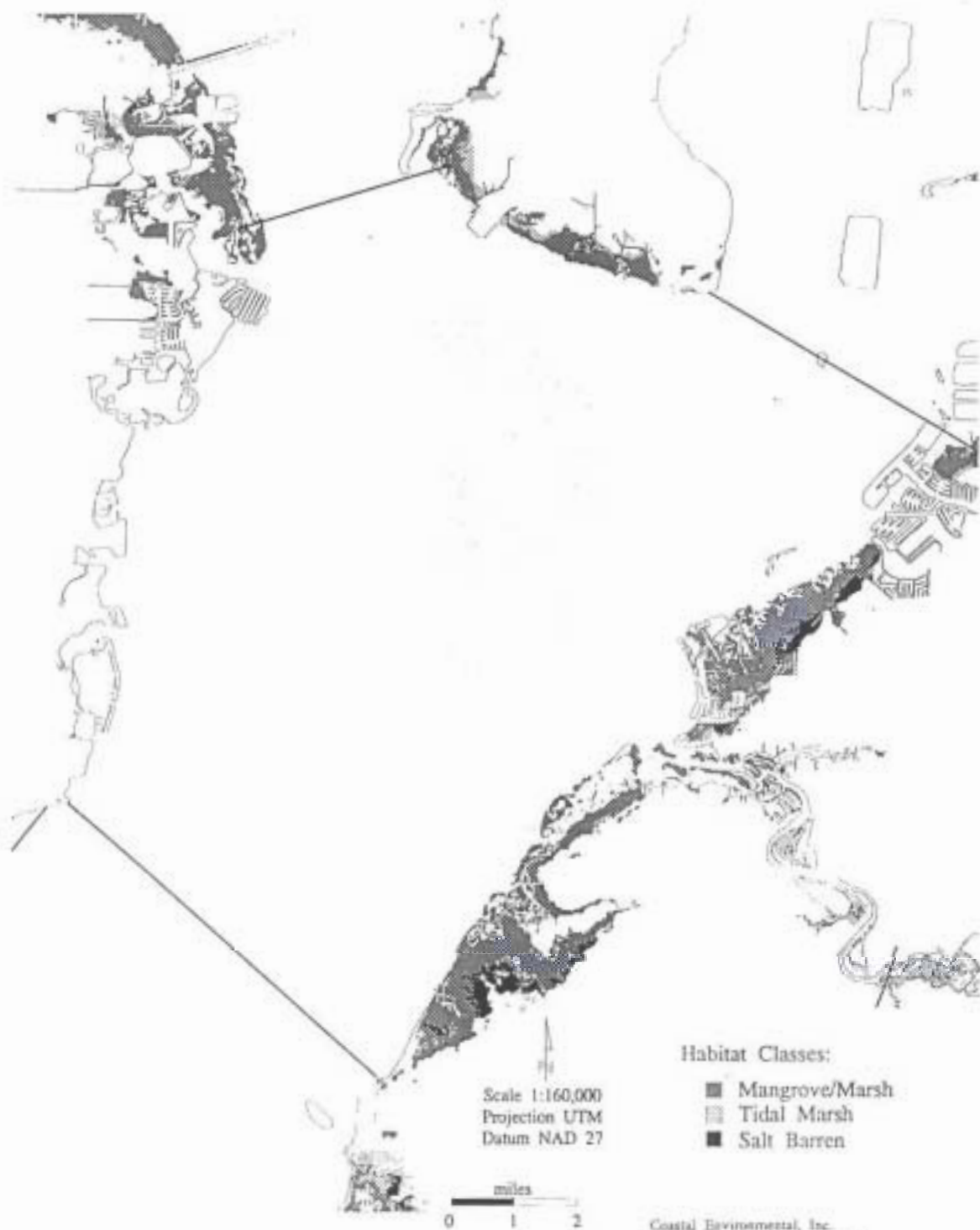
1990 EMERGENT WETLANDS Hillsborough Bay



Coastal Environmental, Inc.
Map Publication No: LS9315601

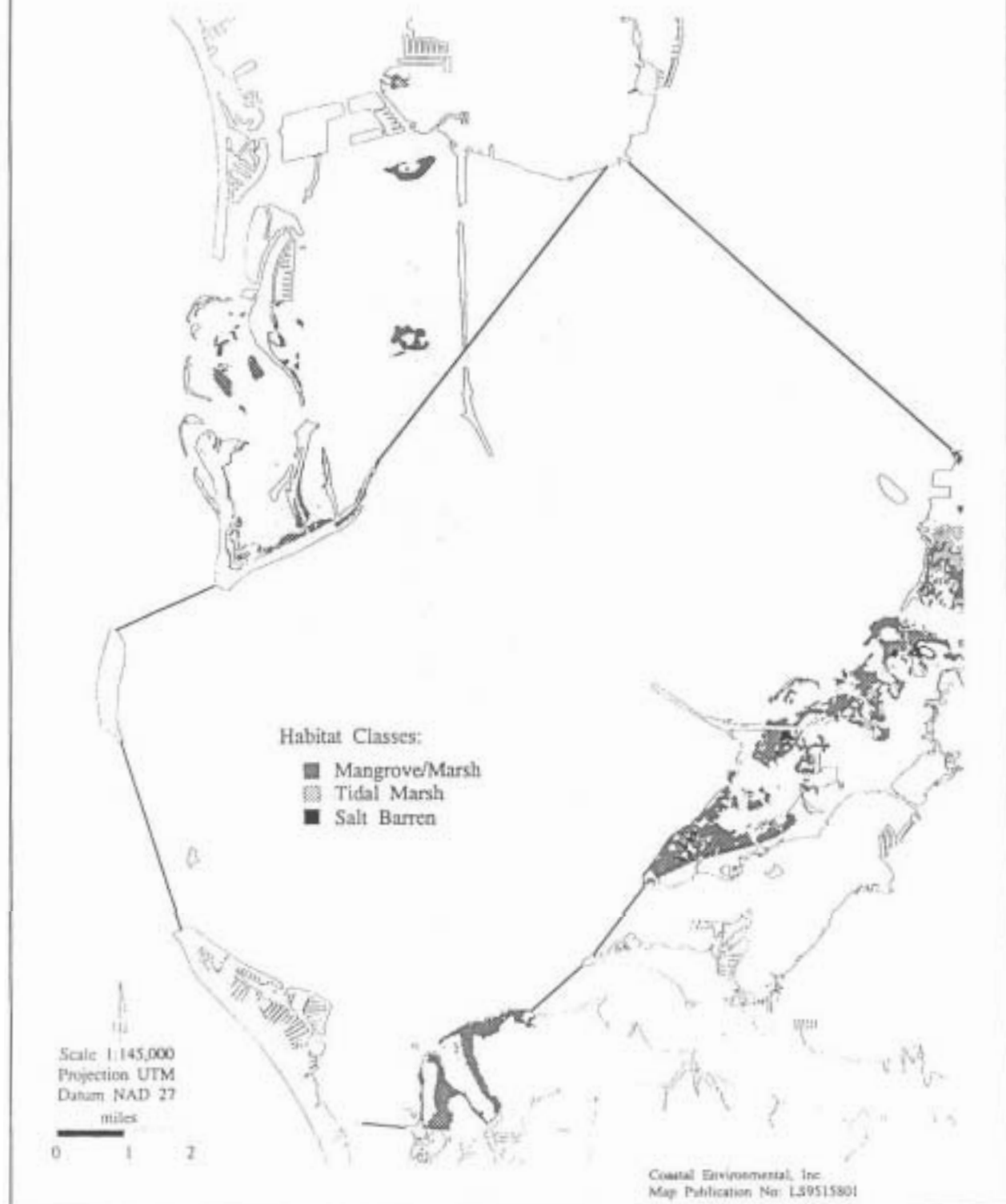
1990 EMERGENT WETLANDS

Middle Tampa Bay



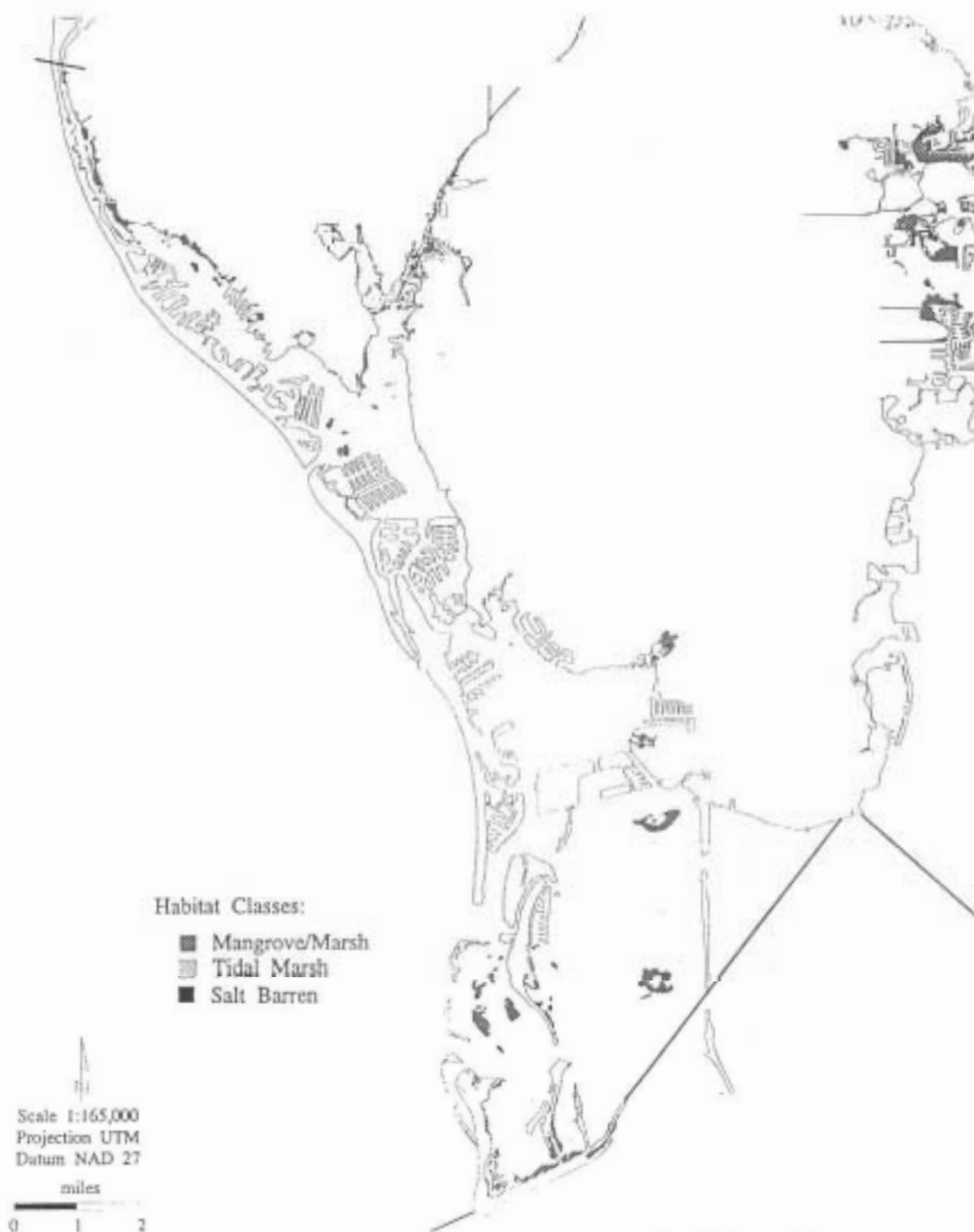
1990 EMERGENT WETLANDS

Lower Tampa Bay



1990 EMERGENT WETLANDS

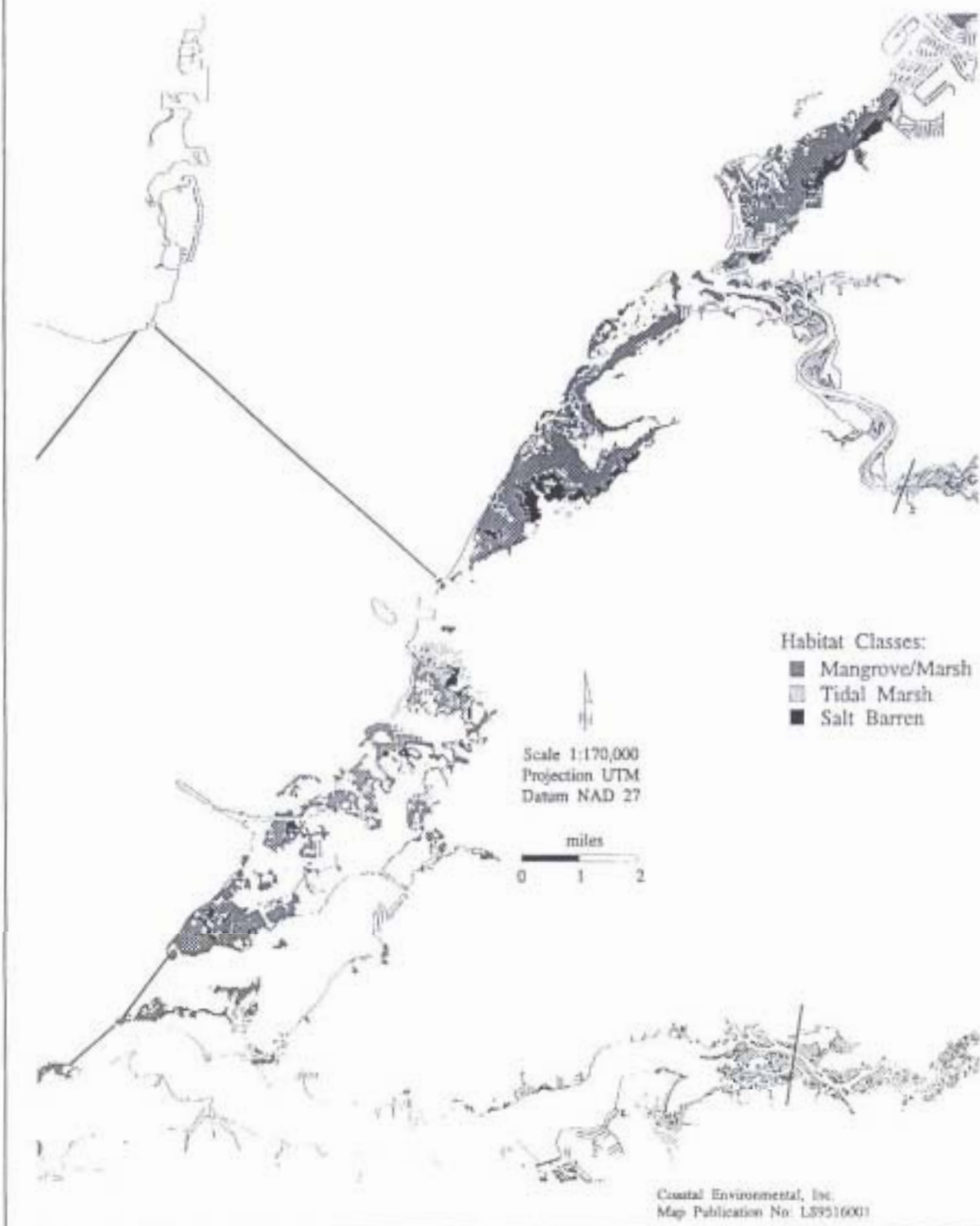
Boca Ciega Bay



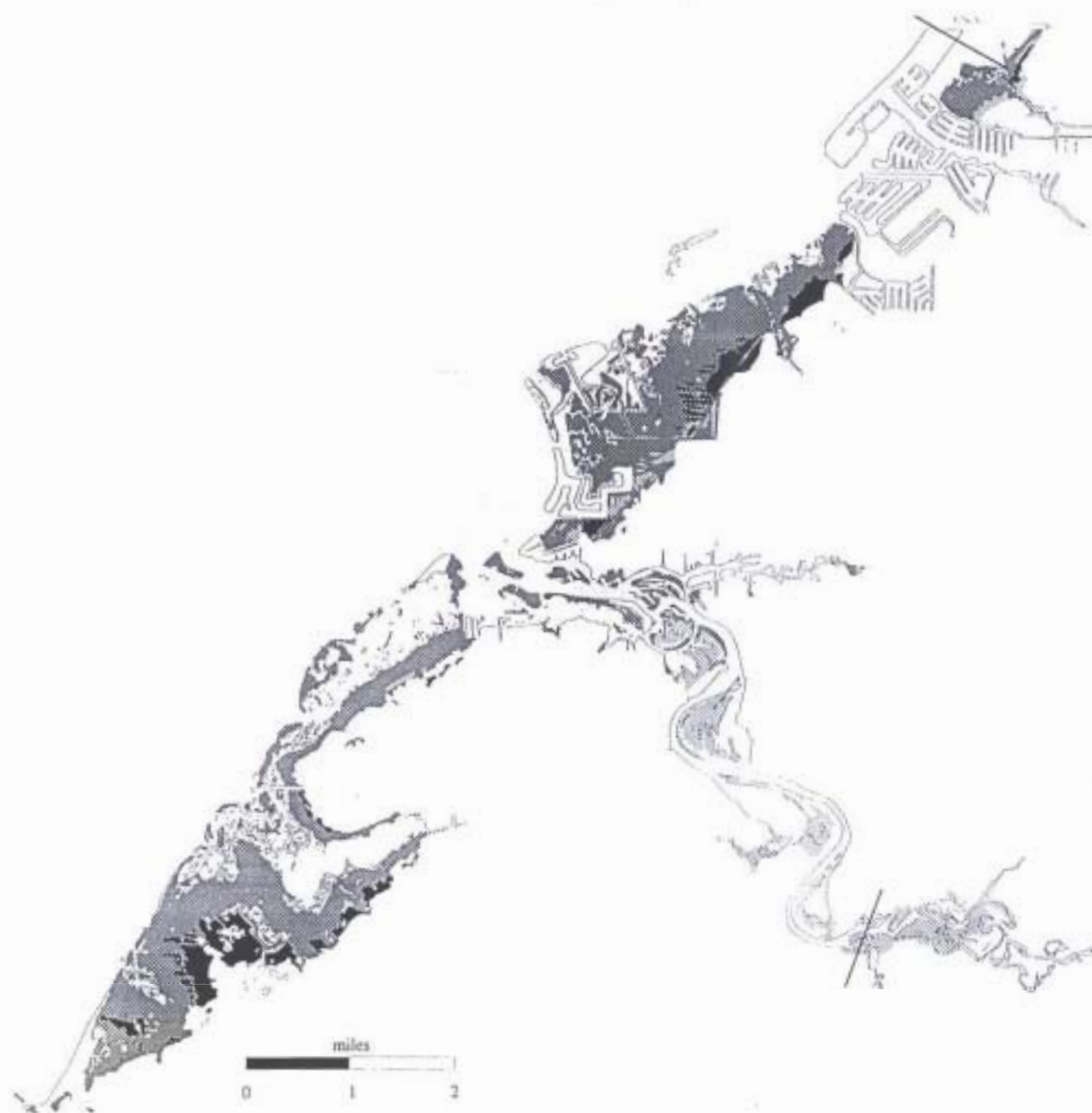
Coastal Environmental, Inc.
Map Publication No. LS9515901

1990 EMERGENT WETLANDS

Terra Ceia Bay and Manatee River



1990 EMERGENT WETLANDS East Middle Tampa Bay



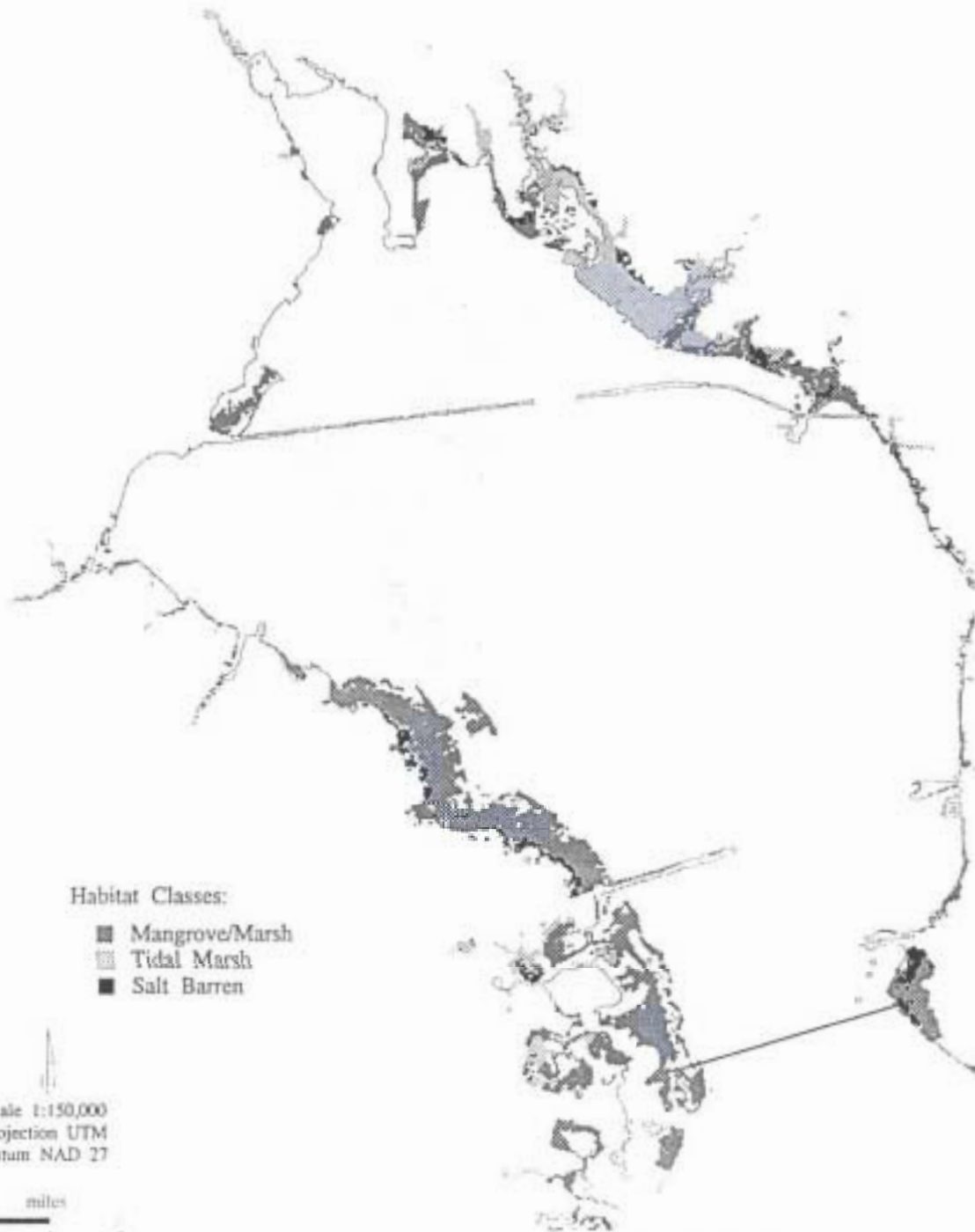
Scale 1:95,000
Projection UTM
Datum NAD 27

Habitat Classes:

- Mangrove/Marsh
- Tidal Marsh
- Salt Barren

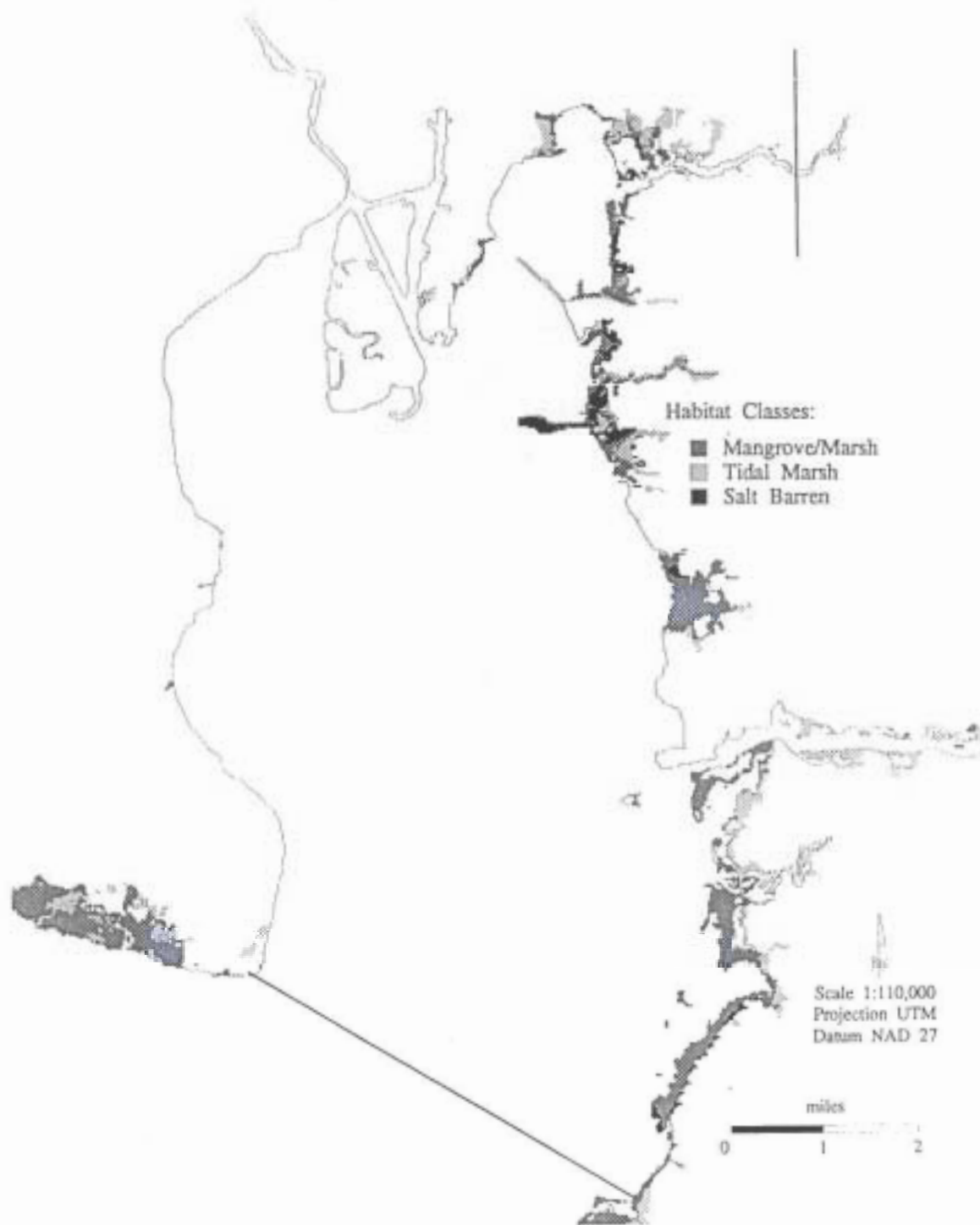
Coastal Environmental, Inc.
Map Publication No. LS9516801

1950 EMERGENT WETLANDS Old Tampa Bay



Map Prepared by Coastal Environmental, Inc.

1950 EMERGENT WETLANDS Hillsborough Bay



Map Prepared by Coastal Environmental, Inc.

1950 EMERGENT WETLANDS

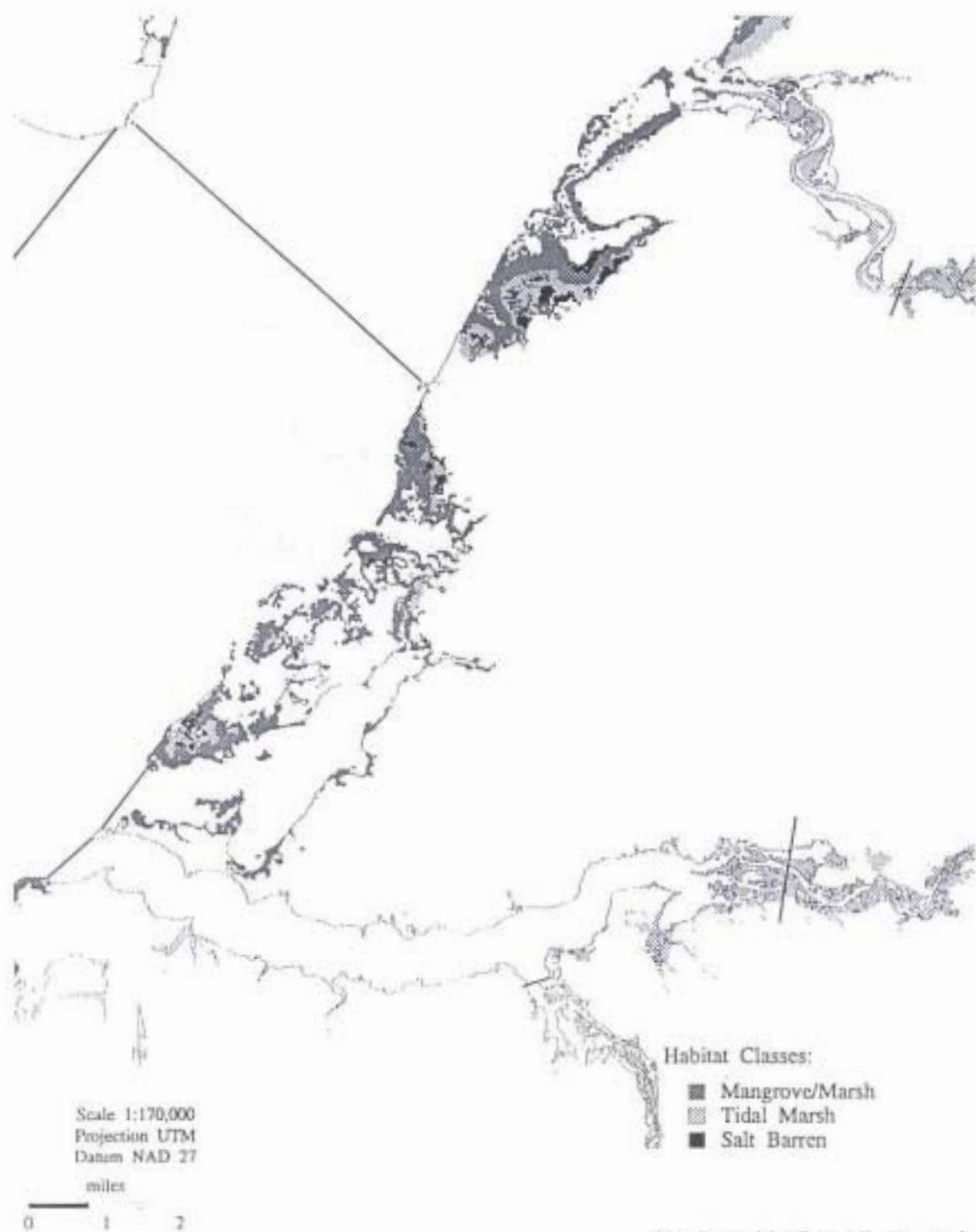
Middle Tampa Bay



Map Prepared by Coastal Environmental, Inc.

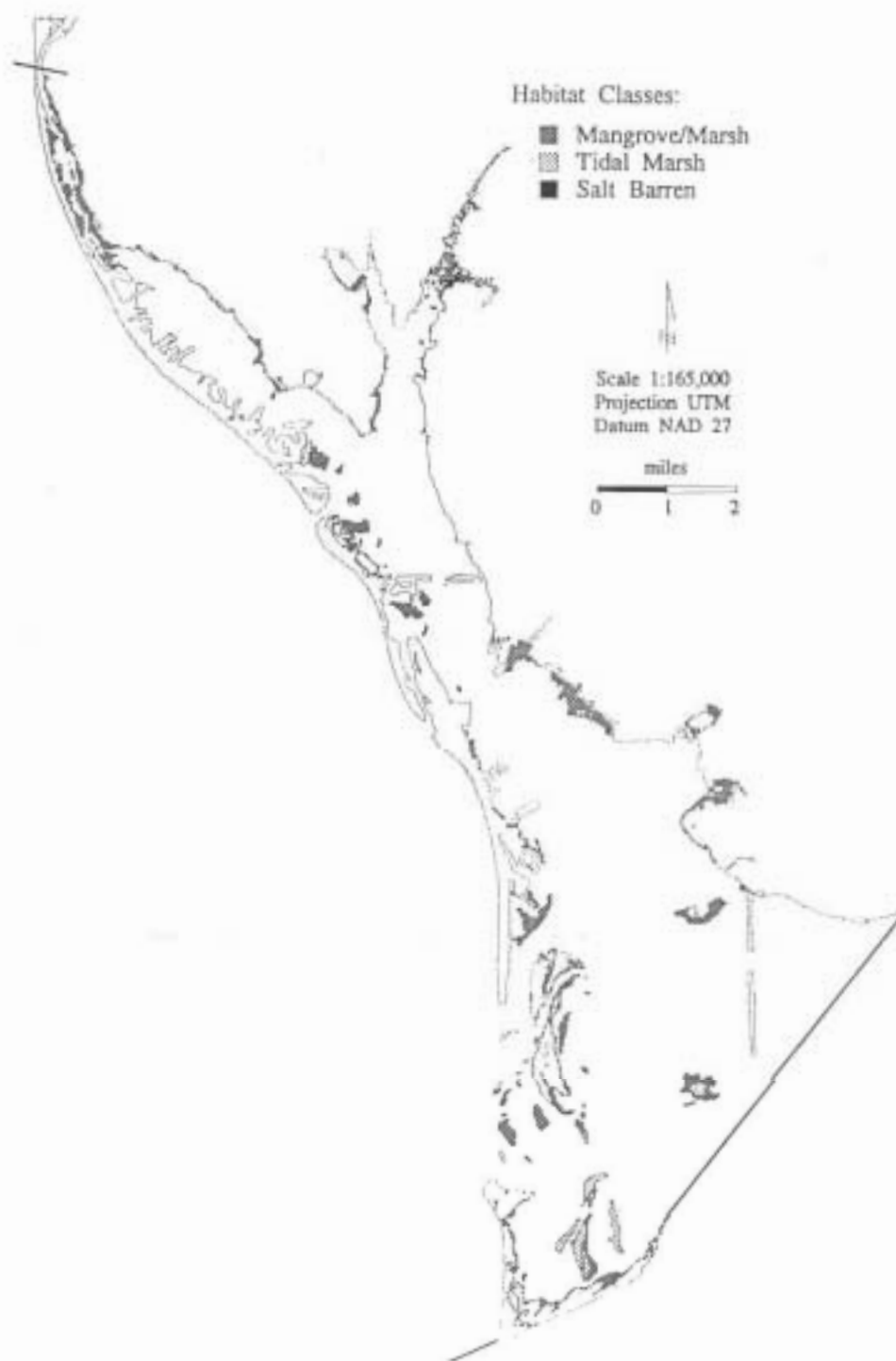
1950 EMERGENT WETLANDS

Terra Ceia Bay and Manatee River



1950 EMERGENT WETLANDS

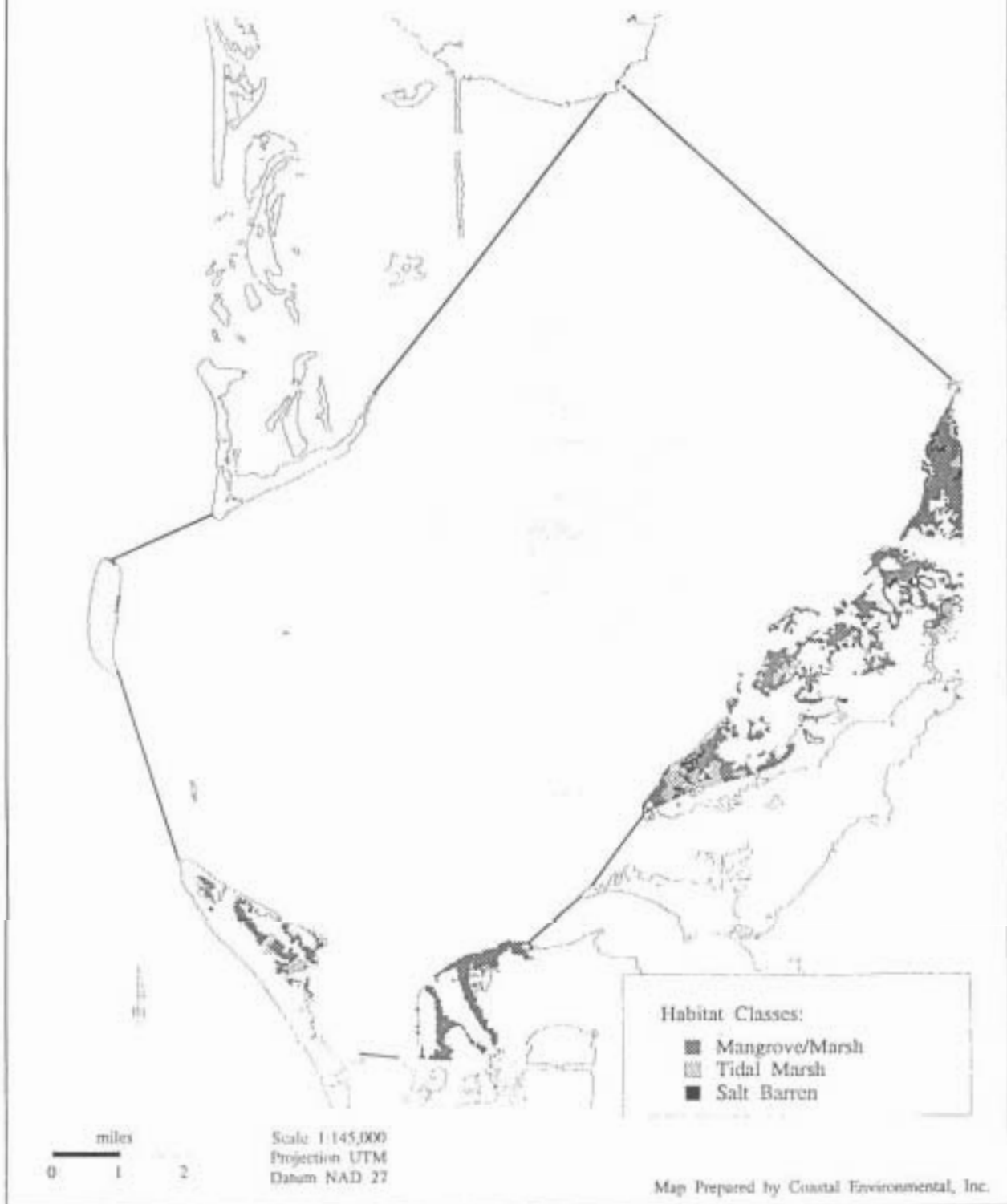
Boca Ciega Bay



Map Prepared by Coastal Environmental, Inc.

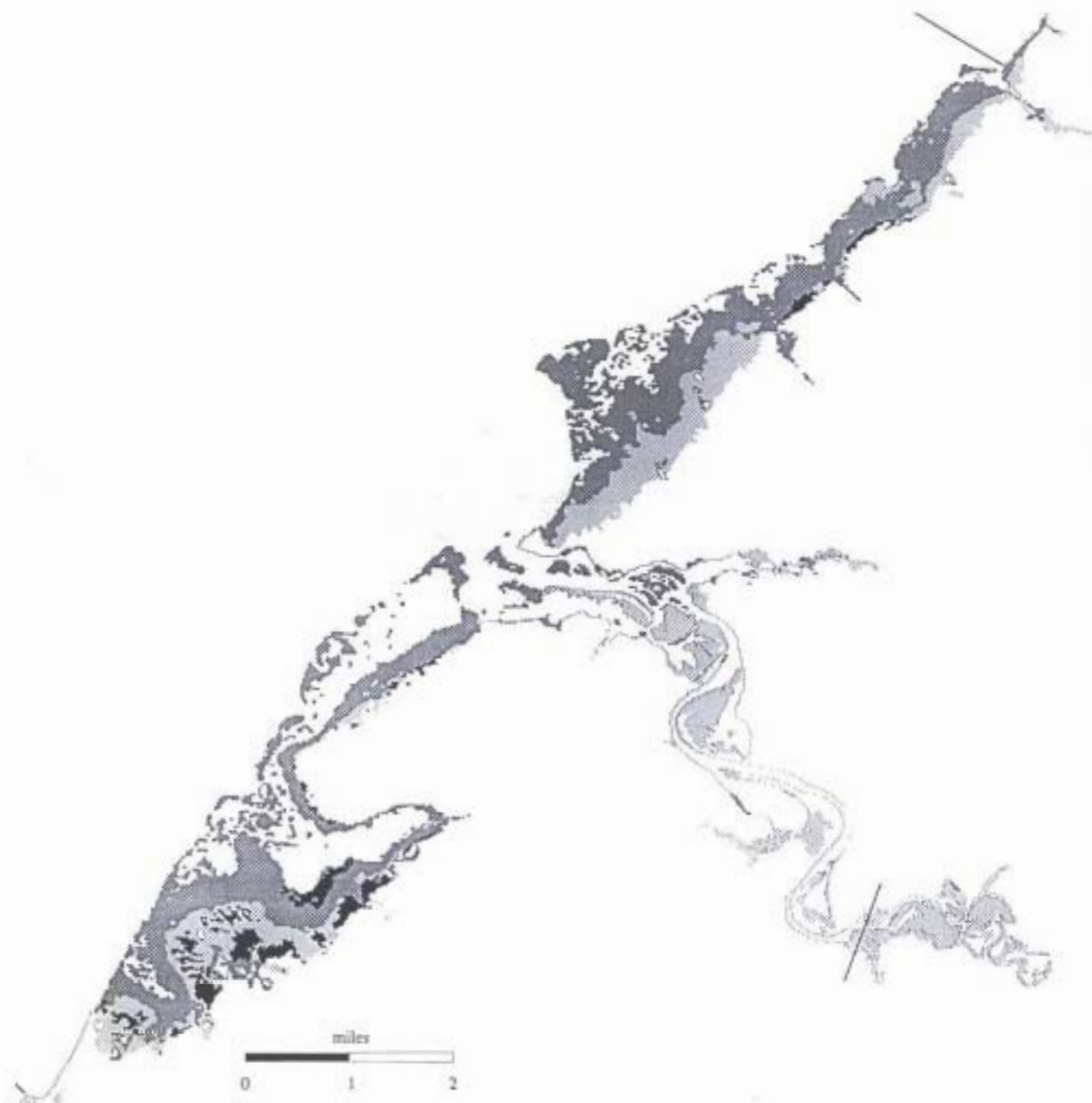
1950 EMERGENT WETLANDS

Lower Tampa Bay



1950 EMERGENT WETLANDS

Middle Tampa Bay



Scale 1:95,000
Projection UTM
Datum NAD 27

Habitat Classes:

- Mangrove/Marsh
- Tidal Marsh
- Salt Barren

Map Prepared by Coastal Environmental, Inc.

APPENDIX K
FMRI Comments No. 2



Department of Environmental Protection

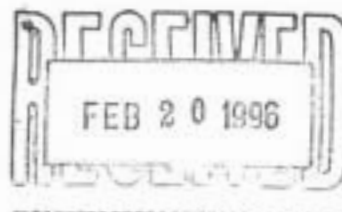
Lawton Chiles
Governor

Florida Marine Research Institute
100 Eighth Avenue S.E.
St. Petersburg, Florida 33701-5095

Virginia B. Wetherell
Secretary

February 20, 1996

Ms. Holly Greening
Program Scientist
Tampa Bay National Estuary Program
111 Seventh Avenue South
St. Petersburg, Florida 33701



Dear Holly:

I recently reviewed a Draft (10/95) Document entitled: "Setting Priorities for Habitat Protection and Restoration: Restoring the Balance". My comments relate to Page 11, Table 8. Restoration projects, completed and in progress by SWIM and FDEP..... The Table makes only one reference to DNR and none to FMRI in spite of our direct involvement with saltmarsh restoration/creation efforts at ten major sites totaling over 325,000 units of Spartina (over 20 acres). While FMRI is certainly part of DEP, for the projects I have outlined below, the Southwest District Office used Pollution Recovery Trust Funds and typically performed or contracted the site planning / design / clearing / construction and FMRI used County Net License Monies or SWIM grant funds to purchase the plants and complete the plantings. In those projects where FMRI used SWIM grant funds, SWIM was a silent partner and FMRI initiated the contract agreement, purchased the plants and implemented the planting. Nevertheless FMRI has received very little recognition for our part in these restoration projects.

The Table likewise fails to mention any of FMRI seagrass restoration efforts at six sites in Tampa Bay: beginning with Lassing Park funded by County Net License, in 1987; five sites funded by Special Legislative appropriation by Ms. Mary Figg Rep. Hillsborough County; in 1987; another three sites funded by SWIM, in 1988; and a Cost Benefit Analysis at Lassing Park funded by DEP Pollution Recovery, in 1989. All totaled 25,000 units of seagrass were transplanted as part of FMRI's restoration efforts during these years. Results from these studies were used in part by Mr. Mark Fonseca, NMFS, to prepare a report entitled: "A Guide To Planting Seagrasses in the Gulf Of Mexico" and several subsequent publications.

While I would not object to DEP SWD, SWIM, DOT, Manatee or Pinellas County, or the City of St. Petersburg being called the lead agency when one or another has initiated some critical component of the particular restoration project, FMRI's contribution in providing the vegetative fisheries habitat component of these projects should be recognized. In the TBNEP January 1996 Document: "Charting the Course for Tampa Bay", page 148 of the Bay Habitats Action Plan recognizes FMRI as one of the "principal players in habitat enhancement and

February 20, 1996

restoration". Nevertheless the compilers of this Table seem to have overlooked FMRI's contribution. In the same section on Bay Habitats, on page 149, Step 4, one of the recommendations is to: * Pursue a permanent source of funding for the SWIM program. While I am in hearty agreement with that sentiment I would suggest that an additional recommendation might be to: * Pursue a permanent source of funding for FMRI's Marine Habitat Research and Restoration Program, which was canceled July 1, 1996 for lack of funds following the loss of commercial Gill Net License revenues from the five Counties surrounding Tampa Bay.

I am also very disappointed that the Habitat Protection and Restoration document makes no recommendation to continue experimental seagrass restoration. If water quality has indeed improved to the extent that deeper seagrasses can survive or if former seagrass areas are now suitable for seagrass survival, lets put that notion to the test. Passively waiting for seagrasses to "recover" or "recolonize" is not restoration. Actively attempting to speed seagrass recovery is. While I understand that non-agency entities are not likely to be able to implement large-scale (1000's of units) seagrass transplants, agencies are capable of doing cooperative seagrass transplants.

Also in the "Charting the Course for Tampa Bay" document, in the Implementation and Financing chapter, page 238 the first recommendation is to: * Maintain existing levels of expenditures for programs making cost-effective contributions to bay restoration goals. Appendix D, in the "Habitat Protection and Restoration" document, page 6 lists costs for "Principal Ecologists" at \$150.00 per hour. That amount is fully ten times the level of funding required for state employees charged with the same responsibilities.

Sincerely;

DIVISION OF MARINE RESOURCES



Frank Courtney
Assistant Research Scientist
Fisheries Assessment Section

FXC
Enclosure

I would recommend the following modifications to Table 8. Restoration Projects, completed and in progress, by SWIM, DEP SW District and DEP FMRI.

Year	Lead Agency	Site Names	Coop.	Size	Habitat
5-12/95	FMRI	SERF	Port Manatee	1.5	Spartina Pond
92/93	DEP	Leffis Key	Manatee Co. SBNEP FMRI	3.0	Spartina
92	FMRI	Lk Tarpon Outfall	SWIM	.25	Spartina
89/90	FMRI	Hendry Delta	SWIM	4.0	Spartina
***** SWIM and Pinellas Co just completed Joes Creek III *****					
91/92	DEP	Joes Creek II	Pinellas Co. FMRI SWIM	3.0	Spartina
90	DEP	Joes Creek I	Pinellas Co. FMRI SWIM	1.0	Spartina
91/92	DEP	Gandy Park (S.E.)	DOT FMRI SWIM BAEAT	1.25	Spartina
91	DEP	Foch Lake	St. Pete FMRI SWIM	1.5	Spartina
90	DEP	Palonis Park Gandy (N.E.)	DOT FMRI SWIM	0.5	Spartina
***** SWIM and Pinellas Co. have since completed a Boca Ceiga II					
89/90	DEP	Boca Ceiga I	Pinellas FMRI SWIM	0.7	Spartina

89	FMRI	Lassing Park	DEP NMFS	0.5	Halodule Syringodium
88	FMRI	CoffeePot Bayou Bunces Pass Rattlesnake Key Green Key	NMFS City of Tampa	0.5	Halodule Syringodium
87	FMRI	Shore Acres Coffeepot Bayou Bunces Pass Rattlesnake Key MacDill	NMFS	0.25	Halodule
87	FMRI	Lassing Park	Mote Mangrove Systems	0.5	Halodule