St. Andrew Bay Watershed

Surface Water Improvement and Management Plan

Northwest Florida Water Management District

September 2000
Program Development Series 00-2

ST. ANDREW BAY WATERSHED SURFACE WATER IMPROVEMENT AND MANAGEMENT PLAN

Adapted in part from "A Look to the Future: A Management Plan for the St. Andrew Bay Ecosystem," St. Andrew Bay Environmental Study Team (1998)

Developed by the Northwest Florida Water Management District
under the auspices of the Surface Water Improvement and Management (SWIM)
Program and in cooperation with the Bay Environmental Study Team and
the Florida Department of Environmental Protection

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The St. Andrew Bay Watershed SWIM Plan

The St. Andrew Bay watershed SWIM Plan is adapted from "A Look to the Future: A Management Plan for the St. Andrew Bay Ecosystem," developed in 1998 by the Bay Environmental Study Team (BEST) with assistance from the Department of Environmental Protection and with funding provided by the Florida Coastal Management Program.

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CHAPTER I. INTRODUCTION

St. Andrew Bay Watershed

The St. Andrew Bay watershed is the only major estuarine drainage basin entirely within the Florida Panhandle. For management purposes, this watershed is defined as incorporating the interconnected St. Andrew, West, East, and North bays; St. Joseph Bay; and Deer Point Reservoir, as well as the respective surface water basins of each of these waterbodies (Figure 1). This is consistent with the St. Andrew Bay watershed described in the Florida 305(b) report (Hand and Lord 1996) and U.S. Geological Survey Hydrologic Unit 03140101. St. Andrew Sound, formed by Crooked Island, is a smaller embayment located between St. Andrew and St. Joseph bays. The overall watershed covers approximately 749,663 acres in six Florida counties. Approximately 61 percent of the watershed is located in Bay County, with 20 percent in Gulf County, 9 percent in Washington County, 4 percent in Calhoun County, 4 percent in Walton County, and 2 percent in Jackson County.

St. Andrew, North, West and East bays (Figure 2) have a combined surface area of approximately 59,568 acres. Econfina Creek, through Deer Point Reservoir, provides the major freshwater inflow into the estuary, along with a number of smaller creeks. East Pass and West Pass have provided surface water communication with the Gulf of Mexico at each end of Shell Island. West Pass was artificially cut in 1934 as the primary navigation channel to the Gulf, while most exchange between the estuary and the Gulf historically occurred through East Pass. East Pass recently closed, however, and a permit application for dredging and reopening the pass is under review at the time of this writing. Also prominent in the St. Andrew Bay estuary area are Tyndall Air Force Base (AFB) and the cities of Panama City, Panama City Beach, Lynn Haven, Springfield, Callaway, Parker, and Cedar Grove.

Deer Point Reservoir (Figure 2) has a surface area of approximately 4,572 acres and a watershed covering approximately 282,880 acres. The reservoir is located approximately eight miles north of Panama City. It was created through construction of a dam across the northern portion of North Bay in 1961. The reservoir impounds flow from Econfina, Bear, Bayou George, and Cedar creeks, and discharges into North Bay. Econfina Creek is the primary tributary, contributing between 57 and 79 percent of the water entering the reservoir (FDER 1990). The reservoir now serves as the primary source of drinking water for most of the municipalities in Bay County.

St. Joseph Bay (Figure 3) is located on the southwest coast of Gulf County, bounded by Cape San Blas and St. Joseph Peninsula. This bay is notable in that it is the only embayment in the eastern Gulf of Mexico lacking a major source of surface fresh water inflow. It is connected to the Intracoastal Waterway, however, by Gulf County Canal. The bay has a surface area of approximately 42,826 acres. In recognition of its outstanding resource value, most of St. Joseph Bay was designated an Aquatic Preserve in 1969 for the purpose of preserving the biological resources in the bay and maintaining them in an essentially natural condition. Prominent in the vicinity of the bay are the city of Port St. Joe, T.H. Stone Memorial St. Joseph Peninsula State Park, the St. Joseph Bay Buffer Preserve, and Eglin AFB lands.

Another, smaller system in the St. Andrew Bay watershed is Lake Powell, located in southwest Bay County and southeast Walton County. Lake Powell is a large interdunal lake that periodically opens to the Gulf of Mexico through a shallow, intermittent inlet. The lake's watershed covers approximately 8,612 acres, with a surface water area of approximately 666 acres. The excellent resource value of this lake has been recognized by the state of Florida through its designation of Lake Powell as an Outstanding Florida Water. Keppner and Keppner (2000) provides an overview of information about the lake and issues relating to it.

Bay County, which accounts for the largest area of the drainage basin, had a year-round population of 127,000 according to the 1990 Census figures. Baskerville-Donovan (1991; cited in BEST 1998) calculated projected growth rates for the period 1990-2000 of seven percent for the Panama City area and 26 percent for the unincorporated areas of Bay County. The estimated 1998 population of Bay

County was 147,496 (BEBR 1999). Bay County has a number of municipalities, primarily concentrated in the Panama City metropolitan area. These include the cities of Callaway, Cedar Grove, Lynn Haven, Mexico Beach, Panama City, Panama City Beach, Parker, and Springfield.

Calhoun County borders northeastern Bay County between Gulf and Jackson counties and covers 363,392 acres. Blountstown and Altha are incorporated, although these are outside the watershed. The 1990 population of Calhoun County was 11,011, and the 1998 population estimate was 13,600 (BEBR 1999).

Gulf County encompasses 357,760 acres in the eastern part of the St. Andrew Bay watershed, including St. Joseph Bay and Wetappo Creek, which discharges into East Bay. Port St. Joe and Wewahitchka are Gulf County municipalities. Port St. Joe is located on St. Joseph Bay and within the watershed of interest. The 1990 population of Gulf County was 11,504, and the 1998 population estimate was 14,300 (BEBR 1999).

Jackson County is the most northern county intersecting the St. Andrew Bay watershed. The county covers approximately 596,680 acres and has 11 incorporated municipalities, although none of these are in the St. Andrew Bay watershed. The census count in 1990 was 41,375, and the estimated 1998 population was 49,700 (BEBR 1999). The southwestern portion of Jackson County includes the headwaters of the Econfina Creek, which discharges into Deer Point Reservoir.

Washington County covers approximately 391,040 acres north of Bay County. The estimated 1990 population was 16,919, and the 1998 estimate was 21,300 (BEBR 1999). The county has five municipalities, all of which are located outside of the St. Andrew Bay watershed. The population is steadily increasing in unincorporated areas, including Sunny Hills and other emerging developments. Washington County has approximately 16,448 acres of freshwater lakes, rivers and streams, the majority of which occur in the southern portion of the county. Development along the county's rivers is limited due to the risk of flooding, as well as river corridor and floodplain acquisition by the Northwest Florida Water Management District.

Walton County covers approximately 682,240 acres, of which approximately 26,667 are within the St. Andrew Bay watershed, as defined above. This area drains into the Intracoastal Waterway and several coastal dune lake drainages, including Lake Powell. The population in the coastal area has been growing rapidly, with land use intensifying accordingly. Walton County's estimated 1990 population was 27,759, and the 1998 estimate was 38,304 (BEBR 1999).

Figure 1 St. Andrew Bay Watershed

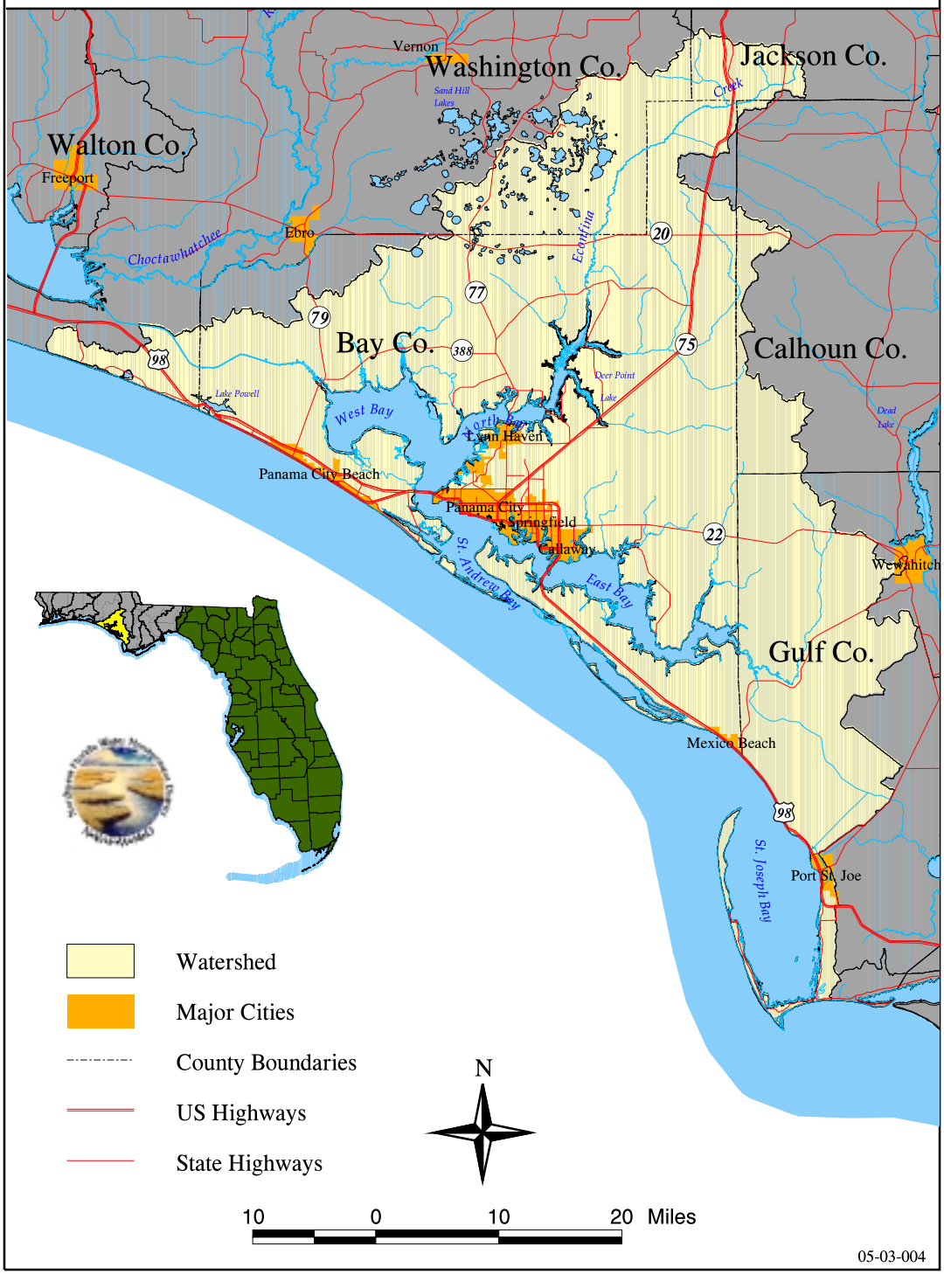


Figure 2 St. Andrew Bay Area Geographic Features

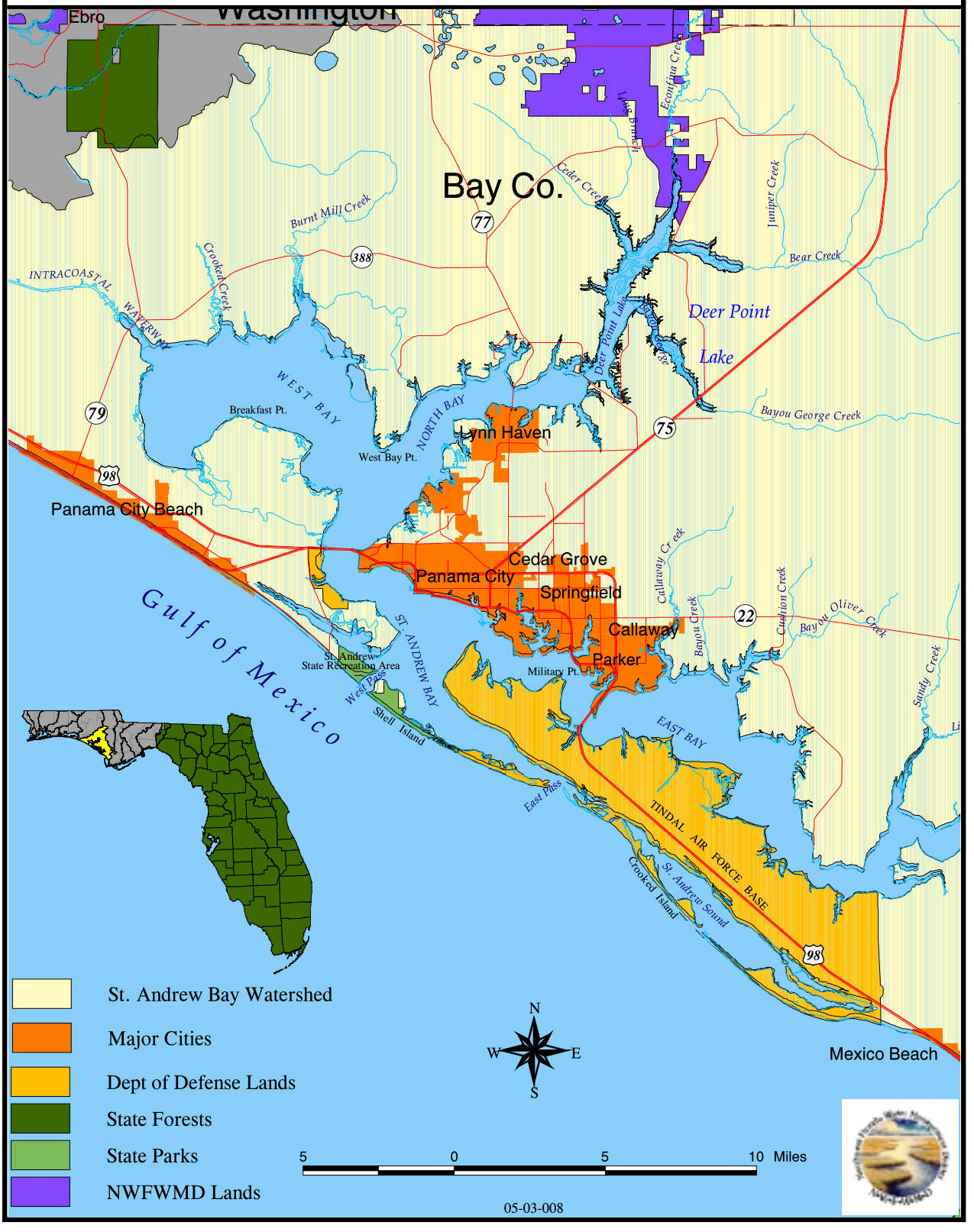
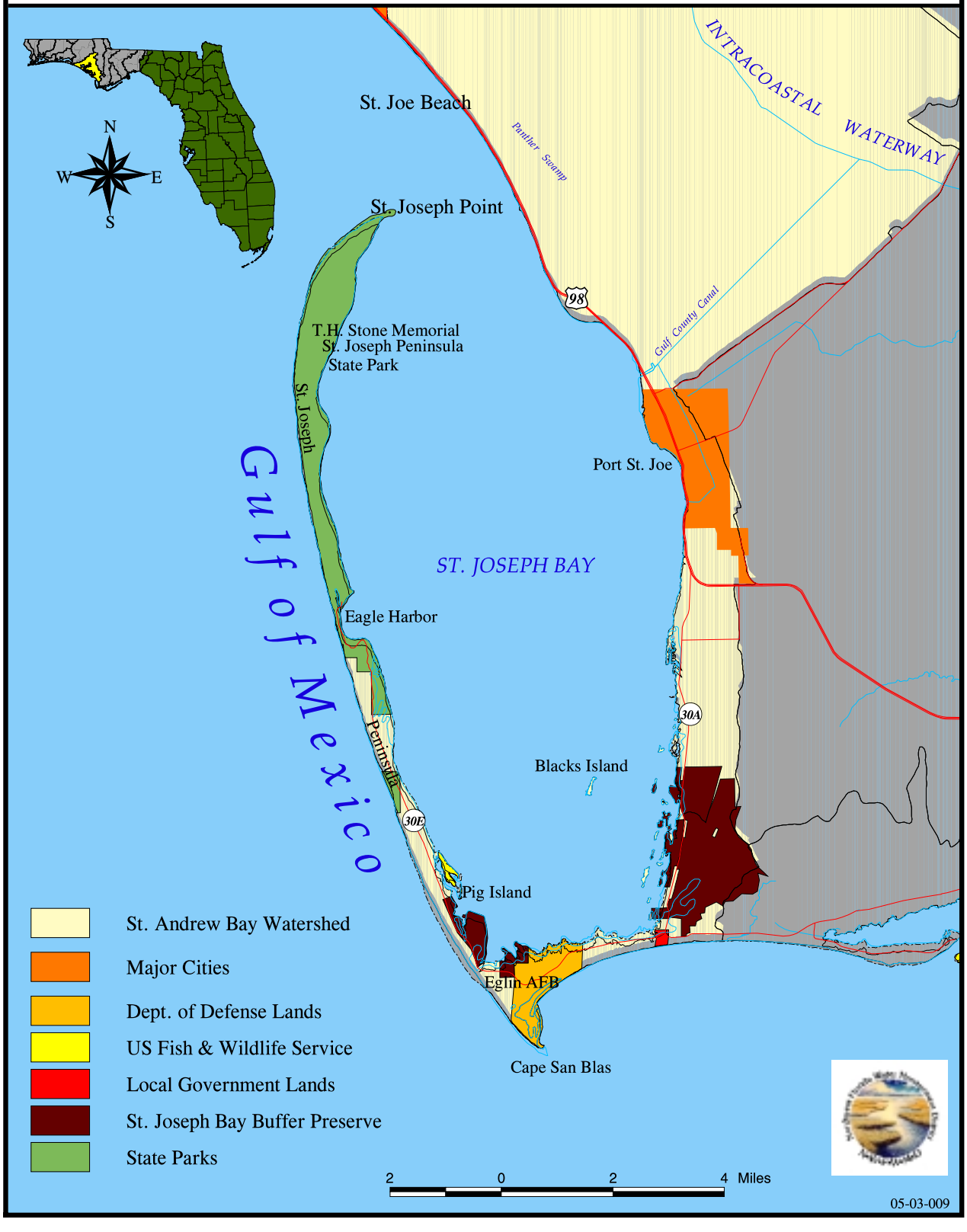


Figure 3 St. Joseph Bay Area Geographic Features



The Surface Water Improvement and Management Act

This plan has been developed in accordance with the Surface Water Improvement and Management (SWIM) Act, which was enacted by the Florida Legislature in 1987 and amended in 1989. The Act asserts that water quality in many of the state's surface waterbodies is degraded or is in danger of degradation. Where associated natural systems have suffered as a result of degraded water quality, so have aesthetics, recreation, wildlife habitat, drinking water, and associated economic resources. Causes of such degradation identified by the Act include point and nonpoint source pollution and destruction of natural systems that enhance water quality and provide habitat.

In response to the identified problems, the Florida Legislature directed the state's five water management districts to develop and implement plans to improve water quality and related aspects of the state's surface waters. Before any plans could be developed, however, each district was required to determine which waterbodies were eligible for the SWIM program and then prioritize those waterbodies based upon the need for restoration and preservation. The only statutory constraint placed on eligibility is that waterbodies be of statewide or regional significance.

The Northwest Florida Water Management District (NWFWMD) completed the prioritization task with a report adopted by the District's Governing Board on April 28, 1988 and by the Florida Department of Environmental Regulation (FDER) (Now Department of Environmental Protection) on May 16, 1988. The report included a prioritized list of 24 waterbodies. Preservation was identified as the primary requirement for all but one of these waterbodies, although it was recognized that some areas within all of the systems require some level of restoration.

In accordance with Chapter 373.453, F.S., the SWIM priority list must be reviewed and updated every three years. A weakness of the original SWIM priority list was that estuaries and rivers were listed separately from their major tributaries, a practice which could result in fragmented, incomplete, or otherwise uncoordinated management of integrated systems ("piecemeal" management). In 1992, the District addressed this issue by updating the priority list using a watershed approach.

The current NWFWMD SWIM priority list is displayed in Figure 4. It should be noted that this plan incorporates four waterbodies from the priority list: Deer Point Reservoir (priority 3), St. Joseph Bay (priority 7), St. Andrew Bay (priority 8), and the Sand Hill Lakes (priority 14).

The Act directs the District to develop SWIM plans, in priority order, to include activities, schedules, and budgets for preservation and/or restoration. The Department of Environmental Protection (DEP), Fish and Wildlife Conservation Commission (FWCC), Department of Agriculture and Consumer Services (DACS), Department of Community Affairs (DCA), and local governments are cooperators in this process. Once developed, the plans are to be periodically reviewed and revised as needed.

The Act provides detailed direction as to the contents of SWIM plans. The following is an excerpt:

"These plans shall include, but not be limited to:

(a) A description of the waterbody system, its historical and current uses, its hydrology, and a history of the conditions which have led to the need for restoration;
(b) An identification of all governmental units that have jurisdiction over the waterbody and the land within a one-mile perimeter of the waterbody, including local, regional, state, and federal units;
(c) A description of adjacent land uses and those of important tributaries, point and nonpoint sources of pollution, and permitted discharge activities;
(d) A list of the owners of point and nonpoint sources of water pollution that are discharged into each waterbody and tributary thereto and that adversely affect the public interest, including separate lists of those sources that are:
    1. operating without a permit;
    2. operating with a temporary operating permit; and

3. presently violating effluent limits or water quality standards.

The plan shall also include a timetable for bringing all sources into compliance with state standards when not contrary to the public interest. This paragraph does not authorize any existing or future violation of any applicable statute or regulation and does not diminish the authority of the Department of Environmental Protection;

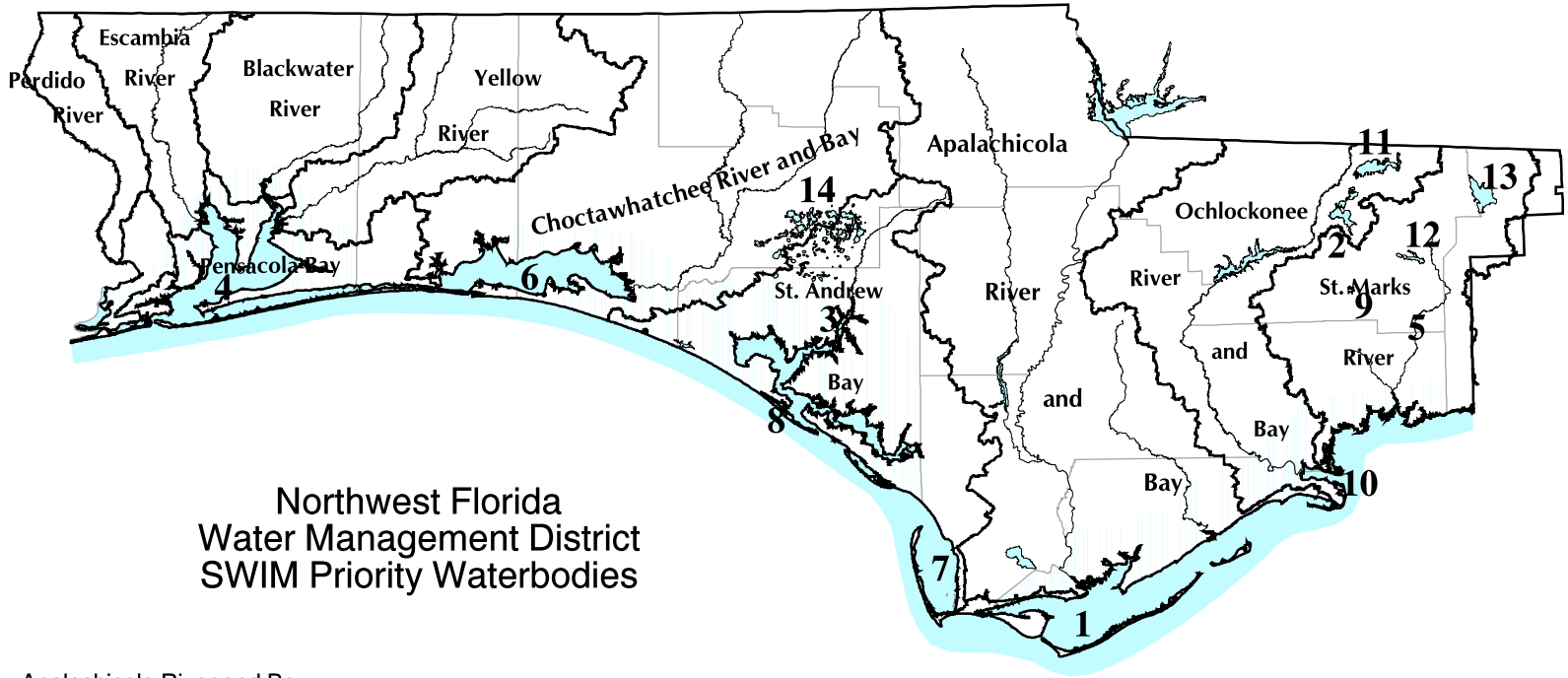
(e) A description of strategies and potential strategies for restoring the waterbody to Class III or better;
(f) A listing of studies that are being or have been prepared for the surface waterbody;
(g) A description of the research and feasibility studies which will be performed to determine the particular strategy or strategies to restore the waterbody;
(h) A description of the measures needed to manage and maintain the waterbody once it has been restored and to prevent future degradation; and
(i) An estimate of the funding needed to carry out the restoration strategies."

Chapter 62-43, Florida Administrative Code (F.A.C.) further defines the scope and format of SWIM plans (see Appendix D).

SWIM Plan Development, Review, and Implementation

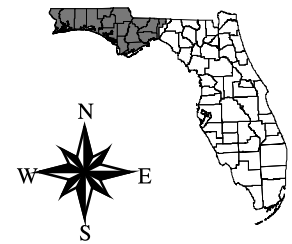
Local, regional, state, and federal interests play integral roles in the development and implementation of SWIM plans. Florida's growth management legislation, including the Florida State Comprehensive Planning Act of 1972 and Florida Regional Planning Council Act (Chapter 186, F.S.), the Local Government Comprehensive Planning and Land Development Act of 1985 (Chapter 163, Part II, F.S.), and the State Comprehensive Plan (Chapter 187, F.S.), as amended, provides a system in which state, regional, and local comprehensive plans are required to be consistent with one other. Because SWIM waterbodies normally encompass the jurisdictions of a number of local governments, this system is a primary mechanism by which SWIM waterbodies can be cooperatively managed from a regional perspective. From a planning perspective, the SWIM Plan must be consistent with the State Comprehensive Plan, state agency plans, and regional plans. Similarly, future revisions of local government comprehensive plans should reflect the goals and objectives of the SWIM Plan.

The St. Andrew Bay watershed SWIM Plan is the result of a cooperative effort by representatives of state and federal agencies, local governments, and the private sector. In 1998, the Bay Environmental Study Team (BEST), working with the Department of Environmental Protection and with funding provided by the Florida Coastal Management Program, developed an ecosystem management plan entitled “A Look to the Future: A Management Plan for the St. Andrew Bay Ecosystem.” In recognition of the work accomplished for this plan, as well as to facilitate accomplishment of its goals and in order to prevent redundancy in planning, this SWIM plan incorporates much of the BEST plan.



Northwest Florida Water Management District SWIM Priority Waterbodies

1. Apalachicola River and Bay (including Lake Seminole, Chipola River, and St. George Sound)
2. Lake Jackson
3. Deer Point Lake
4. Pensacola Bay System (including Escambia, Blackwater, Yellow and Shoal rivers and Santa Rosa Sound West)
5. St. Marks River (including Wakulla River and Apalachee Bay)
6. Choctawhatchee River and Bay (including Santa Rosa Sound East)
7. St. Joseph Bay
8. St. Andrew Bay
9. Lake Munson
10. Ochlockonee River and Bay
11. Lake Iamonia
12. Lake Lafayette
13. Lake Miccosukee
14. Sand Hill Lakes



50 0 50 100 Kilometers

30 0 30 60 Miles

05-03-006

Figure 4

The District Governing Board is required by the SWIM Act to hold a public workshop in the vicinity of the waterbody to obtain public input concerning the plan. The draft plan will be revised based upon this input, as well as state agency comments. At least 60 days prior to a public hearing, at which the District's Governing Board will consider the plan for approval, copies must be provided to DEP, DACS, DCA, the FWCC, and all local governments. Before the plan is submitted for consistency review, DEP is required by Section 373.455, F.S. to make three specific determinations with which to judge the sufficiency of the plan:

(1) whether the costs identified in the plan are reasonable estimates of the actual costs;

(2) the likelihood that the plan will significantly improve or protect water quality and associated natural resources; and

(3) whether plan activities can be funded using available revenues from the SWIM Trust Fund or other funding which may be proposed by the Department, the District, or local governments.

The DEP will also review the proposed plan to determine its effects on state-owned lands and on marine and estuarine aquatic life and their habitats.

The FWCC, DACS, DCA, and local governments will review the plan based on their responsibilities and perspectives as outlined below:

(1) the FWCC will review the proposed plan to determine its effects on wildlife, freshwater aquatic life, and their habitats;

(2) the DACS will review the proposed plan to evaluate its effects on forestry and agricultural resources;

(3) the DCA will review the proposed plan to determine its consistency with the State Comprehensive Plan and its effects on Areas of Critical State Concern; and

(4) local governments will review the proposed plan to evaluate its effects on local resources.

The SWIM Act provides for annual plan updates, if needed, as part of the budgeting process. This plan will be revised as needed to address changing management needs and the concerns of various affected entities.

Goals, Issues, Objectives, and Projects of the St. Andrew Bay Watershed SWIM Plan

The St. Andrew Bay watershed has experienced many of the impacts that are common to Florida waterbodies. These include urban stormwater runoff and other nonpoint sources of pollution, domestic and industrial point source pollution, and habitat loss and degradation. Some portions of the watershed, however, have thus far been spared the level of resource degradation that tends to come with intensive development. Effective watershed management and planning at this stage can help preserve the natural and human resources provided by the St. Andrew Bay watershed, coordinate existing restoration needs, and prevent the need for expensive and difficult solutions in the future.

To help address these challenges, the St. Andrew Bay watershed SWIM Plan is organized into a hierarchy of programs, goals, issues, objectives, and projects. Collectively, the projects represent the action plans to fully implement the plan. Programs are general categories of activities used to divide the plan into distinct subject areas based upon priority issues that have been identified for the watershed. Most of the programs, priority issues, and projects in this plan have been previously identified by the St. Andrew Bay Environmental Study Team (BEST) and incorporated within the BEST management plan for the St. Andrew Bay ecosystem (BEST 1998).

The St. Andrew Bay watershed plan takes a basin perspective to address priority issues. These are identified as growth management, nonpoint source pollution, point source pollution, chemical

contamination, biodiversity, public outreach, and management of the Deer Point Reservoir basin. The plan provides for addressing these issues through several programs: watershed planning and coordination, stormwater retrofit and treatment, public outreach and education, biodiversity and natural systems, chemical contaminants, cumulative assessment, and Deer Point Reservoir watershed management. Each of these programs has a set of goals, issues, and objectives to guide implementation. The program goals are broad-based, identify ultimate program objectives, and provide the underlying framework for the plan. Under each program are a number of projects (Chapter 3) that have been identified to address specific issues.

The following pages identify the plan programs as well as their associated goals, issues, objectives, and projects.

Planning, Coordination, and Administration Program

Goal: Provide comprehensive, coordinated management of the watershed in order to preserve and protect watershed resources and functions.

Issues Addressed:
- Administrative and programmatic requirements
- Spill response
- Growth management

Objectives: Implement and update a comprehensive plan for the watershed; facilitate necessary research, and coordinate intergovernmental and public-private sector cooperation.

Projects:
- PC1 Planning, coordination, and administration
- PC2 Establish a National Estuary
- PC3 Coordination of spill response plan
- PC4 Coordination of watershed management with growth management

Stormwater Retrofit and Treatment Program

Goal: Provide for effective treatment and management of urban stormwater runoff.

Issues Addressed:
- Urban stormwater runoff
- Nonpoint source pollution
- Surface water, sediment, and habitat quality

Objectives: Evaluate effectiveness of existing treatment systems and maintenance.
Evaluate sediment quality in existing treatment ponds.
Implement stormwater treatment system retrofits.

Projects:
- ST1 Examine stormwater treatment facility effectiveness
- ST2 Survey sediment quality in stormwater treatment ponds
- ST3 Retrofit stormwater infrastructure

Public Outreach and Education Program

Goal: Promote the sustainability of the resources of the St. Andrew Bay watershed through public education and outreach.

Issues Addressed:
- Public outreach and education

Objectives: Improve public awareness about the St. Andrew Bay watershed, its functions, the benefits it provides, and how individuals can help protect it.

Projects:
- PE1 Distribution of the Boater's Guide
- PE2 Update and manage watershed website
- PE3 Inform public about watershed resources, functions, and services
- PE4 Publicize BEST activities

Biodiversity and Natural Systems Program

Goal: Protect and restore the natural ecological diversity, productivity, and ecological functions of the St. Andrew Bay watershed.

Issues Addressed:
- Habitat quality
- Biological diversity
- Protected species
- Water quality
- Estuarine freshwater needs

Objectives: Identify and protect critical habitats, species, and functions.

Projects:
- BD1 Biodiversity assessment
- BD2 Land assessment
- BD3 Conservation of primary tributary basins
- BD4 Assessment & monitoring of state-owned submerged land
- BD5 Management of state-owned submerged land – policy
- BD6 Assessment & restoration of East Pass closure
- BD7 Assessment of freshwater inflow needs for the St. Andrew Bay estuary
- BD8 Bayou management generic model & citizen's bayou management
- BD9 Finfish comparison survey
- BD10 Grand Lagoon bridge replacement
- BD11 Seagrass protection and management
- BD12 Wetland protection, management, and restoration

Chemical Contaminants Program

Goal: Identify extent of chemical contamination; initiate restoration actions.

Issues Addressed:
- Chemical contamination
- Point source pollution
- Stormwater treatment

Objectives: Identify extent of contaminants within sediments and biota.
Restore contaminated sediments within impacted bayous.

Projects:

- CC1 Sediment contaminant monitoring
- CC2 Bayou restoration
- CC3 Dioxin compound evaluation
- CC4 Chemical monitoring of biological organisms

Cumulative Assessment Program

Goal: Identify environmental quality and trends within the watershed.

Issues Addressed:

- Nonpoint source pollution
- Point source pollution
- Water, biological, and habitat quality

Objectives: Identify environmental quality and trends for surface waters and basin discharges.
Identify changes attributable to both impacts and corrective actions.

Projects:

- CA1 Point source cumulative assessment
- CA2 Determination of assimilative capacity of the St. Andrew Bay estuary
- CA3 Nonpoint source pollution assessment and abatement

Deer Point Reservoir Basin Program

Goal: Protect the quality and quantity of water, as well as habitat quality, in the Deer Point Reservoir basin.

Issues Addressed:

- Biological, water, and sediment quality
- Nutrient loading
- Water quality
- Water quantity
- Preservation, restoration, and conservation of water resources

Objectives: Update biological, water, and sediment quality data.
Develop a basin nutrient loading budget.
Develop an understanding of basin's water quality and quantity.
Provide for the basin's current and future water resource needs.

Projects:

- DPR1 Update biological, water quality, and sediment data
- DPR2 Develop nutrient loading budget
- DPR3 Water quality and quantity assessment

Major issues and concerns associated with the system are discussed in Chapter II, and SWIM Plan project descriptions are in Chapter III. A general description of the St. Andrew Bay watershed, including both the human and environmental components, can be found in Chapter IV. Ongoing management activities by various levels of government are described in Chapter V. Appendix A contains a list of biota present in the watershed. Appendix B contains a list of past and current research activities within the watershed. Appendix C includes relevant portions of Chapter 373, Florida Statutes (F.S.), and Appendix D includes Chapter 62-43, Florida Administrative Code (F.A.C.).

Previous SWIM Activities in the St. Andrew Bay Watershed

A SWIM plan for Deer Point Reservoir was developed in 1988 and revised in 1991. The focus of the Deer Point Lake SWIM program was documentation of existing reservoir and watershed conditions to facilitate development of water quality and natural resource protection strategies. The plan included four major programs: watershed management, water quality, preservation, and public education and awareness. Deer Point Lake SWIM activities concluded in 1994 with publication of the Deer Point Lake Watershed Summary Report (Cairns et al. 1994).

Reports produced through the Deer Point Lake SWIM program include the following:

- Deer Point Lake Project: Preliminary Land Use and Nonpoint Source Assessment (Rains and Wiley 1990);
- Deer Point Lake Watershed Land Use/Cover Assessment (Rains and Macmillan 1991);
- Biological Water Quality of the Deer Point Lake Drainage Basin, Bay County, Florida (FDER and NWFWMD 1992);
- Deer Point Lake Environmentally Sensitive Areas Assessment (O'Rourke et al. 1993);
- Deer Point Lake Watershed Nonpoint Source Assessment (Latham and Cairns 1994); and
- Deer Point Watershed Summary Report (Cairns et al. 1994).

Through these projects, land use and cover data and trends were documented. Data were produced and made available in geographic information system (GIS) and spreadsheet formats. Estimates of nonpoint source (NPS) pollutant loading were developed for the watershed, specific areas with high pollutant loading potential were identified, and recommendations for protecting the reservoir from future NPS pollution were provided to local governments and state agencies. The DER-NWFWMD study of biology and water quality noted good overall environmental quality and a need for protection of existing conditions. Specific areas of concern and greater impact were also noted. The environmentally sensitive areas assessment provided a GIS-based analysis of floodplain areas, soil suitability for septic systems, aquifer recharge potential, and wetlands. Sensitive areas were identified, and regulations for appropriate land use planning and land development regulations were provided.

In addition to these activities, educational brochures were produced and distributed, information for the public was provided through the local news media, presentations were made in area schools, and public workshops were provided. Information developed through the Deer Point Lake SWIM program also proved important for the development of the NWFWMD land acquisition and management program for the Econfina Creek Water Management Area and Econfina Recharge Area (ERA).

The Deer Point Watershed Summary Report provided a number of recommendations (Cairns et al. 1994). Of primary importance are local land use planning and land development regulations (LDRs) that are consistent with watershed management for a drinking water reservoir. The potential effects of land use on water quality, floodplain functions, and the viability of the reservoir as a potable water resource must be considered in designating future land uses. Increases in land use intensity over existing uses should be avoided throughout the Deer Point Reservoir watershed. Emphasis should also be placed on implementing appropriate LDRs and best management practices (BMPs) for allowed land uses. Effective stormwater treatment should be provided for all development, and wetland resources and functions should be protected. Other recommendations include long-term monitoring, contingency planning for hazardous material spills, and correction of documented NPS pollution loading problems (for example, Bear and Bayou George creeks).

Following completion of the SWIM studies and reports in the early 1990s, the focus of the District's activities in the Deer Point Reservoir watershed shifted to water quality protection through land acquisition. Using Preservation 2000 and Save Our Rivers funding, the District launched an

aggressive effort to acquire frontage along Econfina Creek, the largest tributary to the reservoir. The effort was later expanded to target recharge areas in the watershed. Through this land acquisition program, the District has acquired approximately 8,347 acres of land along Econfina Creek, including about 20 miles of creek frontage. In December 1997, the District purchased 28,954 acres in the Sand Hill Lakes area that provides water recharge protection for the springs that feed the Deer Point Reservoir. With an average recharge rate of approximately 30 inches a year, this is one of the highest recharge areas in the District. The land will be permanently protected, helping to maintain the natural hydrology of the system and to prevent point and nonpoint source contamination that could result from land use conversions and development. The District continues to add land to these major holdings and has purchased a number of smaller parcels that are either inholdings or adjacent to other District lands in the basin. As of 2000, the District's total landholdings in the Deer Point Reservoir watershed were approximately 37,301 acres, acquired at a cost of over $29 million.

CHAPTER II. PRIORITY ISSUES ASSOCIATED WITH THE ST. ANDREW BAY WATERSHED

Priority issues facing the St. Andrew Bay watershed were identified through the process leading to development of "A Look to the Future" (BEST 1998), as well as additional literature review and discussions with state agency and local government staff. These issues are described below. Some revisions and additions have been made to consolidate discussions under general issue areas and to incorporate additional information.

Growth Management

Land use planning for the protection of natural resources and ecosystems is based on the principle that a location's environmental characteristics render the area inherently more suitable for some land uses than others. Permitting programs do not substitute for land use planning, but both are necessary tools for effective protection of natural resources and ecosystems. Permitting processes are generally limited in scope and tend to identify specific resource constraints and result in decisions to approve, deny, or modify specific proposed actions. Planning allows local governments to guide intensive land uses away from important natural resources in advance of site-specific permit applications. It is driven by local needs and values and allows residents and policymakers to be proactive and future-oriented.

Local government comprehensive plans are intended to guide future development so as to "preserve and enhance present advantages; encourage the most appropriate use of land, water, and resources, consistent with the public interest; overcome present handicaps; and deal effectively with future problems that may result from the use and development of land within their jurisdictions" (Section 163.3161(3), F.S.). The comprehensive planning process is also intended to enhance intergovernmental coordination. In accordance with Chapter 163, F.S., and Rule 9J-5, F.A.C., comprehensive plans must have the following elements:

- Future Land Use;
- Traffic Circulation;
- Mass Transit;
- Ports, Aviation, and Related Facilities;
- Housing;
- Sanitary Sewer, Solid Waste, Drainage, Potable Water, and Natural Groundwater Recharge;
- Coastal Management (coastal counties);
- Conservation;
- Recreation and Open Space;
- Intergovernmental Coordination; and
- Capital Improvements.

Each element must include goals, objectives, and policies along with supporting data and analysis and maps. Local comprehensive plans are subject to review to ensure consistency with the State Comprehensive Plan (Chapter 187, F.S.) and the requirements of Chapter 163, F.S.

The planning process provides local governments with the opportunity to protect natural resources by directing intensive land uses to areas where infrastructure is available and where density and intensity can best be accommodated with minimal impacts. The proactive focus of growth management planning makes it an integral part of watershed management.

The Florida Department of Community Affairs is the state land planning agency responsible for reviewing local government comprehensive plans for consistency with the Growth Management Act. Although DCA does not issue permits, it plays an important role by ensuring that local government comprehensive plans contain measures to plan for the protection of regionally significant natural resources. The West Florida and Apalachee regional planning councils, with the NWFWMD, DEP,

FWCC, and Florida Department of Transportation (FDOT), review comprehensive plan amendments and comment to DCA. In addition to plan development and implementation, local governments perform various planning and permitting functions, including ensuring that development permits are consistent with their respective comprehensive plans and land development codes.

Nonpoint Source Pollution

Nonpoint source (NPS) pollution is generated when stormwater runoff collects pollutants from diffuse sources such as lawns, pavement, dirt roads, buildings, farms, forestry operations, and construction sites, and carries them into receiving waters. Pollutants entering the water in this way may include sediment, nutrients, bacteria, pesticides, heavy metals, oil, and grease. Pollutants entering the groundwater may also enter surface waters through seepage (DeHan 2000).

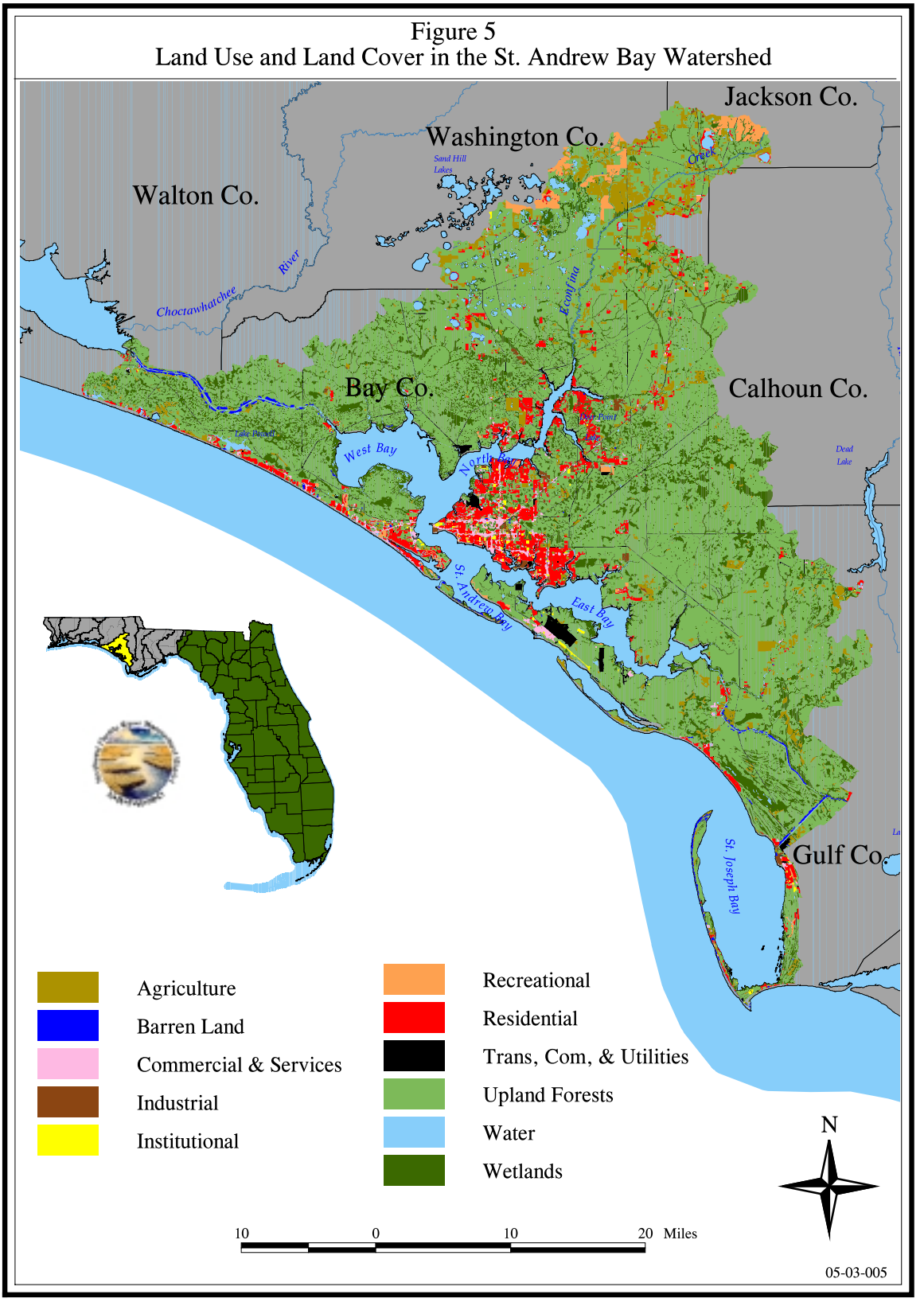
Evaluations of the relationship between land use and water quality consistently report that urban land uses have the greatest NPS pollutant loading per unit of area, generally followed by agricultural and lower intensity land uses (Harper 1994; NWFWMD 1998). Generally, medium and high intensity residential, commercial, and industrial land uses contribute the greatest loading of nutrients, biochemical oxygen demand (BOD), and suspended solids (Harper 1994).

The environmental degradation commonly associated with intensive land use reflects not only the total deposition of NPS pollutants, but also hydrologic changes and habitat loss caused by physical alterations to the land. Urbanization tends to cause channelization, increased impervious surface area, erosion, and habitat loss. Resulting hydrologic effects include increased peak discharge volume and velocity, decreased time for runoff to reach receiving waters, increased frequency and severity of flooding, a lowered water table, and reduced dry weather streamflow (U.S. EPA 1993). Similarly, agricultural land use may cause channelization, erosion, and loss of protective vegetation, which may affect stream and runoff hydrology. Alterations such as these, coupled with the deposition of pollutants, generally increase pollutant loading, sedimentation, and erosion.

Natural forests and wetlands tend to be associated with good water and habitat quality (Wang et al. 1997; Allan et al. 1997). Vegetation cover provides habitat, regulates runoff, maintains stable surface water and surficial groundwater flow, and moderates effects of floods and droughts. Wetland functions include floodwater storage, sediment and shoreline stabilization, nutrient cycling, high primary production, and provision of unique habitats. Silviculture activities, such as when forests are harvested or subjected to mechanical site preparation, fertilizer and pesticide application, and road construction and use, can result in the discharge of sediments and other pollutants. Silvicultural uses have been found to be consistent with maintenance of good water and habitat quality, however, when appropriate best management practices (BMPs) are employed (NWFWMD 1998; Bureau of Laboratories 1997). Silviculture BMPs establish Special Management Zones (SMZs), which consist of specific areas associated with waterbodies within which certain activities are limited. Implementation of SMZs and other BMPs are expected to protect water quality by reducing discharges of sediments, nutrients, logging debris, and chemicals, as well as by reducing water temperature fluctuations and riparian habitat disturbance.

A relatively limited portion of the St. Andrew Bay watershed is devoted to agricultural production. Agricultural uses can cause NPS pollution through fertilizer nutrient losses, chemical applications, livestock waste, erosion and sedimentation, and streambank and hydrologic alterations. Best management practices were pioneered in agriculture, and include an array of actions that minimize pollutant releases, detain runoff, and control erosion. When consistently and effectively implemented, BMPs have been observed to reduce soil loss, nutrient enrichment, sedimentation, and other adverse impacts (Park et al. 1994). Their implementation also often benefits bank stability and fish and wildlife habitat.

Figure 5
Land Use and Land Cover in the St. Andrew Bay Watershed



Lands within the Econfina Creek Water Management Area (NWFWMD) and St. Joseph Bay Buffer (DEP) have been acquired specifically to protect surface and ground water resources—including from NPS pollution. Other public lands in the watershed that are managed to minimize the potential for NPS pollution include DEP Division of Recreation and Parks lands, DACS Division of Forestry lands, U.S. Department of the Interior National Wildlife Refuge lands, the William J. Rish Recreational Park on St. Joseph Peninsula, and some U.S. Department of Defense lands.

Additional NPS pollution can result from sanitary sewer overflows, construction and operation of marinas, discharge from vessels, waterfront clearing and construction, and atmospheric deposition. Septic systems also have the potential to be direct or indirect sources of nutrient and bacterial pollution via ground and surface waters. Their effects on surface water quality depend on soil conditions, slope, height above the water table, maintenance, and overall numbers and density of septic systems.

The BEST (1998) noted that the number of stormwater permits issued has been increasing steadily. There were 51 issued in 1991, for example, while 95 were issued in 1995. Some retrofit addressing existing problems has been accomplished. The plan for Panama City beach nourishment, for example, provided for a stormwater management system that should increase the quality and decrease the quantity of stormwater being discharged directly into the Gulf of Mexico. Substantial stormwater retrofit challenges remain, however.

The primary concentration of intensive land use and apparent NPS pollution potential in the St. Andrew Bay watershed occurs in and around the Panama City metropolitan area (Figure 5). Additional concentrations of transportation and associated land uses occur on Tyndall AFB. In the St. Joseph Bay basin, the primary concentration of intensive land use is in and around the city of Port St. Joe. Residential and commercial development also occurs around Mexico Beach, St. Joe Beach, and scattered along the peninsula north of Cape San Blas. Additional NPS pollution potential is widespread at the urban-rural fringe, proximate to new development and construction sites.

Point Source Pollution

Point sources are permitted to discharge certain pollutants in specific amounts to the land or surface waters. The National Pollutant Discharge Elimination System (NPDES) is administered by the U.S. Environmental Protection Agency (U.S. EPA), but the permitting of discharges within Florida has been delegated to the Florida DEP. These permits are reviewed and renewed at designated intervals. The overall assimilative capacity of the system is unknown, although specific permits are issued based on the results of water quality based effluent limit (WQBEL) studies.

Several point source facilities discharge domestic and industrial wastewater directly into surface waters in the St. Andrew Bay watershed. There are also a number of facilities that discharge to sprayfields, percolation ponds, and other non-surface water points. These are usually considered re-use facilities, since the portion of discharge that does not evaporate enters the local ground water. Permitted wastewater facilities affecting the watershed are listed in Table 1 and illustrated in Figure 6.

Table 1. Summary of Permitted Domestic and Industrial Waste Facilities in the St. Andrew Bay Watershed

#	Name	Location		Permitted Discharge		Documented Problems (current)	Comments
		N.LAT	W.LONG	MGD	Type		
	DOMESTIC						
1	Gulf Aire Subdivision STP	29°54'30"	85°22'13"	0.070	IR		
2	Lake Merial WWTF	30°23'36"	85°41'10"	0.098	PP		Under construction
3	Millville AWT Facility	30°08'38"	85°37'50"	5.000	SW		
4	Pinnacle Port Condominium	30°16'00"	85°58'58"	0.090	PP		
5	Shores STP	30°15'55"	85°58'00"	0.055	PP		
6	Sunny Hills WWTF	30°32'47"	85°35'54"	0.050	IR		
7	Bay Point STP	30°08'45"	85°43'20"	0.500	IR		
8	Sunnyside Beach & Tennis	30°15'35"	85°57'54"	0.050	PP		
9	Sandy Creek Ranch	30°06'11"	85°29'12"	0.075	IR		
10	Cypress Apartments WWTF	30°09'56"	85°45'17"	0.016	DF		
11	Barrier Dunes/Seacliff	29°45'00"	85°23'55"	0.050	PP		
12	St. Andrew WWTF	30°11'22"	85°42'25"	5.000	SW	NCL 2	
13	Panama City Beach	30°13'00"	85°51'11"	7.000	SW	CO 1	
14	Military Pt. Regional AWT	30°06'58"	85°37'38"	7.000	SW	CO initiated 3	
15	Tyndall CS Tr. Complex	30°01'15"	85°29'51"	0.050	IR		
16	City of Lynn Haven	30°15'00"	85°39'39"	2.500	SW	CO 1	
	INDUSTRIAL						
17	General Chemical Corp.	29°48'48"	85°17'04"	0.014	PP		
18	Arizona Chemical Company	30°08'40"	85°37'04"				Disch to P. St. Joe WWTP
19	Louisiana Pacific Corp	30°19'53"	85°51'49"		IR		
20	Stone Container Corp	30°08'27"	85°37'04"		SW	AO	Disch to Military Pt. Lagoon
21	Premier Refractories, Inc.	29°50'18"	85°17'55"		SW		
22	Apalachicola Northern RR	29°49'00"	85°18'04"	0.400	SW	CO	Groundwtr cleanup ongoing
23	Military Point Lagoon	30°06'56"	85°37'50"		SW		
24	Gulf Power Smith Steam	30°16'07"	85°42'04"		SW		
25	City of Port of St. Joe	29°49'44"	85°18'17"		SW	NCL 1	
26	Mexico Beach Launderette	29°56'59"	85°25'16"	0.003	DF		Tying in to municipal sewer

Source: Florida Department of Environmental Protection

Abbreviations and Symbols

CO - Consent order
AO - Administrative order
NCL - Non-Compliance Letter

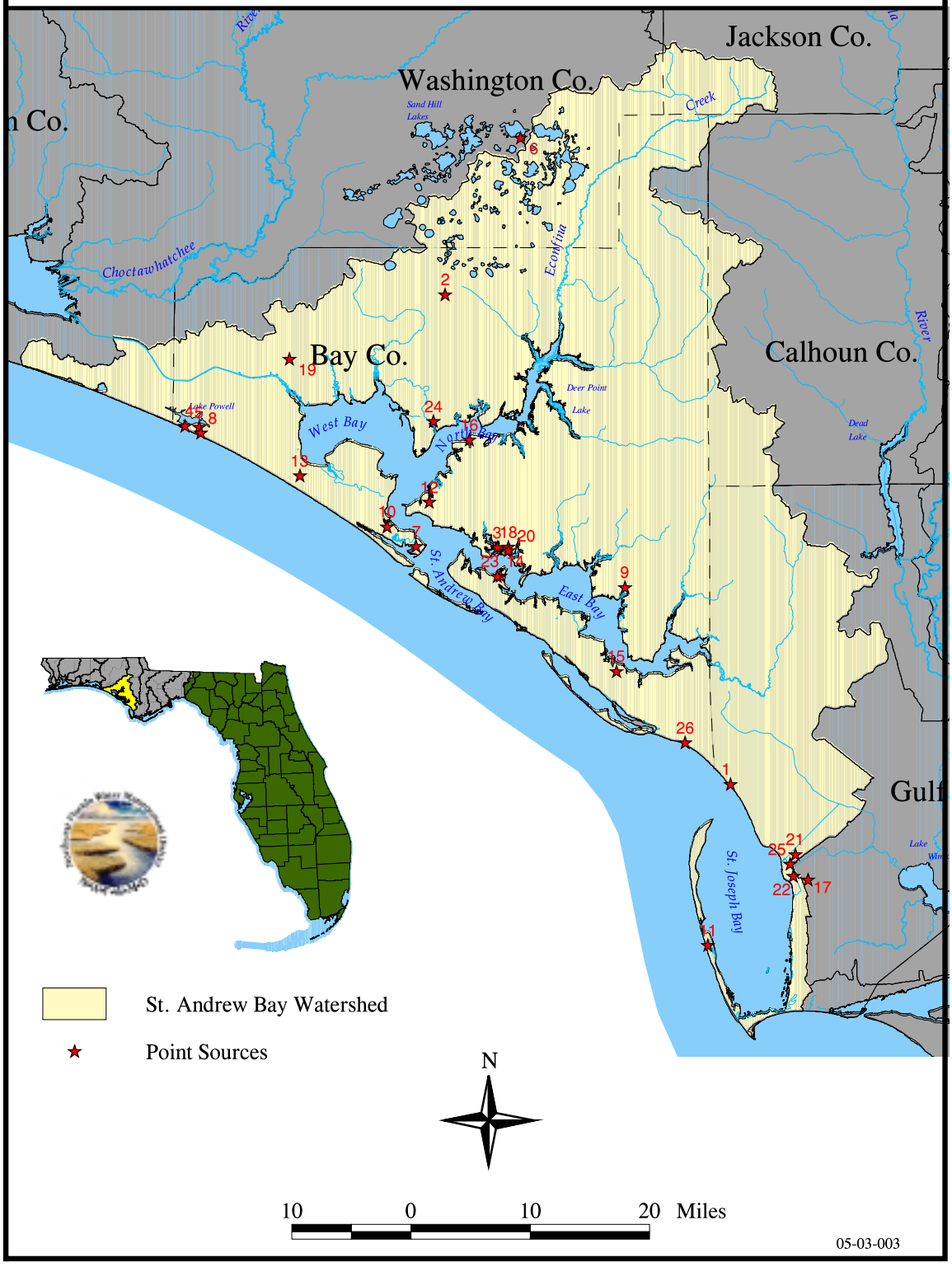
SW - Discharge to surface water
IR - Spray irrigation to land
PP - Discharge to percolation pond
DF - Discharge to drainfield

(1) Water quality violations
(2) Sanitary overflows
(3) Facility out of permit specifications

Chemical Contamination

Alteration of living resources can take place via chemical contamination of air, water, soils, sediments, vegetation, and animals from commercial/industrial air emissions, vehicular emissions, point source discharges, stormwater runoff, vessel discharges, and oil or hazardous material spills. Chemical contaminants can cause insidious and difficult to document injuries to organisms and habitats. Chemical contamination can degrade habitats, reduce biological productivity and diversity, and even eliminate the presence of entire species. Degradation of water and/or sediment by toxic chemicals can generate contaminated food chains. Top predators, such as eagles, dolphins, and turtles, are often the most severely harmed.

Figure 6 Point Sources of Pollution in the St. Andrew Bay Watershed



There are many difficulties associated with evaluating and remediating chemical contamination problems. First, adverse effects are usually most significant during reproductive phases: developing eggs, larval or embryonic. Injury or mortality is not easily observed when it occurs in invertebrate, fish, or bird eggs, or in developing internal embryos of mammals. Second, injuries caused by several chemicals working together (synergism) are difficult to document and to understand. Third, chemical contaminants are not usually generated from one single, easily identifiable source, but from several sources, often remote and diverse. The environmental pathway from injured organisms back to a contaminant source or sources is therefore often difficult to describe.

Chemical contaminants can also be harmful to human beings, as well as affecting fish and wildlife resources. Concern is warranted when it comes to consuming seafood that contains undesirable quantities of mercury, PCBs, dioxin and other harmful chemicals. Public health agencies attempt to monitor concentration levels of undesirable chemicals that occur in food products and public natural resource land and recreational waters.

Biological Diversity

The aquatic and terrestrial habitats within the St. Andrew Bay watershed support a rich diversity of flora and fauna. The protection and, where necessary, restoration of these interdependent habitats is crucial to the health of the ecosystem. The sustainability of ecosystem functions and the future of the watershed's biodiversity will depend on the extent, location, and interrelationship of the remaining viable habitats.

In order to maintain biodiversity, substantial areas of habitat should be protected through public acquisition, conservation easements or other less than fee measures, mitigation banking, or private conservation actions. These areas should be selected for habitat diversity and their location relative to major sources of freshwater inflow to estuaries and along the shore of the estuaries themselves. Where possible, they should also be connected through corridors of natural vegetation such that wildlife movement is not restricted. Management of terrestrial areas should be directed toward maintenance of natural habitat and human use commensurate with that management, rather than production of commodities for sale. Wetland areas should be maintained or restored to sustain the ecological functions of these communities in the watershed.

In places, natural habitats that have been altered or reduced in size should be restored. For example, long-leaf pine-wiregrass habitat has been greatly reduced from its earlier dominance in this region of Florida. As a result, populations of many species depending on this community have greatly declined. Restoration of portions of this community will expand available habitat for species that are dependent on it, aid in the maintenance of listed species, and restore and protect watershed functions.

Protection and Management of Seagrass Communities

The seagrass communities in St. Andrew and St. Joseph bays are among the most extensive and diverse of any in the Florida Panhandle (Wolfe et al. 1988). These communities perform a number of important functions, including providing spawning, nursery, and protective habitat for a wide diversity of organisms; stabilizing substrates and shorelines; and providing the basis of both detrital and grazing food webs. The productivity of seagrass beds, along with salt marshes, is particularly important in St. Joseph Bay, as it lacks significant external sources of energy (DEP 1997). Seagrass communities provide habitat for a number of commercially and recreationally important species, including bay scallop (*Argopecten irradian concentricus*), spotted seatrout (*Cynoscion nebulosus*), blue crab (*Callinectes sapidus*), mullet (*Mugil cephalus*), penaeid shrimp (*Penaeus* spp.), and redfish (*Sciaenops ocellatus*).

An analysis of 1992 aerial photography performed by the U.S. Geological Survey (USGS) indicates that the interconnected estuarine system of West, North, St. Andrew, and East bays support approximately 9,828 acres of seagrass beds. The same analysis indicates that St. Joseph Bay

supports approximately 9,669 acres of seagrasses. Comparison with historical aerial photography indicates that the overall seagrass coverage in St. Andrew, West, North, and East bays appears to have declined by approximately 17 percent between 1953 and 1992 (BEST 1998). The 1992 seagrass coverage is illustrated in Figure 7.

Five species of seagrass have been documented in St. Andrew, West, East, and St. Joseph bays. These are turtle grass (*Thalassia testudinum*), Cuban shoal grass (*Halodule wrightii*), manatee grass (*Syringodium filiforme*), widgeon grass (*Ruppia maritima*), and star grass (*Halophila engelmanni*). Turtle grass is the dominant species, while shoal and manatee grasses are also distributed widely. Shoal grass is thought to function as a pioneer species in successional development of grass beds, and may predominate where conditions lack the stability required for extensive turtle grass coverage. Manatee grass is frequently found intermixed with other species, while star grass is reported to be patchily distributed. Widgeon grass tolerates relatively low salinity and is reported in areas with greater freshwater inflow.

Seagrass communities are susceptible to adverse impacts of human activities and are sensitive to changes in water and sediment quality. Because of this, they serve as an indicator of overall ecological health. Excessive nutrient loading can increase phytoplankton and chlorophyll concentrations, which reduce the amount of light available for seagrasses, and can encourage the growth of epiphytic algae. The loading of suspended solids can also reduce light penetration and contribute to smothering of benthic habitats. Physical damage to seagrass beds are caused by dredging, frequent operation of recreational and commercial watercraft (prop scars, sediment suspension), dragging of commercial fishing gear, sedimentation and other nonpoint source pollution from construction and other land-based activities, and sustained or frequent alterations of salinity.

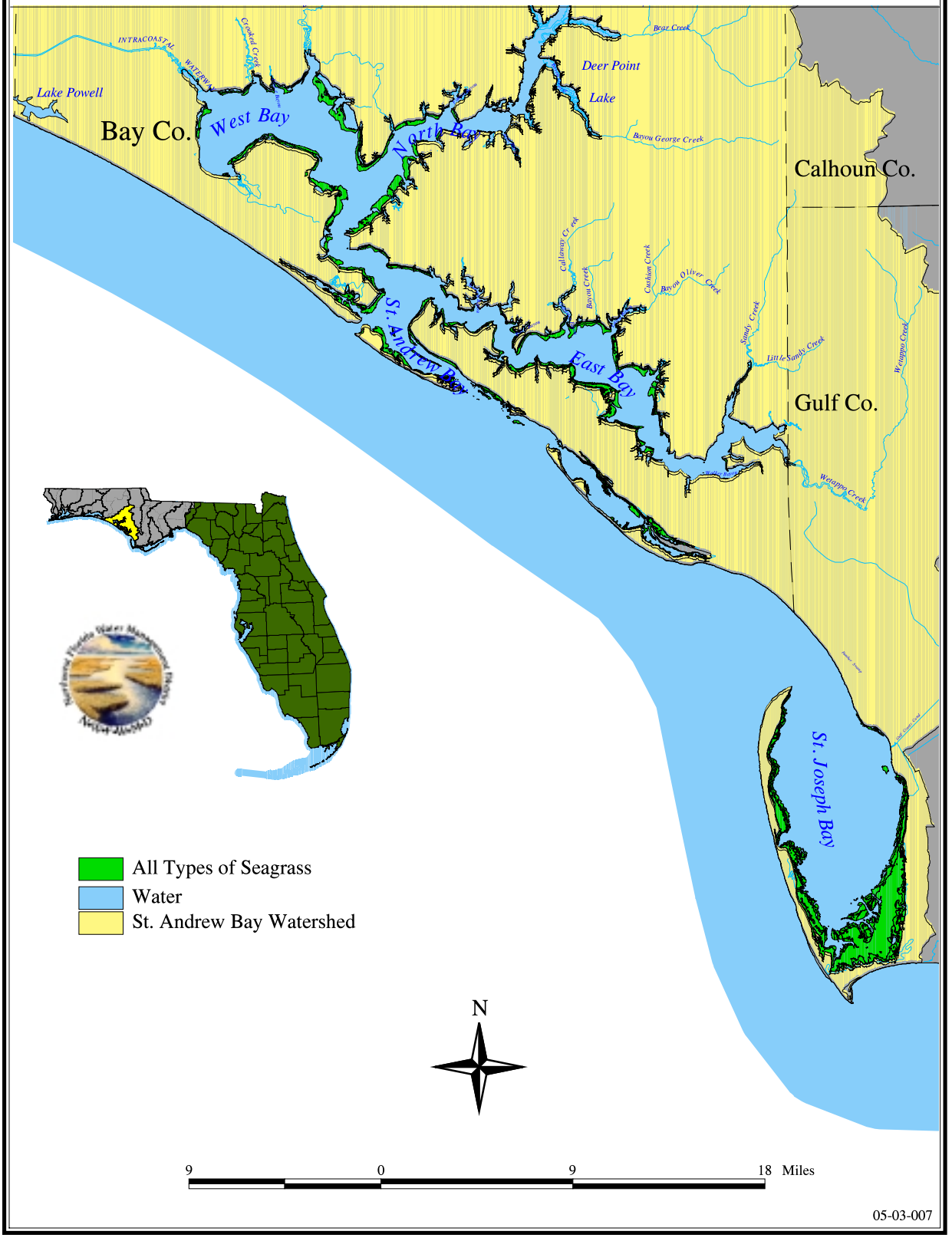
Protection and Management of Wetlands

The St. Andrew Bay watershed supports many types of wetlands, each with distinct characteristics and functional values. Wetlands generally have a high rate of primary production, support a large diversity of organisms, and provide a number of ecosystem functions. They reduce runoff velocity, attenuate and store floodwaters; prevent shoreline erosion; provide spawning shelter and habitat for fish, shellfish, waterfowl, and other wildlife; provide habitat for a number of plant species; provide groundwater recharge; and facilitate the cycling of nutrients and energy. Wetlands may act as sinks to store and transform nutrients and other constituents—including pollutants. They may at times also export nutrients as detritus.

Wetlands occur throughout the St. Andrew Bay watershed. Salt marshes and inland forested wetlands are especially prominent in several areas, including the West Bay watershed, Panther Swamp, and the southern and southeastern portion of St. Joseph Bay. Protection of areas such as these will prove important for future productivity and water and habitat quality.

Wetlands are subject to direct impacts from dredge and fill activities and secondary impacts from hydrologic disruption and development of adjacent uplands. Their functions can be further diminished through habitat and hydrologic fragmentation. Many of the more intact wetland systems in the watershed are located at the urban-rural fringe where development and permitted impacts are increasing. While small, individually permitted actions may have limited effects by themselves, the cumulative effect of the many such impacts that are occurring can be expected to include a long-term degradation of wetland and surface water resource quality. Thus, to preserve and enhance watershed functions, wetland impacts should be avoided where possible and otherwise minimized. Where impacts are permitted, appropriate and verifiable mitigation should be accomplished.

Figure 7 General Seagrass Coverage in the St. Andrew Bay Watershed



Protection and Management of other Terrestrial Habitats

In addition to supporting numerous species of plants and animals, terrestrial habitats provide important functions for receiving waters. Natural vegetation regulates runoff, maintains stable surface and surficial groundwater flow, and moderates effects of floods and droughts. Displacement of natural vegetation and alteration of hydrology, however, tends to increase erosion and NPS pollutant loading and cause other direct and secondary impacts on upland, wetland, and aquatic habitats.

Natural shoreline communities, including wetlands, coastal scrub, and forested uplands, provide an interdependent web of habitats that support many terrestrial and aquatic species. They also stabilize the shoreline and provide a buffer that protects water quality. A number of authors (e.g., Desbonnet et al. 1995; Fennessy and Cronk 1997) have described processes by which vegetated shoreline buffer zones reduce NPS pollution. Shoreline communities can be directly impacted by waterfront development and armoring, degraded by fragmentation, and impacted by vehicles driven along the shoreline. Additionally, erosion tends to be exacerbated when nearby shorelines are hardened.

Public conservation lands, such as those managed by the DEP, NWFWMD, DACS Division of Forestry, and U.S. Department of the Interior, help protect ecological diversity within the watershed. This diversity is further protected and habitat fragmentation is limited by conservation efforts on private and military lands.

Public Outreach

Many residents and users of the watershed may not be aware of how their daily activities impact water resources associated with the St. Andrew Bay watershed. For this reason, a public education program is crucial to ensure effective management of the watersheds. Public education can foster appreciation for the natural resources of the area, which in turn can facilitate efforts to protect the ecosystem.

An example of an existing public awareness initiative within the watershed is the St. Andrew Bay Environmental Study Team (BEST). This group has been working for several years to enhance communication, cooperation, and coordination among the agencies that have either knowledge of or responsibility in the St. Andrew Bay watershed.

Deer Point Reservoir Basin Management

Deer Point Reservoir provides the primary source of drinking water for Bay County. The reservoir also provides fresh water for industrial use, a recreational resource, and fish and wildlife habitat. Prevention and abatement of NPS pollution and maintenance of the quality and function of the Econfina Recharge Area (ERA) are particularly important for protecting the future use and quality of the reservoir.

To protect ground and surface water quality in Econfina Creek and Deer Point Reservoir, the NWFWMD has acquired over 37,000 acres in the ERA. This land is managed to protect water resources and to provide public recreational and educational opportunities. The Bay County Comprehensive Plan also contains a Deer Point Reservoir Protection Zone element that sets standards for development near the reservoir and its tributaries. The Comprehensive Plan additionally incorporates criteria governing the placement of septic tanks near the reservoir, as well as criteria applying to septic systems in the remainder of the county.

CHAPTER III. PROJECT DESCRIPTIONS

Projects are detailed descriptions of activities proposed to address specific issues. The project descriptions identify approaches and methods to be applied and include objectives and strategies for accomplishment. A preliminary step for all projects will be identification of similar initiatives and coordination with other entities undertaking related efforts. Table 2 provides SWIM funding recommendations for fiscal years between October 2000 and September 2005. While projects may have a longer implementation timeframe, for budgeting purposes only five years of estimated project funding are provided in the plan. The funding indicated reflects project prioritization. Relative funding priorities may change, however, depending on funding availability and emergent issues and opportunities.

Most of the projects included in this plan were developed by the BEST in the development of "A Look to the Future" (BEST 1998). Some revisions to project descriptions have been made to consolidate similar projects, to incorporate St. Joseph Bay, and to incorporate additional sources of information or potential funding sources. Project descriptions for activities funded under SWIM will receive further elaboration and refinement prior to initiation.

Table 2. Five-Year SWIM Funding Table for the St. Andrew Bay Watershed

		Fiscal Year				
ID#	**PROJECT NAME**	**2000-01**	**2001-02**	**2002-03**	**2003-04**	**2004-05**
Planning, Coordination, and Administration Program						
PC1	Planning, Coordination, & Administration	$10,000	$10,000	$10,000	$10,000	$15,000
PC2	Establish NEP					
PC3	Coordinate with Coast Guard & State Agencies for Spill Response Plans					
PC4	Coordinate Watershed Management Activities with Growth Management Plans		$5,000	$5,000	$5,000	$5,000
Stormwater Retrofit and Treatment Program						
ST1	Examine Stormwater Treatment Facility Effectiveness		$10,000	$10,000	TBD*	TBD*
ST2	Survey Sediment Quality in Existing Ponds					
ST3	Retrofit Stormwater Infrastructure		$50,000	$50,000	TBD*	TBD*
Public Outreach and Education Program						
PE1	Distribution of the Boater's Guide					
PE2	Update & Manage Watershed Website					
PE3	Inform the Public About Watershed	$7,000	$20,000	$20,000	$5,000	$5,000
PE4	Publicize BEST Activities					
Biodiversity and Natural Systems Program						
BD1	Biodiversity Assessment					
BD2	Assessment of Lands					
BD3	Conservation of Primary Tributary Basins	TBD*	TBD*	TBD*	TBD*	TBD*

*TBD=Costs to be determined.

Table 2. Five Year SWIM Funding Schedule for the St. Andrew Bay Watershed (Continued)						
ID#	**PROJECT NAME**	**2000-01**	**2001-02**	**2002-03**	**2003-04**	**2004-05**
BD4	Management of State-owned Submerged Land – Assessment & Monitoring					
BD5	Management of State-owned Submerged Land – Policy					
BD6	Assessment & Restoration of East Pass Closure	$15,000				
BD7	Assessment of Freshwater Inflow Needs for St. Andrew Bay Estuary		$100,000	$100,000	TBD*	TBD*
BD8	Bayou Management Generic Model & Citizen's Bayou Management Groups					
BD9	Finfish Comparison Survey					
BD10	Grand Lagoon Bridge Replacement					
BD11	Seagrass Protection and Management					
BD12	Wetland Protection, Management, and Restoration	$10,000	TBD*	TBD*	TBD*	TBD*
Chemical Contaminants Program						
CC1	Chemical Contaminant Sediment Monitoring within the Watershed					
CC2	Bayou Restoration					
CC3	Evaluation of Dioxin Compounds					
CC4	Chemical Monitoring of Biological Organisms					
Cumulative Assessment Program						
CA1	Point Source Assessment					
CA2	Determine Assimilative Capacity of the St. Andrew Bay Estuary					
CA3	Nonpoint Source Pollution Assessment/Abatement			$25,000	TBD*	TBD*
Deer Point Reservoir Basin Program						
DPR1	Update Biological, Water Quality, and Sediment Data					
DPR2	Nutrient Loading Budget					
DPR3	Water Quality and Quantity Assessment					

*TBD=Costs to be determined.

PLANNING, COORDINATION, AND ADMINISTRATION PROGRAM

PC1 Planning, Coordination, and Administration

This project provides for implementation of a comprehensive program for the management of the St. Andrew Bay watershed. This effort requires coordination between the SWIM program and other programs being implemented by the NWFWMD and other entities involved with the watershed. Administrative tasks include project management, research coordination, pursuit of additional funding, coordination with advisory committees, plan updates, coordination with local governments and other agencies, and development of methods to assess progress in achieving plan objectives.

Actions Completed: The BEST has facilitated an interagency, public-private cooperative effort to protect the resources and benefits of St. Andrew, West, North, and East bays and their watersheds. With the assistance of DEP and funding provided by the National Oceanic and Atmospheric Administration (NOAA), BEST also completed and proceeded with implementation of *A Look to the Future: A Management Plan for the St. Andrew Bay Ecosystem*. For St. Joseph Bay, DEP developed and is implementing an Aquatic Preserve plan and is acquiring and managing the St. Joseph Bay Buffer Preserve. The St. Joe Bay Committee is a grassroots effort focusing on issues relating to St. Joseph Bay with participation of local residents, the resource users community, and resource management agencies.

Action: Effectively implement the SWIM plan as a broad-based watershed management effort coordinated with other government agencies and non-government organizations.

Strategy: The planning, coordination, and administration project will incorporate the following activities.

1. Coordinate SWIM activities with BEST; the St. Joe Bay Committee; local governments; federal, regional, and state agencies; and other private initiatives. BEST and the St. Joe Bay Committee will be asked to review and comment on plan implementation and projects and progress toward fulfillment of plan objectives. Members of the groups will also work within their respective agencies to promote appropriate management and regulatory activities in a manner consistent with the plan.
2. Identify and pursue grant and other funding opportunities to help supplement SWIM funding and enhance long-term planning and implementation.
3. Track plan implementation efforts and monitor their progress. Identify criteria and measures to assess plan progress, potentially measure trends in public awareness to assess the achievement of education objectives; biological, physical, and chemical indicators; institutional factors, such as permit compliance and the implementation of comprehensive plans. Where appropriate, measures should be consistent with the requirements of the Florida Forever program.
4. Prepare periodic updates to the SWIM Plan.
5. Manage funding for plan implementation.
6. Participate in and/or receive advisement from groups, programs, and activities of other agencies and local governments related to land use, environmental regulation, and other watershed issues.
7. Provide technical assistance on watershed related issues.

Products: Efficient implementation of a coordinated watershed management plan.

Expected Benefits: Enhanced resource management and interagency and intergovernmental coordination.

Monitoring: Coordinated through other projects contained within this plan.

Estimated Cost: See Table 2.

Anticipated Funding Source(s): SWIM program.

PC2 Establish a National Estuary

Actions Completed: Publication and update of the document: *A Management Plan for the St. Andrew Bay Ecosystem*, prepared by DEP and BEST, complete the basic requirements of the Environmental Protection Agency for management of St. Andrew Bay under their National Estuary Program (NEP).

Action: The DEP and BEST should jointly submit the *Management Plan for the St. Andrew Bay Ecosystem* to the EPA and request that St. Andrew Bay watershed be designated a National Estuary under the federal program and receive associated benefits of such designation. Include in the submission package to EPA an update of the 1995 *St. Andrew Bay NEP Nomination* document.

Background: St. Andrew Bay was nominated in 1995 for inclusion in the federal National Estuary Program. The *St. Andrew Bay NEP Nomination* document provided the information necessary for consideration of the nomination and identified BEST as the core of an NEP management conference. Also included in the nomination document was a required draft *Management Conference Agreement* and letters requesting NEP designation for the bay by BEST members. Unfortunately, because of the large number of nominations submitted from Florida in 1995, the EPA was not able to include St. Andrew Bay as an approved NEP that year.

Strategy: The BEST and DEP, with limited funds, have succeeded in developing a comprehensive conservation and management plan for St. Andrew Bay, and have done so without the funding (which for most NEPs amounted to millions of federal dollars) usually provided by the EPA for Plan development. Furthermore, BEST (as a core to National Estuary management for St. Andrew Bay) stands ready to accept designation of the bay as a National Estuary, and to move forward with implementation of many of the identified, on-the-ground action items. Representatives of the EPA-NEP decision group should be invited to come to Panama City, Florida to discuss, in detail, the nomination request. Also in attendance should be representatives of the Florida Governor's Office, and other parties, as appropriate.

Expected Benefits: Designation of St. Andrew Bay as a National Estuary will provide national recognition of the value of the ecological, biological, social, economic, and educational resources of the bay and its watershed. Such designation will aid greatly in obtaining additional federal, state, private, or grant funding for restoration projects, conservation and management efforts, scientific studies, and educational initiatives.

Monitoring: The measurement of success of the federal NEP designation for St. Andrew Bay will be an increase in BEST's capacity to obtain funding for a variety of projects, increased awareness of the bay's resources by residents and visitors, and accomplishment and implementation of a number of management action plans.

Estimated Cost: There should be no substantial costs associated with the submission of NEP materials to EPA.

Anticipated Funding Source(s): Not applicable.

Potential Project Partners: Bay Environmental Study Team, U.S. Environmental Protection Agency, and local governments.

PC3 Coordinate with U.S. Coast Guard & State Agencies for Spill Response Plan

Actions Completed: A number of contingency plans exist at the state, federal, and local level. The action here proposed is directed at the Coast Guard Geographical Specific Tactical Response Plan (GSTRP), which emphasizes actions to be taken in a waterbody immediately upon notification of a spill.

Action: Form a BEST committee to provide information to the Coast Guard for incorporation into the GSTRP. Members would be solicited from those members with knowledge of the natural resources and hydrology of the St. Andrew Bay system.

Background: The Coast Guard is developing the GSTRP to provide for immediate planned response to spills in specific sections of each waterbody. These plans require knowledge of environmental factors as well as knowledge of response equipment and personnel present in close proximity to the waterbody. Local input can be of assistance to the Coast Guard in developing these plans.

Strategy: The BEST committee would supply the Coast Guard with advice regarding the division of the St. Andrew Bay system into geographical response units. It would provide information regarding the natural resources in each response area and would prioritize the sensitive areas for protection in the event of a spill.

Expected Benefits: Input from local people with knowledge of the bay can enhance the ability of the plan to protect the priority sensitive areas of the system. The adverse environmental effects of a spill could be reduced as a result of this input.

Monitoring: None required unless an event occurs.

Regulatory Needs: None.

Estimated Cost: None except time devoted by volunteers.

Anticipated Funding Source(s): None needed.

Potential Project Partners: U.S. Coast Guard, U.S. Fish and Wildlife Service, Florida Department of Environmental Protection, National Marine Fisheries Service, Environmental Protection Agency, Bay Environmental Study Team, local governments, and private sector participants.

PC4 Coordinate Watershed Management Activities with Growth Management Plans

Actions Completed: Publication of *A Management Plan for the St. Andrew Bay Ecosystem* and the *St. Joseph Bay Aquatic Preserve Management Plan* provided substantial information identifying the existing natural resource quality of the St. Andrew Bay watershed. Other reports and surveys have established the system as a unique coastal resource with exceptional water quality, biological diversity, and biological productivity, as well as extremely high economic, educational, and social values. The BEST has reviewed Evaluation and Appraisal Reports from Bay County local governments and notified local governments of its desire to provide technical advice and assist in the development of BMPs for the St. Andrew Bay system.

Action: Efforts will be made to facilitate consistency between local and regional land use planning and the St. Andrew Bay watershed SWIM plan. Additionally, the BEST should ensure local governments have received the *St. Andrew Bay Ecosystem Management Plan* for consideration in the local land use planning process. The BEST will maintain lines of communication with local governments in order to ensure management practices included in the plans are applied uniformly throughout the watershed.

Background: It has been demonstrated by BEST and federal and state government agencies, municipal governments, conservation groups, and citizens that the St. Andrew Bay watershed is an ecologically, economically, and recreationally valuable coastal resource of significant importance to the general public, commercial fishermen, recreational businesses, industries, and educational institutions. Further, it has been demonstrated that the watershed faces a multitude of conservation, growth, and management challenges that will require a variety of management tools, funding sources, management resources, and dedicated persons to assure retention of the valuable resources. The Coastal Management, Conservation, Recreation and Open Space, and economic elements of Local Government Comprehensive Plans include strategies for municipal government management that can significantly protect and conserve the resources of the bay. However, these elements can be strengthened and improved by adoption of watershed management objectives and actions within each comprehensive plan.

Strategy:

1. BEST will ensure local governments have received a copy of the ecosystem management plan.
2. The Growth Management Committee and the Natural Resources Committee will each designate a committee member to work with a particular local government to assist them in understanding the plan and modifying appropriate comprehensive plan elements to incorporate management actions and practices.
3. The BEST Growth Management Committee will seek volunteers to serve as local government liaisons in order to enhance communication between BEST and the local governments and to provide a path for offering technical advice and information.
4. The BEST will also continue to offer technical assistance to local governments as comprehensive plan amendments are written.
5. Comprehensive plans, amendments, and developments of regional impact (DRIs) will be reviewed for consistency with the watershed management plan.
6. District staff will coordinate with local governments, Aquatic Preserve offices, the BEST, the St. Joseph Bay Committee, and state agencies as part of the planning process.

Products: Improved recognition of the relationships between land use and water resource quality throughout the watershed and enhanced consistency between SWIM and local and regional planning.

Expected Benefits: Continuity between Local Government Comprehensive Plans and the *Management Plan for the St. Andrew Bay Ecosystem*, an increased overall effort to properly manage the St. Andrew Bay watershed, and development of more uniform and effective growth management plans in terms of natural resource management.

Monitoring: Modification and improvement of Local Government Comprehensive Plans should be reflected in positive actions by local governments that result in beneficial results for the watershed. Monitoring would involve tracking development of the plans and their consistency in addressing management of the natural resources of the St. Andrew Bay watershed.

Regulatory Needs: Additional uniformity of growth management plans regarding natural resources.

Estimated Cost: Costs for this action plan are minimal, but in-kind volunteer assistance by members of the BEST Growth Management and Natural Resource committees may be considerable. Some costs will be associated with the time involved by state and regional agencies and local governments. See Table 2 for estimated SWIM costs.

Anticipated Funding Source(s): Local governments and Florida Department of Community Affairs; NWFWMD participation funded through SWIM.

Potential Project Partners: Bay Environmental Study Team, St. Joe Bay Committee, local governments, Florida Department of Community Affairs, Northwest Florida Water Management District.

STORMWATER RETROFIT AND TREATMENT PROGRAM

ST1 Examine Existing Stormwater Treatment Facility Effectiveness

Actions Completed: The DEP has permitted stormwater facilities since 1982.

Action: Evaluate existing stormwater treatment systems for proper functioning. Establish or improve facility maintenance where necessary to restore treatment capacity.

Background: A number of stormwater ponds may require additional maintenance or retrofit to re-establish or enhance their ability to adequately treat runoff.

Strategy: Examine existing stormwater treatment permits for the presence of conditions that require facility maintenance. Inspect those facilities for effectiveness and compliance with treatment requirements. Describe corrective actions and identify implementation funding. Identify geographic points where stormwater effluent enters waters of the state. Evaluate water quality at these points against state water quality standards. Identify sources of pollution, and pursue retrofit needs through project ST3.

Products: One or more reports identifying specific recommendations for improved facility operation and maintenance, and an identification of potential stormwater retrofit needs.

Expected Benefits: Return those facilities that are not currently functioning to a required or improved level of efficiency. This would serve to increase the quality of the water exiting these treatment facilities and entering surface waters.

Monitoring: Develop a program with appropriate performance measures to monitor the quality of the water discharged from facilities before and after implementation to quantify the effect of maintenance on the quality of water leaving the facility.

Regulatory Needs: If not already required, require that maintenance of stormwater facilities be included in all permits to assure that the required treatment levels are maintained throughout the life of the facility.

Estimated Cost: Time required for DEP and/or NWFWMD inspectors to visit the identified facilities and determine compliance.

Anticipated Funding Source(s): Local governments, Florida Department of Environmental Protection, and SWIM.

Potential Project Partners: Local governments, Bay Environmental Study Team, St. Joe Bay Committee, Florida Department of Environmental Protection, and Northwest Florida Water Management District.

ST2 Survey Sediment Quality in Existing Stormwater Ponds

Actions Completed: None.

Action: Analyze sediment quality in selected, permitted stormwater ponds.

Background: A number of treatment ponds have accumulated sediments and pollutants for many years. The concentrations of sediments and the pollutants carried by the runoff entering these ponds may be of concern. Sediment quality in the ponds should be investigated, and, if necessary, contaminated sediments should be removed and properly disposed of.

Strategy: The information gathered under ST1 can be used to select a sample of the permitted treatment ponds for analysis of contaminant levels in the sediments that have accumulated in the ponds. Standard sampling and analytical techniques should be employed in obtaining and analyzing the sediments.

Monitoring: Perform in conjunction with ST1.

Regulatory Needs: None.

Estimated Cost to Complete the Action: Cost would depend on the number of ponds to be sampled, the number samples to be taken from each pond, and the scope of the analysis for contaminants.

Anticipated Funding Source(s): EPA, NOAA, DEP, and the U.S. Fish and Wildlife Service.

Potential Project Partners: Florida Department of Environmental Protection, U.S. Fish and Wildlife Service, local governments, Bay Environmental Study Team.

ST3 Retrofit Stormwater Infrastructure

Actions Completed: Many urbanized areas have drainage systems that would benefit from the installation of treatment facilities. Progress toward improving the water quality discharged from these drains is slow due to funding limitations.

Action: Identify areas of concern, and develop retrofit recommendations and plans. Coordinate implementation. Investigate the date of construction, prioritize areas of concern, and present recommendations to appropriate governmental agencies. Design treatment systems and BMPs for priority sub-basins. Identify sources of implementation funding, and help coordinate implementation with local governments.

Background: Stormwater drainage structures were often constructed without sufficient treatment facilities. These old drains may be contributing a major amount of pollution to surface waters. Although federal NPDES regulations require permits for stormwater discharges in major urban areas, state regulations only require limited treatment for development occurring since 1982.

Strategy: Prioritize areas concerned based on sub-basin data, such as area, land use, water quality, flow, and other existing information. Survey stormwater drainage structures and assess possible impacts on receiving waters based on sediment and pollutant load. This can be estimated from an examination of the condition of the drainage area, as well as collection of water quantity and quality data. Investigate dates of construction, prioritize areas of concern, and present analyses and recommendations to appropriate governmental agencies. Design treatment systems and BMPs for priority sub-basins. Identify sources of implementation funding, and help coordinate implementation with local governments.

Products: Stormwater retrofit plans, detailed designs, and ultimately improved stormwater treatment and water quality.

Monitoring: Compare pre-retrofit discharge water quality with post retrofit water quality. Establish and monitor appropriate numeric performance measures.

Regulatory Needs: Wetland resource and stormwater permits where necessary.

Estimated Cost to Complete the Action: Cost would depend on the number of structures requiring retrofit.

Anticipated Funding Source(s): Local governments, EPA, NOAA, DEP, SWIM, Florida Forever, and the U.S. Fish and Wildlife Service.

Potential Project Partners: Local governments, Florida Department of Environmental Protection, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, Bay Environmental Study Team, St. Joe Bay Committee Northwest Florida Water Management District.

PUBLIC OUTREACH AND EDUCATION PROGRAM

PE1 Distribution of Boater's Guides

Actions Completed: A Boater's Guide to St. Andrew Bay has been published by the DEP and is available to the public. A new boaters guide for St. Joseph Bay is under development and is expected to become available beginning in 2000.

Action: Assure broad distribution of the boater's guides for St. Andrew and St. Joseph bays.

Background: The Aquatic Preserves program has recognized the need for boaters guides that would help those using bay waters do so in a manner that sustains the quality of the resources.

Strategy: Provide guides for distribution by the Florida Marine Patrol, Coast Guard Auxiliary, bait and tackle shops, fishing license vendors, dive shops, marinas, state parks, public libraries, and others. Inform the newspaper, television and radio stations of the availability of the guides, and place a notice of availability in local newsletters. Make the guides available via the Worldwide Web.

Expected Benefits: Increased public awareness of valuable habitats, as well as the importance of safe boating and avoiding seagrass beds and other sensitive areas.

Monitoring: See BD11.

Regulatory Needs: None.

Estimated Cost: Use volunteers to contact and distribute.

Anticipated Funding Source(s): None needed for distribution. Additional printing can be funded by private sources, as well as state, federal, and local agencies.

Potential Project Partners: Bay Environmental Study Team, St. Joe Bay Committee, and the Florida Department of Environmental Protection.

PE2 Update and Manage Watershed Website

Actions Completed: BEST has developed a watershed website at http://www.bestenviro.org/.

Action: Continue to maintain and update the BEST website. It should include BEST purposes, activities, and publications, as well as general information about the watershed and efforts individuals can take to help protect it.

Background: An Internet Web site would increase exposure of BEST to the public.

Strategy: The site should include information regarding the mission and goals of BEST, BEST activities, BEST publications, Boater's Guide, and other information.

Expected Benefits: A broad exposure of BEST to the public here and elsewhere.

Monitoring: Monitor number of visitors to the site.

Regulatory Needs : None.

Estimated Cost: Volunteers will maintain the site

Anticipated Funding Source(s): None needed.

Potential Project Partners: Bay Environmental Study Team.

PE3 Inform the Public about Watershed Resources, Functions, and Services

Actions Completed: A bibliography of the scientific information regarding the St. Andrew Bay ecosystem and nearshore waters of the Gulf of Mexico has been completed. Additional data files from the early years of BEST are in the possession of the U.S. Fish and Wildlife Service. A file of BEST activities and correspondence are present at Gulf Coast Community College. Boaters Guides have been prepared and distributed.

Action: Assemble information about watershed resources in a central, accessible location, and notify the public of its availability. Serve as a resource "information bank" for elected officials, decision-makers, the private sector, governmental representatives, and the general public. Develop and disseminate information concerning watershed resources, their functions, and how people can help protect them through a variety of means, including printed material, videos, and other media.

Background: A substantial amount of data, along with numerous documents relating to the St. Andrew Bay watershed, have been maintained in many different locations by various state and federal agencies, local governments, and private organizations.

Strategy: Maintain publications and other resources about the watershed in an accessible central location, and make it available to the public. Develop a means to coordinate and have for distribution all educational information related to St. Andrew and St. Joseph bays in a central advertised location. Develop additional public information about watershed resources, functions, and benefits, and disseminate through a variety of media.

Products: Development and distribution of printed educational materials (e.g., documents, brochures, and posters), public workshops, and other educational products. Also, a central repository of publications and information available to the public.

Expected Benefits: Educational materials would be centralized and available to the public for informational and educational purposes. Information will be more readily available for teachers to incorporate into their curriculum. A variety of information will be presented to the public concerning watershed resources, their functions, and how people can help protect them.

Monitoring: None needed.

Regulatory Needs: None.

Estimated Cost: Share of staff time and/or volunteers will be used to accumulate and catalog information and make it available. Additional funding for educational materials and dissemination may be provided through SWIM, volunteer efforts, the aquatic preserves, and local governments.

Anticipated Funding Source(s): Florida Department of Environmental Protection, SWIM program, and local governments.

Potential Project Partners: DEP Aquatic Preserve Offices, NWFWMD, St. Joe Bay Committee, Bay Environmental Study Team, National Marine Fisheries Service, Gulf Coast Community College, local governments.

PE4 Publicize Bay Environmental Study Team Activities

Actions Completed: None.

Action: Establish marketing strategies for publicity of other committee issues/concerns.

Background: In the past, BEST has not substantially attempted to publicize the activities of its committees. Events held by BEST, however, have been publicized more effectively.

Strategy: Develop a process whereby BEST committees can submit issues, concerns, or results to the Public Outreach Committee, which will then develop publicity plans.

Expected Benefits: Increased awareness of BEST's activities and distribution of educational materials to a broad audience.

Monitoring: None required.

Regulatory Needs: None.

Estimated Cost: None.

Anticipated Funding Source(s): None.

Potential Project Partners: Bay Environmental Study Team.

BIODIVERSITY AND NATURAL SYSTEMS PROGRAM

BD1 Biodiversity Assessment

Actions Completed: A BEST herbarium of 1,000 specimens of vascular plants and a database of the vascular plants of Bay County was completed in 1998 and updated in 1999. The herbarium is available to the public and is located at the Panama City field office of the U.S. Fish and Wildlife Service. An inventory of the biological resources of the St. Andrew Bay system was also completed. The St. Joseph Bay Aquatic Preserve, U.S. Fish and Wildlife Service, Gulf County, and Eglin AFB have prepared a draft habitat conservation plan for Gulf County and St. Joseph Bay.

Action: Continue to determine the biodiversity of the ecosystem through the completion of surveys of flora and fauna. Priority surveys should be directed at the freshwater fish, amphibians, reptiles, and freshwater invertebrates within the system.

Background: Compilation of the species present within the ecosystem revealed that the freshwater fish in the system have not been surveyed since 1954 and have never been surveyed ecosystem wide. The amphibians, reptiles, and freshwater invertebrates have also apparently not been surveyed recently. Mammals of the system appear to never have been systematically surveyed. Therefore, surveys are required to understand the diversity of these important groups of animals.

Strategy: Surveys of fish, terrestrial mammals, amphibians, reptiles, and aquatic invertebrates should be designed by the appropriate biologists of the FWCC. The surveys could be performed by FWCC personnel or by volunteers under the supervision of FWCC personnel.

Expected Benefits: Benefits to the ecosystem would be to increase the knowledge of these groups that provide recreational activities, both direct and indirect, to the public. It would also provide information necessary to the management of the system to maintain biodiversity and serve as a means of educating the public about the kinds and numbers of organisms that share the ecosystem with humans.

Monitoring: No monitoring required.

Regulatory Needs: None required.

Estimated Cost: Cost would depend on the survey design and whether or not volunteers would be used in conducting the surveys. Equipment should be available from the Fish and Wildlife Conservation Commission and the U.S. Fish and Wildlife Service. Estimated cost with volunteer help is estimated at $30,000 for a one-year survey.

Anticipated Funding Source(s): Explore funding for the project from the state and federal agencies responsible for management of these resources.

Potential Project Partners: Florida Fish and Wildlife Conservation Commission, U.S. Fish and Wildlife Service. U.S. Environmental Protection Agency, Florida Department of Environmental Protection, St. Andrew Bay Resource Management Association, Bay County Audubon Society, Florida Wildlife Federation, St. Joe Bay Committee, and the Bay Environmental Study Team.

BD2 Assessment of Lands

Actions Completed: The NWFWMD has evaluated and begun restoration on lands within the Econfina Creek recharge area. DEP, working with Eglin AFB, Gulf County, and the U.S. Fish and Wildlife Service, has evaluated lands and habitats in Gulf County pursuant to development of a draft habitat conservation plan.

Action: Obtain information as to the distribution of natural or minimally degraded lands in the ecosystem. Emphasize large tracts of land that exhibit wide habitat diversity.

Background: Initial examination of the habitats and their aerial extent is necessary prior to pursuing the goals of obtaining a public interest in the lands with desirable habitat distributions.

Strategy: Using large scale aerial photographs, survey the ecosystem for tracts of land with a mosaic of habitats not adequately represented on existing public lands and for natural corridors to link existing public lands. Use small maps and wetland inventory maps to further scrutinize candidate areas located from the large-scale survey. Obtain information regarding ownership and communities present. Provide information and recommendations to appropriate agencies.

Expected Benefits: Benefits would include identification of areas considered most valuable for maintaining biodiversity and ecosystem function. Priority areas for enhancement of existing conservation lands, corridors of natural vegetation needed linking conservation areas, and additional priority lands would be identified.

Monitoring: None needed for this action.

Regulatory Needs: None needed for this action.

Estimated Cost: Use of existing aerial photographs at the various agencies such as the NWFWMD, U.S. Fish and Wildlife Service, etc. should be sufficient. Cost = $5,000.00 for labor to examine the aerials and for field confirmation.

Anticipated Funding Source(s): This could be accomplished by volunteer help or by direct action of resource management agencies. Funds could be sought from grant sources to support this action.

Potential Project Partners: Florida Fish and Wildlife Conservation Commission, U.S. Fish and Wildlife Service, Florida Department of Environmental Protection, St. Joe Bay Committee, and the Bay Environmental Study Team.

BD3 Conservation of Primary Tributary Basins

Actions Completed: The NWFWMD previously developed a watershed plan for the Econfina Creek-Deer Point Reservoir basin and has proceeded to acquire priority lands in the Econfina Recharge Area.

Actions: Identify lands within major tributary basins of the watershed that, if protected, would serve to best conserve the ecological functions and water quality of tributaries and receiving waters. Protect lands important for the maintenance of watershed resources and functions through a variety of means.

Background: Other than the Econfina Creek basin, major tributary basins have not been examined from the point of view of conserving water quality and ecological functions. The Burnt Mill Creek and Crooked Creek tributaries to West Bay and Sandy Creek and Wetappo Creek tributaries to East Bay, among others, should be examined with the view of obtaining public control over the management of these lands to conserve their ecological and water quality maintenance functions. Areas should also be evaluated for consideration of BMPs, restoration, riparian buffer establishment, and other means of protecting watershed resources and functions.

Strategy: Use aerial photography, land use and cover data, and field investigation to identify priority lands for watershed protection. Develop conceptual plans for preservation and restoration. Identify sources of funding, and work with local governments and state and federal agencies to develop detailed designs and proceed with implementation. Implementation may include land acquisition,

less-than-fee protection, wetland or upland habitat restoration, erosion control, establishment and/or restoration of riparian buffer zones, restoration of other priority uplands, and BMP implementation. Examples of appropriate sites include but are not limited to the Sand Hill Lakes, the "mid-city wetland" in Panama City and other wetlands discharging into surface waters, Breakfast Point and other buffer areas on St. Andrew and St. Joseph bays, and linkages between existing conservation areas.

Products: One or more reports with conservation and land management recommendations. Protection of lands important to watershed resources and functions.

Expected Benefits: Acquiring lands or a management interest in them would provide for the conservation of the diversity and water quality functions of these lands. Restoration would rehabilitate or enhance ecological function and may help mitigate impacts.

Monitoring: Quantitative performance measures will be established as appropriate. Monitoring and analysis may include developing correlations between preservation and restoration activities and water and habitat data collected in receiving waters.

Regulatory Needs: Review and develop recommendations for local comprehensive plans and land development regulations.

Estimated Cost: Detailed cost estimates are to be determined. Initial cost would involve the time necessary to obtain and examine the aerial photography and data and perform the field surveys. This could be accomplished in conjunction with BD2. Land acquisition and restoration activities may require outside sources of funding.

Anticipated Funding Source(s): Water Management Lands Trust Fund, Florida Forever, DOT mitigation, state grant programs administered by DEP and DCA, SWIM, local governments, and federal grant funding.

Potential Project Partners: Local governments, Florida Department of Environmental Protection, Florida Fish and Wildlife Conservation Commission, U.S. Fish and Wildlife Service, St. Joe Bay Committee, Bay Environmental Study Team, and the Northwest Florida Water Management District.

BD4 Management of State Owned Submerged Land - Assessment & Monitoring

Actions Completed: Some private submerged lands have been publicly acquired and protected through the St. Joseph Bay Buffer acquisition project.

Action: Assessment and monitoring of state-owned submerged lands.

Background: The state of Florida owns most lands at and below mean high tide in the St. Andrew Bay watershed. These submerged lands support a variety of habitats from seagrass beds to intertidal emergent marsh. These lands should be managed to maintain the integrity of the ecosystem. However, information as to the extent of these lands, particularly the emergent saltmarsh, is not generally known. In order to effectively manage these lands, one must know where they are and what habitats they support.

Strategy: Request that the state agency responsible for holding these lands in trust for the citizens of Florida produce a series of maps that delineate the boundary of the state owned submerged lands in the St. Andrew Bay watershed and establish the type of habitats supported. BD11 will provide for the tracking of submerged vegetation on these lands.

Expected Benefits: Increased knowledge would enhance state ability to protect the ecological functions of submerged lands without adversely affecting private property.

Monitoring: Monitor the loss and alteration of submerged lands during the permitting process, and examine historical permitting information to identify area lost or converted and habitats involved. This monitoring would be related to that performed for BD6**.**

Regulatory Needs: Monitoring and reporting.

Estimated Cost: DEP staff time to assemble and report data.

Anticipated Funding Source(s): Florida Department of Environmental Protection.

Potential Project Partners: Florida Department of Environmental Protection, St. Joe Bay Committee, and the Bay Environmental Study Team.

BD5 Management of State Owned Submerged Lands – Policy

Actions Completed: Federal and state wetland regulations are respectively administered by the U.S. Army Corps of Engineers and Florida Department of Environmental Protection.

Action: Institute a policy whereby state owned submerged lands will not be converted from the natural or currently occurring condition for private or public use other than the maintenance of their ecosystem functions. The policy will be directed at the maintenance of ecosystem functions by retaining publicly-owned submerged habitats, particularly emergent and submerged vegetated wetlands.

Background: The state of Florida owns most lands located at or below mean high tide line. These submerged lands support a variety of habitats and should be managed to maintain the integrity of the ecosystem. The key to the management of these lands, in the interest of the maintenance of ecosystem function, is the prevention of their loss, destruction, or alteration for private or public uses. Case by case evaluation of permits does not prevent loss, destruction, or alteration for private uses of these lands. Many methods of encouragement to prevent the alteration or conversion of state-owned submerged lands exist within the permitting process. However, they do not provide for the prevention of the loss or conversion of state owned submerged lands.

Strategy: Work with and encourage the responsible agencies to institute policies that prevent conversion of submerged lands to ownership by entities other than the state of Florida. Institute policies to prevent the conversion of submerged lands to uplands or alteration of existing ecosystem functions of the land. Encourage state acquisition of existing private submerged land leases.

Expected Benefits: This would add further assurance that public lands remain in public ownership and remain a functioning part of the ecosystem. This would eliminate or reduce incremental losses of public lands and their ecological functions resulting from the permitting of activities such as bulkheads waterward of mean high tide.

Monitoring: Annually review permits issued for compliance with the policy, establish number of acres of public lands converted to private ownership, and number of acres of habitat change on public lands.

Regulatory Needs: Consistent enforcement of uniform statewide regulations.

Estimated Cost: Cost would be the time necessary for DEP staff to write the policy and prepare the annual reports for monitoring.

Anticipated Funding Source(s): Florida Department of Environmental Protection.

Potential Project Partners: Florida Department of Environmental Protection.

BD6 Assessment and Restoration of East Pass Closure

Actions Completed: None.

Action: To initially examine the hydrological effects of the closure of East Pass on the circulation patterns in the lagoon that would be formed by closure and on the hydrology of West Pass.

Background: East Pass is the historical natural opening into the St. Andrew Bay system. The pass, however, recently closed. Concern has been expressed that closure will result in water and habitat quality impacts and alter the hydrology of the arm of the bay that extends from Grand Lagoon eastward between Shell Island and Tyndall Air Force Base.

Strategy: Examine the hydrologic and water quality effects of the closure of East Pass, as well as alternative strategies to address any adverse conditions identified. Develop and pursue a plan for re-opening and stabilizing the inlet, should analysis indicate this to be the most appropriate course of action. Pursue alternative approaches as analysis may indicate.

Products: An analysis of the situation and alternative approaches to addressing identified issues; implementation of the most appropriate courses of action.

Expected Benefits: Results of the analysis should indicate impacts to the system and a basis from which decisions can be made regarding appropriate courses of action.

Monitoring: Specific monitoring would be developed based on the analysis conducted and detailed plans developed.

Regulatory Needs: State and federal regulations would apply to any actions conducted in submerged lands and wetlands.

Estimated Cost: To be determined. Initial SWIM costs are provided in Table 2.

Anticipated Funding Source(s): Potential funding sources may include Bay County, SWIM, and the U.S. Army Corps of Engineers.

Potential Project Partners: Bay County, municipalities discharging to the system, Florida Department of Environmental Protection, U.S. Army Corps of Engineers, and the Northwest Florida Water Management District.

BD7 Assessment of Freshwater Inflow Needs for the St. Andrew Bay Estuary

Actions Completed: Flow over the dam has been and is being monitored.

Action: Determine the quantity of fresh water that must enter the estuary through the Deer Point Dam and from other sources to maintain estuarine nursery areas and to assure the continued productivity of the bay system.

Background: The dam creating Deer Point Reservoir was constructed in 1961 as a low level dam and spillway to provide a source of potable water for the growth of Bay County. The dam was constructed at the upper end of North Bay and impounds the high quality water entering from Econfina Creek and other tributaries. The Bay County Board of County Commissioners was authorized by special acts of the Florida Legislature to construct a saltwater barrier and convert a portion of North Bay and the surrounding lands into a freshwater reservoir. The area had experienced saltwater intrusion in coastal wells and a source of potable freshwater was needed to serve the residents of the county and its industries.

Prior to the construction of the dam, the impounded area was estuarine in nature. Brusher and Ogren (1976) and Ogren and Brusher (1977) investigated the distribution and species of finfish and shrimp in the St. Andrew Bay system. They concluded that the area of North Bay below the Deer Point dam was a truly estuarine nursery area and important to the continued maintenance of populations of certain finfish and shellfish in the system. Their conclusions were based on the quantity, quality, and timing of the freshwater inflows from the Deer Point Reservoir.

Deer Point Reservoir receives an average of 619 million gallons per day (mgd) from its tributaries. The historic low flow was 285 mgd during a recent drought. Bay County currently has a consumptive use permit from the NWFWMD that allows it to withdraw an average of 69.5 mgd, with a maximum daily limit of 82 mgd. A modification of this permit may occur in 2010, which would permit the county to withdraw a daily average of 98 mgd with a maximum daily withdrawal of 107 mgd. The NWFWMD has also reserved an additional amount of water equal to the seven day/ten-year flow entering the reservoir for resource enhancement purposes.

Strategy: Collect empirical data and develop and run hydrodynamic and water quality models to evaluate the fresh water needs of the system.

Products: Hydrodynamic and water quality models and analyses; one or more reports with specific recommendations for maintaining freshwater inflow requirements into the system.

Expected Benefits: Maintenance of the estuary as a nursery for estuarine-dependent fish and shellfish.

Monitoring: Substantial monitoring of inflow, salinity, water quality, and biology may be required to develop and calibrate the models and analyses.

Regulatory Needs: Regulations regarding the amount and timing of freshwater releases from the Deer Point Dam may be needed. The results will also be applicable to other consumptive use permitting decisions.

Estimated Cost: See Table 2.

Anticipated Funding Source(s): SWIM and potentially other participating agencies and grant sources.

Potential Project Partners: The Northwest Florida Water Management District, Florida Department of Environmental Protection, U.S. Environmental Protection Agency, Florida Fish and Wildlife Conservation Commission, U.S. Fish and Wildlife Service, local governments, and the U.S. Geological Survey.

BD8 Bayou Management Generic Model and Citizen's Bayou Management Groups

Actions Completed: The DEP has been instrumental in forming various action-oriented citizen's groups that focus on particular issues, usually pertinent to relatively small geographic areas. The expertise is available within BEST to accomplish this within the St. Andrew Bay watershed, also on a relatively small scale.

Action: The BEST should create a Bayou Management Generic Model for Citizen's Bayou Management Groups (CBMG) and then establish such groups to consist of people living adjacent to and within watersheds of the bayous of St. Andrew Bay. These groups shall focus on issues including, but not limited to, water quality, sediment deposition and contamination, fish and wildlife habitat conservation, public recreation, and other issues pertaining to the quality and uses of the bayous.

Background: There are 59 bayous within St. Andrew Bay, and these bayous have traditionally been the receiving waters for stormwater runoff and some have experienced extensive sedimentation from upland sources that has adversely impacted the conditions within the bayous, including impeded navigation, sediment chemical contamination, and wetland habitat losses. The bayous are critically important nursery grounds for fish and marine invertebrate species, and also provide important habitat for adult fishes, subadult sea turtles, myriad numbers of birds, and various mammals (including bottlenose dolphins). The bayous also serve as prime sites for waterfront residential communities, and they are important recreational areas. They also provide important safe harbors and are valuable recreational fishing sites.

Strategy: Implement the formation of Citizen's Bayou Management Groups for the St. Andrew Bay bayous. Help organize and direct these groups toward active participation in the management of the bayous.

Expected Benefits: Greater public participation in the environmental destiny of the bayous by which citizens live, and a greater understanding of the overall problems involved with the management of these waterbodies.

Monitoring: Monitor the accomplishment of these groups through specific, discrete actions and management strategies. This will amount to an evaluation of their success in addressing the particular problems associated with each bayou.

Estimated Cost: Costs include the time and effort of BEST committee members to create the generic Bayou Management Model and to educate citizens in customizing the model for their particular use. Costs also include funding for group support, including creation or acquisition of maps, aerial photographs, wetland and biological inventory data, and property information.

Anticipated Funding Source(s): In kind funding via participation of state, local, and federal agencies, and state and federal grants.

Potential Project Partners: Bay Environmental Study Team, Resource Management Association.

BD9 Finfish Comparison Survey

Actions Completed: Ogren and Brusher (1977) performed a study of the distribution and abundance of fish in St. Andrew Bay. The study was based on a specific set of conditions regarding fishing gear used, minimum depth of water sampled, and time of sampling. This information can serve as a baseline against which future studies can be compared.

Action: Reproduce the survey conducted by Ogren and Brusher (1977) in order to obtain a comparison of existing finfish populations with those reported in the previous study. In addition to replicating historically used methods, ensure current methods and standards are applied to ensure consistency with current and future research activities.

Background: About 80-90 percent of the commercially and recreationally exploited finfish and shellfish in the Gulf of Mexico are considered to be estuarine dependent. The status of certain populations within the St. Andrew Bay system is currently unknown. Juvenile Red Snapper were common in the 1977 survey, but they appear to have declined over the years. A reproduction of the 1977 study would provide information as to the current status of these species in the bay system.

Strategy: Design a survey to closely reproduce the 1977 survey to provide comparative information as to the species present, their distribution, and numbers.

Expected Benefits: The trend in the populations of finfish subject to the sampling procedures would be better understood. This information would be available for use in the management plans for these species and in the management of their habitats within the bay system.

Monitoring: The study itself would be a monitoring activity in that it would provide information to compare against the 1977 information. Currently, there is no knowledge of the increase, decrease, or absence of change in the occurrence and abundance of these finfish species over the last 21 years.

Estimated Cost: The study would be labor and equipment intensive. An estimate of the cost would be obtained after the study was designed and the complete needs to accomplish the work were established.

Anticipated Funding Source(s): Potential sources of funding include responsible federal and state agencies and grant sources.

Potential Project Partners: Florida Department of Environmental Protection, Florida Fish and Wildlife Conservation Commission, U.S. Fish and Wildlife Service, the National Marine Fisheries Service.

BD10 Grand Lagoon Bridge Replacement

Actions Completed: In the 1950s when Highway 757 (Thomas Drive) was designed to cross over Grand Lagoon. The design provided for construction of an earthen causeway and small bridge. The causeway eliminated approximately 95 percent of the historic, cross-sectional water column of the Lagoon at the point of the crossing. At the time this work was completed, Thomas Drive was a two-lane road. In recent years, the highway has been expanded to five-lanes for several miles on both sides of the crossing (including a center turn lane), but the crossing remains two-lane.

Action: Include in any future design for bridge replacement and highway expansion a crossing structure spanning the Lagoon that is a modern, cement-supported bridge which spans the entire width of the Lagoon. And entirely remove the old earthen causeway. This action will restore the historic, cross-sectional hydrologic dimensions of the Lagoon.

Background: The causeway/bridge crossing over Grand Lagoon has restricted tidal flushing, water exchange, and marine fish and invertebrate larval transport. The structure has also severely reduced transport of pollutants and contaminants out of the lagoon. As may be seen in aerial photographs of the areas east and west of the lagoon, the structure appears to have resulted in unusual tidal currents at the point of the small bridge. These currents appear to have resulted in sediment transport beyond the bridge, causing burial of valuable seagrass beds.

Strategy: The BEST, and particularly the Growth Management Committee and Steering Committee, should communicate with the Metropolitan Planning Organization (MPO), the Florida Department of Transportation, and other appropriate agencies to clearly define the need for adequate bridge replacement and to accelerate such replacement. At a minimum, such communication should call for:

1. Complete removal of the old earthen causeway.
2. Removal of all sediments east and west of the old bridge that have buried seagrass beds.
3. Construction of a concrete-pile-supported bridge that spans the entire width of the Lagoon, and thus restores historic tidal flushing and water exchange between the eastern and western halves of the waterbody.

BEST should solicit the support of Bay County, other state and federal agencies, and concerned citizen's groups during this effort.

Expected Benefits: Increased water quality, water exchange, larval transport, and restoration of seagrass beds near the crossing.

Monitoring: The effectiveness of this action to the environment will be measured as increased water clarity, water quality, tidal movement, biological diversity, and seagrass bed recovery. The monitoring will be accomplished through several of the other Action Plans identified within this document.

Estimated Cost: Expansion of the "bottleneck" two-lane crossing to conform with the five-lane highway sections on either side of the Grand Lagoon crossing is already anticipated by the Florida Department of Transportation. Additional environmental enhancement costs that need to be components of any FDOT plans include causeway and sediment removal to assure tidal flushing and the recovery of buried sea grass beds. These environmental enhancement components of the bridge replacement plan should be calculated by FDOT.

Anticipated Funding Source(s): Florida Department of Transportation, U.S. Army Corps of Engineers (Section 1135 or 206 funds), Florida Department of Environmental Protection, Bay County, other state and federal funding programs.

Potential Project Partners: Bay Environmental Study Team, Florida Department of Transportation, U.S. Army Corps of Engineers, Florida Department of Environmental Protection, and Bay County.

BD11 Seagrass Protection and Management

Background: As discussed in Chapter II, seagrasses are extremely important components of the St. Andrew Bay and St. Joseph Bay ecosystems. Impacts to and loss of seagrass beds have been documented in these systems, and the cause of some seagrass losses are not fully understood. A comprehensive program is needed to better document the role of seagrasses in the ecosystems, determine the reasons for loss of seagrass beds, determine the relative importance of various user impacts, increase public awareness about seagrasses, and implement programs to protect and, where necessary, restore seagrass systems.

Actions Completed:

The U.S. Geological Survey completed a survey of the acreage of seagrass in the bay system.

The DEP Bureau of Coastal and Aquatic Managed Areas has completed boater's guides for St. Andrew and St. Joseph bays that include discussions of seagrass beds and how to protect them.

Actions:

1. Continue monitoring seagrasses over a five-year cycle.
2. Pursue additional state, federal and local legislation that would provide additional protection for seagrass beds.
3. Identify areas of significant loss of seagrass. Investigate the cause of the loss. Initiate corrective measures to encourage regrowth. This is a long-term action due to the slow regrowth, but is essential.
4. Investigate possible causes of the loss of approximately 350 acres of seagrass in West Bay adjacent to Botheration Bayou, and develop a restoration plan if restoration is determined to be possible.
5. Produce a video, a full color brochure, a slide show, and similar materials that will educate the public about the importance of seagrass meadows in St. Andrew Bay and St. Joseph Bay, the activities that can impact seagrasses, and what people can do to protect them.

6. Seek alternative pier and dock construction techniques to reduce adverse impact of these structures on seagrass meadows.

Strategies:

1. Encourage and work with the U.S. Geological Survey and U.S. Fish and Wildlife Service to provide an update of the current seagrass survey from aerial photography on a five-year cycle.
2. Examine existing and historical seagrass survey maps and other available information to locate areas of significant losses. Implement studies to determine causes of the losses and potential for restoration.
3. Present data and information to appropriate state, federal, and local governmental agencies as support for requests to eliminate the losses of seagrasses.
4. Initiate protection and restoration efforts to address documented needs.
5. Develop an outline of the specific issues and areas to be included in the video and brochure, obtain videotape and photographs of seagrass meadows and prop scars. Offer the video to local TV stations, fishing shows and tournaments, schools, libraries, and civic groups for educational purposes.
6. Develop the brochure, possibly with a companion educational poster. Print and distribute these to marinas, tackle shops, boat rental vendors, dive shops, and others for distribution to customers or users. Also distribute brochures and posters to schools, educational events, and others.
7. Convene meetings between the permitting agencies and the commenting agencies to develop ideas regarding alternative dock and pier construction plans. Investigate the environmental benefits of each idea and the cost of construction. Inform the public of the environmental advantages of such construction and encourage the use of such construction in seagrass beds.

Expected Benefits:

1. Increase in public awareness of the beauty, significance and diversity of seagrass meadows in St. Andrew and St. Joseph bays. This knowledge will increase the understanding of users and encourage better stewardship of the resource.
2. Losses of seagrass beds to dredging and filling will be reduced or cease.
3. Identification of the cause for losses of seagrass coverage will allow for the development of a restoration plan. Restoration, where possible, could restore seagrasses on currently unvegetated bay bottoms.

Monitoring:

1. Monitor the overall status of seagrass communities, considering their health and extent as primary indicators of the health of the ecosystem.
2. Monitor seagrass coverage and functions, so as to provide a basis for evaluating environmental responses to actions proposed in this plan.
3. Monitor appropriate agencies to ensure that no losses of seagrass are permitted through regulatory programs.
4. Monitor restoration activities to document success or failure of restoration techniques.
5. Compare the condition of seagrass beds subject to the new dock and pier construction techniques with those of the traditional techniques.

Regulatory Needs: May require new legislation and/or changes to regulations and policies of the responsible agencies.

Estimated Cost: TBD.

Anticipated Funding Source(s):

1. Grants from federal agencies with responsibility for estuarine and marine resources (e.g., U.S. EPA, U.S. FWS, and NOAA).
2. Science Museum Grant, The Man in the Sea Museum, Panama City Beach.
3. In kind service from the Aquatic Preserves offices, including personnel, supervision, research, and possibly funding.

Potential Project Partners: U.S. Geological Survey, Florida Department of Environmental Protection, U.S. Environmental Protection Agency, Florida Fish and Wildlife Conservation Commission, U.S. Fish and Wildlife Service, St. Joe Bay Committee, Bay Environmental Study Team, National Marine Fisheries Service, Resource Management Association, Bay County Audubon Society, DEP Aquatic Preserves offices, and private sector participants

BD12 Wetland Protection, Management, and Restoration

This project will focus on the following tasks: inventorying wetlands; identifying areas for protection, restoration, and enhancement; and using vegetated buffers for wetlands and waterbodies.

Task 1: Wetlands Inventory

Actions Completed: The U.S. Department of Interior, National Wetlands Inventory completed the maps for the area in the late 1970s. These maps provide an acceptable baseline of the ecologically defined wetlands in the system.

Action: Determine the type, quantity, and location of the various wetland types currently existing in the system based on the National Wetlands Inventory classification. This could be combined with BD2 and BD11.

Background: Reasonably accurate information regarding the types, quantity, quality, and location of wetlands within the system is not evident. The National Wetlands Inventory survey maps for the system are about 20 years old. The Natural Resources Committee intends to investigate was to changes in wetlands that have occurred.

Strategy: Review existing wetland inventory maps for the system to obtain baseline data on wetlands. Determine the status of plans for NWI map updates. If the wetland inventory maps are not forthcoming in a reasonable period of time, obtain the most current Florida Department of Transportation aerial photographs and perform a comparison to identify wetlands in the watershed.

Products: Updated and improved wetland coverage data.

Expected Benefits: The basic information necessary to manage the wetlands would be obtained. This information, in conjunction with that obtained from BD2 and BD11, would provide a basis for an identification of priority wetlands.

Monitoring: Data collected would provide a baseline with which to compare the results of future efforts.

Regulatory Needs: None.

Estimated Cost: Costs would depend on the entity performing the update and how it is performed. Most desirable would be for the NWI to be revised n the near future. Next would be that BEST

contract to do this with funds obtained from grants. Last would be that the Natural Resources Committee perform the work with whatever funds are available.

Anticipated Funding Source(s): Investigate the status of the work of the Wetlands Inventory, approach the U.S. Fish and Wildlife Service regarding the possibility of their participation, approach the U.S. EPA regarding the possibility of obtaining funds from them, NOAA for estuarine and marine emergent wetlands, and investigate grants from other agencies and foundations.

Potential Project Partners: Northwest Florida Water Management District, St. Joe Bay Committee, Bay Environmental Study Team, U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, Florida Department of Environmental Protection, Florida Department of Transportation, and local governments.

Task 2: Wetland Restoration and Enhancement

Actions Completed: None.

Action: Identify wetland areas needing enhancement or restoration. Plan and coordinate implementation of priority restoration and enhancement activities.

Background: National Wetlands Inventory (NWI) maps generally identify wetlands within the ecosystem. Areas needing enhancement or restoration have yet to be examined and delineated on a watershed scale.

Strategy: Review NWI maps and DEP land use and cover data, evaluate aerial photography, conduct field investigations, and consult with resource management agencies to identify candidate sites for enhancement and/or restoration. Design restoration and enhancement for priority sites. Identify alternative sources of funding, and help coordinate implementation with local governments and other state and federal agencies.

Products: Design and implementation of priority wetland restoration and enhancement actions.

Expected Benefits: Wetland resources and functions would be enhanced and restored, resulting in benefits for water quality, productivity, and habitat. The candidate sites could also be used as mitigation sites to offset wetland impacts resulting from the wetland permitting processes within the ecosystem.

Monitoring: Monitoring would be initiated on selected areas and based on specific identified needs.

Regulatory Needs: None.

Estimated Cost: Detailed cost estimates are to be determined for specific preservation, restoration, and enhancement activities. Initial SWIM funding estimates are indicated in Table 2.

Anticipated Funding Source(s): General wetland coverages are available from the U.S. Fish and Wildlife Service and DEP. Restoration and enhancement funding may be provided by SWIM, Florida Forever, DEP, DOT mitigation, local governments, and state and federal grant programs.

Potential Project Partners: Northwest Florida Water Management District, St. Joe Bay Committee, Bay Environmental Study Team, U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, Florida Department of Environmental Protection, Florida Department of Transportation, local governments.

Task 3: Buffer Zones for Wetlands and Waterbodies

Actions Completed: County and municipal comprehensive plans may have vegetative buffers stipulated. For example, Bay County has such requirements generally, and a more stringent set of requirements for lands Deer Point Reservoir platted after adoption of the County Comprehensive Plan.

Action: Review comprehensive plans for the presence of vegetated buffers for wetlands and waterbodies. Encourage enforcement of existing buffer zones and inclusion of buffer zones in those plans lacking such protections.

Background: The holistic view of ecosystem management recognizes that biotic communities exist in a continuum. Ecotones are important in maintaining biodiversity and water quality. These interconnected habitats, for example, provide for faunal movement between them. Riparian buffer zones also help to prevent NPS pollution by slowing runoff velocity and forcing it through vegetation. This leads to increased settling of sediments and attached pollutants prior to discharge. Soluble pollutants are also removed through biological processes within macrophytes, algae, and the soil.

Strategy: Establish vegetated buffers and protect existing buffers around waterbodies and wetlands. Assist in the delineation and design of buffer zones and the identification of BMPs and management measures.

Products: Designs and recommendations for shoreline buffer zones and BMPs. Coordination of implementation with local governments and private landowners.

Expected Benefits: Improved water quality through protection and maintenance of riparian functions.

Monitoring: Monitor the trend in increase or decrease of natural vegetation around waterbodies. This could be accomplished through period examination of aerial photography. Develop correlations with water and habitat quality monitoring.

Regulatory Needs: No additional regulatory programs are needed for implementation of this action.

Estimated Cost: Limited funding for staff time may be required. SWIM funding is estimated in Table 2.

Anticipated Funding Source(s): Local governments, SWIM, Florida Forever, and state and federal grant programs may potentially provide funding.

Potential Project Partners: Northwest Florida Water Management District, St. Joe Bay Committee, Bay Environmental Study Team, U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, Florida Department of Environmental Protection, Florida Department of Transportation, and local governments.

CHEMICAL CONTAMINANTS PROGRAM

CC1 Chemical Contaminant Sediment Monitoring within the Watershed

Actions Complete: The U.S. Fish and Wildlife Service sediment database for St. Andrew Bay includes 103 sampling locations and analyses for 61 individual chemicals. In addition, five locations have been sampled for 17 dioxin and furan compounds.

Action: Chemically evaluate, once every ten years, approximately 200 sediment locations in the St. Andrew Bay Ecosystem.

This action is necessary in order to preserve and protect the vast, productive, and economically valuable sediment habitat within the St. Andrew Bay Ecosystem. It is also necessary to measure the effectiveness of contaminant management programs in preventing chemical degradation of the bay's vast sediment habitat areas. Already-implemented and operational management programs within the bay include: 1) urban stormwater treatment facilities, 2) state-permitted treated point source discharges, 3) oil and chemical spill prevention initiatives, 4) state-permitted pollution-control for industrial and municipal air pollution emissions, and 5) regulation of port, marina, and vessel discharges.

The sediment chemical evaluation and monitoring program should include the following:

1. The already established 103 U.S. Fish and Wildlife Service sediment sampling locations.
2. The establishment of new sediment monitoring stations in the 37 (of 59) St. Andrew Bay bayous that have never been sampled for chemical contaminants.
3. The establishment of additional open water stations, as necessary, for scientific sampling of the bay.
4. The establishment of ten sediment sampling stations in Deer Point Reservoir.
5. Chemical evaluation of sediment samples at least once every 10 years, at approximately 200 sediment locations (stations) within the 70,000 acres of St. Andrew Bay and Deer Point Reservoir.

Note: Two hundred sampling locations is a small, but adequate number, for this monitoring program. Two hundred stations amounts to an average of one station for every 350 acres of sediment habitat. This action will only require monitoring 20 stations per year on a rotational basis.

Background: The U.S. Fish and Wildlife Service began evaluating the chemical health of the sediments within the St. Andrew Bay ecosystem in 1985. This sampling established a valuable database for future comparison and monitoring of the health of the ecosystem.

Strategy: Monitor routinely, 20 sediment stations each year. Routinely evaluate the database to establish trends in chemicals, locate problem areas, identify contaminant sources, and initiate corrective actions.

Expected Benefits: The continued economic benefits of undegraded habitat, including production of marine and freshwater organisms for commercial and recreational harvest, preservation of harvestable organisms that are safe for human consumption, and preservation of a clean ecosystem for human recreation.

Monitoring: Monitoring will be through annual reports that update the database, contain trend analysis, and define locations of concern. The U.S. Fish and Wildlife Service will manage the database.

Estimated Cost: Total annual cost is estimated at $35,000 including analytical and operational components. Annual analytical cost is estimated at $30,000 for laboratory chemical analyses - ($1,500 per sample x 20 samples, which includes: organochlorine compounds; total PCBs; polycyclic aromatic hydrocarbons; aliphatic hydrocarbons; metals; acid volatile sulfides; grain size; and total organic carbon). Annual operational cost is $5,000 and includes collection and shipment of samples, data interpretation, and preparation of an annual database report.

Anticipated Funding Source(s): Potential sources may include local governments, state of Florida funds, state and federal grants, and private funding obtained through the Bay Environmental Study Team.

Potential Project Partners: U.S. Fish and Wildlife Service, St. Joe Bay Committee, Bay Environmental Study Team, and local governments.

CC2: Bayou Restoration

The Bayou Restoration Project will focus on the following four areas within the watershed: Martin Lake, Watson Bayou, Massalina Bayou, and Lynn Haven Bayou. Other focus areas may be added if problems are identified.

Martin Lake

Actions Completed: The U.S. Fish and Wildlife Service has completed a preliminary evaluation of chemical contaminants occurring in the sediments of Martin Lake, and the Florida Game and Fresh Water Fish Commission conducted fish surveys in the lake. The cities of Springfield and Parker have shown a desire to have the lake managed for multiple public uses, including recreational fishing and fish consumption, boating, and swimming. Local governments and the county school board have also expressed an interest in pursuing marine and estuarine ecology education. Springfield, Parker, and Callaway are working with Bay County and the state of Florida on a project to restore Martin Lake through sediment removal and implementation of a comprehensive stormwater management system within jurisdictions with drainage into the lake. The city of Parker is also developing a 12-acre environmental park on Martin Lake that will be available for science and environmental education, research, and related activities.

Background: Prior to the 1950s Martin Lake was actually Martin Bayou with a free and open connection to St. Andrew Bay. Because industrial effluent from the bay was entering and polluting the bayou, a small dam was constructed at the entrance in the late 1950s. The estuarine bayou evolved into a freshwater lake with one-way outflow of water into the bay. In the late 1980s, the U.S. Fish and Wildlife Service collected sediment samples from within the lake and found sediments to be contaminated with polycyclic aromatic hydrocarbon (PAH) compounds and some metals. Dioxin compounds were also present in the sediment. Fish, including largemouth bass and redear sunfish, are present in the lake. A complete evaluation of chemicals in the lake's fish has not yet been performed.

Action: Restore Martin Lake's habitat to an uncontaminated condition that allows public recreational uses without risk, and which reduces ecological risk to species that use the lake as habitat, including migratory birds, aquatic mammals, fish, and invertebrates.

Strategy: Contamination within Martin Lake may be historic (old contamination from a source that no longer exists) or contemporary. Attempt to identify sources of contemporary contamination of the lake's sediments and biota. If any sources are identified, eliminate further releases. Additionally:

1. determine ecological and human health risks present in the lake; and
2. determine the extent and volume of sediment that must be removed to clean up contaminants within the lake.

Clean up the lake, as necessary, to restore all public uses and achieve an environment that is not an ecological risk to biological resources. Action components of a lake restoration/preservation plan should include: a) evaluation and improvement of land management in headwater areas, b) improved management and treatment of stormwater runoff entering the lake, c) design and construction of bridges or multiple large box culverts under Cherry Street and Highway 22 (to increase water exchange and movement of aquatic species between upper and lower portions of the lake), and d) dredging and disposal of contaminated sediments.

Expected Benefits: Martin Lake is potentially an important urban recreational, educational, and biological resource. Consumable fish, trophy fish, and water-related recreational activities have a direct, positive economic benefit to the public. As a small, fresh water ecosystem, the lake will significantly benefit local educational facilities as a resource for field trips and individual student projects. Natural resource benefits include establishment and maintenance of a diverse aquatic freshwater biological

community supporting waterfowl, mammals, fish, reptiles, and invertebrates. The lake will also provide an important source of fresh water for wildlife.

Monitoring: Upon completion of restoration actions cited above, sediments can be chemically evaluated on a routine basis, fish species can be chemically evaluated to assure that consumed fish are of no risk to the public, and fish and wildlife monitoring studies can be conducted to measure the biological productivity and diversity of the lake. In addition, public use surveys should be conducted to evaluate fishing, boating, swimming and other public uses.

Estimated Cost: The most costly component of lake restoration will be the dredging and disposal of contaminated materials. As the extent and volume of materials needed to be removed has not been estimated, an exact cost estimate has not been determined.

Anticipated Funding Source(s): Potential funding sources may include the U.S. Army Corps of Engineers Section 206 program, the state of Florida, local governments, private sector contribution, the U.S. Environmental Protection Agency, and other grant sources.

Potential Project Partners: U.S. Fish and Wildlife Service, Bay Environmental Study Team, local governments.

Watson Bayou

Action Completed: The U.S. Fish and Wildlife Service has completed two rounds of sediment sampling at ten locations within the bayou. Round one was completed in July 1985 and consisted of triplicate samples at each of the ten locations. Round two was completed in July 1995 and consisted of duplicate samples at each of the ten locations. Using sediment quality guidelines, the 1985 data were evaluated, and the bayou ranked as one of the three most extensively contaminated locations within St. Andrew Bay.

Background: Watson Bayou has been the receiving waters for pollutants of various types since 1835, when a sawmill was constructed along the shoreline. A paper mill was constructed in 1931, and various oil and fuel storage facilities were located later, as was a municipal wastewater treatment plant that discharged directly into the bayou. Several marine construction and repair facilities with associated marine railways also contributed metal-containing runoff to the bayou. Organic wastes from commercial fishing operations and petroleum and chemicals from recreational marinas and vessel discharges have also been responsible for contaminants entering the waterbody. Finally, fertilizers and pesticides from residential housing on the western shore have contributed to the problem.

Action: Compare 1985 with 1995 data to see if stormwater, spill prevention, dredge and fill, and other management programs have resulted in less contamination into Watson Bayou. Also compare data sets to determine if any natural restoration resulting from biodegradation or hydraulic flushing has taken place. If the bayou still scores high, using the sediment quality guidelines, proceed with the development and implementation of a Bayou Restoration Plan. Evaluate bayou waters for bacterial problems to assure recreational waters are safe for activities such as swimming, wading, and water skiing. Evaluate fish and shellfish for consumption safety.

Strategy: Commence restoration through public education of shoreline property owners, evaluation of on-site environmental management regulatory programs. Cleanup particularly bad sections via dredging and disposal or other methods, stabilize shorelines, and install stormwater management facilities (particularly in the watershed headwaters) to control urban runoff.

Expected Benefits: The benefits include increased recreational use, cleaner water and sediments, fishable and swimmable conditions (as required by the federal Clean Water Act), and associated increases in waterfront property values. Increased quality of habitat for fish and wildlife, and an increase in the bayou's species diversity.

Monitoring: Develop a Bayou Management Plan that includes components for one-time restoration, and components for perpetual, appropriate watershed management actions to maintain the bayou's restored water quality, sediment quality, fish and wildlife, and public recreational uses.

Estimated Cost: Unknown at this time. May be significant depending on the degree of natural restoration that has taken place, the effectiveness of environmental management programs, and the amount of physical restoration required to restore the bayou.

Anticipated Funding Source(s): Potential funding sources may include the U.S. Army Corps of Engineers Section 206 program, the state of Florida, local governments, private sector contribution, the U.S. Environmental Protection Agency, and other grant sources.

Potential Project Partners: U.S. Fish and Wildlife Service, Bay Environmental Study Team, local governments.

Massalina Bayou

Actions Completed: The U.S. Fish and Wildlife Service has sediment chemical data for three locations within the bayou (1985 and later). Some water quality data may exist. The City of Panama City has constructed stormwater retention and treatment facilities at some points on the bayou.

Action: Take additional sediment samples to compare with the 1985 data and determine the degree of contamination present. Evaluate Massalina Bayou waters for bacterial problems to evaluate water safety for recreational use. Evaluate biological organisms to evaluate consumption safety. If the problems are identified, proceed with the development and implementation of a Bayou Restoration Plan.

Background: For over 50 years, Massalina Bayou has been the site of several small industrial activities, including marine vessel construction and repairs, large marinas, and unknown historical activities at the upper end of the bayou. Urban stormwater runoff from downtown Panama City and adjacent residential neighborhoods has also contributed chemicals, pollutants, fertilizers and pesticides.

Strategy: Commence restoration through public education of shoreline property owners, evaluation of on-site environmental management regulatory programs, clean up particularly bad sections via dredging and disposal or other methods, stabilize shorelines, and install stormwater management facilities (particularly in the watershed headwaters) to control urban runoff. Develop a Bayou Management Plan that includes components for one-time restoration, and components for perpetual, appropriate actions through management, to maintain the bayou's restored water quality, sediment quality, fish and wildlife and public recreational uses.

Expected Benefits: Benefits include increased recreational use, cleaner water and sediments, fishable and swimmable conditions (as required by the federal Clean Water Act), and associated increases in waterfront property values. Increased quality of habitat for fish and wildlife, and an increase in the bayou's species diversity.

Monitoring: Incorporate appropriate water, biological, and sediment monitoring in a Bayou Management Plan.

Estimated Cost: Unknown at this time. May vary considerably dependent on the degree of natural restoration that has taken place, the effectiveness of environmental management programs, and the amount of physical restoration required to restore the bayou.

Anticipated Funding Source(s): Potential funding sources may include the U.S. Army Corps of Engineers Section 206 program, the state of Florida, local governments, private sector contribution, the U.S. Environmental Protection Agency, and other grant sources.

Potential Project Partners: U.S. Fish and Wildlife Service, Bay Environmental Study Team, local governments.

Lynn Haven Bayou

Action Completed: The Florida Department of Environmental Protection, Tyndall AFB, U.S. Fish and Wildlife Service, and private citizens have conducted water quality and chemical contaminant sampling within the bayou. In the mid-1950s, an earthen causeway was constructed that bisects the bayou into north and south halves. Hydrologic flushing between these halves has been eliminated. The U.S. Army Corps of Engineers constructed a mile-long canal that connected upper Lynn Haven Bayou with Upper Goose Bayou.

Action: Restore environmental quality in Lynn Haven Bayou.

Background: There are some preliminary indications that chemical contamination may be present in the bayou. There are strong indications that hydrologic flushing has been severely limited and that larval fish and invertebrate transport may have been reduced. Boat access from upper Lynn Haven Bayou to the lower bayou and St. Andrew Bay has been essentially eliminated for residents of the upper bayou.

Strategy: Evaluate conditions within the bayou, develop a management plan, remove the earthen causeway, and restore former wetlands.

Expected Benefits: Restoration of wetland habitat, upper bayou biodiversity, bayou biological productivity, hydraulic flushing, water and sediment quality, and boat access.

Monitoring: Biological, sediment, and water quality monitoring may be appropriate, depending on specific project activities.

Estimated Cost: To be determined.

Anticipated Funding Source(s): Potential funding sources may include the Tyndall AFB Installation Restoration Program, Comprehensive Environmental Response Compensation and Liability Act (Superfund) funds, U.S. Army Corps of Engineers 206 program, other state and federal grant funding.

Potential Project Partners: U.S. Fish and Wildlife Service, Bay Environmental Study Team, Tyndall AFB, U.S. Army Corps of Engineers, Florida Department of Environmental Protection, U.S. Environmental Protection Agency, and local governments.

CC3 Evaluation of Dioxin Compounds

Actions Complete: The U.S. Fish and Wildlife Service has sampled marine sediments at five locations within St. Andrew Bay, including one bayou and an adjacent lake, for 17 dioxin and furan compounds that are problematic to fish and wildlife resources. Dioxin and furan compounds were measured at every site and included most or all of the individual isomers for which analyses were run. The Corps of Engineers has sampled sediment at two other locations and their data are comparable to the Service data for the area of the bay.

Action: It is not currently known whether the dioxin and furan chemicals detected in the sediment samples constitute a risk to fish and wildlife resources within the bay.

Therefore it seems prudent to evaluate the presence of these compounds more thoroughly to assure knowledge of any ecological impact, identify any local sources, eliminate further discharges as much as practicable, and to determine contributions from atmospheric deposition, local, regional and remote.

Background: Dioxin and furan compounds are among the most toxic chemicals known. Their toxic effects can take place at incredibly low concentrations; as low as parts per billion and parts per trillion. The compounds vary in their toxic effects to different species, but they have been determined to be carcinogenic, teratogenic, and to mimic estrogenic compounds. The U.S. Environmental Protection Agency is scheduled to complete a very comprehensive reassessment of dioxin in the environment and its human health implications this year. Canada will produce, this year, its guidelines for acceptable amounts of dioxin compounds in surface waters, sediments, fresh water and marine organisms, and wildlife.

Strategy: Develop and implement a Dioxin Habitat and Biota Assessment Program for St. Andrew Bay to include additional sampling to estimate amount of bay habitat (sediments) affected, the degree of contamination, and organisms most at risk from exposure to dioxin compounds.

Expected Benefits: The evaluation will result in a determination of the degree of ecological risk, if any, associated with the presence of dioxin compounds in the environment. If significant risks exist, steps can be taken to reduce or eliminate such risk, thereby protecting bay habitat, fish and wildlife resources, and the general public from unnecessary exposure.

Monitoring: The first monitoring will be a final report of the findings of a dioxin evaluation program within St. Andrew Bay. If steps are taken to reduce dioxin concentrations within the bay habitat and biota, such can be measured via sampling implemented as part of CC1 above.

Estimated Cost: Analysis of samples for dioxin compounds is expensive, about $1,000 per sample. Analytical cost is high because the laboratory must detect 17 separate compounds and they must do so at concentrations as small as parts per trillion. However, this analysis is mandatory to determine total toxicity present from all 17 problematic compounds.

Proposed Sampling:

30 sediment samples at $1,000 each	=	$30,000
20 biotic samples at $1,000 each	=	$20,000
Operational funds	=	$10,000
Total	=	$60,000

Anticipated Funding Source(s): Potential funding sources may include the U.S. Army Corps of Engineers Section 206 program, the state of Florida, local governments, private sector, U.S. Environmental Protection Agency, and other grant sources

Potential Project Partners: Florida Department of Environmental Protection, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and the Bay Environmental Study Team.

CC4 Chemical Monitoring of Biological Organisms

Actions Completed: The National Marine Fisheries Service (1971) conducted fish sampling and analysis for metals. The U.S. Fish and Wildlife Service (1986) analyzed fish, crabs and shrimp for metals, organochlorine pesticides, PCBs, and polycyclic aromatic hydrocarbons (PAHs). Both sampling efforts were random and limited.

Action: Develop a chemical contaminant monitoring program for biological resources within the bay. The program should include an evaluation of resources consumed by the public (fish, shrimp, crabs). The program should also evaluate any chemical contaminants that could adversely affect species health and survivability, species reproductive capacity, biological diversity, and overall productivity by analyses of such tissues as eggs, fat, liver, etc. The program should also include opportunistic evaluation of aquatic birds, bird eggs, and incidental mortalities of sea turtles and bottlenose dolphin. The program would include five separate annual components. One component would be completed each year, thus splitting the sampling into a five-year rotational system.

Background: Monitoring of the health of bay biological organisms has not been done on any systematic basis. This work would monitor the acceptability for human consumption of fish and invertebrates, as well as the reproductive health of such important marine organisms as spotted seatrout, redfish, etc. Declines in productivity of marine organisms translate into economic declines due to recreational and commercial fishery impacts.

Strategy: Select and monitor indicator species representative of important groups and habitats. This indicator species should include ten fish species, four birds, and occasional, opportunistic evaluation of sea turtle and bottlenose dolphin mortalities. Chemical analyses should include organochlorine compounds, metals, and PAH compounds. Other chemical compounds may need to be included after review of ecosystem activities, however dioxin and furan compounds are treated separately at this time.

Expected Benefits:

1. Identification of contaminant problems within biota.
2. Correction of problems through identification of pathways of chemicals and sources.
3. Conservation of the bay's high species diversity.
4. Maintenance and possible increase of the bay's biological productivity (biomass).
5. Protection of consumers of the bay's seafood.

Monitoring: The environmental response would be monitored through the annual publication of monitoring reports, and a five-year summary report. Trend analyses could begin after publication of the second five-year report.

Estimated Cost:

Analytical costs	=	$50,000 per year
Operational costs	=	$10,000 per year
Total	=	$60,000 per year

Anticipated Funding Source(s): Potential sources may include local governments, state of Florida funds, National Oceanic and Atmospheric Administration, other state and federal grants, and private funds obtained through the Bay Environmental Study Team.

Potential Project Partners: Florida Department of Environmental Protection, U.S. Environmental Protection Agency, National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service, and the Bay Environmental Study Team.

CUMULATIVE ASSESSMENT PROGRAM

CA1 Point Source Cumulative Assessment

Action: Assess the total loading of the various permitted pollutants to the St. Andrew Bay estuary.

Background: The total pollutant loading from all permitted point sources is not known or generally known. The total amounts of each permitted pollutant should be determined and made available to the interested public.

Strategy: Obtain copies of all permitted point source discharges from the DEP. Calculate the total amounts of each permitted pollutant that is discharged to the estuary per unit time.

Expected Benefits: This information can be used to make informed decisions during the renewal of existing permits or the evaluation of new permit applications. It can also serve to educate the public as to the amount of pollutants entering the estuary.

Monitoring: Monitoring of direct environmental response is not necessary, but monitoring of the increases or decreases in the total permitted pollutant loadings to the estuary can be achieved and cumulative impacts better addressed.

Regulatory Needs: None.

Estimated Cost: Volunteers from BEST can accomplish this work. If available, information can be provided by DEP.

Anticipated Funding Source(s): None needed.

Potential Project Partners: Florida Department of Environmental Protection, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, St. Joe Bay Committee, and the Bay Environmental Study Team.

CA2 Determine Assimilative Capacity of the St. Andrew Bay Estuary

Actions Completed: A water quality-based evaluation of the estuary that concentrated on a portion of East Bay has been conducted with regard to the Military Point discharge of treated domestic and industrial wastewater.

Action: Perform analysis of the estuary to determine its capacity to assimilate pollutant discharges. Apply the information developed to the development and implementation of pollutant load reduction goals (PLRGs) and total maximum daily loads (TMDLs).

Strategy: Conduct empirical and simulated analyses to identify the assimilative capacity of the system and apply to TMDLs and PLRGs. Focus on both point and nonpoint sources of pollution.

Products: Estimates of appropriate pollutant load limits for the system.

Expected Benefits: Knowledge of the assimilative capacity of the estuary is essential to the permitting of new point source discharges and the renewal of existing permitted discharges in view of the rapidly expanding human population. This information would also be applicable to identifying needs for NPS reduction, strategies for preventing and abating NPS pollution, and developing PLRGs and TMDLs.

Monitoring: Appropriate monitoring for analysis and post-analysis monitoring will be part of detailed tasks to be developed for project implementation.

Regulatory Needs: None.

Estimated Cost: To be determined based on the information obtained from DEP and EPA and the design of specific implementation tasks.

Anticipated Funding Source(s): DEP; other state, federal, and local sources; grant sources.

Potential Project Partners: Florida Department of Environmental Protection, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, St. Joe Bay Committee, Bay Environmental Study Team, and the Northwest Florida Water Management District.

CA3 Nonpoint Source Pollution Assessment and Abatement

This project will provide a framework for evaluating the NPS pollution problem affecting the St. Andrew Bay watershed, including all of the waterbodies identified above. It will also incorporate identification of appropriate urban, silvicultural, and agricultural BMPs and implementation with public and private sector cooperators. Identified problems will be addressed through implementation of BMPs and capital improvements.

Actions Completed: The Bay County Utility Department collects monthly water quality samples from 13 stations in the Deer Point Reservoir basin. For Bay County, the NWFWMD also monitors stage, flow and rainfall at several stations in the reservoir's basin. The NWFWMD also collects water quality at one station on Econfina Creek. The NWFWMD and DEP previously completed a water and biological quality study of Deer Point Reservoir for the SWIM program. Estuarine bacteria data has also been collected by the Department of Agriculture and Consumer Services Shellfish Environmental Assessment Section (SEAS), and the St. Andrew Bay Resource Management Association (RMA) has collected estuarine and Deer Point Reservoir water quality data. Florida Lakewatch has also collected water quality samples from the Sand Hill Lakes.

Action: Evaluate existing and potential sources of NPS pollution and impacts on receiving waters. Coordinate BMP and capital improvement implementation.

Strategy: The approach for implementation of this project will include:

1. Characterize hydrology and NPS pollutant loading potential throughout the bay watershed and opportunities for abatement through BMP implementation.
2. Conduct water quality and other appropriate monitoring to identify problem areas.
3. Identify priority sub-basins, as well as BMPs and other improvements needed.
4. In cooperation with local governments, private initiatives, and state and federal agencies, design and implement priority projects.
5. Monitor water quality, biological, and other parameters as appropriate.

Products: Prioritization of needed NPS pollution control actions; design and implementation of the priority actions.

Expected Benefits: With full implementation, specific water and habitat quality problems will be identified and alleviated, and potential future problems may be avoided.

Monitoring: Targeted biological, water quality, and other parameters will be monitored to evaluate existing conditions and benefits.

Regulatory Needs: None.

Estimated Cost: To be determined.

Anticipated Funding Source(s): SWIM, DEP, Florida Forever, local governments, and state and federal grant sources.

Potential Project Partners: Northwest Florida Water Management District, local governments Florida Department of Environmental Protection, U.S. Environmental Protection Agency, Florida Fish and Wildlife Conservation Commission, U.S. Fish and Wildlife Service, St. Joe Bay Committee, and the Bay Environmental Study Team.

DEER POINT RESERVOIR BASIN PROGRAM

DPR1 Update Biological, Water Quality, and Sediment Data

Actions Completed: The Florida Department of Environmental Regulation, Biology Section staff, and the Northwest Florida Water Management District staff conducted a broad-based study of the Deer Point Reservoir drainage basin in Bay County from October 1990 through September 1991. The purpose of this study was to examine the physical, chemical, and biological water quality of the basin with particular emphasis on several areas identified as having the potential for degrading water quality in the basin. This study resulted in publication of *Biological Water Quality of the Deer Point Lake Drainage Basin, Bay County, Florida* (DER and NWFWMD 1992).

Action: Re-establish collection of water quality monitoring and flow data (locate sample sites proximate to those in the District's *Biological Water Quality of the Deer Point Lake Drainage Basin, Bay County, Florida* study). Long-term collection should be considered.

Background: Deer Point Reservoir was created in 1961 by construction of a low-head sheet-pile dam across the northern part of North Bay at Deer Point, which impounded the reservoir. In addition to its value for recreation and wildlife habitat, the reservoir serves as the primary source of drinking water and industrial-supply water for Panama City and Bay County. Although the watershed is largely undeveloped, it is receiving increasing development pressure. This project would evaluate the present and potential threats to water quality and associated natural systems from areas of industrial development or other intense land uses, sanitary waste disposal, and practices which may increase sedimentation to the reservoir (i.e. unpaved roads and inadequate management practices).

Strategy: Project tasks would include:

1. Determine sampling stations and analytical parameters (attempts should be made to utilize sampling sites with existing data).
2. Establish streamflow gauging stations on tributaries (attempts should be made to utilize sampling sites with existing data).
3. Implement the sampling program (monthly, quarterly, etc.).
4. Establish database and incorporate previous and ongoing data.
5. Apply data to other Deer Point Reservoir projects for the purpose of developing and implementing appropriate management strategies for land use, land preservation and acquisition, and protection of water quality.
6. Coordinate with local government and others to implement recommendations.

Expected Benefits: Obtain long-term water quality, biological, and flow data for current and future watershed management and land use decisions.

Monitoring: None necessary unless problems are identified based on the data obtained.

Regulatory Needs: None.

Estimated Cost: Costs will be determined after the development of the plan of study.

Anticipated Funding Source(s): DEP, EPA, Bay County.

Potential Project Partners: Florida Department of Environmental Protection, U.S. Environmental Protection Agency, Bay County, and the Bay Environmental Study Team.

DPR2 Nutrient Loading Budget

Actions Completed: Bay County has data obtained from their sampling stations in the reservoir.

Action: Develop a basic nutrient budget and loading for the reservoir using basin-specific sampling data.

Background: The reservoir has experienced problems with overgrowth of aquatic vegetation. Various methods have been employed to control the plants that have caused problems in the reservoir. The current problem involves extensive growth of *Bacopa caroliniana* (lemon bacopa). It has been suggested that nutrient loading plays a large role in the overgrowth of aquatic vegetation.

Strategy: Develop a plan of study to determine the nutrient inflow to the reservoir and the sources of the inflows. Following development of the plan of study, determine the cost to complete the study, and identify qualified agencies or other sources to complete the work.

Expected Benefits: The nutrient budget would provide the information required to address excessive nutrient inflows (if present) to the reservoir and provide the information to alleviate any nutrient sources that may be detrimental to the reservoir.

Monitoring: Monitoring would be developed after the study was completed and controls, if needed, were established.

Regulatory Needs: Notify appropriate regulatory agencies of the results of the study and recommend that appropriate action, if necessary, be taken to maintain water quality in the reservoir.

Estimated Cost: To be determined after the study plan is developed and as part of the study plan development process.

Anticipated Funding Source(s): DEP, EPA, Bay County.

Potential Project Partners: Florida Department of Environmental Protection, U.S. Environmental Protection Agency, Bay County, and Bay Environmental Study Team.

DPR3 Water Quality and Quantity Assessment

Actions Completed: The St. Andrew Bay Resource Management Association (RMA), a Bay County volunteer citizens' organization, has sampled Deer Point Reservoir from 1990 to 1997. Sampling occurred at three stations monthly from 1990 to 1995, and then quarterly to 1997. Data obtained from the sampling effort is included in annual reports printed by the RMA. Sampling on the reservoir ceased in September 1997. However, Bay County has a sampling program in the reservoir, and also tests the water withdrawn from the reservoir for public use every four hours.

Action: Maintain existing sampling stations by Bay County, and expand the number of stations and parameters measured to assure adequate knowledge of the quality and quantity of the water entering the reservoir.

Background: Sampling efforts have revealed that inflows to the reservoir may contain high numbers of fecal coliforms. Continued and, if necessary, expanded sampling should be maintained and/or initiated to assure that water quality is maintained in the reservoir. Monitoring of the quantity of water entering the system is important in determining the allocation of the water in the reservoir.

Strategy: Coordinate with Bay County to determine if additional sampling stations or parameters should be added to the sampling protocol.

Expected Benefits: Continued maintenance of the reservoir as a Class I waterbody.

Monitoring: The current sampling program is a monitoring program. Additional monitoring may be needed to assess the sources of coliform inflow. If the sources of coliform inflow are identified and actions, if necessary, are taken to reduce the inflow are instituted, then monitoring should be continued to determine the degree of reduction in coliform inflow.

Regulatory Needs: Regulatory actions may be required if the data indicates that a problem exists.

Estimated Cost: Will be determined after coordination with Bay County and the development of a plan of study.

Anticipated Funding Source(s): DEP, EPA, Bay County.

Potential Project Partners: Florida Department of Environmental Protection, U.S. Environmental Protection Agency, Bay County, and the Bay Environmental Study Team.

CHAPTER IV. DESCRIPTION OF THE ST. ANDREW BAY WATERSHED

The St. Andrew Bay watershed is defined for management purposes as incorporating the interconnected St. Andrew, West, East, and North bays; St. Joseph Bay; and Deer Point Reservoir, as well as the respective surface water basins of each of these waterbodies (Figure 1). This is consistent with the St. Andrew Bay watershed described in the Florida 305(b) report (DEP 1996) and U.S. Geological Survey Hydrologic Unit 03140101.

A considerable body of information has been developed about the St. Andrew Bay watershed. Shaffer (1993) compiled a bibliography of the research on St. Andrew Bay, its tributaries, and nearby coastal waters, which was supplemented in 1995 and contains 390 publications regarding the system. The bibliography and publication collection is located at the National Marine Fisheries Service Laboratory in Panama City Beach, Florida. The St. Joseph Bay Aquatic Preserve Management Plan (DEP 1997) incorporates an additional description and literature review of the resources associated with St. Joseph Bay. Keppner and Keppner (2000) provides a compilation of information and an analysis of issues relating to Lake Powell.

The geology, physiography, and climatology of the watershed has been described in a number of documents, which should be consulted for a more detailed description of the various characteristics of the system. Some of these include Hydroqual, Inc. (1993), DEP (1997), Wolfe et. al. (1988), Saloman et. al. (1982), Brusher and Ogren (1976), Ogren and Brusher (1977), and several NWFWMD publications concerning the Deer Point Reservoir and Econfina Recharge Area. The Northwest Florida District of DEP also prepared, in 1996, a comprehensive summary of the elements of an Environmental Indicator System for the St. Andrew Bay watershed.

Surface Water Use

The Deer Point Reservoir is the primary source of drinking water for Bay County and provides fresh water for industrial use. Withdrawal of water from the reservoir for drinking water is regulated through an agreement between the Northwest Florida Water Management District (NWFWMD) and Bay County. Other freshwater lakes, ponds, and streams within the watershed are used primarily for recreational purposes and as residential areas. Some surface water is also used for irrigation and livestock watering. The karst lakes in the watershed are primary sources of recharge for the Floridan Aquifer, which discharges through a number of springs into Econfina Creek.

Estuarine waters provide an important source for both commercial and recreational fisheries. Species harvested include bay scallops, mullet, hard-shell clams, blue crab, shrimp, spotted seatrout, king and Spanish mackerel, and flounder (DEP 1997). In addition to fishing, other recreational activities focused on estuarine and coastal waters and surrounding lands include a wide array of other water sports, as well as beach activities, camping, hiking, hunting, wildlife viewing, and other outdoor pursuits. Other uses include commercial shipping and military and related activities. Real estate development is also increasing, and much of it is oriented toward aesthetic and other natural resource values associated with estuarine and coastal waters. Some of the uses of St. Andrew, St. Joseph, West, North, and East bays, as well as adjacent coastal waters, are discussed further below.

Tourism/Recreational Activities

Bay and coastal waters form a nucleus for a thriving tourist industry. Water sports and related recreational activities are important to the area economy and are directly related to and dependent upon maintenance of the ecosystem. Recreational activities are particularly concentrated at St. Joseph Peninsula St. Park, St. Andrew State Recreation Area (including Shell Island), surface waters in general, the Sand Hill Lakes, and other areas.

Fishing

The value of a variety of habitats lies in the production of finfish and shellfish that support recreational and commercial fisheries. Several areas of the St. Andrew Bay estuarine system and St. Joseph Bay are classified as shellfish harvesting areas (Class II Waters) and support commercial oyster and recreational bay scallop fisheries. Shrimp, blue crabs, horseshoe crabs, and various species of finfish are also commercially and recreationally exploited. Additionally, the charter boat industry is a significant commercial/recreational fishing activity. Numerous authors consistently note that the vast majority of Gulf of Mexico commercially and recreationally important species are estuarine dependent at some point in their life cycles.

Marine Commerce

The Gulf Intracoastal Waterway traverses through East Bay, St. Andrew Bay, and West Bay and provides for the movement of commercial quantities of goods within and between systems along the waterway. It also connects with St. Joseph Bay via the Gulf County Canal. A federally maintained navigation channel extends from West Pass into St. Andrew Bay, and then west to the Port of Panama City and east to Stone Container Corporation. A federal navigation channel also extends through the mouth of St. Joseph Bay to Port St. Joe. Commercial ports are located at Panama City and Port St. Joe.

Military

The U.S. Air Force, the U.S. Coast Guard, and the U.S. Navy have bases within the watershed. Existing navigation channels serve them in obtaining the materials necessary to achieve their functions. The quality of the water in the bay and in the Gulf of Mexico provides excellent research and training opportunities for the military. The military bases in the watershed provide a large number of jobs and spin-off economic benefits for the local economy.

Domestic and Industrial Waste Treatment and Discharge

Treated industrial and domestic wastewater is discharged both directly into surface waters and indirectly through sprayfields and percolation ponds. Estuarine and coastal waters also receive the bulk of the stormwater runoff from the developed areas along the shore and from inland areas.

Research

The unique qualities of St. Andrew and St. Joseph bays make them ideal sites for research on high salinity, clear water, seagrass-dominated systems. A National Marine Fisheries Service laboratory (NMFS) is located on St. Andrew Bay and conducts research on pelagic and estuarine dependent fisheries, as well as on seagrass systems. Because of the clear water, the NMFS has used bay and nearby coastal waters for the testing of the effectiveness of Turtle Exclusion Devices (TEDs) for protecting threatened and endangered sea turtles. The Naval Coastal Systems Station also conducts naval research in estuarine and Gulf waters.

Land Use

Table 3 lists generalized land use and cover, based on data derived from 1994-1995 aerial photography by DEP. The largest component of St. Andrew Bay watershed land use and cover is upland forest. The majority of this can be further classified as silviculture. Most of the intensive land use is located around the Panama City metropolitan area, with additional concentrations in and around Tyndall AFB, Mexico Beach, and Port St. Joe. Considerable development is also ongoing at the urban-rural fringe.

Table 3. Generalized Land Use and Cover, St. Andrew Bay Watershed

Category	Acres	Percent
Agriculture	42,324.22	5.75
Barren Land	3,979.80	0.54
Commercial & Services	6,391.39	0.87
Industrial	2,871.36	0.39
Institutional	1,731.64	0.24
Recreational	10,109.31	1.37
Residential	38,011.75	5.16
Trans, Com, & Utilities	9,434.52	1.28
Upland Forests	500,151.51	67.95
Water	12,509.80	1.70
Wetlands	108,546.98	14.75
Total	736,062.28	100.00

The District performed a detailed analysis of the land use within the Deer Point Reservoir drainage basin (Rains and Macmillan 1991). The data presented includes the acres of land in each category of land use as described in the Florida Department of Transportation's Land Use, Cover, and Forms Classification System.

The urbanized areas of the watershed are located primarily adjacent to St. Andrew Bay and consist of the cities of Panama City, Callaway, Parker, Springfield, Cedar Grove, and Panama City Beach. The majority of private lands in the watershed have historically been devoted to silviculture, along with limited agricultural uses. Considerable residential, commercial, and resort development is ongoing, however, at the urban-rural fringe throughout the watershed.

The largest landowner in the watershed is the St. Joe Company. The majority of St. Joe land has traditionally been used to grow trees as a source of pulpwood for the production of paper products. Recent reorganization of the company changed the company's focus, however, to large-scale, residential, commercial, resort, and related development. Lands adjacent to the Lathrop Tract (BLM) and on the same peninsula are privately owned and managed for timber production. Part of this private land supports a pine-wiregrass community with the attendant listed as protected species of vascular plants. Major public landowners in the watershed include the U.S. Department of Defense, Northwest Florida Water Management District, Florida DACS Division of Forestry, and the Florida DEP Division of Recreation and Parks (Figure 8).

Habitats

The St. Andrew Bay watershed supports a variety of biotic communities and has a high level of biodiversity. Large-scale maps of the watershed generally indicate that the watershed includes a primarily sand pine scrub forest along the Gulf coast, with pine flatwoods, pine sand hills, and wetlands among the dominant habitats in the rest of the watershed. Although this is true on a broad scale, the system is quite diverse and supports a mosaic of distinct biotic communities. The major creeks in the system are Econfina Creek, Bear Creek, and Cedar Creek that enter Deer Point Reservoir; Wetappo Creek and Sandy Creek that enter East Bay; Burnt Mill Creek and Crooked Creek that enter West Bay, and the Intracoastal Waterway which enters the system in West Bay and exits the system at the eastern most part of East Bay

Some of the habitat types listed below are the subjects of regulatory activities. Wetlands are subject to permitting systems at the state, federal, and local levels, and beaches are subject to regulation by the state. Local comprehensive plans place some conditions on the development on uplands.

Federal Fishery Management Councils, as well as the Florida Fish and Wildlife Conservation Commission, manage marine fisheries. The Magnusen Fishery Management and Conservation Act currently requires each federal Fishery Management Council to describe and identify essential fish habitat in relation to the species for which the Councils have developed fishery management plans. The thrust of the essential habitat designations is to conserve those estuarine and marine fishery habitats that are essential to the survival and productivity of those species of finfish and shellfish for which the Councils have developed management plans. The National Marine Fisheries Service is in the process of providing information to the Councils regarding the description and identification of essential fish habitats and the procedures to conserve those habitats.

Beaches

The immediate coast of the Gulf of Mexico includes beaches of white quartz sand extending the length of the watershed from Walton County in the west to Gulf County in the east. The beaches of the Gulf of Mexico have been intensely developed from the western boundary of St. Andrew State Recreation Area west to the Bay County border. Areas of sandy beaches also occur along some bay shorelines. These are usually located in areas subject to shoreline energy that prevents marsh establishment.

Pine Scrub

This community is best developed along the coast and areas of well-drained sandy soils. The dominant tree is the sand pine (*Pinus clausa*) with sand live oak (*Quercus geminata*), myrtle oak (*Quercus myrtifolia*) and other oaks. The dominant shrub close to the coast is Florida rosemary (*Ceratiola ericoides)* with *Lyonia* spp. occurring in wetter areas.

Pine Flatwoods

Pine flatwoods dominate Bay County and are complex communities that are dependent upon fire and soil-related conditions. The frequency of fire and the drainage characteristics of the soils determine the dominant species of plants present. Pine flatwoods, therefore, vary from open forests of scattered pines with a sparse undergrowth of shrubs and abundant grasses to dense stands of pines with a dense layer of shrubs and few, if any grasses. The major species of pine tree in the watershed are the slash pine (*Pinus elliotti*) and the long-leaf pine (*Pinus palustris*). The major herbaceous plants are wiregrass species (*Aristida* spp.). The major species of shrubs are saw palmetto (*Serenoa repens*) and species of the Ericaceae (Heath Family). The majority of the Pine Flatwoods communities within the watershed are managed for timber production. Within the flatwoods community are other communities such as titi wetlands, bogs, wet prairie areas, and lentic and lotic open water areas. Examples of these communities are abundant throughout the county.

Hardwood Forests

Hardwood forests in the watershed occur near the coast (maritime hammocks) and along streams. These support numerous species of trees and shrubs, depending on the soils and hydrology of the area. An example of hardwood forests associated with rivers and creeks is the land purchased by NWFWMD along Econfina Creek. The hardwood forests along Econfina Creek support diverse plant communities with many interesting and protected species.

Bogs

Bogs are areas of saturated substrates and acid conditions. The dominant vegetation consists of sedges and grasses. However, a number of unique plants, such as pitcher plants, sundews, bladderworts, and butterworts are often present. These bogs are mostly seepage bogs in the watershed and are often surrounded by a transition zone of trees and shrubs such as titi and sweet bay between the bog and the upland area.

Swamps

Swamps are forested wetlands and represent a diverse series of plant communities. The trees characteristic of each type of swamp are all adapted to conditions of saturated soils or standing water for at least a part of the year. Hydroperiod is critical in determining the type of swamp that develops in a given wet area. Included here are shrub bogs such as titi swamps, bay heads, cypress swamps (riverine and standing water), and riverine swamps such as tupelo swamps. The various types of swamps are widely distributed and relatively abundant in the watershed. They are found wherever the hydroperiod is conducive to their development.

Freshwater Marsh

Emergent, herbaceous vegetation dominates sites where the soil is saturated or stranding water is present for at least part of the year. As with swamps, there are a variety of types of freshwater marshes including bogs, basin marsh, depression marsh, floodplain marsh, wet prairie, and the marshes that fringe lakes and ponds. Each type of marsh is characterized by the hydroperiod, soil type, and the dominant vegetation or combination of plants. Some examples are pitcher plant bogs, sawgrass marshes, beakrush marshes, and cattail marshes. Freshwater marshes are widely distributed and abundant in the St. Andrew Bay watershed.

Saltmarsh

The estuarine part of the ecosystem supports large areas of saltmarsh. These marshes are dominated by needle rush (*Juncus roemerianus*) which forms extensive stands at, above, and sometimes below the mean high tide line. Smooth cordgrass (*Spartina alterniflora*) dominates the intertidal zone where the tidal amplitude is sufficient to support this community. Saltmarshes provide high rates of primary productivity and important habitat for a variety of faunal communities.

Lakes and Ponds

The St. Andrew Bay watershed contains a number of lakes and ponds. These are most abundant in the sandy uplands west of Econfina Creek. Coastal ponds and lakes also occur in the watershed close to the Gulf of Mexico and usually develop in depressions between old dune lines. In the sand hills of northern Bay and southern Washington counties, numerous karst lakes and sinks have formed due to the dissolution of underlying limestone and the subsequent collapse of overlying sand hills. The area is upland with remnant dunes or ridges and well-drained, nutrient poor soils. Thus, these lakes are some of the most oligotrophic in the nation. Chemically, the water is soft, low pH, and low in nutrients; generally resulting in very clear waters.

The Sand Hill Lakes region encompasses the primary recharge area for that portion of the Floridan Aquifer that discharges into Econfina Creek (Grubbs 1995; Richards 1997). Econfina Creek and its receiving waterbody, Deer Point Reservoir, are Florida Class I Waters that provide the primary source of drinking water to Panama City and Bay County. In order to protect these waters and associated natural resources, the NWFWMD has acquired over 36,000 acres in the Econfina Recharge Area and along Econfina Creek.

In addition to their importance for groundwater and potable water resources, the Sand Hill Lakes support notable biological resources and provide an important outdoor recreational, aesthetic, and educational resource for residents of the region. The lakes support a community of plants adapted to variable water levels and a low and variable pH range. The plant community includes several listed and endemic species, including the state-endangered endemic *Hypericum lissophloeus* (smooth-barked St. John's wort) and the threatened *Xyris longisepala* (karst pond xyris) (Keppner and Keppner 1999). The benthic macroinvertebrate community is diverse and typically low in population densities.

Lake Powell is a large coastal dune lake located in southwest Bay County and southeast Walton County. It has an inlet to the Gulf of Mexico that opens and closes periodically and characteristics

varying between those of a freshwater lake and an estuarine system (Keppner and Keppner 2000). The lake is designated an Outstanding Florida Water (OFW). At the time of this writing, the lake's drainage basin and shoreline is largely undeveloped, and water quality has generally been found to be good.

Rivers and Creeks

The St. Andrew Bay watershed contains a few rivers and streams that flow directly or indirectly to St. Andrew Bay. None of the lotic waters of the watershed are large, and they are referred to as creeks locally. The major creek in the watershed is Econfina Creek, which has been impounded and provides the largest amount of freshwater to St. Andrew Bay through its discharge into North Bay. Bear Creek and Cedar Creek also enter Deer Point Reservoir and contribute significant freshwater to the reservoir. Numerous smaller creeks drain the remaining area to the bay, and include Burnt Mill Creek and Crooked Creek entering West Bay and Callaway Creek, Wetappo Creek, and Sandy Creek entering East Bay.

Seagrass Beds

Seagrass communities provide important areas of shelter, nursery habitat, primary productivity, and other ecological functions for the estuary. Seagrass beds in St. Andrew, St. Joseph, and other bays within this system are dominated by turtle grass (*Thalassia testudinum*) and shoal grass (*Halodule wrightii*). Other species present include manatee grass (*Syringodium filiforme*), star grass (*Halophila engelmannii*), and widgeon grass (*Ruppia maritima*).

Oyster Reefs

Estuarine waters support extensive areas of oyster reefs, of which some are commercially harvestable. These commercially valuable reefs occur in the areas of the bay designated as Class II Waters. Portions of West Bay, East Bay, and North Bay are designated as shellfish harvesting waters. Oyster reefs also provide important hard bottom habitat in the bay system.

Hard Bottom

Other than oyster reefs, hard bottom habitats in the St. Andrew Bay watershed are found primarily around rock jetties, cement pilings, and other artificial substrates. The most ecologically functional areas are those with numerous cracks and crevices that can be used by various organisms. Such areas support diverse floral and faunal communities of sessile and motile organisms. Hard bottom habitats also attract recreationally and commercially valuable finfish.

Shallow and Deep Water Bottoms

Unvegetated water bottoms within the bay system can be extremely productive in terms of epibenthic organisms and benthic infaunal organisms. These areas serve as feeding habitat for a variety of finfish and shellfish of recreational and commercial value.

Coastal Marine Communities

Coastal Gulf of Mexico waters significantly influence conditions within estuarine waters, combining with freshwater inflow to define circulation, salinity, and biota. Likewise, the estuarine system exports nutrients into the Gulf and provides nursery and other habitat for a wide variety of marine species. Common coastal marine communities in the area include sandy beaches and unvegetated soft bottoms. Hard substrates, such as limestone ledges and artificial substrates, are relatively uncommon. In places they do, however, provide vertical relief, offering refuge for fish and invertebrates. It is commonly reported that approximately 90 to 95 percent of commercially and recreationally important Gulf of Mexico species of fish are estuarine dependent at some point in their life cycles. Commercially and recreationally important species of fish common to these waters include

dolphin (*Coryphaena hippurus*), Spanish and king mackerel (*Scomberomorus* spp.), crevalle jacks (*Caranx hippos*), penaeid shrimp (*Penaeus* spp.), and a number of other species (Wolfe et al. 1988).

CHAPTER V. RESOURCE MANAGEMENT ACTIVITIES IN THE ST. ANDREW BAY WATERSHED

A number of federal, state, and local agencies, as well as private landowners, share management of the St. Andrew Bay watershed. A variety of environmental laws and regulations are in place, and a number of agencies address human activities with the potential to impact the watershed. In some instances, these agencies have overlapping responsibilities, but they work from differing definitions, laws, regulations, and policies.

It is important to recognize that the SWIM program alone cannot accomplish all of the objectives identified within this plan. The SWIM program may, however, provide a framework for cross-jurisdictional watershed management, accomplish model and demonstration projects, and provide "seed" money for the initiation of basinwide restoration and protection. Additionally, through the SWIM program, the Northwest Florida Water Management District may participate in partnerships with local governments and state and federal agencies to share in the costs of larger projects. The NWFWMD may also provide technical assistance and design work for capital-intensive projects. The St. Andrew Bay watershed SWIM program will be implemented in cooperation with ongoing federal, state, local, and private resource management efforts, including those of the Bay Environmental Study Team and local community organizations. Through this program are opportunities for diverse interests to participate in the management process and the development and implementation of management initiatives, including the SWIM plan.

Federal Agencies

Several federal agencies participate in the management of the St. Andrew Bay watershed. There are also a number of federal laws relevant to management of the system. Notable among these are:

- Coastal Zone Management Act of 1972 (Amended 1990).
- Coastal Barrier Resources Act of 1982.
- National Flood Insurance Act of 1968.
- Clean Water Act of 1977 (Amended 1987).
- National Environmental Policy Act of 1969.
- Endangered Species Act of 1973.
- Various other laws pertinent to resource protection efforts of the agencies listed below.

U.S. Department of the Interior

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) reviews proposed federal actions and permits under the Fish and Wildlife Coordination Act. The USFWS is charged with protection and recovery of threatened and endangered species under the Endangered Species Act, and with the management of migratory birds under the North American Migratory Bird Treaty.

U.S. Geological Survey

The U.S. Geological Survey (USGS) performs surveys, investigations, and research pertaining to topography, geology, and mineral and water resources, and collects and publishes water resource data. The Biological Resource Division of the USGS (formerly National Biological Service) is the biological research arm of the Department of the Interior. The mission of this division is to assess the status and trends of the nation's biological health.

Minerals Management Service

The Minerals Management Service (MMS) is responsible for the regulation of oil and gas wells on the Outer Continental Shelf (OCS). Federal jurisdiction of submerged OCS lands begins at the outer limit of state waters (approximately 10.4 miles off Florida's Gulf coast) and extends to 200 nautical miles from the coast.

U.S. Department of Agriculture

Natural Resource Conservation Service

Formerly the Soil Conservation Service (SCS), the Natural Resource Conservation Service (NRCS) promotes the use of conservation practices on private lands and provides technical assistance to reduce soil losses and otherwise protect natural resources while maintaining or improving agricultural productivity and profitability. Much of the technical assistance provided by the NRCS helps improve water quality by minimizing runoff and erosion, minimizing pesticide overspray and fertilizer losses, maintaining vegetated buffer strips, etc. The NRCS helps farmers develop conservation plans for highly erodible lands.

Farm Service Agency

Formerly the Agricultural Stabilization and Conservation Service (ASCS), the Farm Service Agency (FSA) conducts a number of programs that protect water quality and conserve natural resources. Among these are the Agricultural Conservation Program (ACP) and Conservation Reserve Program (CRP). The ACP is a cost-sharing program that helps farmers put highly erodible land into conservation use and/or implement BMPs. The CRP provides funding to take highly erodible land out of production and convert it into conservation land use. The FSA also works with agencies and farmers to develop county conservation plans.

U.S. Department of Defense

U.S. Air Force

Tyndall AFB is located approximately 12 miles east of Panama City. Missions performed at Tyndall AFB include air education and training and development and testing of conventional munitions and sensor tracking systems. The base population is approximately 21,000.

The Eglin Military Complex occupies much of the Florida Panhandle east of Pensacola. With 724 square miles of land area, Eglin AFB is one of the largest military installations in the world. The mission of Eglin AFB's natural resource program is to "support the Air Force's mission through responsible stewardship of the installation's natural resources utilizing integrated natural resources management and principles of ecosystem management to ensure ecosystem viability and biodiversity while providing compatible multiple uses." Eglin AFB owns approximately 425 acres on Cape San Blas. Activities conducted on this site include support of Eglin Gulf Test Range air operations, launch and tracking of surface to air missiles, and ground training operations (Eglin AFB 1999).

U.S. Navy

The Navy operates the Naval Coastal Systems Station (CSS) on St. Andrew Bay. The CSS develops and tests mine warfare and other systems.

U.S. Army Corps of Engineers

The Army Corps of Engineers (COE) regulates activities in water and wetlands under four separate, but related laws: Rivers and Harbor Act of 1899, as amended, Federal Water Pollution Control Act of 1972, Clean Water Act of 1977, and Marine Protection Research and Sanctuaries Act of 1972. The COE's major responsibilities in the St. Andrew Bay watershed are maintenance of congressionally authorized navigation channels, pollution abatement, maintenance of water quality, and enhancement

of fish and wildlife. The agency is also involved in permitting placement of dredge and fill materials in navigable waters and adjacent wetlands. In addition, the COE provides some funding for aquatic plant control in navigable public waters.

U.S. Department of Transportation

U.S. Coast Guard

The USCG is charged with protecting the nation's coastline. The U.S. Coast Guard is responsible for regulation of boating safety, search and rescue, interdiction of narcotics importation, fisheries enforcement in the U.S. Exclusive Economic Zone (EEZ), and a variety of other activities for protection of the nation's coastline. The Coast Guard regulates construction of structures such as bridges, causeways, and aerial utilities which may pose navigation hazards and addresses commercial navigation safety issues. The Coast Guard also responds to oil spills and releases of hazardous substances and marine debris.

U.S. Department of Commerce

National Marine Fisheries Service

The National Marine Fisheries Service (NMFS) records commercial fish landings, enforces national fishery laws, and protects vital fishery resources in federal waters. The Environmental Assessment Branch comments on federal permit applications that may adversely impact fishery resources.

National Oceanic and Atmospheric Administration

The National Oceanic and Atmospheric Administration (NOAA), Office of Coastal and Resources Management (OCRM) administers the Coastal Zone Management Act (CZMA) at the federal level. The CZMA recognizes competing demands on limited coastal resources and encourages coastal states to develop Coastal Management Plans (CMPs) to ensure the beneficial use, protection, and development of the coastal zone. As incentive for the states, the CZMA empowers them with review authority of proposed federal actions. Actions found inconsistent with approved state programs may be modified or blocked. Additionally, states with approved programs are eligible for federal coastal zone management funding. The OCRM administers Coastal Zone Enhancement Grants to states with approved CMPs, exercises oversight and approval over state CMPs, and exercises joint oversight with EPA over the Coastal Nonpoint Pollution Control Program. The Office of Oceanography and Marine Assessment, Ocean Assessment Division (OAD) conducts research, assessment, and monitoring activities on environmental quality issues in estuaries. Through its National Status and Trends Program (NS&T), OAD is conducting a nationwide monitoring program to assess chemical contamination in estuaries throughout the country. With the National Coastal Pollutant Discharge Inventory, OAD determines sources and analyzes the composition of discharged pollutants in estuaries. The OAD also has a National Estuarine Inventory that characterizes the physical and hydrologic features of the nation's estuaries and coastal areas. The National Estuarine Research Reserve (NERR) program, originally the National Estuarine Sanctuaries program, was established in 1972 with the enactment of the Coastal Zone Management Act. Under this program, matching funds are provided to support the establishment of research facilities and educational programs. There are currently 22 National Estuarine Research Reserves.

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) is responsible for the control and abatement of air, water, noise, solid waste, toxic waste, and radiation pollution. The EPA has delegated authority to the Florida DEP for hazardous waste cleanup, public drinking water systems, and point source pollutant discharges. The EPA exercises oversight of state programs such as wetland dredge and fill permitting and nonpoint discharge elimination. The EPA also provides overall coordination for the Gulf of Mexico Program, a cooperative effort involving five states, 11 federal agencies, and two

countries. The general objective of this program is to protect, restore, and enhance coastal and marine waters of the Gulf of Mexico and adjacent lands and to protect the quality of recreational use and economic vitality. Specific issue areas addressed by the program include nutrient enrichment, coastal erosion, marine debris, habitat degradation, freshwater inflow, public health, and living aquatic resources. The EPA coordinates the National Estuary Program (NEP), which was established by Congress in 1987 as part of the Clean Water Act. This program is designed to facilitate cooperative public-private efforts to protect and restore the health of estuaries while supporting associated economic and recreational resources. Currently 22 estuaries are part of the NEP. The EPA Office of Research and Development (ORD) has initiated the Environmental Monitoring and Assessment Program—Estuaries (EMAP-E) to quantitatively assess pollution and the success of pollution control in near coastal waters. Additionally, the EPA administers the national Nonpoint Source Management Program, established in 1987 under Section 319 of the Clean Water Act. This program provides for states to develop NPS assessments and management programs to reduce NPS pollutant loadings in problem areas using BMPs and other measures. The programs must be watershed-based to the maximum extent practicable. Federal matching funds are available for states with approved programs.

State Agencies

Following are some of the state laws and regulations that are relevant to management of the St. Andrew and St. Joseph bay watersheds. Numerous agency rules have been adopted to implement these statutes, notable among these are:

- Chapter 161, F.S. Beach and Shore Preservation;
- Chapter 163, Sections 163.3161-163.3243, F.S. Local Government Comprehensive Planning and Land Development Regulation Act;
- Chapter 186, F.S. Florida State Comprehensive Planning Act;
- Chapter 187, F.S. State Comprehensive Plan;
- Chapter 258, F.S. State Parks and Preserves;
- Chapter 259, F.S. Land Acquisitions for Conservation or Recreation;
- Chapter 373, F.S. Water Resources;
- Chapter 380, F.S. The Florida Environmental Land and Water Management Act; and
- Chapter 403, F.S. Environmental Control.

Many state agencies affect the system, at least indirectly. These include the Office of the Governor, the Department of Environmental Protection, the Department of Agriculture and Consumer Services, the Fish and Wildlife Conservation Commission, the Department of Community Affairs, the Department of Health, the Department of Children and Families, the Department of Transportation, and the Department of State.

Office of the Governor

The Office of the Governor is responsible for ensuring coordination between state agencies involved in the protection and management of the St. Andrew Bay system and for ensuring that these activities are consistent with the State Comprehensive Plan.

Florida Department of Environmental Protection

The Florida Department of Environmental Protection (DEP) is responsible for regulating air, water, wastewater, stormwater, and hazardous waste pollution through a permitting and certification process. The Department also provides oversight of the Ecosystem Management and Restoration Trust Fund, used for SWIM. Wetland resource permitting in northwest Florida is performed by DEP, in

cooperation with the U.S. Army Corps of Engineers and other agencies. The Department also implements the Outstanding Florida Waters (OFW) program, enforces water quality standards throughout the state, and administers aquatic preserves. Additional functions for which DEP is responsible are coordinated through the following divisions and offices of the Department.

Division of Water Resource Management

This division is responsible for permitting public drinking water and wastewater treatment facilities. This division is also responsible for the development and implementation of water quality management programs. It coordinates with U.S. EPA on the NPDES program, administers the Clean Water Act Section 319 Nonpoint Source Management Program in Florida, administers the state water quality classification system, maintains the state water quality database, and publishes a report on the status of Florida's surface waters (the "305 (b)" report). The Bureau of Watershed Management performs administration and oversight of SWIM funding. This bureau also implements the Department's rotating cycle watershed management program, which includes the development of TMDLs. The Bureau of Submerged Lands and Environmental Resources reviews applications for activities that require environmental resource permits and approval for use of state-owned submerged lands. The Bureau of Mine Reclamation is responsible for activities relating to mine reclamation.

Office of Beaches and Coastal Systems

The Office of Beaches and Coastal Systems is responsible for erosion control, hurricane protection, coastal flood control, shoreline and offshore rehabilitation, and the regulation of construction and other activities that are likely to affect the physical condition of the beach and shore.

Northwest District Office

The St. Andrew Bay watershed is within the area served by DEP's Northwest District Office, located in Pensacola, and the District's Branch Office in Panama City. The Northwest District Office reviews applications for stormwater permits, wetland resource permits, and approval for use of state-owned submerged lands. The Northwest District Office also manages point source discharge permits, administers water quality and other monitoring, and has initiated a variety of restoration projects.

Division of State Lands

This division is charged with overseeing uses, sales, leases, and transfers of state-owned lands, including state parks, recreational areas, and other lands within the St. Andrew Bay watershed. Among the state lands are approximately 1,250 acres that have been acquired along the southern portion of the St. Joseph Bay basin as part of the St. Joseph Bay Buffer.

Office of Coastal and Aquatic Managed Areas

The Office of Coastal Aquatic Managed Areas manages coastal lands and waters that have been designated as Aquatic Preserves, State Buffer Preserves, National Estuarine Research Reserves, and the Florida Keys National Marine Sanctuary. Within the St. Andrew Bay watershed, this includes the St. Joseph Bay and St. Andrew Bay State Recreation Area aquatic preserves and the St. Joseph Bay Buffer Preserve.

Division of Recreation and Parks

The St. Andrew State Recreation Area (SASRA) is located on a peninsula in St. Andrew Bay and on Shell Island. T.H. Stone Memorial St. Joseph Peninsula State Park occupies approximately 2,516 acres on the St. Joseph Bay peninsula. Camp Helen State Recreation Area occupies approximately 184 acres on the western shore of Lake Powell. Also within the western reach of the St. Andrew Bay watershed SWIM planning area are the newly acquired Deer Lake State Park and a portion of Grayton

Beach State Recreation Area. These areas include substantial conservation lands and are focal points of much recreational activity.

Division of Resource Assessment and Management

This division is responsible for the management of mineral resources, oil and gas exploration, and geological studies.

Florida Department of Agriculture and Consumer Services

The Florida Department of Agriculture and Consumer Services (DACS) regulates the purchase and use of restricted pesticides and helps with soil and water conservation activities of the Soil and Water Conservation Districts and Agricultural Extension Agencies.

Shellfish Environmental Assessment Section (SEAS)

The Shellfish Environmental Assessment Section (SEAS) is responsible for classification and management of shellfish harvesting areas. SEAS monitors oyster bars and other shellfish resources, water quality, and harmful algal blooms.

Division of Agricultural Environmental Services (AES)

The AES regulates the registration and use of pesticides, including the purchase of restricted pesticides, maintains registration and quality control of fertilizers, regulates pest control operations, mosquito control, and evaluates and manages environmental impacts associated with agrochemicals.

Division of Forestry (DOF)

This division is responsible for managing state forests and providing developing and implementing forestry best management practices (BMPs). The DOF is also responsible for oversight of statewide BMP implementation and for monitoring public and private forestry operations to determine BMP compliance and effectiveness.

Division of Plant Industry

This division is responsible for overseeing the designation of plant species.

Office of Agricultural Water Policy Coordination (OAWP)

The OAWP participates in water policy issues to ensure the availability of an adequate supply and quality of water for the production of food and fiber. The office cooperates with agencies and agricultural producers to make available streamlined agricultural regulatory processes and voluntary, incentive-based acceptable alternatives and agricultural best management practices consistent with the sustainability of agriculture and resource conservation. The OAWP also provides assistance to Soil and Water Conservation Districts in carrying out conservation activities at the local and watershed level, and providing improved local delivery of services to agricultural producers. The OAWP also facilitates in the participation of Soil and Water Conservation Districts in water-related issues at the district (county) or watershed level.

Florida Department of Community Affairs

The Department of Community Affairs (DCA) is the lead state planning agency. The DCA coordinates the review and approval of Local Government Comprehensive Plans and is responsible for coordinating Developments of Regional Impact (DRIs) and administering Areas of Critical State Concern (ACSC) and the Florida Coastal Management Program (FCMP). The DCA reviews Land

Development Regulations (LDRs) when it is suspected that local governments have failed to adopt the regulations and if it is suspected that adopted regulations are inconsistent with the comprehensive plans. Other DCA responsibilities include coordinating the state clearinghouse and FCMP consistency review of proposed federal actions. The DCA administers the Florida Communities Trust (FCT) program, which provides grants, loans, and technical assistance to local governments for acquiring lands and otherwise implementing the Conservation, Recreation, Open Space, and Coastal Management elements of their comprehensive plans. The DCA is also the lead state emergency management agency. It operates the Emergency Operations Center (EOC) and coordinates training, preparedness, and post-disaster relief efforts for natural and technological (oil spills, etc.) disasters.

Florida Department of Health

Septic tank permitting is administered at the state level by the Department of Health to protect human health and water quality. The Department is also involved in water quality monitoring, particularly for bacteria, at public recreation beaches. These programs are in partnership with county governments.

Florida Department of Children and Families

The Department of Children and Families operates William J. Rish Recreational Park on St. Joseph Peninsula. This 94-acre park provides recreational services for handicapped Florida residents and has access to St. Joseph Bay and the Gulf of Mexico. The park is operated as a sublease from St. Joseph Peninsula State Park.

Department of State

The Department of State is responsible for the protection of cultural resources, including archaeological sites and historic landmarks.

Florida Department of Transportation

The Florida Department of Transportation (DOT) is responsible for interstate and interregional transportation systems in Florida. The Department also assists in meeting local transportation needs by providing technical and financial assistance to local governments and metropolitan planning organizations (MPOs). As a developer of major linear features, FDOT plays an important role in protecting wetlands and other sensitive resources and in mitigating impacts. With the enactment of Section 373.4137, F.S., mitigation of wetland impacts from state transportation projects is funded by FDOT and implemented by DEP and the water management districts. The Department is responsible for annually submitting to DEP and the water management districts an inventory of habitats that may be impacted in the succeeding three years of the adopted work program.

Florida Fish and Wildlife Conservation Commission (FWCC)

The FWCC has been created to replace the Florida Game and Fresh Water Fish Commission (FGFWFC) and the Marine Fisheries Commission (MFC). The Commission has a nine-member appointed commission and has regulatory and management jurisdiction over game and non-game wildlife and marine and freshwater aquatic life. The FWCC is also responsible for research on freshwater and marine life, wild animals and their habitats, enforcement of fish and wildlife conservation laws, boating safety, and enforcement of environmental laws. The Commission reviews projects and permit applications that may affect fish and wildlife habitat. It monitors fish and wildlife populations and habitat quality within the watershed, manages wildlife management areas, and coordinates non-game wildlife management and endangered species protection. The Division of Wildlife is also responsible for designating Critical Wildlife Management Areas to protect designated species. The Florida Marine Research Institute (FMRI) conducts marine research, monitoring, and ecological modeling and maps marine resources and habitat.

Regional Agencies

Northwest Florida Water Management District

In addition to implementing the SWIM program, the NWFWMD administers permitting programs for consumptive water use, management and storage of surface waters, well drilling and operation, and artificial recharge. The NWFWMD serves the 15 western-most counties of the state and the western portion of Jefferson County. Consumptive water uses permitted by the NWFWMD include irrigation and public water supply.

Through the Save Our Rivers, Preservation 2000 programs, the NWFWMD has purchased thousands of acres of land within northwest Florida. Among these are over 36,000 acres acquired within the Econfina Recharge Area and St. Andrew Bay watershed. These lands are managed to protect water resources, to preserve natural systems, to protect natural floodplain functions, and to provide for continued public access and use. Public uses provided for include hunting, water sports, camping, education, and research. The NWFWMD may provide payments in lieu of taxes to reimburse counties for lost ad valorem taxes on lands acquired under Save Our Rivers, Preservation 2000, and Florida Forever and thus removed from county tax rolls. To qualify, counties must have a population of 75,000 or less and levy an ad valorem tax of at least 9 mills. Annual payments may be made for up to ten consecutive years.

Pursuant to Section 373.4137 and in consultation with state and federal agencies and local governments, the NWFWMD is responsible for developing and periodically updating a regional mitigation plan to address the impacts of state transportation impacts incurred by the Florida Department of Transportation. The NWFWMD is also responsible for implementation of the approved plan and for ensuring mitigation requirements are met.

Regional Planning Councils

The West Florida Regional Planning Council (WFRPC) is the regional planning body serving the seven western-most counties of the state, including the St. Andrew Bay watershed east of Gulf County. The Apalachee Regional Planning Council (ARPC) serves nine counties in the eastern Panhandle, including Gulf County. Regional planning councils coordinate development of regional impact (DRI) reviews, review local government comprehensive plans, prepare and adopt Strategic Regional Policy Plans (SRPP), and assist local governments in planning and grant writing.

Local Governments

Local governments perform some of the most important activities to protect and restore environmental quality and educate the public about how individuals can help achieve such goals. Major examples include wastewater treatment, solid waste management, land use planning, stormwater management, and public education. A variety of special projects may also be conducted. The cities of Springfield, Parker, and Callaway, for example, are working with Bay County and state agencies on a project to restore Martin Lake through sediment removal and implementation of a comprehensive stormwater management system. The city of Parker has applied for state funding for septic tank removal and is developing a 12-acre environmental park on Martin Lake that will be available for science and environmental education, research, and related activities. Bay County is developing stormwater management plans for subwatersheds within the county and has applied for grant funding to plan and implement the placement of channel markers to assist boaters in avoiding seagrass beds.

Counties and municipalities within the St. Andrew Bay watershed are identified in Chapter 1. Types of local government plans, ordinances, and regulations common to most local governments include:

- comprehensive plans;
- zoning and land development codes;

- flood protection ordinances;
- permit requirements for construction and septic systems;
- stormwater management requirements;
- infrastructure planning and development;
- utilities, including potable water, wastewater treatment, solid waste, and stormwater; and
- subdivision regulations.

Local government comprehensive planning is discussed in Chapter 2.

Community Associations and Other Private Initiatives

Private organizations play an instrumental role in management and protection of the resources of the St. Andrew Bay system. Among the contributions of these organizations are elevating resource issues on the public agenda, providing guidance and insight to resource management agencies, and participating in the planning and implementation of specific projects. A major private initiative active within the St. Andrew Bay watershed is the Bay Environmental Study Team (BEST). The St. Joe Bay committee is a comparable initiative focusing on St. Joseph Bay. The St. Andrew Bay Resource Management Association (RMA) is a volunteer initiative that has collected a considerable body of water quality and seagrass data.

Special Resource Management Designations

Public Land Ownership

Management of the watershed requires maintenance of terrestrial and aquatic habitats and their interrelationships. This can best be accomplished through management of fairly large areas of land and water. Public conservation lands are generally managed to maintain ecological functions while providing for other public uses. Thus, increasing in the acreage of appropriate lands in public ownership will facilitate improved maintenance of the St. Andrew Bay watershed. Military bases frequently maintain natural habitats and functions, although this is not a primary mission of the facilities. Other state and federal agencies also have programs directed at encouraging and facilitating ecosystem management on private lands. Public lands in the St. Andrew Bay watershed are illustrated in Figure 8.

Agencies managing public lands within the St. Andrew Bay watershed include the NWFWMD, DACS Division of Forestry, the Fish and Wildlife Conservation Commission, Florida Department of Environmental Protection, and the U.S. Department of Defense. Public lands are used for a variety of purposes, including, but not limited to, resource management. Descriptions of land management objectives and activities are contained within the discussion of individual agencies and organizations.

The Land Management and Advisory Council (LMAC) is an interagency committee which advises the Board of Trustees (Governor and Cabinet) on the management of natural resource lands administered by state agencies. All management agencies must submit management plans to LMAC within one year after a lease is signed for lands 160 acres and greater. The LMAC has approval/disapproval/deferral authority delegated to it by the Trustees.

Water Management District Lands

In order to protect and restore water and habitat resource values and protect the Class I waters of Econfina Creek and the Deer Point Reservoir, the NWFWMD has acquired approximately 8,347 acres along Econfina Creek and an additional 28,954 acres in the Econfina Recharge Area (ERA) of the Sand Hill Lakes. Land management and restoration activities include a major effort to restore native longleaf-wiregrass habitat throughout the uplands, as well as wetland and aquatic habitats in and

around the lakes. The NWFWMD has developed an extensive database regarding the ERA and the Deer Point Reservoir watershed (Richards 1997; Cairns et. al. 1994; FDER 1992; Latham and Cairns 1994; O'Rourke et. al. 1993; Rains and Wiley 1990; Rains and Macmillan 1991).

St. Joseph Bay Buffer Preserve

The state of Florida has acquired approximately 1,250 acres along the southern portion of the St. Joseph Bay basin. These lands, designated the St. Joseph Bay Buffer, are managed to protect the bay for general natural resource conservation, and to provide for low intensity recreational use.

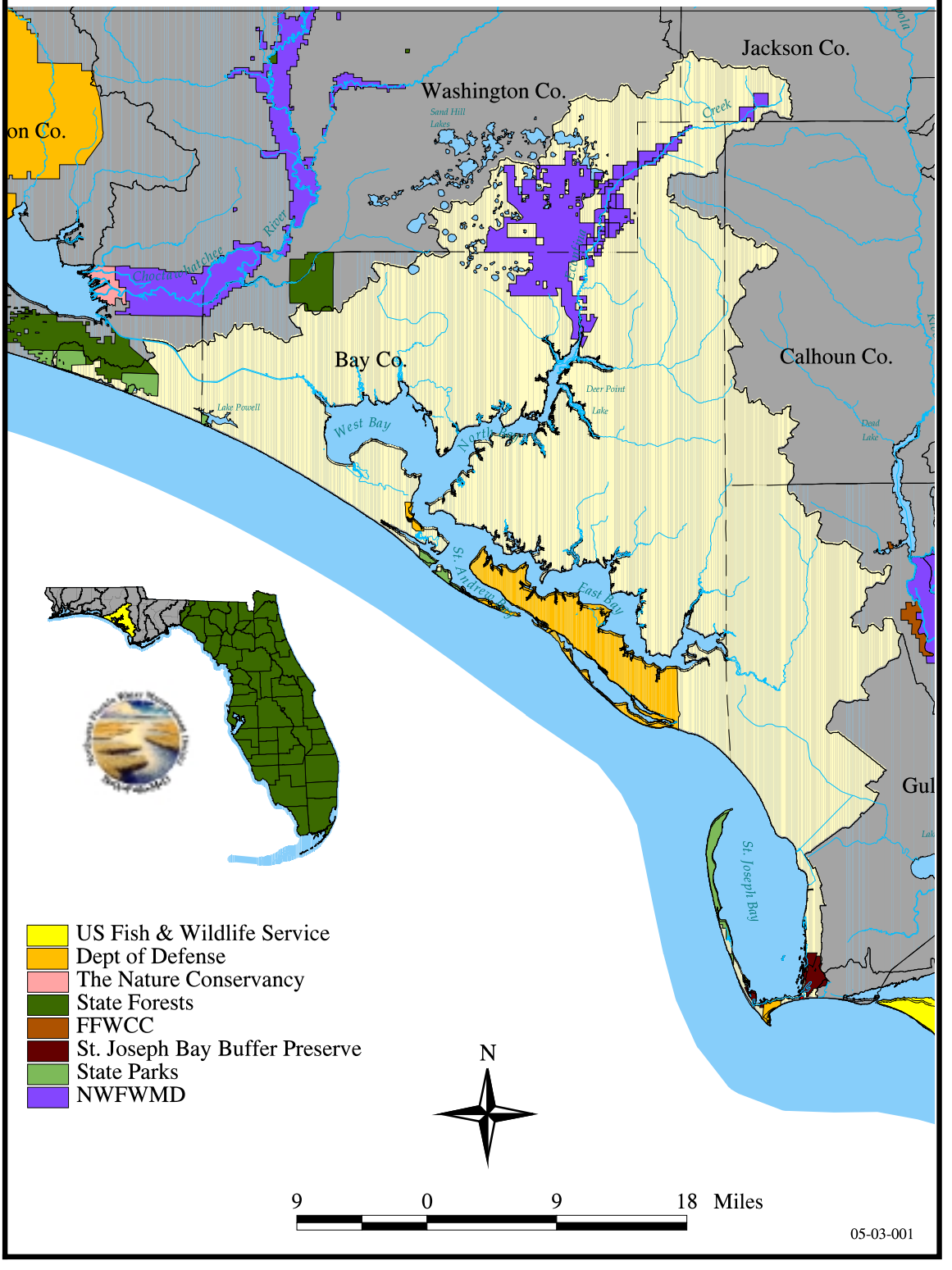
Division of Recreation and Parks Lands

The St. Andrew State Recreation Area (SASRA) is located on a peninsula in St. Andrew Bay and on Shell Island. SASRA is consistently in the top five of the Florida State Parks with regards to the number of visitors each year. The intense use of the mainland part of the SASRA places increasing demands on the land for visitor use areas. Often, these demands are at the expense of the natural habitats occurring on the mainland part of the recreation area. As visitor use increases, the quality of remaining natural habitats are degraded. The part of St. Andrew State Recreation Area on Shell Island remains relatively lightly used and natural because of the absence of facilities for human use. However, visitation by boaters has increased and will likely continue to increase with the population.

The northern portion of the St. Joseph peninsula north of Cape San Blas is the site of T.H. Stone Memorial St. Joseph Peninsula State Park. This park occupies approximately 2,516 acres, includes substantial conservation lands and is a focal point of increasing recreational activity. Intensive use of this park and nearby waters also impacts land and water resources in a manner similar to that described for the St. Andrew State Recreation Area.

Camp Helen State Recreation Area was acquired by the state in 1996 and includes approximately 184 acres just west of Lake Powell. Also within the western reach of the SWIM planning area within Walton County are Deer Lake State Park and a portion of Grayton Beach State Recreation Area.

Figure 8 Public Lands in the St. Andrew Bay Watershed and Vicinity



Bureau of Land Management Land

The Bureau of Land Management, within the U.S. Department of Interior, owns 185 acres of land in the watershed. This land is a peninsula in East Bay known as the Lathrop Tract. The uplands consist of pinelands with part of the property supporting a long-leaf pine-wiregrass flatwoods community that supports a variety of threatened and endangered plants and animals. Extensive saltmarsh and shallow bayous surround the uplands. The Bureau of Land Management has developed management plans for their lands. The Lathrop Tract is addressed in the Bureau's 1995 management and decision document.

Florida Department of Agriculture and Consumer Services Lands

The Division of Forestry manages Porter Pond State Forest. This is an 80-acre tract of land located in Washington County adjacent to NWFWMD lands. Management provides for multiple use, including timber production, recreation, and conservation. Historically, the primary purpose has been production of timber for sale to obtain revenue for the continued operation of the agency. This emphasis has changed to one of management for the total value of the resource to the public including the protection of native ecosystems.

Florida Fish and Wildlife Commission Lands

The Point Washington Wildlife Management Area is leased by the state of Florida from the St. Joe Company. The lease, however, can be broken with very short notice from either party. Therefore, these lands cannot be considered as being within control of the public for long-term ecosystem management.

United States Military Bases

Tyndall AFB owns a large tract within the St. Andrew Bay watershed. This land supports a large variety of natural habitat types as well as large areas of intensive development. Tyndall has a program for wildlife and timber management and is responsible for the management and protection of threatened and endangered species inhabiting their land. The U.S. Air Force also owns approximately 425 acres on Cape San Blas. Activities conducted on this site include support of Eglin Gulf Test Range air operations, launch and tracking of surface-to-air missiles, and ground training operations (Eglin AFB 1999).

The Naval Coastal System Station (CSS) is located on St. Andrew Bay and has been intensively developed. Some undeveloped forested land and land recovering from deforestation is present on the base property. As a federal installation, CSS would be responsible for compliance with federal laws regarding habitat management and wildlife management.

The U.S. Coast Guard has a station adjacent to the CSS on St. Andrew Bay. One of the Coast Guard's many responsibilities is the containment and removal of spills of hazardous materials in the marine and estuarine environment of the watershed. The Coast Guard has developed contingency plans to process hazardous material spills and maintains containment equipment in Panama City.

<u>Outstanding Florida Waters (OFW)</u>

Rule 62-302.700, F.A.C. directs that the "highest protection" be provided to waters designated as OFW. No degradation to water quality is allowed in these waters other than as provided in Rule 62-4.242 (2) and (3), F.A.C. Within OFWs, dredge and fill activities may not be permitted unless they are deemed "clearly in the public interest" (Section 403.918, F.S.).

Waters within the St. Andrew and St. Joseph Bay watersheds that are designated as OFW include waters within state parks and recreation areas, aquatic preserves, other designated special waters,

the National Seashore, and lands acquired under the Environmentally Endangered Lands, Conservation and Recreation Lands (CARL), and Save Our Coast programs (program areas). Specific OFWs within the St. Andrew and St. Joseph bay SWIM planning area are illustrated in Figure 9 and include the following:

- Lake Powell;
- St. Andrew State Recreation Area;
- St. Andrew State Recreation Area Aquatic Preserve;
- T.H. Stone Memorial St. Joseph Peninsula State Park;
- St. Joseph Bay Aquatic Preserve;
- Pig Island Unit of the St. Vincent National Wildlife Refuge, St. Joseph Bay; and
- Portions of the Point Washington CARL acquisition area within the St. Andrew Bay watershed, including Camp Helen State Recreation Area, Deer Lake State Park, and Grayton Beach State Recreation Area.

Aquatic Preserves

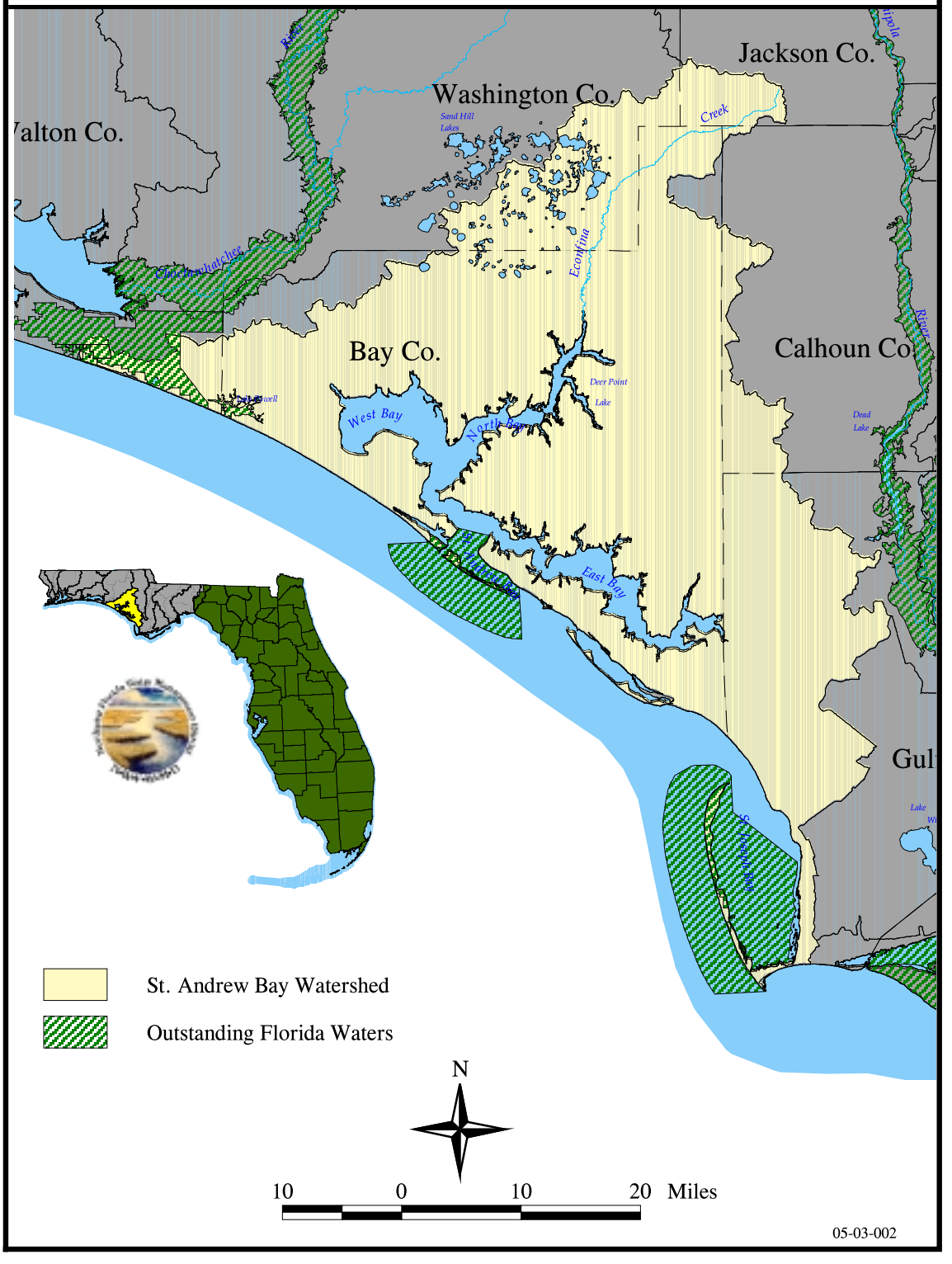
The St. Joseph Bay and St. Andrew State Park aquatic preserves are recognized as exceptional water resources by the state of Florida. The St. Joseph Bay Aquatic Preserve covers approximately 73,000 acres in the bay and adjacent Gulf of Mexico waters, including tidal lands, islands, sand bars, submerged bottoms, and land waterward of mean high water to which the state holds title. The St. Andrew State Recreation Area Aquatic Preserve contains about 25,000 acres located below the mean high water line within the waters of St. Andrew Bay and the Gulf.

These areas were designated as preserves by the Florida Legislature for the purpose of preserving their biological resources and maintaining these resources in an essentially natural condition. The preserves are managed by the DEP, Office of Coastal Aquatic Managed Areas. Section 258.36, F.S., directs that "...state-owned submerged lands in areas which have exceptional biological, aesthetic, and scientific value..." be set aside as aquatic preserves for the benefit of future generations. In general, the following provisions apply to aquatic preserves:

- no further sale, lease, or transfer of state-owned submerged lands unless it is in the public interest;
- no bulkhead line waterward of mean high water with the exception of those required by roads or bridges in the public interest for which no reasonable alternative exists;
- no oil or gas drilling;
- no dredging or filling, with limited exceptions provided under Section 258.42 (3), F.S.;
- no mineral excavation;
- no structures other than private docks; commercial docks in the public interest; utility crossings, navigational aids, or shore protection structures as provided under Section 258.42 (3), F.S.; and
- no waste or effluent discharges inconsistent with the purposes of the preserve.

Additionally, management regulations are to be conducted in "such a manner as not to unreasonably interfere with lawful and traditional public uses…such as sport and commercial fishing, boating, and swimming" (Section 258.43(3), F.S).

Figure 9 Outstanding Florida Waters in the St. Andrew Bay Watershed and Vicinity



Preserve waters are intensively used for recreational and commercial fish and shellfish harvesting, boating, scuba diving, snorkeling, swimming, and other water related activities. As the preserves include waters entering and exiting the bays during each tidal cycle, maintaining their condition requires protecting water quality throughout the waterbodies. Intensive recreational, commercial, and navigation uses have the potential to adversely affect preserve resources and increase the challenge of achieving the goals of the Aquatic Preserve Program.

Classification of Surface Waters

The state's surface waters have been classified according to their "designated use," which is defined as their "present and future most beneficial use" (Chapter 62-302, F.A.C.). Waters are classified I through V, with Class I generally having the most stringent standards and Class V the least. Classifications and designated uses are:

- Class I – Potable Water Supplies;
- Class II – Shellfish Propagation or Harvesting;
- Class III – Recreation, Propagation, and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife;
- Class IV – Agricultural Water Supplies; and
- Class V – Navigation, Utility, and Industrial Use.

Most of the tributaries and lakes within the St. Andrew and St. Joseph Bay systems are Class III waters. There are some exceptions. Class I designated waters include Deer Point Reservoir, Bayou George Creek, Bear Creek, Big Cedar Creek, and Econfina Creek. Class II waters include portions of East, North and West bays as well as waters within the St. Joseph Bay Aquatic Preserve and Indian Lagoon.

CHAPTER VI. REFERENCES

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APPENDIX A. LISTED BIOTA OF THE ST. ANDREW BAY WATERSHED

The following tables of species considered protected by state and federal agencies are presented by major groups of organisms. The sources of the tables are provided below. The Florida Department of Agriculture and Consumer Affairs, through the Endangered Plant Advisory Council, is responsible for determining the status of protected plants. The Florida Fish and Wildlife Conservation Commission is responsible for determining the status of protected animals, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service are responsible for determining the status of plants and animals under the federal Endangered Species Act. The tables provided below are constructed in a similar fashion. The heading Florida refers to the status of the organism as determined by state agencies, the heading Federal refers to the status as provided by federal agencies, and County indicates the county or counties within the watershed where a given organism may be found. The designations are; E = endangered, T = threatened, SSC = species of special concern, N = not listed, B = Bay County, C = Calhoun County, G = Gulf County, J = Jackson County, Wa = Walton, and W = Washington County.

Bay County is the only county entirely within the St. Andrew Bay watershed. Therefore, those protected species known to occur in Bay County are confirmed as present in the watershed. It was not possible, within the time available, to determine the exact locations of the species listed as protected in the other counties in the watershed. Therefore, some to many of the protected species listed for the other counties may not actually occur within the St. Andrew Bay watershed. Species designated as protected in the official documents change periodically, and one should consult the most recent document for the current designations and status.

Vascular Plants

Wunderlin et. al. (1996) listed 856 species and varieties of vascular plants from Bay County. In 1998, the BEST received a grant from the Norcross Wildlife Foundation to perform a survey of the vascular plants of Bay County and to develop a herbarium for the specimens collected. Keppner and Keppner (1999) completed the work and provided 1000 specimens of over 900 species from Bay County for the herbarium and a list of the vascular plants reported from Bay County. That work has continued and the current list of vascular plants known from Bay County currently totals 1,253 species in 524 genera in 152 families. The work has added an additional 395 species to the list provided by Wunderlin et. al. (1996). The 1,253 species known from Bay County represents 31 percent of the 4,012 species listed for the State of Florida by Wunderlin et. al. (1996).

The lists of vascular plants from the other counties in the watershed were obtained from Wunderlin et. al. (1996). According to that work, there are 844 species known from Calhoun County, 726 species known from Gulf County, 1,377 from Jackson County, 1,275 from Walton County, and 804 from Washington County. There is, of course, a significant similarity in species between the counties so that a simple addition of the number of species from each county is not valid. The following table of protected vascular plants was taken from the Florida Department of Agriculture and Consumer Affairs document prepared by Coile (1998). Scientific and common names are from Coile (1998). The federal status of the plants on the list was obtained from Marois (1998).

Animals

The animals that are designated as protected in the watershed were obtained from Wood (1996) and from the document dated 1997 on the Florida Game and Fresh Water Fish Commission website. Neither reference provided information pertaining to the counties from which each species is known. However, Peterson (1997) did provide a list of the counties from which the species designated as protected at the time of his compilation have been reported. This document was used to determine the protected animals that occur in the counties in the St. Andrew Bay watershed. Additional records of protected birds were obtained from Loftin et. al. (1987).

Protected Plants in the St. Andrew Bay Watershed

Scientific Name	Common Name	State	Federal	Counties
Andropogon arctatus	Pinewood Bluestem	T	N	C,G,J,Wa,W
Arabis canadensis	Sicklepod	E	N	J
Aristida simpliciflora	Chapman's Threeawn	E	N	J
Aristolochia tomentosa	Pipevine	E	N	B,C,G,J,W
Asclepias viridula	Green Milkweed	T	N	B,G,Wa,W
Asplenium verecundum	Delicate Sleenwort	E	N	J
Aster hemisphericus	Aster	E	N	W
Aster spinulosus	Pinewoods Aster	E	N	B,C,G,W
Baptisia hirsuta	Hairy Wild Indigo	T	N	Wa
Baptisia megacarpa	Apalachicola Wild Indigo	E	N	W
Baptisia simplicifolia	Scare-weed	T	N	Wa
Bigelowia nuttallii	Nuttall's Rayless Goldenrod	E	N	W
Brickellia cordifolia	Flyer's Nemesis	E	N	J
Bumelia lycioides	Buckthorn7	E	N	J
Bumelia thornei	Thorn's Buckthorn	E	N	G,J
Cacalia diversifolia	Indian-plantain	T	N	C,J,Wa,W
Calamintha dentata	Toothed Savory	T	N	B,J,Wa,W
Calamovilfa curtissii	Curtiss's Sandgrass	T	N	B,Wa
Callirhoe papaver	Poppy Mallow	E	N	J
Calopogon multiflorus	Many-flowerd Grass Pink	E	N	Wa
Calycanthus floridus	Sweetshrub	E	N	J,Wa
Calystegia catesbaeiana	Catesby's Bindweed	E	N	J
Carex baltzellii	Baltzell's Sedge	T	N	B,C,W
Cheilanthes microphylla	Southern Lip Fern	E	N	W
Chrysopsis cruiseana	Cruise's Goldenaster	E	N	B,Wa
Chrysopsis godfreyi	Godfrey's Goldenaster	E	N	B, Wa
Cleistes divaricata	Spreading Pogonia	T	N	B,C,G,Wa
Coelorachis tuberculosa	Florida Jointail	T	N	B*,W
Coreopsis integrifolia	Fringleaf Tickseed	E	N	C,J,W
Cornus alternifolia	Pagoda Dogwood	E	N	C,J,W
Crataegus phaenopyrum	Washington Thorn	E	N	W
Cryptotaenia canadensis	Honewort	E	N	J
Cuphea aspera	Tropical Waxweed	E	N	C,G
Dirca palustris	Leatherwood	E	N	J
Drosera filiformis	Threadleaf Sundew	E	N	B,W
Drosera intermedia	Water Sundew	T	N	B,C,G,Wa
Epigea repens	Trailing Arbutus	E	N	Wa
Eriocaulon nigrobracteatum	Darkheaded Hatpins	E	N	B,C
Euphorbia commutata	Wood Spurge	E	N	J
Euphorbia telephioides	Telephus Spurge	E	N	B,G
Forestiera godfreyi	Godfrey's Swamp Privet	E	N	J
Gentiana pennelliana	Wiregrass Gentian	E	N	B,C,G,W
Hexalectris spicata	Crested Coralroot	E	N	C,J
Hexastylis arifolia	Heartleaf Wild Ginger	T	N	Wa,W
Hymenocallis henryae	Henry's Spiderlily	E	N	B,G,Wa
Hypericum lissophloeus	Smoothbark St. John's-wort	E	N	B,W
Ilex amelanchier	Serviceberry Holly	T	N	J
Illicium floridanum	Florida Anise	T	N	B,J,Wa,W

Isopyrum biternatum	False Rue-anemone	E	N	J,W
Isotria verticillata	Whorled Pogonia	E	N	W
Juncus gymnocarpus	Coville's Rush	E	N	B,Wa,W
Justicia crassifolia	Thickleaved Waterwillow	E	N	G
Kalmia latifolia	Mountain Laurel	T	N	B,C,Wa,W
Lachnocaulon digynum	Panhandle Bog Buttons	T	N	B,C,Wa
Liatris provincialis	Godfrey's Gayfeather	E	N	B*
Lilium catesbaei	Catesby Lily	T	N	B,C,G,J,Wa,W
Lilium iridollae	Panhandle Lily	E	N	Wa
Lilium michauxii	Carolina Lily	E	N	J
Linum westii	West's Flax	E	N	C,G,J
Listera australis	Southern Tway Blade	T	N	J
Lobelia cardinalis	Cardinal Flower	T	N	C,J,Wa
Lupinus westianus	Gulf Coast Lupine	T	N	B,G,Wa,W
Macbridea alba	White Birds-in-a-nest	E	T	B,G
Macrantha flammea	Hummingbird Flower	E	N	B,C,J,Wa
Magnolia ashei	Ashe's Magnolia	E	N	B,Wa,W
Magnolia pyramidata	Pyramid Magnolia	E	N	B,C,J,Wa
Malaxis uniflora	Green Addersmouth	E	N	J,W
Malus angustifolia	Southern Crabapple	T	N	C,J,Wa,W
Marshallia obovata	Barbara's Buttons	E	N	J
Marshallia ramosa	Barbara's Buttons	E	N	W
Matelea alabamensis	Alabama Spinypod	E	N	J
Matelea baldwiniana	Baldwin's Spinypod	E	N	J
Matelea flavidula	Yellowflowered Spinypod	E	N	W
Matelea gonocarpus	Angle-pod	T	N	B,C,G,J,W
Opuntia stricta	Shell Mound Prickly Pear	T	N	G,Wa
Oxypolis greenmanii	Giant Water-dropwort	E	N	B,C,G
Pachysandra procumbens	Allegheny Spurge	E	N	J
Paronychia chartacea	Papery Whitlow-wort	E	T	B,W
Pellaea atropurpurea	Hairy Cliff-brake Fern	E	N	W
Physocarpus opulifolius	Ninebark	E	N	C,J
Physostegia godfreyi	Apalachicola Dragonhead	T	N	B,C,G,Wa
Pinckneya bracteata	Fever Tree	T	N	B,C,G,J,W
Pinguicula ionantha	Panhandle Butterwort	E	T	B,G
Pinguicula lutea	Yellow Butterwort	T	N	B,C,G,J,Wa,W
Pinguicula planifolia	Swamp Butterwort	T	N	B,C,G,J,Wa,W
Pinguicula primuliflora	Primrose-flowered Butterwort	E	N	B,Wa,W
Platanthera blephariglottis	Whitefringed Orchid	T	N	J,Wa,W
Platanthera ciliaris	Yellowfringed Orchid	T	N	B,C,J,Wa,W
Platanthera clavellata	Green Rein Orchid	E	N	C
Platanthera integra	Orange Rein Orchid	E	N	C,G,J,Wa,W
Platanthera nivea	Snowy Orchid	T	N	B,C,J,Wa,W
Podophyllum peltatum	Mayapple	E	N	J
Pogonia ophioglossoides	Rose Pogonia	T	N	B,C,G,Wa,W
Polygonella macrophylla	Largeleaf Jointweed	T	N	B,Wa
Polymnia laevigata	Tennessee Leaf-cup	E	N	J
Quercus arkansana	Arkansas Oak	T	N	C,Wa
Rhexia parviflora	Apalachicola Meadowbeauty	E	N	B,C,G
Rhexia salicifolia	Panhandle Meadowbeauty	T	N	B,C,Wa,W
Rhododendron austrinum	Florida Flame Azalea	E	N	C,J,Wa,W

Rhododendron chapmanii	Chapman's Rhododendron	E	E	G
Rhynchospora stenophylla	Narrowleaf Beakrush	T	N	B,Wa,W
Rudbeckia nitida	St. John's Susan	E	N	B
Ruellia noctiflora	Nightflowering Ruellia	E	N	G,J
Salix eriocephala	Heartleaved Willow	E	N	J
Salvia urticifolia	Nettle-leaved Sage	E	N	J
Sarracenia leucophylla	Whitetop Pitcher Plant	E	N	B,C,G,Wa
Sarracenia psitticina	Parrot Pitcher Plant	T	N	B,C,G,J,Wa,W
Sarracenia purpurea	Decumbent Pitcher Plant	T	N	B,C,Wa,W
Schisandra coccinea	Bay Star Vine	E	N	J,W
Scutellaria floridana	Florida Skullcap	E	T	B,G
Spigelia gentianoides	Gentian Pinkroot	E	E	C,J,W
Spiranthes laciniata	Lace-lip Ladies'-tresses	T	N	B
Spiranthes longilabris	Long-lip Ladies'-tresses	T	N	G
Spiranthes ovalis	Lesser Ladies'-tresses	E	N	J
Spiranthes tuberosa	Little Pearl-twist	T	N	J,W
Stachydeoma graveolens	Mock Pennyroyal	E	N	B,C
Stenorrhynchos lanceolatus	Leafless Beaked Orchid	T	N	Wa
Stewartia malacodendron	Silky Camelia	E	N	B,C,Wa,W
Tephrosia mohrii	Pinelands Hoarypea	T	N	Wa
Thalictrum cooleyi	Cooley's Meadow-rue	E	E	Wa
Tipularia discolor	Crane-fly Orchid	T	N	J,Wa
Trillium lancifolium	Narrowleaf Trillium	E	N	J
Verbesina chapmanii	Chapman's Crownbeard	T	N	B,C,G,J,Wa
Xanthorhiza simplicissima	Yellowroot	E	N	J,Wa
Xyris chapmanii	Chapman's Yelloweyed Grass	E	N	C
Xyris isoetifolia	Quillwort Yelloweyed Grass	E	N	B,G,W
Xyris longisepala	Karst Yelloweyed Grass	E	N	B,Wa,W
Xyris lousianica	Kral's Yelloweyed Grass	E	N	C
Xyris scabrifolia	Harper's Yelloweyed Grass	T	N	B,C,G,J,Wa
Zephranthes atamasco	Rainlily	T	N	J,Wa
Zigadenus leimanthoides	Coastal Death Camas	E	N	Wa

Protected Animals in the St. Andrew Bay Watershed

Scientific Name	Common Name	State	Federal	Counties
Invertebrates				
Procambarus econfinae	Panama City Crayfish	SSC	N	B
Freshwater Fish				
Acipenser oxyrhyncus desotoi	Gulf Sturgeon	SSC	T	B,C,G,Wa
Notropis melanostomus	Blackmouth Shiner	E	N	Wa
Pteronotropis welaka	Bluenose Shiner	E	N	Wa
Amphibians				
Ambystoma cingulatum	Flatwoods Salamander	N	T	C,J.Wa,W
Hyla andersonii	Pine Barrens Treefrog	SSC	N	Wa
Rana capito	Gopher Frog	SSC	N	B,C,G,J,Wa,W
Rana okaloosae	Florida Bog Frog	SSC	N	Wa

Reptiles					
Alligator mississippiensis		American Alligator	SSC	T	B,C,G,J,Wa,W
Caretta caretta		Atlantic Loggerhead Turtle	T	T	B,G,Wa
Chelonia mydas		Atlantic Green Turtle	E	E	B,G,Wa
Dermochelys coriacea		Leatherback Turtle	T	T	B,G,Wa
Drymarchon corias couperi		Eastern Indigo Snake	T	T	B,C,J,Wa,W
Gopherus polyphemus		Gopher Tortoise	SSC	N	B,C,J,G,Wa,W
Graptomys barbouri		Barbour's Map Turtle	SSC	N	G
Macroclemys temminckii		Alligator Snapping Turtle	SSC	N	C,G,Wa,W
Pituophis melanoleucas		Florida Pine Snake	SSC	N	B,C,Wa,W
Birds					
Ajaia ajaja		Roseate Spoonbill	SSC	N	B*
Aramus guarauna		Limpkin	SSC	N	B*,G,J
Charadrius melodus		Southeastern Snowy Plover	T	T	B,G
Cistothorus palustris marianae		Marian's Marshwren	SSC	N	B
Egretta caerulea		Little Blue Heron	SSC	N	B,C,G,J,Wa,W
Egretta rufescens		Reddish Egret	SSC	N	B
Egretta thula		Snowy Egret	SSC	N	B,C,G,J,Wa,W
Egretta tricolor		Tricolored Heron	SSC	N	B
Eudocimus albus		White Ibis	SSC	N	C,J
Falco peregrinus		Peregrine Falcon	E	N	B,Wa
Falco sparvarius paulus		Southeastern American Kestrel	T	N	B,Wa
Grus canadensis		Florida Sandhill Crane	T	N	B*
Haematopus palliatus		American Oystercatcher	SSC	N	B,G
Haliaeetus leucocephala		Bald Eagle	T	T	B,G
Myctera americana		Wood Stork	E	E	C,G,J
Pandion haliatus		Osprey	SSC	N	B,G,J
Picoides borealis		Red-cockaded Woodpecker	T	E	B,Wa
Rhynchops niger		Black Skimmer	SSC	N	B,G,Wa
Sterna antillarum		Least Tern	T	N	B,G

* records in Loftin et. al. 1987

Mammals					
Myotis grisescens		Gray Bat	E	E	J,W
Myotis sodalis		Indiana Bat	E	E	J
Peromyscus allophrys	*polionotus*	Choctawhatchee Beach Mouse	E	E	B,Wa
Peromyscus peninsularis	*polionotus*	St. Andrews Beach Mouse	E	N	B,G
Sciuris niger shermani		Sherman's Fox Squirrel	SSC	N	W
Tamias striatus		Eastern Chipmunk	SSC	N	Wa
Trichechus manatus		West Indian Manatee	E	E	B,G,Wa
Ursus americanus		Florida Black Bear	T	N	B,C,G

APPENDIX B. PREVIOUS & CURRENT RESEARCH ACTIVITIES IN THE ST. ANDREW BAY WATERSHED

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1. PROJECT: A preliminary search for the Panama City crayfish, *Procambarus (Leconticambarus) Eeconfinae,* Hobbs, 1942, in Bay County, Florida

RESEARCHER(S): Edwin J. Keppner and Lisa A. Keppner

INSTITUTION(S): Submitted to U.S. Fish and Wildlife Service

COMPLETION DATE: 2000

DESCRIPTION: The purpose of this preliminary study was to determine if the protected Panama City Crayfish, *Procambarus (Leconticambarus) Eeconfinae* Hobbs, 1942 is still present in Bay County. The study also wanted to note any other crayfish species encountered while searching for the Panama City Crayfish. The Panama City Crayfish was located at four sites. Three additional species of crayfish were collected in Bay and Gulf County.

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2. PROJECT: A Compilation of the Information Pertaining to Lake Powell, Bay County, Florida

RESEARCHER(S): Keppner, E.J., and Keppner, L.A.

INSTITUTION(S): Submitted to Bay County Board of County Commissioners

COMPLETION DATE: 2000

DESCRIPTION: The purpose of the report was to provide a compilation of existing information regarding Lake Powell, provide some history, examine factors that may harm the lake, and provide recommendations of lake needs.

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3. PROJECT: A Preliminary Survey of Four Protected Species of Vascular Plants, with Emphasis on Smooth-barked St. John's-wort (*Hypericum lissophloeus* Adams), on the Land Owned by the Northwest Florida Water Management District in Bay and Washington Counties, Florida

RESEARCHER(S): Keppner, L.A., and Keppner, E.J.

INSTITUTION(S): Bay Environmental Study Team; U.S. Fish and Wildlife Service

COMPLETION DATE: 1999

DESCRIPTION: A preliminary survey of four species of protected vascular plants was completed in the Sand Hill Lakes region of Bay and Washington counties. The primary species of interest was *Hypericum lissophloeus* Adams (smooth-barked St. John's-wort). The other species surveyed for included *Xyris longisepala* Kral (Kral's yelloweyed grass), *Xyris isoetifolia* Kral (quillwort yelloweyed grass), and *Rhexia salicifolia* Kral and Bostick (Panhandle meadowbeauty). The presence of *Drosera filiformis* Raf. (threadleaf sundew) was also noted where observed. A subjective evaluation of the abundance of *H. lissophloeus* was also made. Results included completion of the document "A Preliminary Survey of Four Protected Species of Vascular Plants, with Emphasis on smooth-barked St. John's-wort (*Hypericum lissophloeus* Adams), on the Land Owned by the Northwest Florida Water Management District in Bay and Washington Counties, Florida" and its submission to the U.S. Fish and Wildlife Service and Northwest Florida Water Management District.

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4. PROJECT: Report of findings for a Level II water quality based effluent limitation water quality study for the proposed City of Lynn Haven surface water discharge to St. Andrew Bay, Florida

RESEARCHER(S): Hartman & Associates and Panhandle Engineering

COMPLETION DATE: 1999

DESCRIPTION: This study includes water quality data and impact assessment, survey of benthic invertebrates, sediments, and hydrography related to the proposed sewage treatment plant discharge into St. Andrew Bay, near Martin Lake.

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5. PROJECT: Cape San Blas Final Programmatic Environmental Assessment

INSTITUTION(S): Eglin Air Force Base

COMPLETION DATE: 1999

DESCRIPTION: The cumulative environmental impacts of all current and anticipated future testing and training operations conducted on Eglin's Cape San Blas property is analyzed in this Programmatic Environmental Assessment.

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6. PROJECT: Movement of gag, Myteroperca microlepis, in and from St. Andrew Bay, Florida

RESEARCHER(S): Heinisch, Bruce V. and William A. Fable

COMPLETION DATE: 1999

DESCRIPTION: Researchers tagged and released 250 gag groupers. Recaptures showed that most juvenile gag overwinter in St. Andrew Bay.

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7. PROJECT: St. Andrews Bay Entrance Inlet Management Study; Feasibility and design investigation of the effects of the St. Andrews Bay entrance on the adjacent beaches

RESEARCHER(S): Dombrowski, Michael R.

COMPLETION DATE: 1999

DESCRIPTION: This is a study of shoreline changes, littoral drift, erosion rate, hydrology, and coastal sedimentology of the East Pass (Old Pass) of St. Andrew Bay.

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8. PROJECT: Managing the Nearshore Waters of Northwest Florida: St. Andrew Bay

INSTITUTION(S): Bay Environmental Study Team

COMPLETION DATE: 1998

DESCRIPTION: A Management Plan was developed for the St. Andrew Bay Ecosystem by the Bay Environmental Study Team (BEST) and Florida DEP, with support from the Florida DCA, Coastal Management Program, and U.S. Department of Commerce, NOAA. Results included completion of "A Look to the Future: A Management Plan for the St. Andrew Bay Ecosystem."

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9. PROJECT: Environmental Contaminants Evaluation of the St. Andrew Bay System

RESEARCHER(S): M. Brim.

INSTITUTION(S): U.S. Fish and Wildlife Services

COMPLETION DATE: 1998

DESCRIPTION: A comprehensive 12-year study (1985-1997) of the chemical contaminant concentrations in the sediments and selected biota (fishes and invertebrates) of St. Andrew Bay. Contaminants analyzed include metals, pesticides, PCB, PAH, hydrocarbons, biphenyl, dibenzofuran and dioxin. Results included publication of the report: **"**Environmental Contaminants Evaluation of the St. Andrew Bay System, Florida: Volumes I-III,**"** USFWS Publication PCFO-EC98-01.

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10. PROJECT: A Look to the Future: a Management Plan for the St. Andrew Bay Ecosystem

INSTITUTION(S): Bay Environmental Study Team and Florida DEP

COMPLETION DATE: 1998

DESCRIPTION: This is a comprehensive overview of St. Andrew Bay, its biota, environmental conditions and problems, and a plan for improving and preserving the bay and its ecosystem.

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11. PROJECT: Annual and triennial reevaluation of the North Bay shellfish harvesting area (#10), Bay County, for the 1997 calendar year

RESEARCHER(S): Edwards, Patrice

INSTITUTION(S): Florida DEP

COMPLETION DATE: 1998

DESCRIPTION: This study includes an analysis of pollution sources, water quality, and recommended classification of shellfish harvesting waters.

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12. PROJECT: Abundance and size of gulf (Paralichthys albigutta) and southern (P. lethostigma) flounders during fall movements in St. Andrew Bay, Florida, 1979-1984

RESEARCHER(S): Trent, Lee

COMPLETION DATE: 1998

DESCRIPTION: This study describes the seasonal occurrence and movements of these two flounders in St. Andrew Bay.

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13. PROJECT: Delineation of the Floridan Aquifer Zone of Contribution for Econfina Creek and Deer Point Lake

RESEARCHER(S): Richards, Chris

COMPLETION DATE: 1997

DESCRIPTION: Data collection and analysis were completed to delineate the Floridan Aquifer Zone of Contribution for Econfina Creek and Deer Point Lake. Results included publication of "Delineation of the Floridan Aquifer Zone of Contribution for Econfina Creek and Deer Point Lake: Bay and Washington Counties, Florida," NWFWMD Water Resources Special Report 97-2.

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14. PROJECT: Boaters guide to St. Andrew Bay

INSTITUTION(S): Florida Department of Environmental Protection

COMPLETION DATE: 1997

DESCRIPTION: This map of St. Andrew Bay includes location of boat ramps, marinas, seagrass beds, tidal marshes, aquatic preserves, and conservation information.

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15. PROJECT: Size and density dependent mating tactics in the simultaneously hermaphroditic seagrass Serranus subligarius (Cope, 1870)

RESEARCHER(S): Oliver, Ann S.

COMPLETION DATE: 1997

DESCRIPTION: This paper describes the mating behavior of the belted sandfish, observed at the jetties of St. Andrews State Park.

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16. PROJECT: St. Joseph Bay Aquatic Preserve Management Plan

INSTITUTION(S): DEP, Bureau of Coastal and Aquatic Managed Areas.

COMPLETION DATE: 1997

DESCRIPTION: The objective of this plan was to protect the preserve's natural resources for the benefit of future generations. Onsite management activities include actions by field personnel to protect plant communities, animal life, geologic features, archeological sites, and water resources of the preserve. This document was published in 1997. Following publication, it was adopted by reference into the existing aquatic preserves rule, Chapter 18-20, F.A.C..

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17. PROJECT: City of Panama City Beach wastewater treatment facility water quality based limit level II study on West Bay

RESEARCHER(S): Baskerville-Donovan, Inc., Hydroqual, Inc., and Vittor and Associates

COMPLETION DATE: 1997

DESCRIPTION: This study was undertaken in order to evaluate the discharge of the wastewater treatment plant located in Panama City Beach. This study included an examination of hydrodynamics and water quality in West Bay; dissolved oxygen; total nitrogen; effluent metals; benthic communities and seagrasses.

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18. PROJECT: An assessment of molluscan shellfish resources in West Bay, Bay County, FL.

RESEARCHER(S): Cake, Edwin W., Jr., Cirino, John, and Hydroqual, Inc.

COMPLETION DATE: 1997

DESCRIPTION: This is a survey of the oyster and clam resources of West Bay. It includes information regarding location, density, size and apparent health of the populations.

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19. PROJECT: Inventory of biological resources of the St. Andrew Bay System

RESEARCHER(S): Keppner, E.J.

INSTITUTION(S): Bay Environmental Study Team

COMPLETION DATE: 1996

DESCRIPTION: The purpose of this paper was to create an inventory of biological resources in St. Andrews Bay. Results included completion of "An Inventory of the Biological Resources Reported from the St. Andrew Bay Estuarine System, Bay County, Florida."

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20. PROJECT: Ecology study of St. Andrew Bay

INSTITUTION(S): Gulf Coast Community College

COMPLETION DATE: 1996

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21. PROJECT: Cape San Blas Ecological Study

RESEARCHER(S): Carl Petrick

INSTITUTION(S): Eglin AFB (lead agency), U.S. Fish and Wildlife Service, Florida DEP, FNAI, and the FGFWFC

STARTING DATE: 1993

COMPLETION DATE: 1996

DESCRIPTION: A study was conducted of U.S. Air Force Property on Cape San Blas to identify biological, geophysical, cultural, and historical resources. Prior to this study there were high rates of coastal erosion due to public beach driving and military operations. This study will aid the development of management strategies to protect and enhance area resources. It has provided base line data regarding the Cape's natural resources, information that is useful when evaluating the impacts of military operations on natural resources, and a better understanding of the impacts of public beach driving on natural resources in the area.

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22. PROJECT: Bay Scallop Larvae Recruitment Project

INSTITUTION(S): St. Joseph Bay Aquatic Preserve

COMPLETION DATE: Ongoing

DESCRIPTION: The scallop population in St. Joseph Bay decreased significantly during 1977-1998, compared with 1995-1996. This study has been initiated at four sites in the bay to identify the cause.

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23. PROJECT: "The effects of habitat structure on stone crabs: a test of the generality of the demographic bottleneck hypothesis"

RESEARCHER(S): Beck, M.W.

COMPLETION DATE: 1995

DESCRIPTION: The focus of this study was the limiting effects of habitat upon the population structure, growth and fecundity of stone crabs, Menippe mercenaria, in St. Joseph Bay.

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24. PROJECT: "Size-specific shelter limitation in stone crabs: a test of the demographic bottleneck hypothesis"

RESEARCHER(S): Beck, M.W.

COMPLETION DATE: 1995

DESCRIPTION: This was a study on the effects of available sheltering habitat on the reproduction and survival of stone crabs, Menippe mercenaria, in St. Joseph Bay.

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25. PROJECT: "Temporal and spatial patterns of dietary resource utilization in the echinoid lytechinus variegatus"

RESEARCHER(S): Beddingfield, Steven D., and James B. McClintock

COMPLETION DATE: 1995

DESCRIPTION: This study focused on the differences in growth, reproduction and recruitment of the sea urchin, lytechinus variegatus, in various seagrass habitats of St. Joseph's Bay.

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26. PROJECT: Volunteer water monitoring works--The Lake/Baywatch Program in St. Andrew Bay, Florida

RESEARCHER(S): Foster, John M.

COMPLETION DATE: 1995

DESCRIPTION: This paper describes the history and methodology of this volunteer water quality sampling program.

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27. PROJECT: "Bay scallop production among seagrass habitats"

RESEARCHER(S): Bologna, P.

COMPLETION DATE: 1995

DESCRIPTION: This was a study on scallop growth, population production, and predation rate in various seagrass beds in St. Joseph Bay.

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28. PROJECT: "Sea urchin herbivory: evidence for long-lasting effects in subtropical seagrass meadows"

RESEARCHER(S): Heck, K.L., Jr. and J.F. Valentine

COMPLETION DATE: 1995

DESCRIPTION: This is a study of the effects of sea urchin (Lytechinus variegatus) grazing upon seagrass beds in St. Joseph Bay

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29. PROJECT: "Indirect effects of a predatory gastropod in a seagrass community"

RESEARCHER(S): Kuhlmann, M.L.

COMPLETION DATE: 1995

DESCRIPTION: The ecological interaction between the pen shell, Atrina rigida**,** and its predator, the horse conch, Pleuroploca gigantea, in St. Joseph Bay, and its indirect effects upon other species.

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30. PROJECT: "Horse conch foraging behavior and indirect effects on fish reproduction"

RESEARCHER(S): Kuhlmann, M.L.

COMPLETION DATE: 1995

DESCRIPTION: The effects of predation of the horse conch (Pleuroploca gigantea) upon populations of pen shells (Atrina rigida), and its indirect effects on Florida blenny (Chasmodes saburrae) reproduction in St. Joseph Bay.

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31. PROJECT: Scarring of Florida's seagrasses: assessment and management options

RESEARCHER(S): Sargent, Frank J., Timothy J. Leary, and David W. Crewz

INSTITUTION(S): Florida Department of Environmental Protection

COMPLETION DATE: 1995

DESCRIPTION: This study includes information on the status of the seagrass beds in St. Joseph Bay.

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32. PROJECT: A general investigation of St. Andrew Bay, Florida

INSTITUTION(S): U.S. Army Corps of Engineers, Coastal Ecology Branch

COMPLETION DATE: 1995

DESCRIPTION: This report supplies a characterization of the marine environment in the vicinity of the navigation channel for Panama City Harbor. It includes information regarding water quality (temperature, salinity, pH, dissolved oxygen), chlorophyll a concentration, light transmission, zooplankton abundance and dominant taxa, sediments, benthic invertebrates, fishes, seagrass distribution and abundance, and current velocities.

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33. PROJECT: 1995 Hydrologic and ecologic design tools for the preservation and management of the Sweetbay Wetland, St. Andrew Bay

RESEARCHER(S): Bartel, Ronald L., Arteaga, Ruben, Ard, Felton B., Akula, Satish B., and Huffman, Daryl B.

INSTITUTION(S): Northwest Florida Water Management District

COMPLETION DATE: 1995

DESCRIPTION: This study used a hydrologic model to assist in the development of a management plan for a preservation wetland in Panama City.

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34. PROJECT: Bioassays of Stone Container Corporation sediment samples from St. Andrew Bay near Stone Container Corporation and near Pitts Street, Panama City, Bay County, Florida

INSTITUTION(S): Florida Department of Environmental Protection, Biology Section

COMPLETION DATE: 1995

DESCRIPTION: This study discusses the results of a bioassay using sediment samples take near Stone Container Corporation monitoring well. The sediment sample was found to be toxic to mysid shrimp, producing 50% mortality. There was no mortality of the silverside minnow.

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35. PROJECT: “Environmentally-induced catastrophic mortality of the sea urchin Lytechinus variegatus in shallow seagrass habitats of St. Joseph’s Bay, Florida”

RESEARCHER(S): Beddingfield, Steven D., and James B. McClintock

COMPLETION DATE: 1994

DESCRIPTION: The study addressed what caused catastrophic mortality of the sea urchins in 1993. It was discovered a combination of low air temperatures and extreme tides caused a die-off of these sea urchins during March 13-14, 1993.

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36. PROJECT: “Indirect effects of a predatory gastropod in a seagrass community”

RESEARCHER(S): Kuhlmann, M.L.

COMPLETION DATE: 1994

DESCRIPTION: This is a study of the interactions among the benthic populations in St. Joseph Bay. Researchers found that horse conchs (Pleuroploca gigantea), while preying upon other gastropods such as pen shells (Atrina rigida), create habitat for shell-occupying or shell-nesting species, such as crabs, octopus, and fish such as blennies (Hypsoblennius hentzi, Chasmodes saburrae) and clingfish (Gobiesox strumosus).

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37. PROJECT: “Effects of bioturbation in controlling turtle grass (Thalassia testudinum Banks ex Koenig) abundance: evidence from field enclosures and observations in northern Gulf of Mexico”

RESEARCHER(S): Valentine, J.F., K.L. Heck, Jr., P. Harper, and M. Beck

COMPLETION DATE: 1994

DESCRIPTION: This study focused on trying to determine biological species that control turtle grass (Thalassia testudinum Banks ex Koenig) in the northern Gulf of Mexico. It found that neither stingrays (Dasyatis americana) nor sand dollars (Mellitis quinquiesperforata) were the cause of the unvegetated patches in St. Joseph Bay. Stone crab (Menippe spp.) burrows did cause loss of turtle grass habitat at the seaward edge.

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38. PROJECT: “Age, growth rate, and size of the southern surf clam, Spisula solidissima similis (Say, 1882)”

RESEARCHER(S): Walker, R.L., and P.B. Heffernan

COMPLETION DATE: 1994

DESCRIPTION: This study compared growth rates of clams from Wassaw Island, Georgia, and St. Joseph Bay.

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39. PROJECT: Assessment of Best Management Practices (BMPs) (Deer Point Lake)

INSTITUTION(S): NWFWMD (lead agency), local governments in Deer Point Lake Watershed, HRS, DACS (Forestry)

STARTING DATE: 1990-91

COMPLETION DATE: 1994

DESCRIPTION: The objective of this project was to address degradation of water quality from nonpoint source pollution in Deer Point Lake. To accomplish this the following tasks were undertaken: review of existing silviculture BMPs and their application, assessment of statewide silviculture compliance programs, review of existing on-site wastewater system permitting process, management practices and the septic tank research program, development of recommendation for the proceeding, and production of a summary document. This was ultimately addressed within the Deer Point Nonpoint Source Assessment report. It was determined that silviculture represented the largest potential contributor of nonpoint source pollution. While the literature indicates recommended BMPs could minimize water quality impacts associated with the forest industry, compliance with these programs is hard to determine. Forestry BMPs are recommendations, and compliance relies upon self-regulation.

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40. PROJECT: Nonpoint Source Loading Rates (Deer Point Lake)

INSTITUTION(S): NWFWMD (lead agency), local governments in Deer Point Lake Watershed

STARTING DATE: 1990-91

COMPLETION DATE: 1994

DESCRIPTION: The objective of this project was to utilize land use loading information to serve as a basis for future land use considerations by identifying the current and potential water quality impacts of various land uses throughout the watershed. This project was designed to estimate the nonpoint source pollution loading rates that occur as a result of these land use changes. Potential water quality impacts per-acre were greatest for the urban land use categories of transportation/utilities, commercial, industrial, and high density residential. The results of the study reflected several areas of concern regarding potential nonpoint source pollution in the Deer Point Lake watershed. Although projected per-acre loading rates were lowest for silviculture areas, these areas included 54% of the acreage within the Deer Point Lake watershed and therefore accounted for the greatest total nonpoint source pollutant loadings.

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41. PROJECT: Pollution Potential of Specific Land Uses (Deer Point Lake)

INSTITUTION(S): NWFWMD (lead agency), DER

STARTING DATE: 1991-92

COMPLETION DATE: 1994

DESCRIPTION: Runoff from areas of access will be examined for expected pollutants (chemical and microbiological) during low and high rainfall periods. In addition, the pollution potential will be assessed. The products of this project will include a qualitative assessment of pollution potential from various waste disposal practices, an assessment of sedimentation from unpaved roads in the basin, as well as recommendations for actions to correct or prevent water quality degradation. Issues concerning this project were addressed within the Deer Point Lake nonpoint report. Existing land use cover within the Deer Point Lake watershed was aggregated into 15 categories based on similarities in loading characteristics. NPS loading rates were high for commercial, high density residential, and industrial. Low and medium density residential, institutional cropland/pasture, extractive, and transportation/utilities were areas of medium loading rates. Recreation open, silviculture, upland forests, lakes and streams, and spoil/barren all had low loading rates.

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42. PROJECT: Areas Unsuitable for Intense Development (Deer Point Lake)

INSTITUTION(S): NWFWMD

STARTING DATE: 1990-91

COMPLETION DATE: 1994

DESCRIPTION: The purpose of this project is to identify areas unsuitable for intense development in the watershed in order develop and implement preservation strategies such as buffers, conservation easements and land acquisition. This information will be used in conjunction with project P-01 to develop and implement a comprehensive preservation and land acquisitions program for the watershed. As part of the SWIM Program, an Environmentally Sensitive Areas report was completed in 1994 which identified ESAs within the Deer Point Lake watershed in order to characterize resource protection needs. The District's GIS was used to compile the best available data from several sources including the Federal Management Agency and the Soil Conservation Service. A series of maps identifying ESAs were produced to assist local governments in protecting the areas.

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43. PROJECT: Development of a Preservation and Land Acquisition Program (Deer Point Lake)

INSTITUTION(S): NWFWMD, Bay County, Washington County, Calhoun County, Jackson County, The Nature Conservancy, Florida Natural Areas Inventory (FNAI)

STARTING DATE: 1991-92

COMPLETION DATE: 1994

DESCRIPTION: Using the information and recommendation generated by Projects P-01 and P-02, critical habitats and areas unsuitable for intense development are prioritized for preservation action. The NWFWMD, in cooperation with local governments, other state agencies, and nonprofit organizations, will seek to provide buffers, acquire land or secure easements for priority sites. This project will be implemented in close coordination with the District's Lands Management program. Coordination with the District Land Acquisitions Program have been undertaken on an as-needed basis with the SWIM staff assisting in natural resource assessments for designated lands. The District currently owns a number of tracts scattered throughout the Econfina Basin and is actively pursuing numerous others.

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44. PROJECT: "Biosynthesis of sex steroids in the echinoid Lytechinus vaiegatus (Lamark)"

RESEARCHER(S): Hasan, A.S., G.A. Hines, and S.A. Watts

COMPLETION DATE: 1993

DESCRIPTION: This study was conducted on samples of sea urchins from St. Joseph Bay.

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45. PROJECT: "Second heritability estimates of growth rate in the southern bay scallop, Argopecten irradians concentricus (Say, 1822)"

RESEARCHER(S): Hefferman, P.B., F.L. Walker, and M. Ryan

COMPLETION DATE: 1993

DESCRIPTION: This study was focused on genetics and growth rates of southern bay scallops collected from St. Joseph Bay.

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46. PROJECT: Ecological evaluation of proposed dredged material from St. Andrew Bay, Florida

RESEARCHER(S): Mayhew, H. L et al.

INSTITUTION(S): Prepared for the U.S. Army Corps of Engineers

COMPLETION DATE: 1993

DESCRIPTION: This study was conducted to determine the environmental suitability for ocean disposal of material to be dredged from the Panama City Harbor channel. Sediments from St. Andrew Bay were analyzed for chemical composition, including metals, hydrocarbons and pesticides, and their toxicity and bioaccumulation in bioassay test organisms. Collections were made from 5 sites in St. Andrew Bay and 1 in the lagoon behind Shell Island.

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47. PROJECT: "Effects of temperature and salinity acclimation of adults on larval survival, physiology, and early development of Lytechinus variegatus (Echinodernata: Echinoidea)"

RESEARCHER(S): Roller, R.A., and W.B. Stickle

COMPLETION DATE: 1993

DESCRIPTION: This study was conducted using sea urchins taken from St. Joseph Bay.

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48. PROJECT: Environmental studies in St. Andrew Bay, Florida. Panama City, FL, Bay County Utilities Dept.

RESEARCHER(S): Hydroqual, Inc. and Barry A. Vittor & Assoc

COMPLETION DATE: 1993

DESCRIPTION: This is a thorough examination of the bay's ecology and water quality and was the most comprehensive study to date. It includes information regarding water quality parameters, hydrography, seagrasses, benthic invertebrates and sediments.

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49. PROJECT: Choosing a vision for St. Andrew Bay: a citizen's guide

RESEARCHER(S): Bay Environmental Study Team

COMPLETION DATE: 1993

DESCRIPTION: This handbook was prepared for a citizen's forum on the future of St. Andrew Bay and the environmental choices that are available. It includes basic information on the hydrography, biology and ecology of the bay, as well as some economic information.

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50. PROJECT: "Mussels in seagrass meadows; their influence in macroinvertebrate abundance and secondary production in the northern Gulf of Mexico"

RESEARCHER(S): Valentine, J.F., and K.L. Heck, Jr.

COMPLETION DATE: 1993

DESCRIPTION: A study of the mussel Modiolus americanus and other macroinvertebrate populations in the various seagrass beds of St. Joseph Bay.

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51. PROJECT: "Age, growth rate, and size of the southern surf clam, Spisula solidissima similis (Say, 1882)"

RESEARCHER(S): Walker, R.L., and P.B. Heffernan

COMPLETION DATE: 1993

DESCRIPTION: Two populations of the southern surf clam were studied. One was from Georgia and the other from St. Joseph Bay, Florida. It was noted that the Florida population tended to grow larger and live longer than the Georgia population.

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52. PROJECT: Environmental Studies in St. Andrew Bay: A Report to the Bay County Board of County Commissioners.

RESEARCHER(S): Hydroqual and Vittor; Bay County Board of County Commissioners

COMPLETION DATE: 1993

DESCRIPTION: A hydrologic model of St. Andrew Bay was developed for the Bay County Board of County Commissioners. The model was used to predict the movement and mixing of effluent from Bay County's Military Point Lagoon discharge. Currents and spatial and temporal variations of water levels, salinity, and temperature were modeled, and predicted effects of the discharge on water quality and the bay's biotic community were evaluated.

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53. PROJECT: Literature search on the St. Andrew Bay watershed and nearby coastal waters.

RESEARCHER(S): R.N. Shaffer

INSTITUTION(S): National Oceanic and Atmospheric Administration

COMPLETION DATE: 1993

DESCRIPTION: The purpose of this search was to compile information on St. Andrews Bay and nearby coastal waters. It resulted in the completion of the document "A Bibliography of Research on St. Andrew Bay, Its Tributaries, and the Nearby Coastal Waters of Bay County, Florida," NOAA Tech. Memo. NMFS-SEFSC-320.

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54. PROJECT: Final Report: A thermal plume characterization and environmental assessment: Warren Bayou and West Bay, St. Andrew Bay Lansing Smith Electric Generating Plant, Panama City, Florida

INSTITUTION(S): Law Environmental, Inc.

COMPLETION DATE: 1993

DESCRIPTION: This was a study of the effects of the Lansing Smith Plant's thermal discharge on the aquatic life in the receiving waters of the bay. It includes data regarding the hydrography of the

thermal plume, water quality, the seagrass communities, sediments, and benthic invertebrates. Comparisons are made between this study and previous studies on this discharge

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55. PROJECT: Hydrologic Gauging (Deer Point Lake)

INSTITUTION(S): NWFWMD (lead agency), DER

STARTING DATE: 1990-91

COMPLETION DATE: 1993

DESCRIPTION: In order to quantify the hydrologic regime of Deer Point Lake, the tributary streams must be gauged. Econfina Creek has a long period of record – the other streams have only limited discharge records. Hydrologic gauging stations will be established on Bear Creek, Big Cedar Creek and Bayou George Creek. Discharge measurements will continue for one year. This project was completed in 1993, but as a result of staffing constraints, it was not incorporated into the water quality and biological sampling program.

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56. PROJECT: Coordination of Management Plan (Deer Point Lake)

INSTITUTION(S): NWFWMD (lead agency), Bay, Washington, Jackson, and Calhoun counties.

STARTING DATE: 1990-91

COMPLETION DATE: 1993

DESCRIPTION: This project will continue to provide administrative support to ensure implementation of the Deer Point Lake Management Plan. This support includes: development of responsibilities and accountability for implementation of SWIM funded projects, determination of alternative funding mechanisms and securing of funds; coordinating all research funded by SWIM; coordinating with the Deer Point Lake Technical Advisory Committee; and coordination with the programs and projects of other federal, state, and local agencies. This project was combined with others concerning coordination efforts. What resulted was an Intergovernmental Coordination Element (ICE) that was adopted by rule in Chapter 9J-5.015, F.A.C., by the Department of Community Affairs. The local government ICE provides the opportunity for coordination among local governments on the land use planning and growth management issues to protect Deer Point Lake and the associated tributaries through coordinated watershed management.

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57. PROJECT: Impact of Future Development on Water Availability (Deer Point Lake)

INSTITUTION(S): NWFWMD (lead agency), Bay County, Washington County, Panama City

STARTING DATE: 1991

COMPLETION DATE: 1993

DESCRIPTION: This project will define and describe the ground water flow system that contributes to the Econfina Creek drainage basin. The following tasks will be included: conceptualization of the flow system, model calibration, data collection, and model predictions. The product will be a ground water flow model that is utilized as a lake-watershed management tool for evaluating seasonal and man-made stresses on the hydrologic system. This project has not been completed.

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58. PROJECT: St. Joseph Bay Aquatic Preserve Management Plan

INSTITUTION(S): Florida Department of Natural Resources, Bureau of Submerged Lands and Preserves.

COMPLETION DATE: 1992

DESCRIPTION: The purpose of this plan was to protect the plant communities, animal life, geologic features, archeological sites, and water resources of the preserve, while providing uses and activities that are compatible with resource protection. The plan includes a physical description of the area, biota, habitats; human uses, impacts, and management and research goals. The Management Plan was published in 1992.

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59. PROJECT: Water Quality and Biological Sampling Program (Deer Point Lake)

INSTITUTION(S): NWFWMD (lead agency), DER

STARTING DATE: 1990-91

COMPLETION DATE: 1992

DESCRIPTION: The objective of this project is to obtain monthly water quality and biological data to serve as baseline information to be used in conjunction with other associated Deer Point projects in development of appropriate management strategies. Future management and land use decisions will also be affected by the findings of this project. The results of this study can be found in a report entitled Biological Water Quality of the Deer Point Lake Drainage Basin (FDER 1992). Biological water quality measurements indicated good overall health of Deer Point Lake. However, a comparison of subbasins provided evidence of some silting problems in the Bear Creek subbasin, Moccasin Creek, and Bayou George subbasin. Elevated nutrient and bacterial concentrations were identified along Bayou George subbasin. In addition, comparatively higher concentrations of NPS loadings identified in the Bear Creek and Bayou George subbasins are consistent with greater acreages of intensive land use in these two subbasins.

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60. PROJECT: Comprehensive shellfish harvesting area survey of North Bay, Bay County, Florida.

RESEARCHER(S): Wiggins, David R., Hudson, Thomas J., and Barnett, Ernest L.

INSTITUTION(S): Florida Dept. of Natural Resources, Shellfish Environmental Assessment Section

COMPLETION DATE: 1992

DESCRIPTION: This environmental survey of the oyster harvesting areas in North Bay includes information regarding water quality, pollution, hydrography and bacteria.

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61. PROJECT: Shoreline Alteration (Deer Point Lake)

INSTITUTION(S): NWFWMD (lead agency), DER, DNR

STARTING DATE: 1990-91

COMPLETION DATE: N/A.

DESCRIPTION: This project will document the areas and magnitude of shoreline alteration practices in Deer Point Lake via development of “swimming beach” type areas and installation of bulkheads. Baseline information necessary for the development of the management practices to prevent water quality degradation from shoreline altercation will be provided. In addition, one or more sites will be selected for cultivation with natural vegetation and will be highlighted as an alternative to beaches, bulkheads and other alterations. This project has not been completed.

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62. PROJECT: Land Development Regulations and Comprehensive Plan Implementation (Deer Point Lake)

INSTITUTION(S): NWFWMD, Bay County, Washington County, Calhoun County, Jackson County

STARTING DATE: 1990-91

COMPLETION DATE:

DESCRIPTION: This project will provide technical assistance to local governments in the Deer Point lake watershed as they develop their comprehensive plans and land development regulations. The District will participate in the review and development of regulations and the programs which are related to the future management of Deer Point Lake and its watershed. Where appropriate, specific ordinance language will be recommended and specific program tasks will be suggested. Where applicable, products of the present and future SWIM projects will be utilized to assist in the development of management strategies which will afford Deer Point Lake with the appropriate level of protection. This project has not been completed.

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63. PROJECT: Assessment of Land Use and Vegetative Cover (Deer Point Lake)

INSTITUTION(S): NWFWMD

STARTING DATE: 1990-91

COMPLETION DATE: 1991

DESCRIPTION: Satellite imagery were utilized to map land use and vegetation cover. The best available data will be utilized to map historic and future land uses. The land use/cover data and map series was developed as part of the Deer Point Lake Land Use Report. The information can be used to quantify any of the specific land use categories within the watershed or to combine categories for different types of analysis.

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64. PROJECT: Intergovernmental Working Group (Deer Point Lake)

INSTITUTION(S): NWFWMD (coordination), Counties in the Watershed

STARTING DATE: 1990-91

COMPLETION DATE: 1994

DESCRIPTION: In this project a Joint Public Education and Awareness Committee consisting of representatives from the county school boards and representatives from public information departments of the NWFWMD and counties in the watershed will be created. Responsibilities will be shared more or less equally among members. Watershed advisor committees were created and consulted about issues. Pubic awareness of watershed issues affects acceptability of mandatory controls, effectiveness of voluntary controls, and the degree of support provided by public officials. This was considered an example of an effective public involvement method.

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65. PROJECT: Printed Materials (Deer Point Lake)

INSTITUTION(S): Joint Public Education and Awareness Committee, other agencies, organizations and businesses as needed

STARTING DATE: 1990-91

COMPLETION DATE: In progress/to be completed.

DESCRIPTION: The Joint Public Education and Awareness Committee will work together to develop written materials which address the following: watershed management, on-site stormwater treatment, regulatory and management programs affecting the lake, responsible recreational behavior, and public behavioral activity changes. This project seeks to foster awareness of the lake and issues surrounding it. A large number of printed pieces may be produced and distributed. There was discussion of watershed protection issues in utility newspapers.

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66. PROJECT: "Heritability of the growth rate in the southern bay scallop, Argopecten irradians concentricus (Say, 1822)"

RESEARCHER(S): Crenshaw, J.W., Jr., P.B. Heffernan, and R.L. Walker

COMPLETION DATE: 1991

DESCRIPTION: This study compared genetics and growth rates between populations of the southern bay scallop from Georgia and St. Joseph Bay.

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67. PROJECT: "The role of sea urchin grazing in regulating subtropical seagrass meadows: evidence from field manipulations in the northern Gulf of Mexico"

RESEARCHER(S): Valentine, J.F., and K.L. Heck, Jr.

COMPLETION DATE: 1991

DESCRIPTION: The focus of this study was the effect of the sea urchin grazing on seagrass meadows in the northern Gulf of Mexico. This study found sea urchin densities sufficient to cause overgrazing of seagrasses in St. Joseph Bay.

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68. PROJECT: St. Andrew Bay Phase I hydrodynamic and water quality modeling

RESEARCHER(S): Hydroqual, Inc.

COMPLETION DATE: 1991

DESCRIPTION: This study examines water quality and circulation patterns in the bay.

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69. PROJECT: "A recent history of the St. Joseph Bay Peninsula beaches, Florida, USA"

RESEARCHER(S): Orhan, Hukmu.

COMPLETION DATE: 1991

DESCRIPTION: This study focuses on the coastal changes of Cape San Blas and the St. Joseph Spit. Researchers noted that Cape San Blas is accrediting on its western side but eroding on the east. St. Joseph Spit has grown northwestward.

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70. PROJECT: St. Andrews State Park Aquatic Preserve Management Plan.

INSTITUTION(S): Florida Department of Natural Resources, Bureau of Submerged Lands Preserves

COMPLETION DATE: 1991

DESCRIPTION: The purpose of this plan was to provide a comprehensive description of the park and its fauna, flora and habitats, and measures taken to preserve them. The plan was completed in 1991.

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71. PROJECT: St. Joseph Bay Buffer CARL Project

INSTITUTION(S): Department of Environmental Protection, Division of Marine Resources, Bureau of Coastal and Aquatic Managed Lands

STARTING DATE: 1990

COMPLETION DATE: Ongoing project

DESCRIPTION: The state acquisition will include approximately 5,628 acres. This encompasses undeveloped coastal lands from Port St. Joe south to Cape San Blas Road, also including islands

beyond the salt marshes in the bay. An additional large track will include Richardson hammock and Blacks Island. This project will safeguard the water quality and productive seagrass beds of the bay by protecting the undeveloped land surrounding it. This also serves to ensure the survival of several rare plants, protect one of the best archeological sites in the Panhandle, and give the public a chance to enjoy the natural state of the bay.

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72. PROJECT: "Studies on the effects of the sea urchin Lytechinus variegatus in Thalassia testudinum seagrass meadows in St. Joseph Bay, Florida"

RESEARCHER(S): Valentine, J.F., and K.L. Heck, Jr.

COMPLETION DATE: 1990

DESCRIPTION: The purpose of this study was to determine what effect sea urchins had on seagrass meadows in St. Joseph Bay. This study reported sea urchins graze on seagrass. The researchers identified densities of sea urchins sufficient to overgraze the seagrass meadows in St. Joseph Bay.

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73. PROJECT: Life on a Gulf coast jetty

RESEARCHER(S): Foster, John M.

COMPLETION DATE: 1990

DESCRIPTION: This paper describes plants and animals found at the jetties in St. Andrews State Recreation Area.

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74. PROJECT: The St. Andrews State Park jetties

RESEARCHER(S): Hall, Roland

COMPLETION DATE: 1990

DESCRIPTION: This paper discusses the creation of the channel uniting the bay with the gulf, and the uses of the jetties.

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75. PROJECT: Analysis of the circulation and flushing characteristics of the St. Andrew Bay System

RESEARCHER(S): Rodriguez, J.A. and Wu, T.

INSTITUTION(S): Northwest Florida Water Management District

COMPLETION DATE: 1990

DESCRIPTION: This report describes the hydrodynamics of St. Andrew Bay and includes an inventory of point sources of water pollution. It resulted in the publication of the document "Initial analysis of Circulation and Flushing Characteristics of the St. Andrew Bay System," Northwest Florida Water Management District Water Resources Special Report 90-1.

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76. PROJECT: Germination, survival, and production of marsh plant seedlings in pulp and paper mill effluent and in the sediments from St. Andrews Bay, Florida

RESEARCHER(S): Walsh, Gerald E.

INSTITUTION(S): U.S. Environmental Protection Agency, Environmental Research Lab

COMPLETION DATE: 1989

DESCRIPTION: This is a study on the effects of pulp and paper mill effluent on the growth and survival of marsh plants. There is an analysis of the heavy metal content of the effluent.

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77. PROJECT: Sorting and identifying macroinvertebrates, St. Andrew Bay

RESEARCHER(S): Collard, Sneed B.

COMPLETION DATE: 1989

DESCRIPTION: This report contains data sheets from a project contracted by the Florida Dept. of Environmental Regulation, which enumerate the species of annelids, mollusks, arthropods and other invertebrates found at l0 stations in St. Andrew Bay.

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78. PROJECT: North Bay County sewerage and treatment facilities feasibility study

RESEARCHER(S): Baskerville-Donovan Engineers, Inc.

COMPLETION DATE: 1989

DESCRIPTION: This is an evaluation of the wastewater treatment needs of this area and the different options available.

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79. PROJECT: St. Andrews Bay seagrass study, Panama City, June 16-19, 1988.

RESEARCHER(S): Pruitt, Bruce A.

INSTITUTION(S): U.S. Environmental Protection Agency, Marine and Wetlands Unit

COMPLETION DATE: 1988

DESCRIPTION: This is a study of the seagrass population in East Bay. Light transmission data is provided.

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80. PROJECT: Benthic study, Bay County wastewater discharge, St. Andrew Bay, Florida

INSTITUTION(S): U.S. Environmental Protection Agency, Region IV, Environmental Services Division

COMPLETION DATE: 1988

DESCRIPTION: This is a study of wastewater plant discharge and a survey of the bottom sediments, seagrasses and benthic invertebrates.

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81. PROJECT: Dilution study and toxicity testing, Bay County wastewater discharge, St. Andrew Bay, Florida

INSTITUTION(S): U.S. Environmental Protection Agency, Region IV, Environmental Services Division

COMPLETION DATE: 1988

DESCRIPTION: This is a comprehensive study of the water quality, benthic invertebrates and seagrasses.

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82. PROJECT: A special monitoring project basin survey: biological and physicochemical assessment of St. Andrew Bay estuaries 1986-1987.

RESEARCHER(S): Young, William T., Butts, Glenn L., Donelan, Laurence W., and Ray, Donald H.

COMPLETION DATE: 1988

DESCRIPTION: This study includes surveys and assessments of the benthic macroinvertebrate community, sediments, seagrasses and water quality.

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83. PROJECT: "Predation rates on decapod crustaceans in latitudinally separated seagrass communities: a study of spatial and temporal variation using tethering techniques"

RESEARCHER(S): Heck, K.L., Jr. and K.A. Wilson

COMPLETION DATE: 1987

DESCRIPTION: Experiments were conducted in New Jersey, Bermuda and St. Joseph Bay, Florida. The studies showed that seagrasses provided a significant, though variable, refuge from predation for decapod crustaceans in all three study sites.

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84. PROJECT: Impacts of Bay County aerated lagoon discharge on St. Andrew Bay water quality from Redfish Point to DuPont Bridge

RESEARCHER(S): Spain, Carol M. and McLellan, Steven A.

COMPLETION DATE: 1987

DESCRIPTION: This is a study of the water quality in the area of the bay impacted by the Bay County Wastewater Treatment Plant's lagoon discharge. Parameters are given for salinity, temperature, dissolved oxygen, chlorophyll a, color, suspended solids, BOD5, nitrogen, phosphorus, fecal coliform bacteria, and ammonia; current velocity readings are also given.

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85. PROJECT: St. Andrew Bay system environmental database

RESEARCHER(S): BCM Converse, Inc.

INSTITUTION(S): Submitted to the U.S. Environmental Protection Agency

COMPLETION DATE: 1987

DESCRIPTION: This is a collection of reports on the water quality, hydrography, sediments and biota of St. Andrew Bay.

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86. PROJECT: Comprehensive Shellfish Harvesting Survey for St. Joseph Bay, Gulf County, Florida

RESEARCHER(S): Barnet, E.L., and Gunter, J.S.

INSTITUTION(S): Florida DNR, Shellfish Environmental Assessment Section

COMPLETION DATE: 1986

DESCRIPTION: This document provides a survey of environmental conditions in the bay that relate to shellfish resources and their safety for harvest and consumption.

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87. PROJECT: Comprehensive shellfish harvesting area survey for West Bay, Bay County, Florida

RESEARCHER(S): Barnet, E.L., and Gunter, J.S.

INSTITUTION(S): Florida Department of Natural Resources, Shellfish Environmental Assessment Section

COMPLETION DATE: 1986

DESCRIPTION: This study includes information regarding pollution sources, hydrography, and biota of West Bay.

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88. PROJECT: "Population variation and behavioral changes in two pagurids in association with the sea anemone Calliactis tricolor (Lesueur)"

RESEARCHER(S): Brooks, W.R., and R.N. Mariscal

COMPLETION DATE: 1986

DESCRIPTION: Two species of hermit crabs (Pagurus pollicaris and P. impressus) were studied with regard to their anemone-carrying behavior. One population was studied in St. Joseph Bay and the other in Turkey Point, Florida.

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89. PROJECT: "Egg capsules of eleven marine prosobranchs from northwest Florida"

RESEARCHER(S): D'Asaro, Charles N.

COMPLETION DATE: 1986

DESCRIPTION: This study describes the egg capsules, developmental pattern, and reproductive behavior of the following 11 gastropod mollusks: Florida fighting conch (Strombus alatus), eastern murex (Murex fulvescens), Gulf oyster drill (Urosalpinx perrugata), pitted murex (favartia cellulosa), sharp-rib drill (Eupleura sulcidentata), mauve-mouth drill (Calotrophon ostrearum), cancellate cantharus (Cantharus cancellarius), ribbed cantharus (Cantharus multangulus), banded tulip (Fasciolaria lilium), Florida cone (Conus floridanus), and jasper cone (Conus jaspideus). Samples were taken from stations along the northwest Florida coast, including St. Joseph Bay.

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90. PROJECT: "Variation in the expression of lunar and tidal behavioral rhythms in the horseshoe crab, Limulus polyphemus"

RESEARCHER(S): Rudloe, Anne

STARTING DATE: 1982

COMPLETION DATE: 1985

DESCRIPTION: Lunar and tidal activity patterns in breeding and foraging behavior of horseshoe crabs in St. Joseph Bay were studied over a three-year period.

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91. PROJECT: "Elemental sulfur in the gills of the three species of clams containing chemoautotrophic symbiotic bacteria: a possible inorganic energy storage compound"

RESEARCHER(S): Vetter, R.D.

COMPLETION DATE: 1985

DESCRIPTION: Three species of clams (ringed lucine, Lucinoma annulata, Florida lucine, Lucina floridana, and Calyptogena elongata) from St. Joseph Bay were analyzed for sulfur content.

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92. PROJECT: Recent Foraminifera of St. Andrew Bay, Florida

RESEARCHER(S): Mechler, L.S. and J.R. Grady

INSTITUTION(S): University of Texas, Arlington, Department of Geology

COMPLETION DATE: 1985

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93. PROJECT: Undated Assessment of discharge impacts of the Bay County Wastewater Treatment Plant in St. Andrews Bay

RESEARCHER(S): Young, William T.

INSTITUTION(S): Florida Department of Environmental Regulation

COMPLETION DATE: 1985

DESCRIPTION: This is a sampling study of the water quality in the area of Bay County Wastewater Treatment Plant.

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94. PROJECT: "Estimating vegetation coverage in St. Joseph Bay, Florida with an airborne multispectral scanner"

RESEARCHER(S): Savastano, K.J., K.H. Faller, and Richard L. Iverson

COMPLETION DATE: 1984

DESCRIPTION: Remote sensing techniques were used to construct a computerized map of the bay bottom features such as various bottom types and seagrass coverage.

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95. PROJECT: Recent Foraminifera of St. Andrew Bay, Florida.

RESEARCHER(S): Mechler, Linda S. and Grady, John R.

COMPLETION DATE: 1984

DESCRIPTION: This report includes an analysis of the species of these protozoans found in St. Andrew Bay sediments as well as some hydrographic data.

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96. PROJECT: "Stable carbon isotope ratios of the planktonic food web in the northern Gulf of Mexico"

RESEARCHER(S): Thayer, G.W., J.J. Govoni and D.W. Connally

COMPLETION DATE: 1983

DESCRIPTION: This study of carbon content in the marine food web was conducted with samples taken from off Louisiana and Cape San Blas, Florida.

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97. PROJECT: Hydrolab survey of lower St. Andrew Bay – Panama City, Bay County, August 26, 1983

RESEARCHER(S): Butts, Glenn L. and Donelan, Laurence W.

INSTITUTION(S): Florida Department of Environmental Regulation

COMPLETION DATE: 1983

DESCRIPTION: This was a study of water quality in various locations in the lower bay. Data concerning temperature and dissolved oxygen is provided.

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98. PROJECT: Hydrographic studies of St. Andrew Bay, Florida: a training exercise

INSTITUTION(S): Florida State Environmental Quality Laboratory

COMPLETION DATE: 1983

DESCRIPTION: Dyes were used to study the velocity, dispersal and dilution of the discharge; salinity measurements were taken. The results of an exercise were used in hydrographic techniques to monitor the outfall of wastewater treatment plants.

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99. PROJECT: Survey of benthic faunal assemblages of shallow water sand and seagrass beds in St. Andrew Bay

RESEARCHER(S): Saloman, C.H., S.P. Naughton, and J.L. Taylor

INSTITUTION(S): U.S. Fish and Wildlife Service

COMPLETION DATE: 1982

DESCRIPTION: This study describes species occurrence and populations at 149 stations in St. Andrew Bay. It includes information regarding the seagrasses and sediments. It resulted in publication of the document "Benthic Faunal Assemblages of Shallow Water Sand and Seagrass Habitats, St. Andrew Bay, Florida.

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100. PROJECT: Bioassays of Arizona Chemical Company stormwater retention area overflow ditch and saltwater ditch outfall to St. Andrew Bay, Panama City, Bay County, Florida

INSTITUTION(S): Florida Dept. of Environmental Regulation, Biological Section

COMPLETION DATE: 1982

DESCRIPTION: This is a report of environmental monitoring at this site.

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101. PROJECT: Water Quality Conditions in the St. Andrew Bay Near the Naval Coastal Systems Center

RESEARCHER(S): Lott, D.F. and Loftin, H.G.

COMPLETION DATE: 1982

DESCRIPTION: This report contains hydrographic and water quality data gathered from 1973-1977.

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102. PROJECT: Thermal study of Warren Bayou and West Bay

RESEARCHER(S): Law Engineering Testing Co.

COMPLETION DATE: 1982

DESCRIPTION: This is a study of the thermal discharge of the Lansing Smith Electric Generating Plant, and its effects on the ecology of the surrounding waters. It includes water quality, hydrographic information, and lists of species and their abundance.

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103. PROJECT: Mapping of submerged vegetation using remote sensing technology

RESEARCHER(S): Savastano, K.L., K.H. Faller, L.W. McFadin, and H. Holley

INSTITUTION(S): U.S. Department of Commerce

COMPLETION DATE: 1981

DESCRIPTION: St. Joseph Bay was the site of an experimental aircraft-supported remote sensing program for determining the location of seagrass beds.

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104. PROJECT: Properties of Sea Grass and Sand Flat Sediments from the Intertidal Zone of St. Andrew Bay, Florida

RESEARCHER(S): Grady, J.R.

COMPLETION DATE: 1981

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105. PROJECT: A Special Park in the Panhandle

RESEARCHER(S): Brim, Michael S.

COMPLETION DATE: 1981

DESCRIPTION: This paper gives a description of the fishing and diving opportunities at St. Andrews State Recreation Area.

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106. PROJECT: Observations of the life history of the belted sandfish, Serranus subligarius (Serranidae)

RESEARCHER(S): Hastings, P.A. and Bortone, S.A.

COMPLETION DATE: 1980

DESCRIPTION: Many of the belted sandfish for this study were collected from the jetties of St. Andrews State Park.

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107. PROJECT: "Scallops in St. Joseph Bay, Florida"

RESEARCHER(S): Foster, John M.

COMPLETION DATE: 1980

DESCRIPTION: This study discusses the biology and distribution of the bay scallop, Argopecten irradians concentricus.

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108. PROJECT: The influence of sediment characteristics and seagrass species on the distribution and abundance of polychaetous annelids in north Florida seagrass beds

RESEARCHER(S): Osborne, Nathaniel, M.

COMPLETION DATE: 1979

DESCRIPTION: This is a study of the polychaete worm community and the influence of seagrass and sediment habitat on the worm populations.

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109. PROJECT: The origin and seasonality of the fish fauna on a new jetty in the northeastern Gulf of Mexico

RESEARCHER(S): Hastings, Robert W.

COMPLETION DATE: 1979

DESCRIPTION: This is a survey of the fish fauna on a new jetty at East Pass, Choctawhatchee Bay. It includes records of species found at the jetties in St. Andrews State Park.

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110. PROJECT: Habitat development field investigations, Port St. Joe seagrass demonstration site, Port St. Joe, Florida: summary report

RESEARCHER(S): Phillips, Ronald C., Mary K. Vincent, and Robert T. Huffman

INSTITUTION(S): U.S. Army

COMPLETION DATE: 1978

DESCRIPTION: This study transplanted shoal grass, Halodule wrightii, to determine whether the plant could successfully propagate on their study site, which consisted of dredged material. Results indicated that shoal grass could be successfully propagated on dredged material.

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111. PROJECT: Evaluation of the city wastewater treatment plant, Port St. Joe, Florida

INSTITUTION(S): U.S. Environmental Protection Agency

COMPLETION DATE: 1978

DESCRIPTION: This report provides a technical evaluation of the Port St. Joe WWTP.

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112. PROJECT: Fishes of the Nearshore Zone of St. Andrew Bay, Florida and Adjacent Coast

RESEARCHER(S): Naughton, S.P. and C.H. Saloman

INSTITUTION(S): Southeast Fisheries Center

COMPLETION DATE: 1978

DESCRIPTION: This is a comprehensive study of fishes caught with a beach seine at l7 locations during 1974-1975. Nearly 100,000 fish representing 88 species were collected. Temperature and salinity were recorded.

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113. PROJECT: Seasonal Abundance Size and Sex Ratio of Fishes Caught in Gill Nets in the St. Andrew Bay, Florida

RESEARCHER(S): Pristas, P.J. and L. Trent

COMPLETION DATE: 1978

DESCRIPTION: This is an analysis of a collection of 11,230 fishes representing 70 species, taken from St. Andrew Bay, January - December 1973.

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114. PROJECT: Estimated average daily instantaneous numbers of recreational and commercial fishermen and boaters in the St. Andrew Bay system, Florida, and adjacent coastal waters, 1973

RESEARCHER(S): Sutherland, Doyle F.

COMPLETION DATE: 1978

DESCRIPTION: This census of fishermen includes data regarding their numbers, location, methods, and target species.

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115. PROJECT: The Distribution and Abundance of Fishes Caught With a Trawl in the St. Andrews Bay System, Florida

RESEARCHER(S): Ogren, L.H. and H.A. Brusher

COMPLETION DATE: 1977

DESCRIPTION: This is an analysis of a collection of fishes obtained by using a bottom trawl. It includes tabular data on the collection, and some hydrographic information. Over 200,000 fish were caught, representing 128 different species.

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116. PROJECT: Catch and catch rates of fishes caught by anglers in the St. Andrew Bay system, Florida, and adjacent coastal waters, 1973

RESEARCHER(S): Sutherland, Doyle F.

COMPLETION DATE: 1977

DESCRIPTION: This paper contains the results of a survey of fishermen in various locations on shore and on charter boats. It includes a listing of fishes caught.

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117. PROJECT: Comparisons of catches of fishes in gill nets in relation to webbing material, time of day, and water depth in St. Andrew Bay, Florida

RESEARCHER(S): Pristas, Paul J. and Trent, Lee

COMPLETION DATE: 1977

DESCRIPTION: This is a study of the variation in catch rates for the l2 most abundant fish species in St. Andrew Bay, September - December, 1972.

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118. PROJECT: "The reproductive cycle of the Sunray Venus clam Macrocallista nimbosa (Lightfoot 1786)"

RESEARCHER(S): Haines, M. Lynn

COMPLETION DATE: 1976

DESCRIPTION: Clams used in this study of reproductive cycles were collected from St. Joseph Bay. Results indicated a spawning period of August – November, with a peak in October – November.

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119. PROJECT: Water quality analysis of St. Andrew Bay, Florida

RESEARCHER(S): Brandes, Robert J., and Andrews, Howard O.

COMPLETION DATE: 1976

DESCRIPTION: This is an analysis of projected water quality conditions in St. Andrew Bay, using a mathematical model. It was prepared in support of the 201 Wastewater Treatment Facilities Studies, Bay County, FL, for J.B. Converse & Co., Panama City, FL.

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120. PROJECT: A program of field measurements to define the thermal and dissolved oxygen distribution at the Lansing Smith Plant on West Bay/St. Andrew Bay

COMPLETION DATE: 1976

INSTITUTION(S): Geo-Marine, Inc.

DESCRIPTION: This was a continuation of the study in the 1973 program of field measurements defining thermal and dissolved oxygen distribution at the Lansing Smith Plant.

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121. PROJECT: Distribution Abundance and Size of Penaeid Shrimps in the St. Andrew Bay System Florida USA.

RESEARCHER(S): Brusher, H.A. and L.H. Ogren

INSTITUTION(S): National Marine Fisheries Service

COMPLETION DATE: 1976

DESCRIPTION: Distribution and abundance data concerning eight species of shrimp in St. Andrew Bay are presented, along with associated hydrographic data.

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122. PROJECT: Scombrid Fishes in the St. Andrew Bay, Florida

RESEARCHER(S): Nakamura, E.L.

COMPLETION DATE: 1976

DESCRIPTION: Six species of scombrid fishes (mackerel and tuna) were collected from St. Andrew Bay.

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123. PROJECT: Vertebrates identified in St. Andrews State Recreation Area

INSTITUTION(S): Florida Department of Natural Resources, Division of Recreation and Parks

COMPLETION DATE: 1976

DESCRIPTION: This study includes birds, mammals, reptiles and amphibians.

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124. PROJECT: Water Quality Study, St. Andrews Bay, Florida

INSTITUTION(S): U.S. Environmental Protection Agency, National Enforcement Investigations

COMPLETION DATE: 1975

DESCRIPTION: This is a comprehensive bacteriological, water quality, and remote sensing study of St. Andrew Bay.

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125. PROJECT: An investigation of sediment deposits in St. Andrews Bay

RESEARCHER(S): Sullivan, J.H. Jr. and Duncan Jr., T.W.

INSTITUTION(S): Water and Air Research, Inc.

COMPLETION DATE: 1975

DESCRIPTION: This was a study prepared for International Paper Company in Panama City. It describes the bottom sediments and deposits in the vicinity of paper mill.

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126. PROJECT: Annotated bibliography of the St. Andrew Bay system and adjacent Gulf of Mexico, including manuscripts on file at the National Marine Fisheries Service, Gulf Coastal Fisheries Center, Panama City Laboratory, Panama City, Florida

RESEARCHER(S): Saloman, Carl H.

COMPLETION DATE: 1975

DESCRIPTION: This bibliography contains 52 references, arranged alphabetically by author.

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127. PROJECT: Seagrass bed study in West Bay near the Lansing Smith Power Plant

RESEARCHER(S): Law Engineering Testing Co.

COMPLETION DATE: 1975

DESCRIPTION: This is a survey of the seagrass beds, including information on hydrology, benthic invertebrates, and fishes.

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128. PROJECT: In situ bioassay of the International Paper Company effluent in St. Andrews Bay

RESEARCHER(S): Young, William T. and Sindo, John

INSTITUTION(S):.Florida Department of Environmental Regulation, Northwest District

COMPLETION DATE: 1974

DESCRIPTION: This study was undertaken to determine the toxicity of the paper mill effluent to fishes and shrimp. Water quality data is included.

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129. PROJECT: Waste allocation study, St. Andrew Bay, Florida

RESEARCHER(S): Johnson, Allen E., Duke Jr., James H., and Masch, Frank D.

COMPLETION DATE: 1974

DESCRIPTION: This study developed a mathematical model to simulate the estuarine water quality response to waste discharges into St. Andrew Bay.

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130. PROJECT: "The bathymetry and sedimentation of Cape San Blas shoal and shelf off St. Joseph Spit, Florida"

RESEARCHER(S): Stauble, D.K., and D.A. Warnke

COMPLETION DATE: 1974

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131. PROJECT: A program of field measurements to define the thermal and dissolved oxygen distribution at the Lansing Smith Plant on West Bay/St. Andrew Bay

INSTITUTION(S): Geo-Marine, Inc.

COMPLETION DATE: 1973

DESCRIPTION: Hydrographic and meteorological data from the vicinity of the power plant is given.

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132. PROJECT: Significant associations of the motile epibenthos of the turtle grass beds of St. Joseph Bay, Florida

RESEARCHER(S): Eidemiller, Julia A.

COMPLETION DATE: 1972

DESCRIPTION: This study was a thorough inventory of the fauna of the seagrass beds, and predator-prey relationships.

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133. PROJECT: The Identification of Tintinnids (Protozoa: Ciliata: Tintinnida) of the St. Andrew Bay System

RESEARCHER(S): Cosper, T.C.

COMPLETION DATE: 1972

DESCRIPTION: Twenty-one species of tintinnids are described. A key for identification and scanning electron photomicrographs are included.

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134. PROJECT: Exploratory fishing for the Sunray Venus clam, Macrocallista nimbosa in northwest Florida

RESEARCHER(S): Jolley, John W., Jr.

INSTITUTION(S): Florida Department of Natural Resources

COMPLETION DATE: 1972

DESCRIPTION: This exploratory fishing survey included stations off of St. Joseph Bay, and included tabular data regarding the benthic invertebrate fauna and fishes present in samples.

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135. PROJECT: Longshore current system, Panama City to Pensacola, Florida

RESEARCHER(S): Bruno, Richard O.

COMPLETION DATE: 1971

DESCRIPTION: An analysis of the longshore current, based on one year's data from six beach observations, including one at St. Andrews State Park. Data is given regarding waves and wind.

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136. PROJECT: Some predator-prey relationships involving the Sunray Venus clam, *Macrocallista nimbosa*, along the Gulf Coast of Florida

RESEARCHER(S): Cake, Edwin W., Jr.

COMPLETION DATE: 1970

DESCRIPTION: This study involved collections of Sunray Venus clams and other invertebrates from St. Joseph Bay.

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137. PROJECT: "History and current status of the Sunray Venus clam fishery in northwest Florida"

RESEARCHER(S): Joyce, Edwin A., Jr.

COMPLETION DATE: 1970

DESCRIPTION: This is a report on the fishery for the clam, *Macrocallista nimbosa*, in St. Joseph Bay.

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138. PROJECT: 'Initial observations on a new fishery for the Sunray Venus clam, *Macrocallista nimbosa* (Solander)"

RESEARCHER(S): Stokes, Randall J. Edwin A. Joyce, Jr., and Robert M. Ingle

COMPLETION DATE: 1968

DESCRIPTION: This exploratory fishing survey was conducted in St. Joseph Bay. In addition to clam landings and growth rate, it included hydrographic information (salinity and temperature) and listings of other species caught.

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139. PROJECT: "Effects of industrial waste on the marine environment"

RESEARCHER(S): Copeland, B.J.

COMPLETION DATE: 1966

DESCRIPTION: This study gave an assessment of the effects of industrial discharges on the water quality and biota of St. Joseph Bay.

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140. PROJECT: The Plankton of the St. Andrew Bay System, Florida

RESEARCHER(S): Hopkins, T.L.

COMPLETION DATE: 1966

DESCRIPTION: A comprehensive study of the bay's plankton, both plant and animal.

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141. PROJECT: Sand-ridge migration in St. Andrew Bay, Florida

RESEARCHER(S): Salsman, Garrett G., Tolbert, William H., and Villars, R. G.

COMPLETION DATE: 1966

DESCRIPTION: This study looked at the series of uniform sediment ridges found on the bottom of St. Andrew Bay.

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142. PROJECT: The planktonic organisms found in St. Andrews Bay and the nearshore gulf waters surrounding Panama City, Florida

RESEARCHER(S): Toon, Brian

COMPLETION DATE: 1965

DESCRIPTION: This study was performed as part of the Buships-Field Activities Cooperative Student Trainee Program for Engineers and Scientists. Plankton samples were taken from St. Andrews Bay and the Gulf. A total of 103 species were identified and photographed.

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143. PROJECT: The Prediction of Strength in the Sediments of St. Andrew Bay, Florida

RESEARCHER(S): Holmes, C.W. and H.G. Goodwell

COMPLETION DATE: 1964

DESCRIPTION: The strength (cohesion) of sediments from cores taken from ten sites in St. Andrew Bay are examined in this study.

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144. PROJECT: Marine Bryozoa from Northwest Florida

RESEARCHER(S): Shier, Daniel E.

COMPLETION DATE: 1964

DESCRIPTION: This is a comprehensive study of these moss animals taken from beaches and inshore waters of northwest Florida. It includes samples from St. Andrews State Park.

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145. PROJECT: The marine ichthyofauna of St. Andrew Bay, Florida, and nearshore habitats of the northeastern Gulf of Mexico

RESEARCHER(S): Vick, Norman G.

COMPLETION DATE: 1964

DESCRIPTION: This paper contains an annotated checklist of the fishes collected from these waters. It includes notes regarding abundance, occurrence, and behavior.

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146. PROJECT: Seismic profile in St. Andrew Bay

RESEARCHER(S): Brown, Maurice V.

COMPLETION DATE: 1962

DESCRIPTION: This is an analysis of sound waves yielded information regarding the bottom sediment layers of St. Andrew Bay.

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147. PROJECT: Plankton research in St. Andrew Bay, Florida

RESEARCHER(S): Hopkins, Thomas L.

COMPLETION DATE: 1962

DESCRIPTION: This is a research report on a comprehensive study of the plankton of St. Andrew Bay.

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148. PROJECT: "Recent sedimentary history of St. Joseph Bay, Florida"

RESEARCHER(S): Stewart, Richard A., and Donn S. Gorsline

COMPLETION DATE: 1962

DESCRIPTION: This study includes the geological history and sedimentary profile of St. Joseph Bay.

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149. PROJECT: Survey of St. Joseph's Bay and the Gulf County Canal, October 18-October 20, 1961

INSTITUTION(S): Florida State Board of Health, Bureau of Sanitary Engineering

STARTING DATE: 1961

COMPLETION DATE: 1961

DESCRIPTION: This survey compared water quality at the time of the survey with previous measurements and then cited major pollutant sources. It found a reduction in water quality compared with the previous survey done in 1949. The major pollution sources were St. Joe Paper Company, and the sewage treatment plant of the City of Port St. Joe.

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150. PROJECT: List of fishes from St. Andrew Bay system and adjacent Gulf of Mexico

RESEARCHER(S): Allison, Donald T.

COMPLETION DATE: 1961

DESCRIPTION: This is a report of fish collections made from August 1958 to September 1959.

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151. PROJECT: On the Hydrology of the St. Andrew Bay System, Florida.

RESEARCHER(S): Ichiye, T. and M.L. Jones

COMPLETION DATE: 1961

DESCRIPTION: This is a comprehensive study of the temperature, salinity and currents in the various areas of St. Andrew Bay.

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152. PROJECT: Hydrographic Data of the St. Andrews Bay System

RESEARCHER(S): Jones, M. and Ichiye, T.

COMPLETION DATE: 1960

DESCRIPTION: This report contains information on salinity, temperature, depths, and currents.

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153. PROJECT: Model study for the improvement of the jetties of the St. Andrews Bay entrance channel

INSTITUTION(S): University of Florida, Coastal Engineering Laboratory

COMPLETION DATE: 1958

DESCRIPTION: This study was prepared for the Florida Board of Parks and historic Memorials. It examined the ways of dealing with erosion of the western bank of the channel entrance. Information on waves and tides is included.

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154. PROJECT: A pre-impoundment fishery study of North Bay and associated waters, Bay County, Florida

RESEARCHER(S): Crittenden, Edward

COMPLETION DATE: 1958

DESCRIPTION: This is a report on a collection of fishes that was made before the construction of the dam in North Bay.

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155. PROJECT: Fish population studies of North Bay and its tributaries. Included as part of: FGFWFC report on North Bay and associated waters, Bay County, Florida

RESEARCHER(S): Crittenden, Edward, Barkuloo, James M., and Copeland, J. B.

INSTITUTION(S): Florida Game and Fresh Water Fish Commission

COMPLETION DATE: 1957

DESCRIPTION: This is a fish population survey done prior to the impoundment of Deer Point Lake.

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156. PROJECT: Report on North Bay and associated waters, Bay County, Florida

INSTITUTION(S): Florida Game and Fresh Water Fish Commission

COMPLETION DATE: 1957

DESCRIPTION: This is a pre-impoundment survey of North Bay. It includes information on water quality, hydrology, and fish populations.

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157. PROJECT: “The crown conch *Melongena corona* Gmelin: its habits, sex ratios, and possible relations to the oyster”

RESEARCHER(S): Hathaway, Ralph R.

COMPLETION DATE: 1957

DESCRIPTION: A study of the biology of the crown conch, and its predation on oysters. Samples were taken from St. Marks to St. Andrews Bay, including St. Joseph Bay.

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158. PROJECT: Report on North Bay and Associated Waters, Bay County, Florida

INSTITUTION(S): Florida Game and Fresh Water Fish Commission

COMPLETION DATE: 1957

DESCRIPTION: Information concerning water quality, hydrology, and fish populations is included in this pre-impoundment survey of North Bay.

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159. PROJECT: Acanthurus randalli, a new surgeon fish from the Gulf of Mexico

RESEARCHER(S): Briggs, John C. and Caldwell, D.K.

COMPLETION DATE: 1957

DESCRIPTION: A newly discovered species found at the jetties of St. Andrews State Park is described.

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160. PROJECT: Interaction of Surface Water, Ground Water, and the Geologic Framework in Determining the Health of Coastal Watersheds

RESEARCHER(S): DeHan, Rodney, S.

COMPLETION DATE: March 2000

DESCRIPTION: This study, conducted in St. Joseph Bay, was conducted to provide for an improved understanding of the role of ground water in sustaining the health of coastal watersheds. A variety of data were collected and an analysis was performed to estimate groundwater seepage into St. Joseph Bay and its importance for water quality.

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160. PROJECT: Water Quality Discharge Data for St. Joseph Bay, 1997-1998

RESEARCHER(S): Berndt, Marian P., and Marvin A. Franklin.

COMPLETION DATE: 1999

DESCRIPTION: Historical data were compiled and limited water quality and level data were collected to evaluate potential sources of land-derived water entering St. Joseph Bay.

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APPENDIX C. THE SURFACE WATER IMPROVEMENT & MANAGEMENT ACT

Sections 373.451-373.4595, Florida Statutes

373.451 Short title; legislative findings and intent.--

(1) Sections 373.451-373.4595 may be cited as the "Surface Water Improvement and Management Act."

(2) Legislative intent.--The Legislature finds that the water quality of many of the surface waters of the state has been degraded, or is in danger of becoming degraded, and that the natural systems associated with many surface waters have been altered so that these surface waters no longer perform the important functions that they once performed. These functions include:

(a) Providing aesthetic and recreational pleasure for the people of the state;

(b) Providing habitat for native plants, fish, and wildlife, including endangered and threatened species;

(c) Providing safe drinking water to the growing population of the state; and

(d) Attracting visitors and accruing other economic benefits.

(3) The Legislature finds that the declining quality of the state's surface waters has been detrimental to the public's right to enjoy these surface waters and that it is the duty of the state, through the state's agencies and subdivisions, to enhance the environmental and scenic value of surface waters.

(4) The Legislature finds that factors contributing to the decline in the ecological, aesthetic, recreational, and economic value of the state's surface waters include:

(a) Point and nonpoint source pollution; and

(b) Destruction of the natural systems which purify surface waters and provide habitats.

(5) The Legislature finds that surface water problems can be corrected and prevented through plans and programs for surface water improvement and management that are planned, designed, and implemented by the water management districts and local governments.

(6) It is therefore the intent of the Legislature that each water management district develop plans and programs for the improvement and management of surface waters within its boundaries.

(7) It is also the intent of the Legislature that the department shall conduct or coordinate statewide research by the water management districts or others to provide a better scientific understanding of the causes and effects of surface water pollution and of the destruction of natural systems in order to improve and manage surface waters and associated natural systems.

(8) The state, through the department, shall provide funds from the Surface Water Improvement and Management Trust Fund to assist with the implementation of the district plans and programs under this act. However, to achieve the goals of this act, cooperation and funding is necessary from the state, the water management districts, and local governments.

History.--s. 1, ch. 87-97; s. 24, ch. 89-279.

373.453 Surface water improvement and management plans and programs.--

(1)(a) Each water management district, in cooperation with the department, the Department of Agriculture and Consumer Services, the Department of Community Affairs, the Game and Fresh Water Fish Commission, and local governments shall prepare and maintain a list which shall prioritize water bodies of regional or statewide significance within each water management district. The list shall be reviewed and updated every 3 years. The list shall be based on criteria adopted by rule of the department and shall assign priorities to the water bodies based on their need for protection and restoration.

(b) Criteria developed by the department shall include, but need not be limited to, consideration of violations of water quality standards occurring in the water body, the amounts of nutrients entering the water body and the water body's trophic state, the existence of or need for a continuous aquatic weed control program in the water body, the biological condition of the water body, reduced fish and wildlife values, and threats to agricultural and urban water supplies and public recreational opportunities.

(c) In developing their respective priority lists, water management districts shall give consideration to the following priority areas:

1. The South Florida Water Management District shall give priority to the restoration needs of Lake Okeechobee, Biscayne Bay, and the Indian River Lagoon system and their tributaries.

2. The Southwest Florida Water Management District shall give priority to the restoration needs of Tampa Bay and its tributaries.

3. The St. Johns River Water Management District shall give priority to the restoration needs of Lake Apopka, the Lower St. Johns River, and the Indian River Lagoon system and their tributaries.

(2) Once the priority lists are approved by the department, the water management districts, in cooperation with the department, the Game and Fresh Water Fish Commission, the Department of Community Affairs, the Department of Agriculture and Consumer Services, and local governments, shall develop surface water improvement and management plans for the water bodies based on the priority lists. The department shall establish a uniform format for such plans and a schedule for reviewing and updating the plans. These plans shall include, but not be limited to:

(a) A description of the water body system, its historical and current uses, its hydrology, and a history of the conditions which have led to the need for restoration or protection;

(b) An identification of all governmental units that have jurisdiction over the water body and its drainage basin within the approved surface water improvement and management plan area, including local, regional, state, and federal units;

(c) A description of land uses within the drainage basin within the approved surface water improvement and management plan area and those of important tributaries, point and nonpoint sources of pollution, and permitted discharge activities;

(d) A list of the owners of point and nonpoint sources of water pollution that are discharged into each water body and tributary thereto and that adversely affect the public interest, including separate lists of those sources that are:

1. Operating without a permit;

2. Operating with a temporary operating permit; and

3. Presently violating effluent limits or water quality standards.

The plan shall also include recommendations and schedules for bringing all sources into compliance with state standards when not contrary to the public interest. This paragraph does not authorize any existing or future violation of any applicable statute, regulation, or permit requirement, and does not diminish the authority of the department or the water management district;

(e) A description of strategies and potential strategies for restoring or protecting the water body to Class III or better;

(f) A listing of studies that are being or have been prepared for the water body;

(g) A description of the research and feasibility studies which will be performed to determine the particular strategy or strategies to restore or protect the water body;

(h) A description of the measures needed to manage and maintain the water body once it has been restored and to prevent future degradation;

(i) A schedule for restoration and protection of the water body; and

(j) An estimate of the funding needed to carry out the restoration or protection strategies.

(3) Each water management district shall be responsible for planning and coordinating restoration or protection strategies for the priority water bodies within the district which have been approved by the department as water bodies of regional and statewide significance in need of protection or restoration. The governing board of the appropriate water management district shall hold at least one public hearing and public workshops in the vicinity of the water body under consideration as may be necessary for obtaining public input prior to finalizing the surface water improvement and management plans for the water bodies on the priority list. The water management district shall then forward a copy of the plans to the department and to appropriate local governmental units.

(4) Each September 1, the water management districts shall submit a funding proposal for the next state fiscal year to the department for its review and approval. The proposal shall specify the activities that need state funding and the amounts of funding, and shall describe the specific restoration or protection activities proposed. The department shall review water management district funding proposals and shall consider them in making its annual budget request.

(5) The governing board of each water management district is encouraged to appoint advisory committees as necessary to assist in formulating and evaluating strategies for water body protection and restoration activities and to increase public awareness and intergovernmental cooperation. Such committees should include representatives of the Game and Fresh Water Fish Commission, the Department of Agriculture and Consumer Services, appropriate local governments, federal agencies, existing advisory councils for the subject water body, and representatives of the public who use the water body.

(6) The water management districts may contract with appropriate state, local, and regional agencies and others to perform various tasks associated with the development and implementation of the surface water improvement and management plans.

History.--s. 2, ch. 87-97; s. 25, ch. 89-279; s. 271, ch. 94-356.

373.455 Review of surface water improvement and management plans.--

(1) At least 60 days prior to consideration by the governing board pursuant to s. 373.456(1) of its surface water improvement and management plan, a water management district shall transmit its proposed plan to the department, the Department of Agriculture and Consumer Services, the Game and Fresh Water Fish Commission, the Department of Community Affairs, and local governments.

(2)(a) The department shall review each plan to determine:

1. Whether the costs described in the plan, as projected by the water management districts, are reasonable estimates of the actual costs;

2. The likelihood that the plan will significantly improve or protect water quality and associated natural resources; and

3. Whether the plan activities can be funded based on available revenues within the Surface Water Improvement and Management Trust Fund or other funding which may be proposed by the department, the districts, or local governments.

(b) If the department determines that a plan does not meet these requirements, the department shall recommend to the district modifications or additions to the plan to the governing board at the time of its consideration of the plan pursuant to s. 373.456(1).

(3) The Game and Fresh Water Fish Commission shall review each proposed surface water improvement and management plan to determine the effects of the plan on wild animal life and fresh water aquatic life and their habitats. If the commission determines that the plan has adverse effects on these resources and that such adverse effects exceed the beneficial effects on these resources, the commission shall recommend modifications of or additions to the plan to the district governing board at the time it considers the plan pursuant to s. 373.456(1), or any modifications or additions which would result in additional beneficial effects on wild animal life or fresh water aquatic life or their habitats.

(4) The department shall review each proposed surface water improvement and management plan to determine the effects of the plan on state-owned lands and on marine and estuarine aquatic life and their habitats. If the department determines that the plan has adverse effects on these resources and that such adverse effects exceed the beneficial effects on these resources, the department shall recommend modifications of, or additions to, the plan to the district governing board at the time it considers the plan pursuant to s. 373.456(1).

(5) The Department of Agriculture and Consumer Services shall review each proposed surface water improvement and management plan to determine the effects of the plan on the agricultural resources of the area and the state. If the Department of Agriculture and Consumer Services determines that the plan has adverse effects on these resources and that such adverse effects exceed the beneficial effects on these resources, the department shall recommend modifications of, or additions to, the plan to the district governing board at the time it considers the plan pursuant to s. 373.456(1).

(6) The Department of Community Affairs shall review each proposed surface water improvement and management plan to determine the effects of the plan on the State Comprehensive Plan and Areas of Critical State Concern. If the Department of Community Affairs determines that the plan has adverse effects on the State Comprehensive Plan or these resources and that such adverse effects exceed the beneficial effects on these resources, the department shall recommend modifications of, or additions to, the plan to the district governing board at the time it considers the plan pursuant to s. 373.456(1).

(7) The local governments shall review each proposed surface water improvement and management plan and provide comments as to the effects of the plan on local resources consistent with the intent of this act. If the local government determines that the plan has adverse effects on these resources and that such adverse effects exceed the beneficial effects on these resources, the local government shall recommend modifications of or additions to the district governing board at the time it considers the plan pursuant to s. 373.456(1).

History.--s. 3, ch. 87-97; s. 26, ch. 89-279; s. 272, ch. 94-356.

373.456 Approval of surface water improvement and management plans.--

(1) After consideration of the comments and recommendations submitted pursuant to s. 373.455 and any other public comments, the governing board shall approve the surface water improvement and management plan. Within 15 days of approval, the district shall transmit the plan to the department.

(2) The department shall have the exclusive authority to review the plan to ensure consistency with the state water policy and the State Comprehensive Plan.

(3) Within 30 days after receipt of an approved plan, the department shall submit a determination of consistency to the governing board. The determination of the department shall not constitute a rule or order.

(4) If the department determines that the plan is consistent, the district shall publish notice in the Florida Administrative Weekly. The plan shall be considered effective and shall constitute final agency action of the governing board on the date of advertisement.

(5) If the department determines that the plan is not consistent, the following procedure shall apply:

(a) The secretary shall notify the governing board of the changes recommended by the department to make the plan consistent. The governing board shall review the recommended change at its next regularly scheduled meeting.

(b) Upon conclusion of its review, the governing board shall either incorporate the recommended changes into the plan or state in the plan the reasons for not adopting the changes. The governing board's action shall then be effective and shall constitute final agency action. The plan shall be subject to review pursuant to s. 373.114 as of the date of the governing board action approving the plan after completion of any necessary reviews.

History.--s. 27, ch. 89-279.

373.457 Implementation of surface water improvement and management plans and programs.--

(1) The funds in the Surface Water Improvement and Management Trust Fund shall be available to the water management districts for detailed planning for and implementation of surface water improvement and management plans. However, ss. 373.451-373.4595 do not prohibit a water management district from requesting and receiving funds from the Surface Water Improvement and Management Trust Fund prior to March 1, 1988, for surface water improvement and management activities.

(2) To facilitate appropriate and timely implementation, each water management district shall coordinate the implementation of approved surface water improvement and management plans.

(3) Each water management district shall update annually, as necessary, its approved surface water improvement and management plan. If a district determines that modifications of or additions to its plan are necessary, such modifications or additions shall be subject to the review process established in s. 373.455.

History.--s. 4, ch. 87-97; s. 28, ch. 89-279; s. 10, ch. 93-260.

373.459 Surface Water Improvement and Management Trust Fund.--

(1) There is created, within the department, the Surface Water Improvement and Management Trust Fund to be used for the deposit of funds appropriated by the Legislature for the purposes of ss. 373.451-373.4595. The department shall administer all funds appropriated to or received for the Surface Water Improvement and Management Trust Fund. Expenditure of the moneys shall be limited to the costs of detailed planning for and implementation of programs prepared for priority surface waters. Moneys from the fund shall not be expended for planning for, or construction or expansion of, treatment facilities for domestic or industrial waste disposal.

(2) The secretary of the department shall authorize the release of money from the Surface Water Improvement and Management Trust Fund within 30 days after receipt of a request adopted by the governing board of a water management district or by the executive director when authority has been delegated by the governing board, certifying that the money is needed for detailed planning for or implementation of plans approved pursuant to ss. 373.453, 373.455, and 373.456. A water management district may not receive more than 50 percent of the moneys in the Surface Water Improvement and Management Trust Fund in any fiscal year unless otherwise provided for by law. Beginning in fiscal year 1990-1991, and each year after funds are appropriated, each water management district shall receive the amount requested pursuant to s. 373.453(4) or 10 percent of the money in the appropriation, whichever is less. The department shall allocate the remaining money in the appropriation annually, based upon the specific needs of the districts. The department, at its discretion, may include any funds allocated to a district in previous years which remain unencumbered by the district on July 1, to the amount of money to be distributed based upon specific needs of the districts.

(3) The amount of money that may be released to a water management district from the Surface Water Improvement and Management Trust Fund for approved plans, or continuations of approved plans, to improve and manage the surface waters described in ss. 373.451-373.4595 is limited to not more than 60 percent of the amount of money necessary for the approved plans of the South Florida Water Management District, the Southwest Florida Water Management District, and the St. Johns River Water Management District, and not more than 80 percent of the amount of money necessary for the approved plans of the Northwest

Florida Water Management District and the Suwannee River Water Management District. The remaining funds necessary for the approved plans shall be provided by the district.

(4) Moneys in the trust fund which are not needed to meet current obligations incurred under this section shall be transferred to the State Board of Administration, to the credit of the trust fund, to be invested in the manner provided by law. Interest received on such investments shall be credited to the trust fund.

History.--s. 5, ch. 87-97; s. 29, ch. 89-279; s. 9, ch. 91-79; s. 11, ch. 91-305; s. 11, ch. 94-115; s. 504, ch. 94-356.

APPENDIX D. CHAPTER 62-43, FLORIDA ADMINISTRATIVE CODE

SURFACE WATER IMPROVEMENT AND MANAGEMENT ACT

PART I

PART II

PART III

PART I

62-43.010 Intent.

(1) In Section 373.451, F.S., the Surface Water Improvement and Management Act, the Legislature finds and declares that the water quality of many of the surface waters of the state has been degraded or is in danger of being degraded, and that it is the duty of the state through the state's agencies and subdivisions to enhance the environmental and scenic value of surface waters.

(2) Pursuant to Section 373.026(7), F.S., the Department is responsible for the exercise of general supervisory authority over all water management districts. The Department also has the responsibility, under the Surface Water Improvement and Management Act, to establish the criteria for the water management districts' development of their priority surface water lists; to approve the priority lists and management plan schedules; to review and recommend modifications or additions to the plans as needed to ensure consistency with the state water policy and the State Comprehensive Plan; to establish the uniform format for management plans; and to administer the Surface Water Improvement and Management Trust Fund.

Specific authority: 373.043, F.S.

Law Implemented: 373.026, 373.453, 373,455, 373,456, F.S.

History: New 12-7-87; Amended 2-1-90, formerly 17-43.010.

62-43.020 Definitions.

(1) "Department" means the Department of Environmental Protection.

(2) "Secretary" means the Secretary of the Department of Environmental Protection.

(3) "District" means any one of the five water management districts created by Section 373.069, Florida Statutes.

(4) “Fund” means the Surface Water Improvement and Management Trust fund.

(5) “Procedures Manual” means the Department’s SWIM Review Procedures Manual dated March 20, 1990 which is hereby incorporated by reference.

(6) “Approved Surface Water Priority List” means the list approved by the governing board of a District and approved by the Department based on the criteria adopted by this rule.

(7) “Adopted Plan” means the written strategies for a specific priority water body or bodies, which have completed the full process of approval, review, and adoption pursuant to Sections 373.455 and 373.456, F.S.

(8) “Uniform Format” means the plan format outlined in the Procedures Manual.

(9) “Priority “Planning” means District activity directed toward developing an Approved Surface Water Priority List or an Adopted Plan for the restoration or protection of surface waters.

(10) “State Water Policy” means the comprehensive statewide policy as adopted by the Department pursuant to Sections 373.026 and 403.061, F.S., setting for the goals, objectives, and guidance for the development and review of programs, rules, and plans relating to water resources.

(11) “State Comprehensive Plan” means the plan adopted pursuant to Chapter 187, F.S.

Specific Authority: 373.043, 373.453, 373.455, 373.456, F.S.

History: New 12-7-87; Amended 2-1-90, 5-03-90, Formerly 17-43.020.

PART II

62-43.030 Preparation, Submittal, and Review of surface Water Priority Lists.

(1) Each District, in cooperation with the Department, the Department of Agriculture and Consumer Services, the Department of Community Affairs, the Game and Fresh Water Fish Commission, the Department of Environmental Protection, and local governments, shall develop and maintain a list in priority order of surface waters of regional or statewide significance which require restoration or protection. Each District shall consider the following criteria in preparing the list and priority ranking:

(a) The degree to which state water and quality standards are violated. In reviewing this criterion, each District shall consider the following factors:

1. The status and trends of water quality in the water body, including the nature and extent of pollution loading from point and nonpoint sources and the extent to which uses are impaired;

2. Whether the water body can reasonably be expected to meet or maintain water quality standards without action to control point or nonpoint sources; and

3. The nature and extent of sources of point and nonpoint pollution which contribute to the waters not meeting standards.

(b) An evaluation of the nature and extent of conditions that adversely affect the water body, including, but not limited to:

1. Nutrient balance of the water body;

2. Trophic state of the water body;

3. Existence or need for continuous aquatic weed control;

4. Biological condition of the water body;

5. Physical conditions; and

6. Reduced fish and wildlife values.

(c) Threats to water supplies, especially agricultural and urban supplies, and public recreational opportunities. In reviewing this criterion, each District shall consider the following factors:

1. Whether uses of the water body are impaired, including whether the water body does not meet state water quality standards or requires control programs to maintain compliance with standards; and

2. Whether conditions intermittently or frequently prevent a beneficial use.

(d) Threats to or need for long-term protection of those exceptional or outstanding water bodies which are currently in good conditions.

(e) The extent to which the plans, ordinances, and policies of local governmental units with jurisdiction over the water body are consistent with a district's efforts to restore or protect the water body.

(f) The feasibility of monitoring the success of restoration or protection efforts in the water body.

(g) The economic and environmental feasibility of accomplishing the restoration and protection goals.

(2) Using the criteria established by Section 62-43.030(1), F.A.C., each District shall prepare and submit to the Department a surface water priority list. The list shall include supporting documentation explaining the use of the specified criteria in development of the list and of the selected priority order.

(3) Within 30 days after the receipt of the District's proposed priority list, the Department shall notify the District in writing whether the list is approved as consistent with the intent and provisions of this rule and Section 373.453, F.S. If the list is not approved, the notification shall include recommendations for modifications necessary to obtain Department approval of the final list.

(4) The Approved Surface Water Priority List shall be reviewed and updated by the District as necessary, but in no event less than every 3 years. The revised list shall be submitted to the Department for approval as specified by Section 62-43.030(2), F.A.C.

Specific authority: 373.043, 373.453, F.S.

Law Implemented: 373.026, 373.451, 373.453, F.S.

History: New 12-7-87; Amended 2-1-90, formerly 17-43.030.

62-43.035 Preparation, Submittal, and Review of Surface Water Plans.

(1) Each District, in cooperation with the Department, the Department of Agriculture and Consumer Services, the Department of Community Affairs, the Game and Fresh Water Fish Commission, and local governments shall prepare and submit to the Department a plan, composed of one or more strategies, for the management of the specific water bodies in the order in which they appear on the Approved Surface Water Priority List. These plans shall be developed using the Uniform Format. Each plan shall include at least:

(a) a description of the water body system, its historical and current uses, its hydrology, and a history of the conditions which have led to the need for restoration for protection;

(b) an identification of all government units that have jurisdiction over the water body and its drainage basin within the plan area, including local, regional, state, and federal units;

(c) a description of land uses within the plan area and those of important tributaries, point and non-point sources of pollution, and permitted discharge activities;

(d) a list of owners of point and non-point sources of pollution that discharge into each water body and tributary thereto and that adversely effect the public interest (by causing or significantly contributing to violations of water quality standards). This list shall include separate lists of those sources that are operating without a permit, operating with a temporary operating permit, and those presently violating effluent limits or water quality standards, and include recommendations and schedules for bringing all sources into compliance with state standards when not contrary to the public interest;

(e) a description of strategies for restoring or protecting the water body sufficient to meet Class III standards or better;

(f) a list of studies that are being or have been prepared for the water body;

(g) a list and current status of active restoration or protection projects for the water body;

(h) a description of the research and feasibility studies which will be performed to determine the particular strategy or strategies to restore or protect the water body;

(i) a description of the measures needed to manage and maintain the water body once it has been restored and to prevent future degradation;

(j) a schedule for restoration or protection of the water body; and

(k) an estimate of the funding needed to carry out the restoration or protection strategies.

(2) The District shall hold at least one public hearing, and at least one public workshop in the vicinity of the water body, for which the plan is being developed, in order to maintain public input before completing the plan.

(3) The proposed plan shall be submitted to the Department, the Department of Agriculture and Consumer Services, the Department of Community Affairs, the Game and Fresh Water fish Commission, and local governments for their review, no later than 60 days before consideration of plan approval by the district governing board. Using criteria set forth in Section 373.455(2)(a), F.S., the Department shall evaluate each proposed plan. Within 45 days after receipt of the District's proposed plan, the Department shall notify the District in writing whether the District's plan is consistent with the intent and provisions of this rule and Section 373.455(2)(a), F.S. If the plan is not consistent, the notification shall include recommendations for modifications necessary to obtain the Department's concurrence with the final plan.

(4) Within 15 days after approval of a plan by the District governing board the plan shall be transmitted to the Department. As provided in Section 373.456(2), F.S., and this rule, the Department shall conduct a final review of the plan to determine its consistency with the State Water Policy and the State Comprehensive Plan. In this review the Department shall consider the actions taken by the District governing board in response to any concerns expressed by the Department and other reviewing agencies. Within 30 days after receipt of the plan approved by the governing board, the Department shall notify the District in writing whether the District's plan is consistent with the intent and provisions of the State Water Policy and the State Comprehensive Plan. This determination shall not constitute a Department rule or order.

(a) If the Department determines the plan is consistent, the District shall publish notice of adoption of the approved plan in the Florida Administrative Weekly. This shall constitute final District action on the Adopted Plan and is subject to review pursuant to Section 373.114, F.S.

(b) If the Department determines that the plan is inconsistent, the Secretary shall notify the District of the changes recommended by the Department to make the plan consistent. The district governing board shall review the recommended changes at its next scheduled meeting and shall either adopt them or state why the recommended changes are not adopted. After this meeting the District shall publish notice of adoption of the approved plan in the Florida Administrative Weekly. Such publication shall constitute final District action on the Adopted Plan and is subject to review pursuant to Section 373.114, F.S.

(5) Adopted plans shall be updated by the Districts as necessary, but in no event later than 3 years. A regular schedule of review of updated plans, pursuant to Section 373.455 and 373.456, F.S., shall begin July 1,

1990. Plans shall be reviewed on an annual cycle with a Section 373.456, F.S., review period of 2 months per year per District with the order to be Northwest Florida, Suwannee River, St. Johns River, South Florida, and Southwest Florida Water Management District. The schedule may be adjusted as needed to use the remaining two months of the annual review cycle to address other necessary plan revisions. Each District shall, in consultation with the Department, select those plans to be updated during a specific review cycle.

(6) Substantially revised plans shall be submitted for review as specified by Section 62-43.035(3) and (4), F.A.C. Departmental review of revised plans shall be required when the revisions significantly impact the completion of any portion of an Adopted Plan or where the revisions include the addition of new plan strategies.

Specific Authority: 373.043, 373.453, F.S.

Law Implemented: 373.026, 373.451, 373.453, 373.455, 373.456, F.S.

History: New 12-7-87; Amended 2-1-90, Formerly 17-43.035.

PART III

62-43.050 Release of funds.

(1) The Department shall release money from the Fund to each District for the development of priority lists or plans or for implementation of Adopted Plans. Implementation funds, including matching funds, are only to be used for new activities or the expansion of current activities, and not to continue previously funded District activities.

(2) A District requesting release of money from the Fund shall submit to the Department a request from the District governing board. The District governing board may delegate funding request authority for implementing Adopted Plans to the District Executive Director by resolution. Requests from the District Executive Director shall be notarized and shall cite the delegation authority. The request shall certify that the money is needed to reimburse the District for expenditures during a specified time period or to meet the reasonably expected cash needs of the District within the next 90 days and that the money was or will be used for either Priority Planning or implementation of an Adopted Plan and shall specifically include:

(a) The amount of money being requested;

(b) The total cost of the activity for which the funds are required;

(c) A statement that the District has deposited and presently made available in the District's separate Surface Water Improvement and Management fund 20 percent of the amount identified in (b) above;

(d) Selected technical project designs and other scopes-of-work and descriptions for verification of the achievement of the original purposes of the Adopted Plan or portion thereof for which the money is requested including reference to the specific portion of the Adopted Plan being addressed;

(e) A statement that the proposed use of requested money is consistent with the Adopted Plan; chapter 187, Florida Statutes (the State Comprehensive Plan); and Chapter 62-40, Florida Administrative Code (the State Water Policy); and

(f) The quarterly report in Section 62-43.070(2), F.A.C.

(3) The Department shall review the request for money using the criteria specified in the Procedures Manual. Within 30 days after receipt of the certifying resolution, the Secretary shall authorize the release of the requested money or shall notify the District in writing why the money can not be released.

(4) District expenditures, for purposes set out in Paragraph (1) above, made after July 1, 1987, to implement the provisions of Sections 373.451 through 373.459, F.S., and this rule shall be eligible for reimbursement form the Fund. Only upon written approval of the Secretary may projects which were initiated prior to July 1, 1987 be eligible for reimbursement of expenditures incurred after July 1, 1987 or be applied to the District's 20 percent match requirement.

(5) Any money released from the Fund shall be accounted for in a separate District fund together with the District's 20 percent match requirement to provide for segregated accountability. Any District fund money shall be credited to the District fund.

Specific Authority: 373.043, F.S.

Law Implemented: 373.026, 373.451, 373.457, 373.459, F.S.

History: New 12-7-97; Amended 2-1-90, 5-03-90, formerly 17-43.050.

62-43.060 District Share of Fund.

(1) Each September 1 each District shall submit to the Department a funding proposal for the next state fiscal year for review and approval. Each proposal shall be based on the Adopted Plan funding estimates which shall be revised to reflect actual and projected progress toward meeting Plan goals. Each proposal shall specify the Adopted Plan and portion thereof which needs state funding and the amount of funding and shall describe those activities for which funds are requested. The Department shall consider these proposals, as approved, in developing its annual budget request.

(2) The Department shall not release more than 80 percent of the amount of money specified by a district as necessary for Priority Planning or for implementing the Adopted Plans. A District shall provide at least 20 percent of the amount of money necessary for Priority Planning or for implementing the Adopted Plans from the District ad valorem revenues, operating funds or cash grants accepted for the purposes of the implementation of the Adopted Plan.

(3) Any one District may not receive more than 50 percent of the money in the Fund in any year unless otherwise authorized by law.

(4) Beginning in state fiscal year 1990-1991 each District shall receive the amount requested pursuant to Section 373.453(4), F.S., and Section 62-43.060(1), F.A.C., or 10 percent of the money in the Appropriation, whichever is less. The balance of the appropriation shall be allocated annually by the Department based upon specific needs of the districts as specified in the Adopted Plans and funding requests. The Department shall review each District's needs and may grant a District's request to retain for the District's future application any money in the Fund which was allocated to the district but which remains unencumbered by the District at the end of the state fiscal year. District retention of such money shall be contingent upon the ability of the requesting District to make timely and effective use of the money.

Specific Authority: 373.043, F.S.

Law Implemented: 373.026; 373.451; 373.453, 373.457, 373.459, F.S.

History: New 12-9-87; Amended 2-1-90, Formerly 17-43.060.

62-43.070 Reports.

(1) On July 1 of each year and each quarter thereafter or as soon thereafter as possible, the Department shall prepare and furnish to each District a financial statement providing the current unobligated cash balance in the Fund for each District.

(2) On July 1 of each year and each quarter thereafter, each District shall submit to the Secretary a certified report of activities conducted with Fund money during the preceding quarter, including, at least, a brief description of projects being implemented, a list of receipts, disbursements, District match, and account status for each project for each water body with an Adopted Plan.

(3) Any Fund money and related accrued interest remaining with the Districts on completion of an Adopted Plan or portion thereof shall be credited to the Fund or, upon the approval of the Secretary, transferred to implement another of the District's Adopted Plans or portions thereof for which money was requested.

(4) In January of each year, each District shall submit to the Secretary a progress report of all activities conducted toward completing the strategies contained in an Adopted Plan during the preceding year.

(5) The financial audit as required by Section 11.45(3), F.S., shall include a statement regarding the District's compliance with all applicable rules.

Specific Authority: 373.043, F.S.

Law Implemented: 373.026, 373.451, 373.457, 373.459, F.S.

History: New 12-7-87; Amended 2-1-90, Formerly 17-43.070.

62-43.100 Advisory Table of Approved Surface Water Priority Lists.

An advisory listing of Approved Surface Water Priority Lists is provided in Table 1. An up-to-date listing may be obtained form the Department's Coastal Zone Management Section, 2600 Blair Stone Road, Tallahassee, Florida, 32399.