Draft

Choctawhatchee River and Bay Surface Water Improvement and Management Plan

August 2017

NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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Abbreviations and Acronyms List

ACWP	Alabama Clean Water Partnership
ADEM	Alabama Department of Environmental Management
AFB	Air Force Base
BMAP	Basin Management Action Plan
BMP	best management practice
cfs	cubic feet per second
CBA	Choctawhatchee Basin Alliance
EDC	Economic Development Council
EPA	U.S. Environmental Protection Agency
ERP	Environmental Resource Permitting
°F	Degree Fahrenheit (temperature)
F.A.C.	Florida Administrative Code
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDOH	Florida Department of Health
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FGS	Florida Geological Survey
FNAI	Florida Natural Areas Inventory
F.S.	Florida Statutes
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	Fish and Wildlife Research Institute
GEBF	Gulf Environmental Benefit Fund
GEMS	Gulf Ecological Management Site
GIS	Geographic Information Systems
GSA	Geological Survey of Alabama
INRMP	Integrated Natural Resources Management Plan
IWR	Impaired Surface Waters Rule
MFLs	minimum flows and levels
mgd	million gallons per day
MS4s	municipal separate storm sewer systems
NFWF	National Fish and Wildlife Foundation
NPS	nonpoint source
NRC	National Research Council
NRCS	Natural Resources Conservation
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRDA	Natural Resource Damage Assessment
NWFWMD	Northwest Florida Water Management District
OFWs	Outstanding Florida Waters
OSTDS	onsite sewage treatment and disposal systems
RESTORE	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States (Act)
RWSP	Regional Water Supply Plan
SAV	submerged aquatic vegetation
SEAS	Shellfish Environmental Assessment Section
SHCA	Strategic Habitat Conservation Area
SIMM	Seagrass Integrated Mapping and Monitoring
SMZs	Special Management Zones
SWIM	Surface Water Improvement and Management
SWTV	Surface Water Temporal Variability
TMDL	total maximum daily load
TNC	The Nature Conservancy
UF-IFAS	University of Florida Institute of Food and Agricultural Sciences
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WBID	Waterbody identification number
WFRPC	West Florida Regional Planning Council
WMA	water management area
WWTF	wastewater treatment facility
WWTP	wastewater treatment plant

1.0 Introduction

The Surface Water Improvement and Management (SWIM) plan for the Choctawhatchee River and Bay watershed is intended to provide a framework for resource management, protection, and restoration using a watershed approach. The SWIM program is administered by the Northwest Florida Water Management District (NWFWMD or District) and supports management actions to address water quality, natural systems, and watershed functions and benefits. This plan is an update to the Choctawhatchee River and Bay SWIM Plan approved in 1996 (NWFWMD 1996) and updated in 2002 (NWFWMD 2002).

The Choctawhatchee River begins in southern Alabama and extends into Florida and southward to the Gulf of Mexico. Although much of the watershed is in Alabama, the scope of this plan, for implementation purposes, is limited to the Florida portion of the watershed.

The Choctawhatchee River and Bay watershed provides important environmental functions with numerous benefits and services for people and communities. Among watershed services are water storage and flood attenuation, groundwater recharge, regulation of discharge to receiving waters, water quality protection, cycling of energy and nutrients, erosion control, and stream bank stabilization. Additional human benefits are usable surface and ground waters, fish and wildlife resources, recreational opportunities, aesthetic characteristics, and associated economic benefits.

1.1 SWIM Program Background, Goals, and Objectives

Surface Water Improvement and Management plans are developed pursuant to the SWIM Act, enacted by the Florida Legislature in 1987 and amended in 1989 through sections 373.451-373.459, Florida Statutes (F.S.). Through this Act, the Legislature recognized threats to the quality and function of the state's surface water resources. The Act authorized the state's five water management districts to:

- Develop plans and programs to improve management of surface waters and associated resources;
- Identify current conditions and processes affecting the quality of surface waters;
- Develop strategies and management actions to restore and protect waterbodies; and
- Conduct research to improve scientific understanding of the causes and effects of the degradation of surface waters and associated natural systems.

In addition to the SWIM Act of 1987, the following Florida statutes and rules support and complement the SWIM program:

- Chapter 259, F.S.: Florida Forever Act
- Chapter 375, F.S.: Land Acquisition Trust Fund
- Section 403.067(7)(A)4, F.S.: Total Maximum Daily Loads (TMDLs)
- Section 373.042, F.S.: Minimum Flows and Minimum Water Levels
- Chapter 62-43, Florida Administrative Code (F.A.C.): Surface Water Improvement and Management Act
- Chapter 62-302, F.A.C.: Surface Water Quality Standards
- Chapter 62-303, F.A.C.: Identification of Impaired Surface Waters; and
- Chapter 62-304, F.A.C.: TMDLs

For the purposes of SWIM, watersheds are the hydrological, ecological, and geographical units for planning and managing restoration efforts along Florida's Gulf Coast. Watershed management requires coordination of complementary programs among jurisdictions, agencies, and stakeholders, including local, state, and federal governments, non-governmental organizations, and private citizens.

The SWIM program addresses watershed priorities by identifying management options and supporting cooperative project implementation. Projects may include stormwater retrofits for water quality improvement, wetland and aquatic habitat restoration, resource assessments, and wastewater management improvements, among others.

Surface Water Improvement and Management plans integrate complementary programs and activities to protect and restore watershed resources and functions. They are also designed to address water quality and natural systems challenges more broadly outlined in the District's strategic plan.

1.2 Purpose and Scope

Development of the 2017 Choctawhatchee River and Bay SWIM Plan update (hereafter the 2017 SWIM Plan) is funded by a grant from the National Fish and Wildlife Foundation's (NFWF) Gulf Environmental Benefit Fund (GEBF) to further the purpose of the GEBF to remedy harm and eliminate or reduce the risk to Gulf resources affected by the Deepwater Horizon oil spill.

This plan continues planning efforts initiated in 1996 and updated in 2002, while also addressing new issues, ongoing challenges, and opportunities for achieving watershed protection and restoration. Further, the 2017 SWIM Plan describes the watershed's physical characteristics and natural resources, provides an assessment of current conditions, and identifies priority challenges affecting watershed resources and functions.

In the Choctawhatchee River and Bay watershed, major stakeholders include:

- Northwest Florida Water Management District
- Florida Department of Environmental Protection
- Florida Fish and Wildlife Conservation Commission
- Florida Department of Agriculture and Consumer Services
- Florida Department of Economic Opportunity
- West Florida Regional Planning Council
- Okaloosa, Walton, Washington, Holmes, Jackson and Bay counties
- Municipalities, including DeFuniak Springs, Bonifay, Vernon, Chipley, Graceville, Niceville, Destin, Freeport, Valparaiso, Shalimar, Caryville, Cinco Bayou, Ebro, Noma, Esto, Westville, Fort Walton Beach, Ponce de Leon, and Wausau
- The Choctawhatchee Basin Alliance
- U. S. Department of Agriculture
- U.S. Fish and Wildlife Service
- Eglin Air Force Base and Hurlburt Field
- The Nature Conservancy
- The National Fish and Wildlife Foundation
- And many others

To support implementation, the 2017 SWIM Plan prescribes a set of management actions and strategies to meet the identified challenges. Management actions included are primarily those within the mission and scope of the NWFWMD SWIM program, recognizing the ongoing initiatives and needs of local communities and other agencies. The strategies outlined are intended to leverage funding from many sources; integrating the efforts of local governments, state and federal agencies, and private entities to achieve mutual objectives and goals; and to present innovative solutions to watershed issues.

2.0 Watershed Description

2.1 Geographic and Geological Characteristics

The Choctawhatchee River and Bay watershed covers approximately 3,339,632 acres. About 40 percent of the watershed is within Florida, with the remainder in Alabama. The headwaters of the Choctawhatchee River are in Bullock County, Alabama, approximately 140 miles north of Choctawhatchee Bay. Within Florida, the watershed encompasses portions of Okaloosa, Walton, Washington, Bay, and Jackson counties and all of Holmes County (figures 2-1 and 2-2).

Choctawhatchee River and Bay watershed attributes:

- ✓ Two states: Florida and Alabama
- ✓ 3.3 million acres
- ✓ Six Florida counties
- ✓ 35 distinct natural communities

Florida municipalities in the inland reaches of the watershed include the cities of DeFuniak Springs, Chipley, and Bonifay in Walton, Washington, and Holmes counties, respectively. Smaller communities include the towns of Westville, Caryville, and Ebro and the community of Bruce along the Choctawhatchee River; the City of Ponce de Leon on Sandy Creek; and the towns of Vernon and Wausau near Holmes Creek. The towns of Noma and Esto and the City of Graceville are located east of the Choctawhatchee River near the Alabama state line. The coastal portions of the watershed include the municipalities of Fort Walton Beach, Destin, Niceville, Shalimar, Cinco Bayou, and Valparaiso in Okaloosa County and Freeport in Walton County. The City of Mary Esther drains to Santa Rosa Sound at the divide between the Pensacola and Choctawhatchee watersheds. Unincorporated coastal communities include Miramar Beach, Grayton Beach, Point Washington, and Santa Rosa Beach.

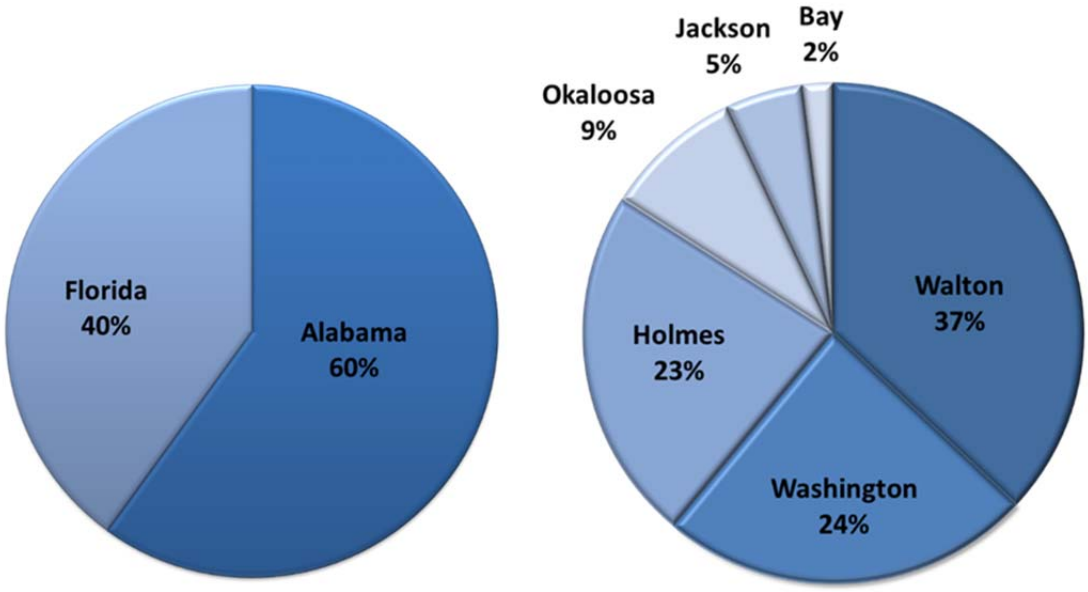


Figure 2-1 Proportion of the Choctawhatchee River and Bay Watershed by State and Florida Counties

The Alabama portion of the watershed includes portions of ten counties: Bullock, Pike, Barbour, Henry, Dale, Coffee, Crenshaw, Covington, Geneva, and Houston. Municipalities in Alabama include Dothan, Ozark, Troy, and Enterprise.

Figure 2-2 Features of the Choctawhatchee River and Bay Watershed within Florida

The Choctawhatchee River and Bay watershed is within the Gulf Coastal Plain physiographic region, characterized by gently rolling hills, sharp ridges, prairies, and alluvial floodplains underlain by sand, gravel, porous limestone, chalk, marl, and clay. Within the Gulf Coastal Plain, the watershed in Florida contains three localized physiographic regions: the Western Highlands, the Gulf Coastal Lowlands, and the River Valley Lowlands (USDA 1989, 2014b; USGS 2013).

The Western Highlands span the northern watershed and extend southward to a relic escarpment approximately 30 to 40 miles south of the Alabama-Florida state line. The Western Highlands are characterized by rolling hills, from 100 to over 300 feet above sea level. These hills consist of Pliocene-Pleistocene delta deposits (5.3 million years to 11,700 years before present), overlain by Pleistocene marine terrace deposits. The River Valley Lowlands follow the floodplain of the Choctawhatchee River and reflect Pleistocene sea level fluctuations, including down-cutting, significant erosional features, and fluvial terraces (USDA 1989).

Choctawhatchee Bay is within the Gulf Coastal Lowlands; a series of successively higher, parallel terraces rising from the coast. Terraces of the Gulf Coastal Lowlands formed during the Pleistocene Epoch when fluctuating sea levels were associated with melting and expansion of ice caps. Dunes, barrier islands, beach ridges, and other topographical features were stranded inland as seas receded (USDA 1989).

Much of the river basin is within the Dougherty Karst District, described by Pratt *et al.* (1989) as a "low, rolling paleokarst terrain dotted with numerous sinks, swampy depressions, and a poorly defined surface drainage." Elevations in the area, which extends over portions of Holmes, Walton, and Washington counties, are generally below 100 feet above sea level. Springs and carbonate outcrops occur, principally along the primary drainages. The Dougherty Karst District is drained by Wrights, Sandy, and Holmes creeks. The southern portion of the river basin is within the Compass Lake Highlands and the Crystal Lake Karst District to the east, and the Eglin Ridge to the west. The Compass Lake Highlands and Crystal Lake Karst are subdivisions of the Dougherty Karst District and contain numerous sinks, closed depressions, and other karst features. The Crystal Lake Karst is drained by Pine Log Creek, and the Eglin Ridge is drained by Bruce and Seven Runs creeks.

The Choctawhatchee watershed follows much of the general stratigraphy of the western Florida Panhandle, with thousands of feet of clays and calcareous sand deposits overlain by sandy limestones, as well as sandy-clayey and dolomitic limestones, buried in turn under surficial deposits of unconsolidated sands, clay, and shells. Weathering of these deposits by wave energy and down-cutting of younger rivers and streams have created relic marine terraces with incised valleys. Many of these geologic processes are a product of prehistoric marine deposition during periods when sea level was higher than the present. The larger stream valleys within most of the watershed commonly contain alluvium deposits of Pleistocene (2.6 million years to 11,000 years before present) and Holocene (11,700 years ago to the present) age. Most of these sediments are derived from erosion of Citronelle Formation, as well as upstream sources of undifferentiated sands, clays, and gravels (Green *et al.* 2002). More details on the geology of the watershed may be found in Appendix C.

Upland soils within the northern watershed formed on beds of clayey and sandy parent materials and are typically well developed, with distinct horizons that exhibit the vertical movement of iron and organic materials (Collins 2010; USDA 2014a). Heavily leached soils that form in coastal pine forests are adjacent to Choctawhatchee Bay. These soils form in sandy parent material and are heavily influenced by coastal erosion/deposition, as well as the chemistry of their overstory vegetation. Hydric soils, common throughout the watershed, are predominantly found along the floodplains of the Choctawhatchee River and its tributaries. Younger poorly developed soils can be found along the coastline and along the banks of the upper Choctawhatchee River where erosional and depositional processes are active.

2.2 Hydrologic Characteristics

2.2.1 Major Streams and Tributaries

The Choctawhatchee River is the primary source of freshwater for Choctawhatchee Bay and the third largest river in Florida in terms of flow. From 1931-2016, the river had an average annual discharge of 6,948 cubic feet per second (cfs) near the discharge into bay. The headwaters of the Choctawhatchee River are in Barbour County, Alabama. The river's primary tributary, the Pea River, joins with the Choctawhatchee River just south of Geneva, Alabama. Within Florida, the river receives inflow from multiple tributaries, including Holmes, Wrights, Pine Log, Seven Runs, Sandy, and Bruce creeks, as well as groundwater contributions from Floridan aquifer springs.

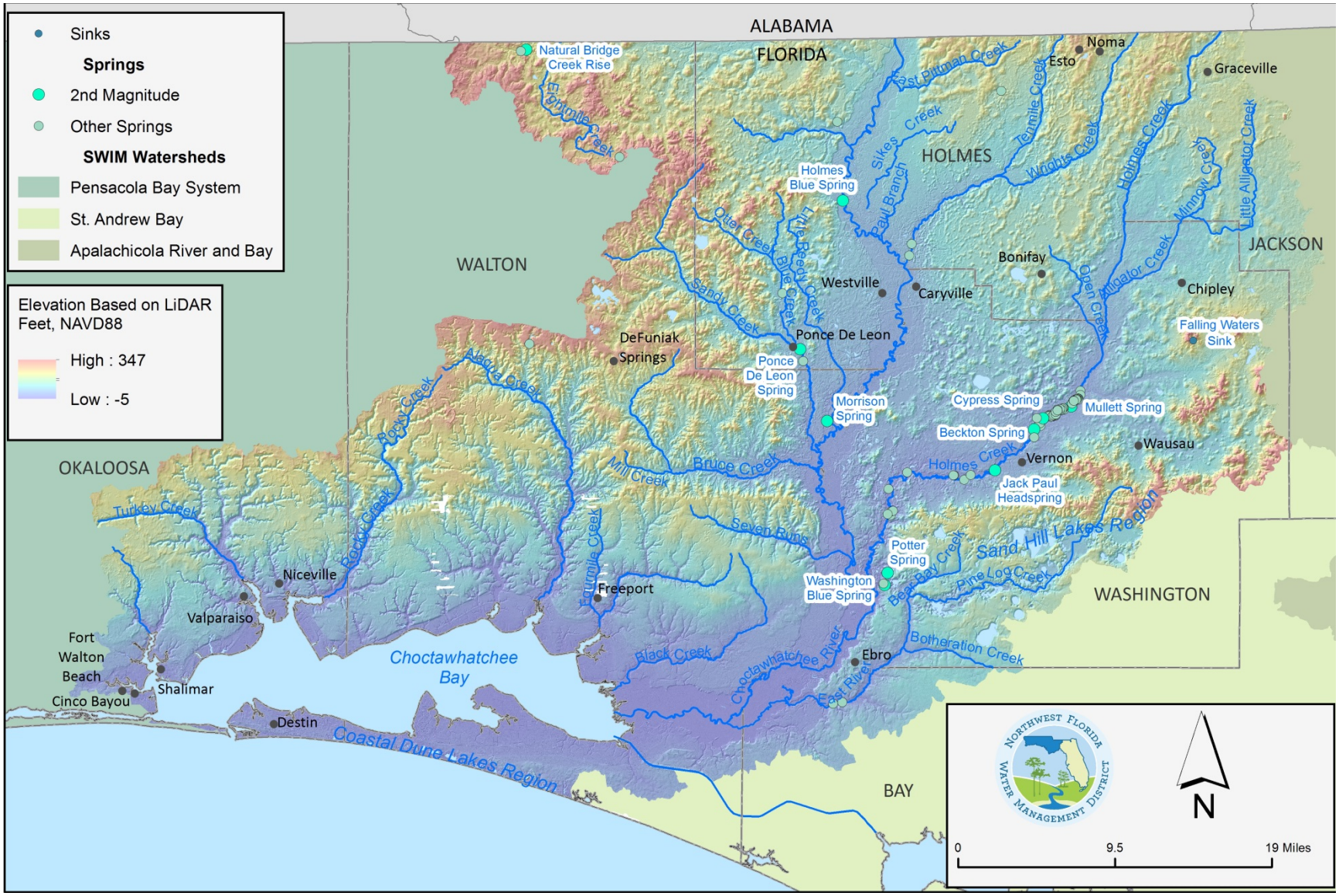
Direct tributaries of Choctawhatchee Bay include Alaqua, Lafayette, and Magnolia creeks in Walton County; Rocky Creek, which extends from Walton County into Okaloosa County; and Turkey, Lightwood Knot, Garnier, and Gap creeks in Okaloosa County. These streams each discharge into estuarine embayments (bayous) along the northern and western shores of Choctawhatchee Bay. Choctawhatchee Bay also receives water from a network of mosquito control ditches draining portions of Walton County south of the bay, and it is connected by the Intracoastal Waterway to West Bay of the St. Andrew Bay estuary. Watershed hydrology and topography within Florida are illustrated by Figure 2-3.

Within the Choctawhatchee River and Bay watershed is a noteworthy concentration of steephead ravines (Vernon 1942; Wolfe *et al.* 1988). Steepheads are ravine features that differ from gully-eroded valleys and seepage springs due to their geological provenience and position on the landscape (Means 2000). Steepheads form when groundwater collects along a relatively impermeable layer and intersects a sloping ground surface, eroding the base of the slope and forming a first order stream (FNAI 2010).

2.2.2 Floridan Aquifer Springs

The major springs in the Choctawhatchee River and Bay watershed discharge freshwater from the Floridan aquifer, which, in the Dougherty Karst Region, lies approximately 100 feet above mean sea level and is thinly confined (Barrios 2005). Notable springs in the watershed include Morrison, Vortex, Ponce de Leon, Pate, Holmes Blue, Mullet, Cypress, and Washington Blue springs.

Beginning at its confluence with Hard Labor Creek, Holmes Creek receives inflow from a series of springs and takes on the characteristics of a karst stream (Pratt *et al.* 1989). Barrios and Chelette (2008) identified 51 separate springs within the Holmes Creek basin, as well as areas of groundwater discharge into the channel. As described by the NWFWMD (2002), Floridan aquifer springs are particularly important to the character of and biological resources associated with Holmes Creek and receiving waters within the Choctawhatchee River.



Sources: NWFWMD 2010

Figure 2-3 General Topography and Hydrology

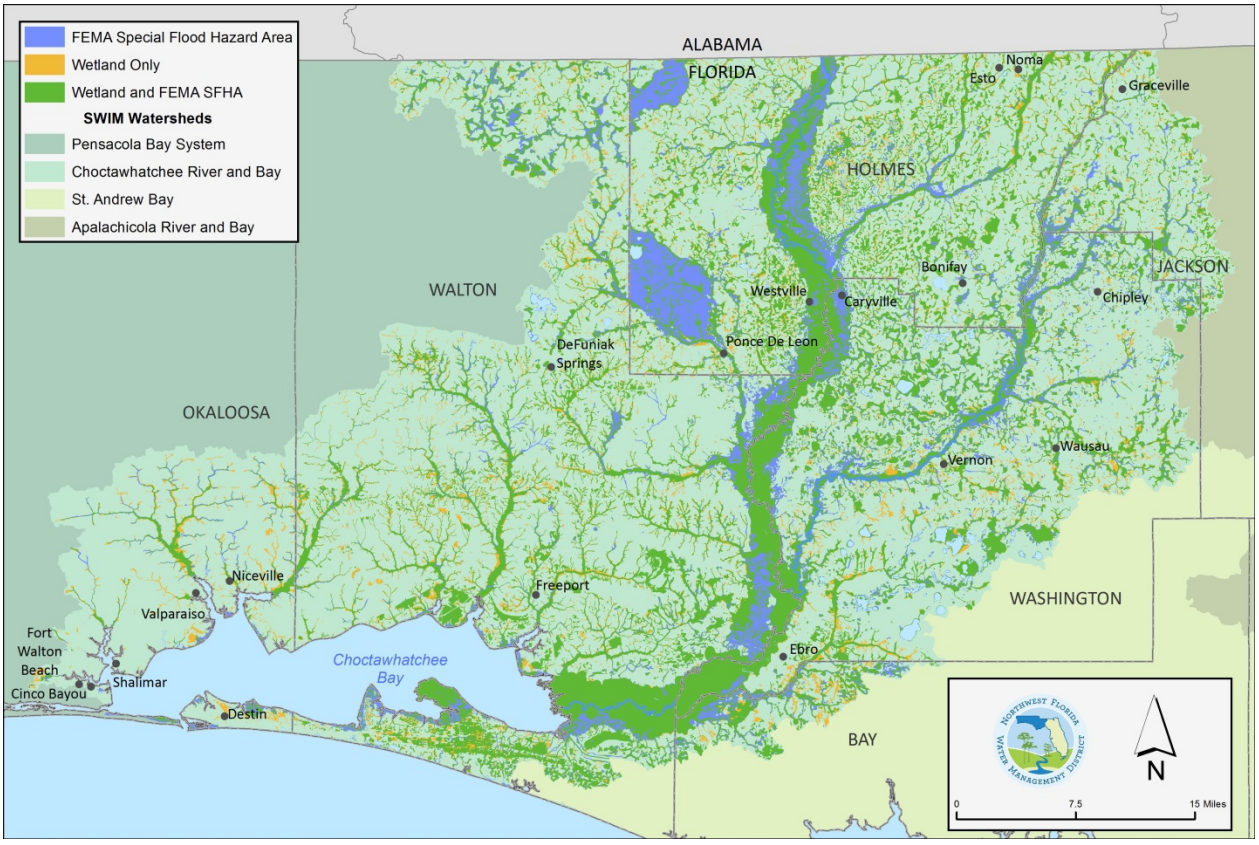
2.2.3 Lakes

The Sand Hill Lakes region extends over portions of the Holmes Creek and Pine Log Creek basins, principally within Washington County. This region has more than 200 lakes, some small steep-walled, round-bottomed sinks, and others larger flat-bottomed pools. The region is an important recharge area for the Floridan aquifer and springs discharging into Holmes Creek, as well as to Econfina Creek in the St. Andrew Bay watershed.

South of Choctawhatchee Bay, primarily in Walton County, is a series of coastal dune lakes. These are naturally-formed lakes, intermittently connected to the Gulf of Mexico. Salinity in the lakes can be variable due to irregular connectivity with the Gulf, saltwater intrusion from salt spray, storm surge over wash, and from beneath during droughts. When dune lakes experience critical pre-flood levels, breaching water forms outlets through the dunes and channels to the Gulf (Bhadha and Jawitz 2008).

2.2.4 Floodplains and Wetlands

As illustrated by Figure 2-4, extensive floodplains span the length of the Choctawhatchee River in Florida. These are primarily forested wetlands, with the habitat grading to a tidal marsh at the river delta. Other major wetland systems include Choctawhatchee Bay's largest salt marsh on the Live Oak Point peninsula, smaller forested wetlands along most of the tributary streams, and an interconnected wetland system inland in southern Walton County (Figure 2-4). Most of the floodplains in the watershed correspond with wetlands. Wetland communities are described further in Section 2.4.



Sources: FEMA 2017, FDEP 2015a, and USFWS 2016b

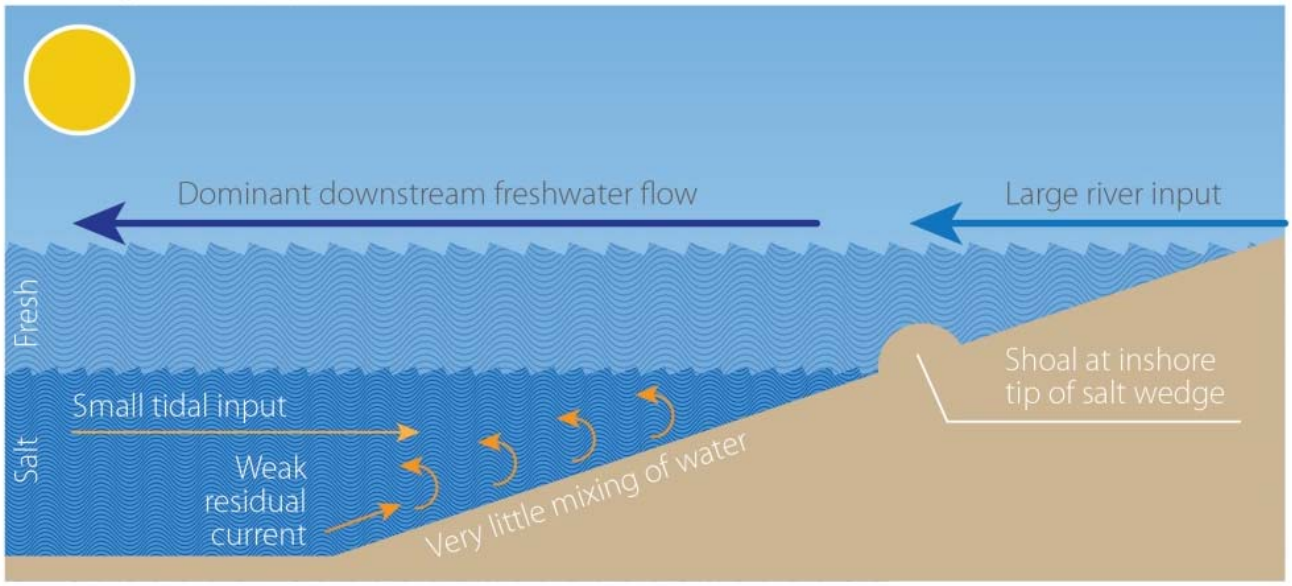
Figure 2-4 Floodplains and Wetlands

2.2.5 Choctawhatchee Bay

Choctawhatchee Bay is more than 27 miles long, following an east-west orientation through Okaloosa and Walton counties. The bay covers approximately 129 square miles and has a single direct opening to the Gulf of Mexico at East Pass near Destin. For descriptive purposes, the bay may be divided into three segments: western, middle, and eastern (Ruth and Handley 2006). Western Choctawhatchee Bay generally includes the area west of the Highway 293 Mid-Bay Bridge to Santa Rosa Sound and is the region of the bay most influenced by interaction with the Gulf of Mexico. A prominent characteristic of this region of the bay is a series of large bayous that define much of the littoral zone. Rocky and Boggy bayous are major features on the north shore. To the west are Garnier and Cinco bayous, and on the south shore of the bay are Old Pass Lagoon and Joes, Indian, and Jones bayous. This segment of the bay also borders Santa Rosa Island (locally referred to as Okaloosa Island) and includes the confluence with Santa Rosa Sound.

The middle reach of Choctawhatchee Bay includes areas between the Mid-Bay Bridge and the State Road 331 causeway. Hogtown Bayou, Basin Bayou, Alaqua Bayou, and LaGrange Bayou are within this portion of the Bay, as are Fourmile Point and Live Oak Point. Eastern Choctawhatchee Bay is the region most substantially dominated by inflow from the Choctawhatchee River. It includes areas east of the State Road 331 causeway. Camp Creek, Black Creek, and the Choctawhatchee River drain directly into the eastern segment. This segment of the bay also includes Tucker Bayou, Jolly Bay, the Choctawhatchee River delta, and the eastern continuation of the Gulf Coast Intracoastal Waterway (GIWW).

Vertical salinity stratification (Figure 2-5) is common throughout the bay, with freshwater discharge from the Choctawhatchee River being the dominant factor in determining the salinity regime (Blaylock 1983; Livingston 1986). Observations conducted by Livingston (1986) found the lowest surface salinities from December through April, with peak salinities noted during the summer and fall.



Source: Graphic by Ecology & Environment, Inc.

Figure 2-5 Stratification of an Estuary

2.3 Land Use and Population

Land use and land cover across the watershed is predominantly forested, with significant agricultural uses, particularly in Alabama and northern Florida (Figure 2-6). Within Florida, most of the land cover consists of upland forest with wetland systems along the Choctawhatchee River and its tributaries (Table 2-1 and Figure 2-7). Urban land uses are concentrated within the coastal communities, and agricultural lands are most prominent within the northeastern extent of the watershed.

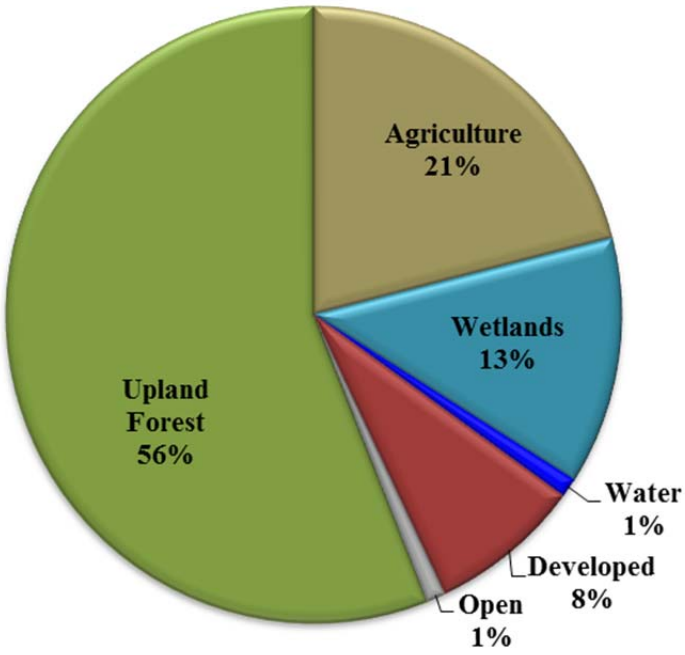


Figure 2-6 Land Cover in the Greater Choctawhatchee Watershed (Alabama and Florida)
Sources: FDEP 2015a; MRCL NLCD 2011

Table 2-1 2012-2013 Land Use and Land Cover in the Choctawhatchee River and Bay Watershed (Florida)

Land Use Category	Square Miles	Percent of Basin
Agriculture	334	1.3
Developed	191	9.1
Open Land	42	2.0
Upland Forests	1,032	49.2
Water	28	15.9
Wetlands	469	22.4

Source: FDEP 2015a

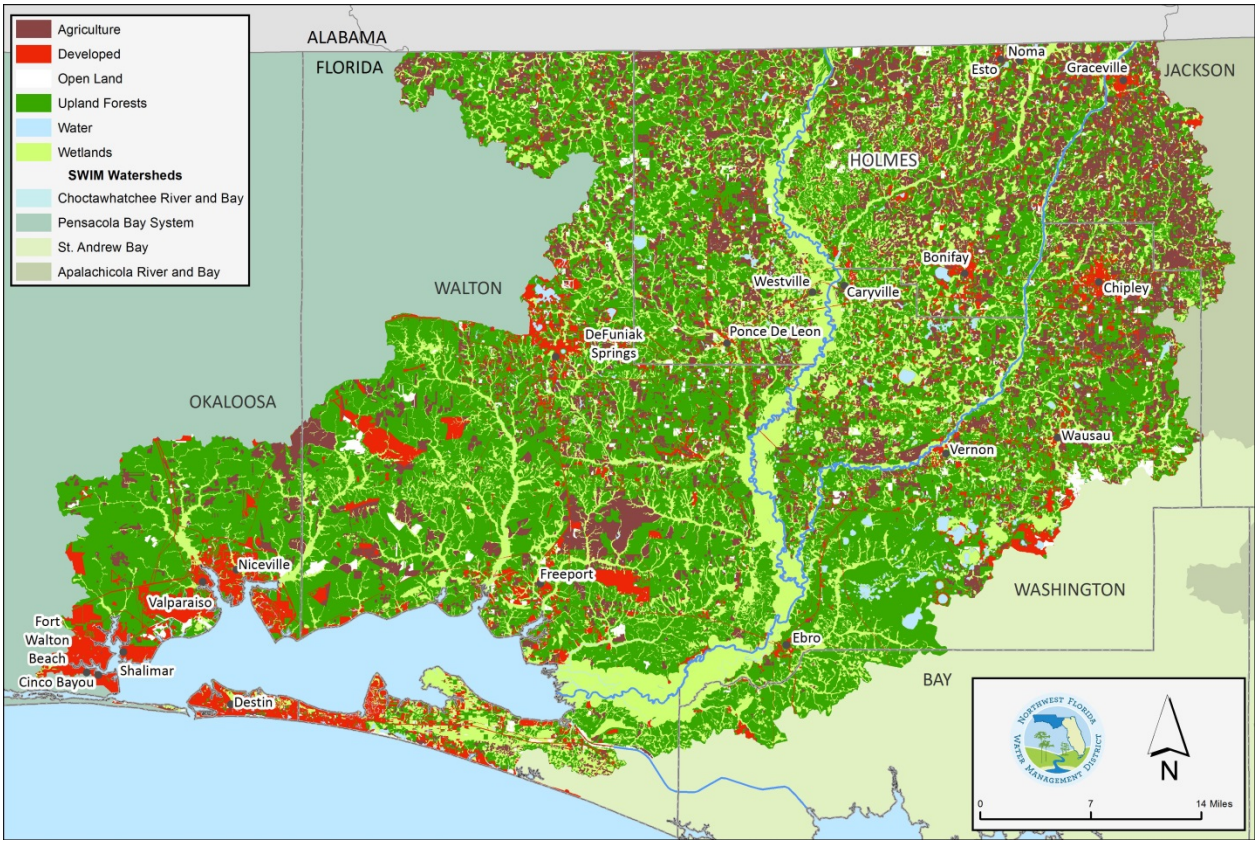


Figure 2-7 Land Use and Land Cover for the Florida Portion of the Choctawhatchee River and Bay Watershed
Source: FDEP 2015a

Public and conservation lands include the District's Choctawhatchee River and Holmes Creek Water Management Area (WMA), which protects over 60,000 acres along the Choctawhatchee River and Holmes Creek. District lands also include properties on the bay at Live Oak Point. Other conservation lands include Point Washington State Forest, Pine Log State Forest, and several state parks along the bay. The Nature Conservancy owns the Choctawhatchee River Delta Preserve at the mouth of the Choctawhatchee River, and FDEP manages Rocky Bayou Aquatic Preserve in the northwestern portion of the bay. Eglin AFB and Hurlburt Field are north and west of the Bay, respectively. Public and conservation lands are described in more detail in Appendix G.

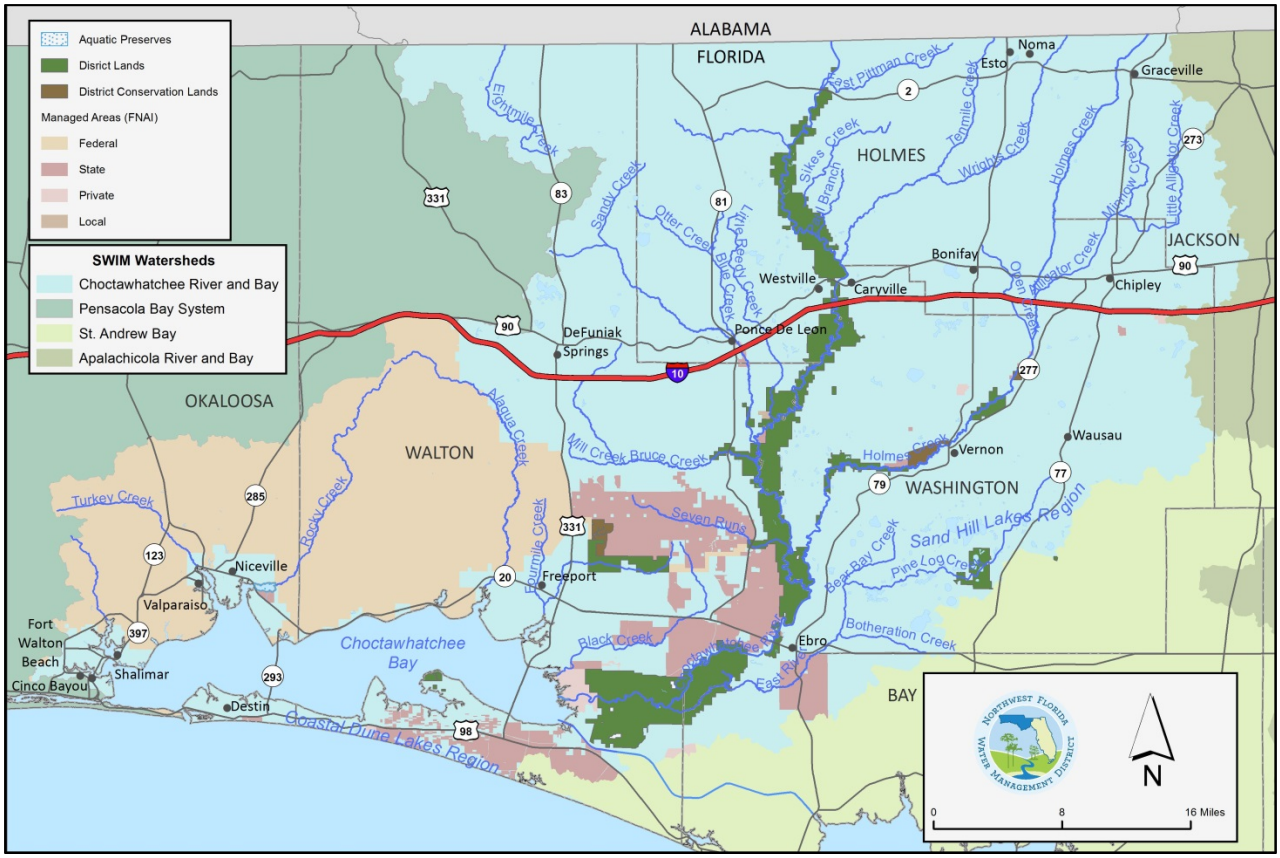


Figure 2-8 Public and Conservation Lands

The largest concentrations of population in the watershed are within Okaloosa and Walton counties. Table 2-2 displays population estimates for the watershed, based on spatial analysis of 2010 U.S. Census data, together with projections to 2030 calculated based on countywide population growth projections from the University of Florida's Bureau of Economic and Business Research (UF BEBR 2016).

Table 2-2 Watershed Population Estimates: 2010-2030

County	2010	2020	2030
Okaloosa	95,955	106,769	113,720
Walton	43,109	54,275	66,101
Washington	21,964	22,850	24,173
Holmes	19,927	20,300	20,700
Jackson	6,838	7,024	7,162
Bay	169	183	200
Total	**187,962**	**211,401**	**232,056**

2.4 Natural Communities

The Choctawhatchee River and Bay watershed encompasses a diversity of natural habitats, including upland, coastal, transitional, wetland, aquatic, estuarine, and marine communities (FNAI 2010). Based on geographic analysis, the watershed includes 35 distinct natural communities within 15 broader community categories as characterized by FNAI (FNAI 2010, 2016a, 2016b).

2.4.1 Terrestrial Communities

Upland communities in the watershed include mesic flatwoods, sandhill, scrub, scrubby flatwoods, upland hardwood forests, wet flatwoods, and xeric hammocks (FNAI 2010). These communities are described in some detail by NWFWMD (1996) and in Appendix E. Listed species supported by upland communities within the watershed include the Choctawhatchee beach mouse (*Peromyscus polionotus allophrys*), the gopher tortoise (*Gopherus polyphemus*), the reticulated flatwoods salamander (*Ambystoma bishopi*), the eastern indigo snake (*Drymarchon corais couperi*), and the red-cockaded woodpecker (*Picoides borealis*).

2.4.2 Choctawhatchee River and Tributaries

The Choctawhatchee River is primarily alluvial in character and supports a range of habitats, including shoreline snags, tributary valley lakes, and spring runs. Holmes Creek has been noted as being ecologically diverse, receiving inflow from over 50 Floridan aquifer springs and providing habitat for a diversity of fish and invertebrates (Barrios and Chelette 2008; Livingston *et al.* 1987; Thompson n.d.; Schlenk 2001).

The Choctawhatchee and Pea rivers, as well as Choctawhatchee Bay, are critical habitat for the threatened Gulf sturgeon (*Acipenser oxyrinchus desotoi*). Hard bottom substrate within the upper river provides spawning habitat (Fox *et al.* 2000), whereas areas of the river receiving substantial spring inflow have been identified as summer holding areas (Hightower *et al.* 2002). Choctawhatchee Bay provides important winter habitat for the sturgeon, primarily over sandy substrates (Fox *et al.* 2000).

The Choctawhatchee River and its tributaries also provide habitat for several species of threatened and endangered freshwater mussels. Among the streams designated as critical habitat are the Choctawhatchee River and Holmes, Wrights, Sandy, Bruce, Natural Bridge, and Alligator creeks. Listed mussels include the Choctaw bean (*Villosa choctawensis*), fuzzy pigtoe (*Pleurobema strodeanum*), southern kidneyshell (*Ptychobranchus jonesi*), southern sandshell (*Hamiota australis*), and tapered pigtoe (*Fusconaia burkei*).

The Choctawhatchee River system receives considerable groundwater contribution, and a number of Floridan aquifer springs are present within the watershed. Springs are concentrated along Holmes Creek, with other springs along Blue Creek, Sandy Creek, and the Choctawhatchee River. Prominent springs in the watershed include Morrison Spring, which flows through a spring run to the Choctawhatchee River, Cypress Spring and Beckton Spring along Holmes Creek, and Ponce de Leon spring on Sandy Creek. Natural Bridge Creek Rise is within the Pea River basin, in Walton County near the Alabama state line.

Steephead ravines and streams develop microclimates and habitats that support distinctive plant communities and occurrences of rare amphibians (Means 2000). Means and Travis (2007) describe declines in occurrences of salamanders in steephead ravines in the Choctawhatchee Bay watershed and adjoining watershed areas.

2.4.3 Riparian, Wetland, and Floodplain Habitats

Riparian habitats include those areas along waterbodies that serve as an interface between terrestrial and aquatic ecosystems. Riparian areas are important fish and wildlife habitats that promote ecological diversity and assist in mitigating or controlling NPS pollution. Riparian vegetation can be effective in removing excess nutrients and sediment from surface runoff and shallow groundwater and in shading streams to optimize light and temperature conditions for aquatic plants and animals. Riparian vegetation, especially trees, is also effective in stabilizing streambanks and slowing flood flows, resulting in reduced downstream flood peaks.

Major floodplain swamps span the length of the Choctawhatchee River. Riparian wetlands and floodplains are also along other streams throughout the watershed (Figure 2-4). Another major palustrine wetland system is south of Choctawhatchee Bay on the Moreno Point peninsula within Walton County.

Clewell (1989) surveyed the Choctawhatchee River floodplain and described 16 general community types. Much of the bottomland along the river consists of hardwood forest, interspersed with pines. While Clewell reported large cypress stumps, he found no unlogged, old-growth stands along the river. Tupelo and cypress swamps occupy some of the wetter areas, and tall levees and relict dunes provide mesic and xeric islands within the hydric bottomlands. The riparian environment changes distinctly at approximately the town of Ebro. Bottomland hardwood forests are prevalent above this point but are generally replaced by seepage swamps below (Clewell 1989). A tidal marsh develops along the delta at the mouth of the river.

2.4.4 Emergent Marsh

Marshes within the Choctawhatchee River and Bay watershed include both salt (brackish) marsh in the coastal reaches and freshwater emergent marsh along the Choctawhatchee River (FNAI 2010). Marsh species composition is influenced by a combination of salinity tolerance and differences in soil type, elevations, and competitive interactions. Salt marshes serve as a transition between terrestrial and marine systems. Generally, salt marshes are intertidal and develop along relatively low energy shorelines. Salt marshes in the Florida Panhandle are usually characterized by fairly homogeneous expanses of dense black needlerush (*Juncus roemerianus*). Often, they are accompanied on the water-ward side by smooth cordgrass (*Spartina alterniflora*). The *Juncus* and *Spartina* zones are distinctive and can be separated easily by elevation.

The major salt marsh on Choctawhatchee Bay is on the Live Oak Point peninsula, bordering Hogtown Bayou on the south shore of the bay (Figure 2-9). This marsh covers approximately 1,000 acres. Prominent species include black needlerush, smooth cordgrass, bulrush (*Scirpus* spp.) and big cordgrass (*Spartina cynosuroides*), with scattered pines and other transitional species on hammocks within the marsh. A network of mosquito control ditches, constructed during the 1960s, intersects the marsh. The marsh has experienced significant erosion on its north shore.

2.4.5 Seagrass Beds

Based on interpretation of aerial photography, Choctawhatchee Bay supported over 5,000 acres of seagrasses in 2015 (Carlson 2017). Seagrass beds are important as they support an abundance of fish and invertebrates. Among these are shrimp, spotted seatrout, Gulf menhaden, red drum or redfish, blue crab, Gulf flounder, striped mullet, and white mullet (Ruth and Handley 2006). Two species of seagrass, shoal grass (*Halodule wrightii*) and widgeon grass (*Ruppia maritima*), are most prevalent in Choctawhatchee Bay, with shoal grass being the most common. General distributions of seagrass and salt marsh habitats

are depicted in Figure 2-9. Additional information about the status and trends of seagrasses in the bay can be found in Section 3.2.

2.4.6 Oyster Beds

While benthic habitats in Choctawhatchee Bay primarily consist of sand and mud flats, as well as seagrass beds as described above, the bay also supports some oyster beds, primarily near the southern shore of the central and eastern reaches of the bay (Burch 1986; Wiggins 1996). Limited oyster landings were reported for Walton County from 2005-2010 (FWC 2017).

2.4.7 Coastal Barrier Systems

Santa Rosa Island serves as a coastal barrier system for Choctawhatchee Bay. The barrier system supports distinct habitats and natural systems, including beaches, foredune and relic dune habitat, tidal marsh, brackish ponds and lagoons, coastal grasslands, and upland forest and scrub communities (National Park Service 2014). As described by the NWFWMD (1996), beach and dune communities with associated maritime forests are found south of Choctawhatchee Bay on Santa Rosa Island and the Moreno Point peninsula. Herbaceous communities along the beach and dune zone are adapted to stresses of high energy shorelines, salt spray, and periodic storms. Coastal scrub communities and maritime forests develop further inland, with some protection from dunes. The typical zonation is broken in places by coastal dune lakes and intermittent streams.

2.4.8 Coastal Dune Lakes

Coastal dune lakes (Figure 2-9) are adapted to the dynamic coastal environment and have been identified as globally rare and imperiled (FNAI 2010). They are ecologically distinct, given their position within the watershed and variable interaction with the Gulf of Mexico. The lakes provide an important stopover point for migrating neo-tropical birds, habitat for aquatic and marine animals, freshwater for aquatic plants, and recreational resources for residents and visitors. Migratory birds such as piping plovers (*Charadrius nivosus*) and red knots (*Calidris canutus*) use lakeshore edges and outfalls for foraging during winter migrations. Snowy plovers (*Charadrius nivosus*) and least terns (*Sternula antillarum*) use dune habitats adjacent to the lakes for nesting and foraging habitat (FDEP 2014a).

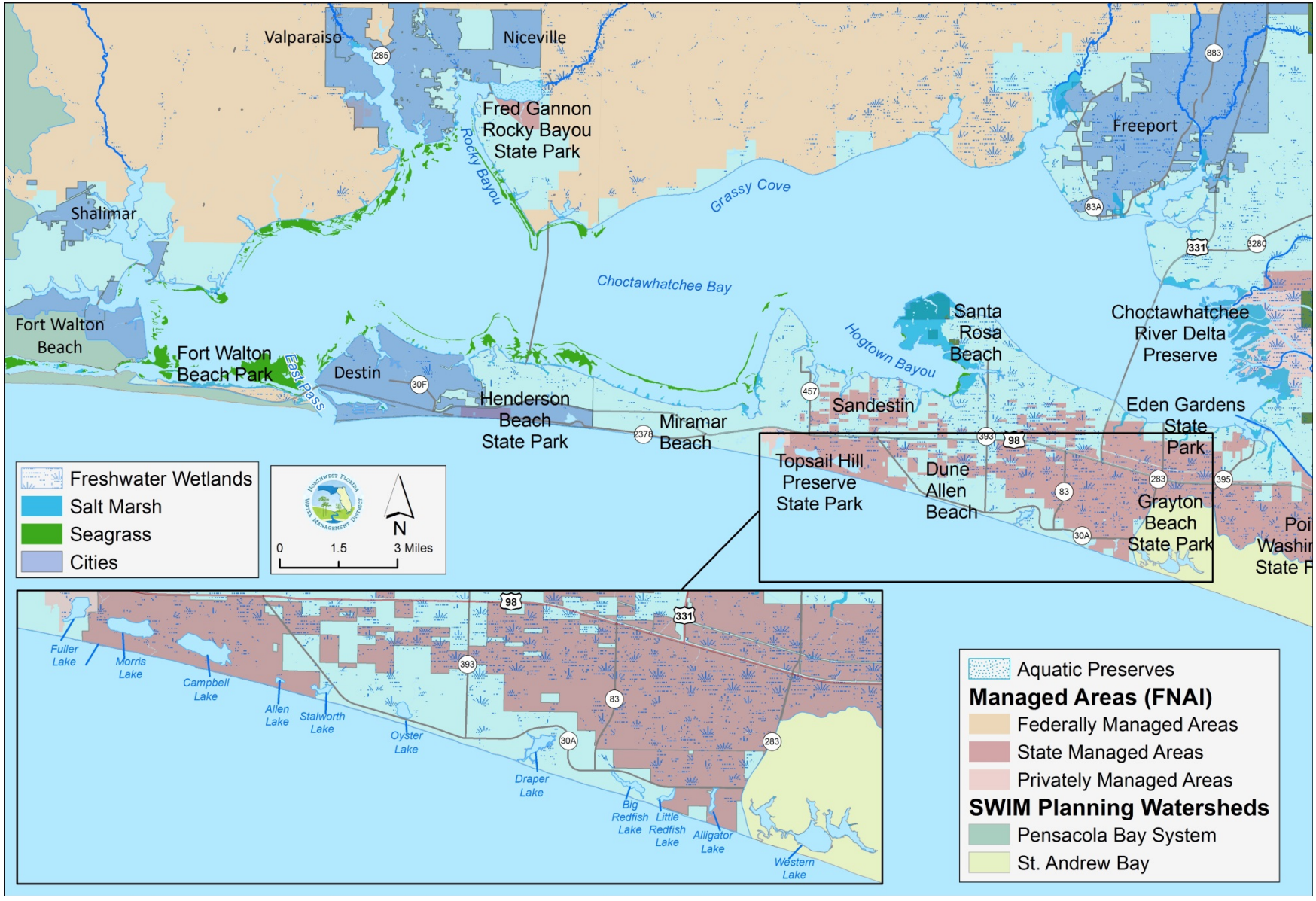


Figure 2-9 Coastal Natural Features in the Watershed

3.0 Watershed Assessment and Water Resource Issues

3.1 Water Quality

3.1.1 Impaired Waters

The FDEP has identified 42 segments of the Choctawhatchee River and Bay watershed as impaired, as well as seven adjacent Gulf beaches (Figure 3-1). Choctawhatchee Bay and much of the river have been listed as impaired for nutrients. Bacteria impairments have also been identified for portions of the bay and several tributaries. Other identified impairments include dissolved oxygen in areas of the eastern bay and impairments for metals within several segments of the river basin and Turkey Creek. The overall list of impaired waters can be found in Appendix F.

Potential pollution sources within the Choctawhatchee River basin include erosion, municipal wastewater, and NPS pollution from agricultural areas. Pollution sources for Choctawhatchee Bay include urban stormwater runoff, septic tanks, and wastewater, as well as contributions from the river system.

Total maximum daily loads (TMDLs) have been adopted for bacteria for one segment of the Choctawhatchee River, as well as Alligator Creek and Camp Branch Creek, both within the Holmes Creek basin (Figure 3-1). Minnow Creek and Sikes Creek within the upper reach of the Choctawhatchee River have TMDLs established for dissolved oxygen. There are no pending or adopted basin management action plans (BMAPs) in the Choctawhatchee River and Bay watershed.

The FDEP has adopted a statewide TMDL for reducing human health risks associated with consuming fish taken from waters impaired for mercury. Mercury impairments are based on potential human health risks, not exceedances of water quality criteria. The primary source of mercury is atmospheric deposition, with 30 percent from natural sources and 70 percent from anthropogenic international sources outside of North America. It is estimated that approximately 0.5 percent of mercury from anthropogenic sources is from Florida (FDEP 2013). Only a small part of mercury in the environment is in the form of methylated mercury, which is biologically available to the food chain. The statewide TMDL for mercury includes a reduction target for fish consumption by humans and by wildlife and an 86 percent reduction in mercury from mercury sources in Florida (FDEP 2013).

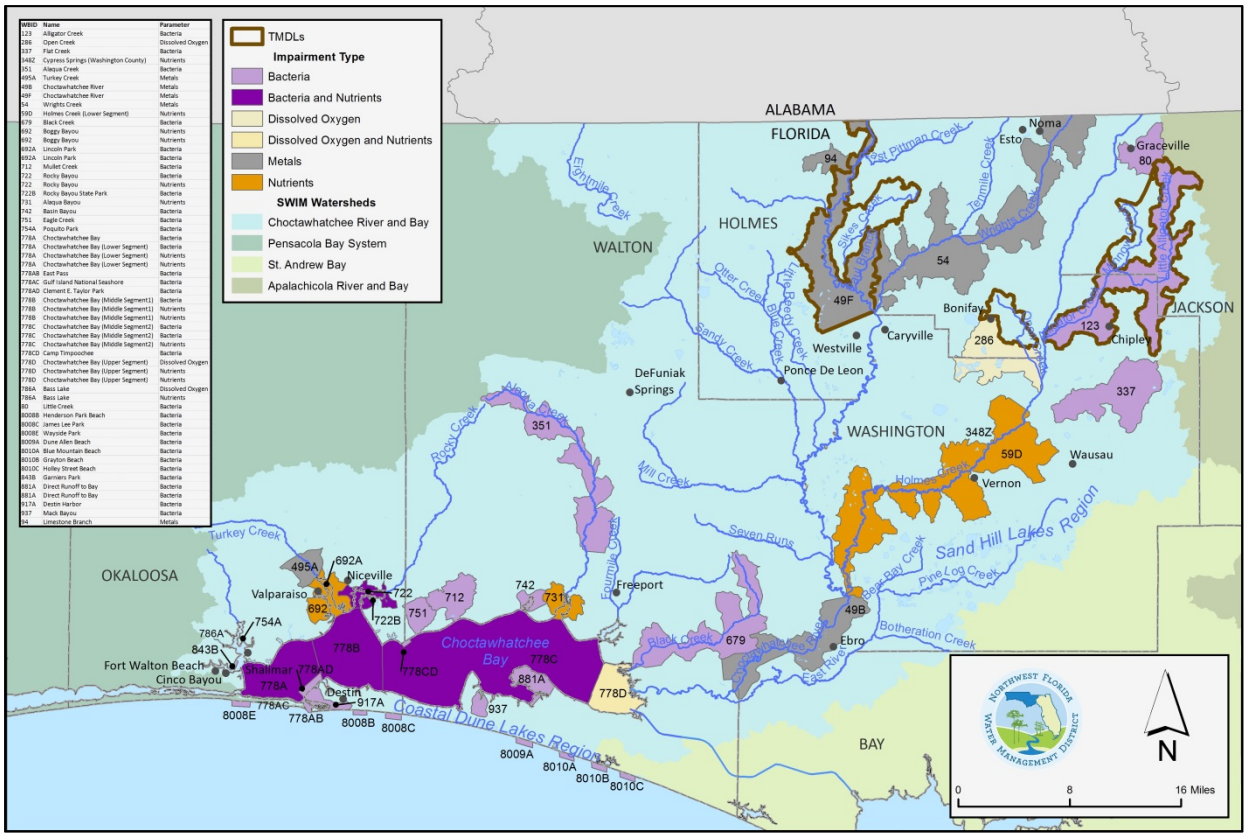


Figure 3-1 Impaired Waters in Florida's Portion of the Watershed
Sources: FDEP 2014b; NOAA 2015; USGS 2015, 2016a.

3.1.2 Pollution Sources

Nonpoint source (NPS) pollution is generated when stormwater runoff collects pollutants from across the landscape (lawns, pavement, highways, dirt roads, buildings, farms, forestry operations, and construction sites, etc.) and carries them into receiving waters. Pollutants entering the water in this way include nutrients, microbial pathogens, sediment, petroleum products, metals, pesticides, and other contaminants. Typical sources of NPS pollution include stormwater runoff from urban and agricultural lands and erosion and sedimentation from construction sites, unpaved roads, and destabilized stream banks. Atmospheric deposition of nitrogen, sulfur, mercury, and other substances via fossil fuel combustion also contribute to NPS pollution.

Stormwater runoff is the primary source of NPS pollution, and it is closely associated with land use. Urban land use, especially medium- to high-density residential, commercial, and industrial areas, has the highest NPS pollution per acre due to impervious surfaces that increase runoff. In urban areas, lawns, roadways, buildings, parking lots, and commercial and institutional properties all contribute to NPS pollution. Urban areas are largely concentrated around Choctawhatchee Bay; the cities of Fort Walton Beach, Destin, Cinco Bayou, Shalimar, Freeport, Valparaiso, Niceville; and adjacent unincorporated areas. In addition to these established areas, the urban-rural fringe hosts new development and construction sites, introducing new NPS pollution sources impervious surface area within the watershed.

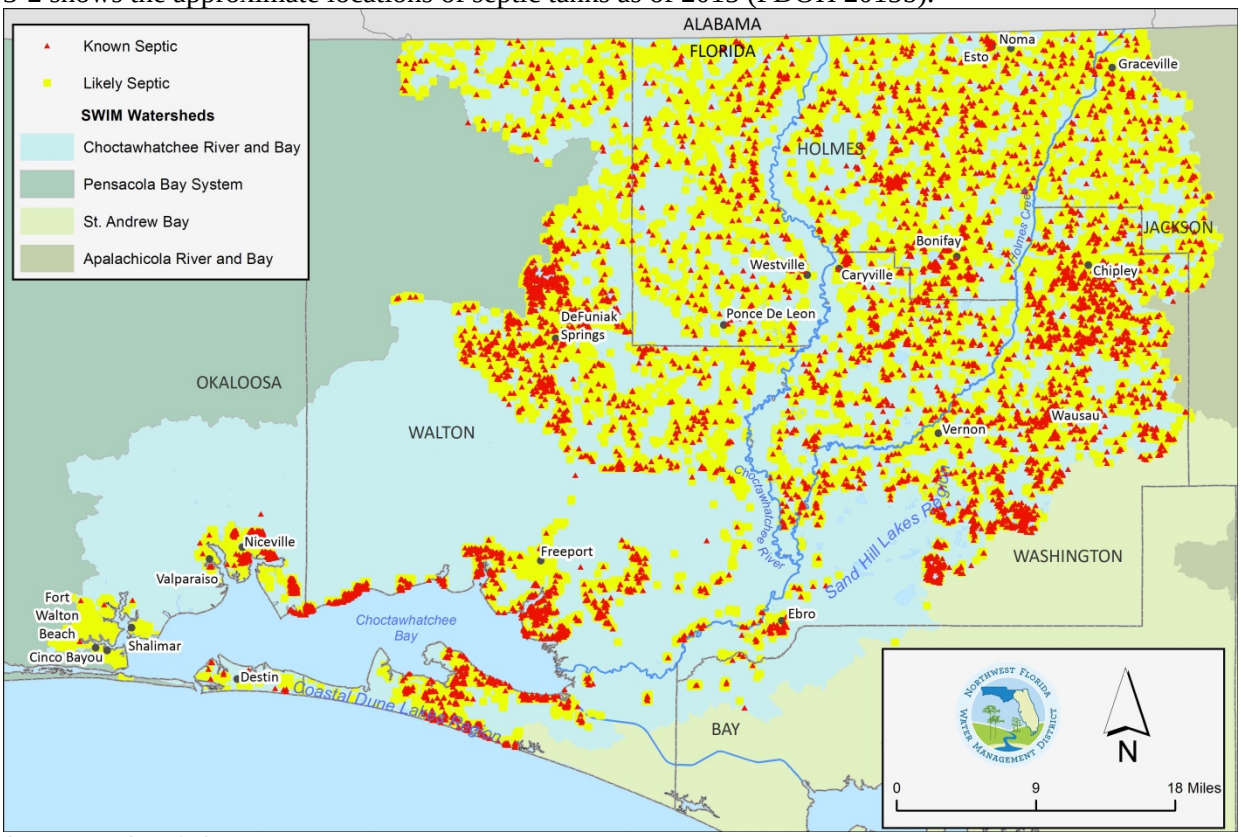
In the Choctawhatchee River and Bay watershed, eight government entities hold Municipal Separate Storm Sewer System (MS4) NPDES permits for stormwater conveyances that discharge to waters of the

State, including Eglin AFB, the City of Niceville, the City of Destin, the City of Valparaiso, Bay County, the City of Fort Walton Beach, Okaloosa County, and Walton County.

Fertilizer application, ditching, road construction, and harvesting associated with agriculture and silviculture can also cause NPS pollution, erosion, sedimentation, and physical impacts to streams and lakes (Stanhope *et al.* 2008). Agricultural lands are most prominent in the northern and eastern portions of the watershed, as well as in Alabama.

Onsite sewage treatment and disposal systems are widespread sources of nutrients and other pollutants. Concentrations of OSTDS can degrade the quality of groundwater and proximate surface waters. While conventional OSTDS can control pathogens, surfactants, metals, and phosphorus, mobility in the soil prevents complete treatment and removal of nitrogen. Dissolved nitrogen is frequently exported from drainfields through the groundwater (NRC 2000). Additionally, OSTDS in areas with high water tables or soil limitations may not effectively treat other pollutants. Pollutants can enter surface waters as seepage into drainage ditches, streams, lakes, and estuaries (EPA 2015; NRC 2000).

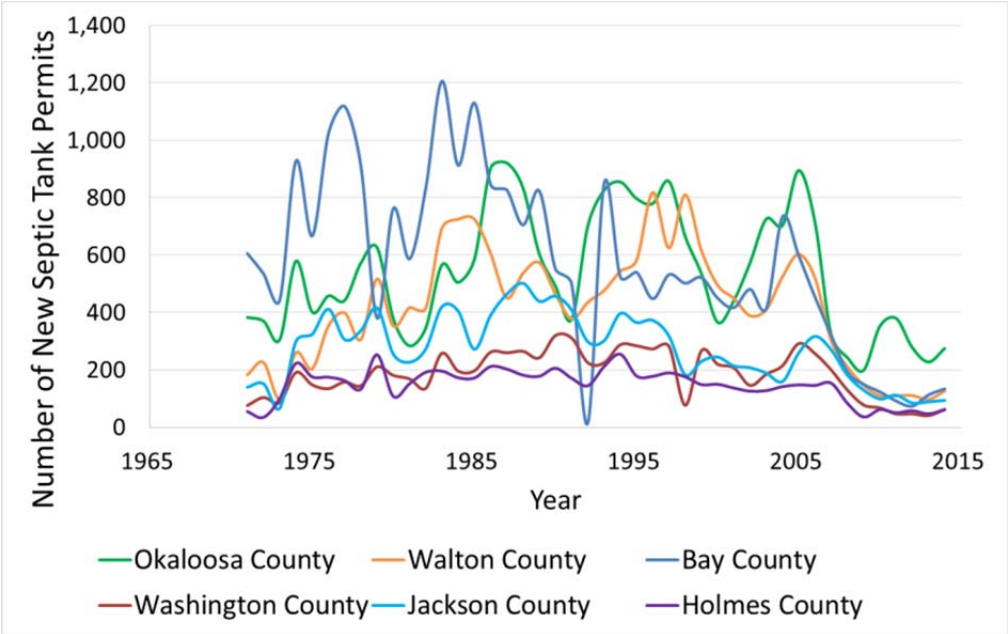
Florida Water Management Inventory data indicate approximately 33,000 known or likely septic systems in the watershed (FDOH 2016). Known septic is based on permit data combined with inspection records. Likely septic is based on results of the review of nine criteria, but without inspection verification. Figure 3-2 shows the approximate locations of septic tanks as of 2015 (FDOH 2015b).



Sources: FDOH 2016

Figure 3-2 Known or Likely Septic Tank Locations in the Choctawhatchee River and Bay Watershed

Across the watershed, new septic installations have declined significantly since the early 2000s (Figure 3-3). According to 2012 FDOH permit data, many of the septic systems in the communities along western Choctawhatchee Bay have been abandoned.



Source: FDOH 2015a.

Figure 3-3 Number of New Septic Tank Permits by Year

Erosion and sedimentation are natural phenomena that can be accelerated by human activities, with undesirable water quality consequences. Factors such as highly erodible soils, unstable slopes, and high rainfall intensities are important factors in erosion and sedimentation. Construction activities, unpaved roads, abandoned clay pits, and agricultural and silvicultural practices lacking proper BMPs are common sources of sedimentation. Accelerated stream bank erosion caused by runoff associated with impervious surfaces can also be a significant source of sedimentation into receiving waters.

The Lower Choctawhatchee Subbasin Road-Stream Crossings Assessment (SAIC 2006) evaluated unpaved road stream crossings, crossover sites, and proximity sites across the Florida portion of the Choctawhatchee River watershed. A total of 1,205 separate sites were evaluated. High priority sites identified included 36 stream crossing sites, 52 road drain crossover sites, and ten proximity sites. In addition to direct impacts to benthic habitats, sedimentation degrades water quality through increased turbidity and suspended solids. An updated assessment of unpaved roads, with funding from NFWF, is in progress at the time of this writing.

Marinas may be a source of NPS pollution from typical activities, such as boat maintenance, fueling, and marine sewage discharge, and due to runoff from parking lots. Pollution from marinas can depend on the availability of pump-out facilities and the level and consistency of marina BMP implementation. Currently, there are nine FDEP-certified Clean Marinas in the Choctawhatchee River and Bay watershed, more than in any other watershed of the NWFWMD (FDEP 2016a).

Some pollutants, such as nitrogen and mercury, are also contributed to the landscape and waterbodies by atmospheric deposition. Most oxidized-nitrogen emissions are deposited close to the emission source and can especially impact surface water proximate to urban areas (Howarth *et al*. 2002a, 2002b, 2002c; NRC 2000).

"The Florida Clean Marina Program and Florida Clean Boatyard Program are voluntary designation programs for implementing environmental practices to protect Florida's waterway such as implementing BMPs, using dustless sanders, recycling oil and solvents, and re-circulating pressure wash systems to recycle wastewater."

- FDEP, About Florida Clean Marina Programs

There are 22 permitted domestic wastewater treatment and water reclamation facilities, as well as 15 industrial wastewater facilities within the Florida portion of the watershed (Table 3-1; Figure 3-4).

The Red Bay Plant Sand and Gravel Mine in Walton County is the only mine recognized by the USGS within the watershed. Other small-scale mines and borrow pits have been identified by the FDEP, including 29 mines or borrow pits in Walton County and two within Holmes County (FDEP 2014c). Sand is the predominant material mined in the watershed; however, several limestone and clay mines also exist within the watershed boundaries (FDEP 2014c).

In the Choctawhatchee River and Bay watershed, there are 187 active petroleum contamination tracking sites registered with the Petroleum Contamination Monitoring database, as well as seven contaminated dry-cleaning sites eligible for the state-funded Dry-cleaning Solvent Cleanup Program. Many are located in developed areas around Choctawhatchee Bay, including Destin, Fort Walton Beach, Niceville, and Freeport.

Table 3-1 Domestic Wastewater Facilities

Facility Name	County	Permitted Flow (mgd)	2015 Flow (mgd)	Discharge Type*
Bethlehem K-12 School WWTP	Holmes	0.03	0.00	Sprayfield
Bonifay WWTF	Holmes	1.40	0.63	Surface water
Noma WWTP	Holmes	0.03	0.03	Surface water
Ponce De Leon WWTP	Holmes	0.08	0.03	RIB
Graceville AWT Facility	Jackson	1.10	0.74	Surface water
Arbennie Pritchett WRF	Okaloosa	10.00	6.72	RIB; golf course irrigation
Fort Walton Beach Reuse Service Area[1]	Okaloosa	2.20	0.35	Golf course irrigation; landscape irrigation

Facility Name	County	Permitted Flow (mgd)	2015 Flow (mgd)	Discharge Type*
George F. French WRF (Destin Water Users)	Okaloosa	6.00	2.93	RIB; golf course, residential, and other landscape irrigation; reuse at facility
Niceville-Valparaiso Regional WWTF	Okaloosa	3.35	2.41	Sprayfield; golf course, residential and other landscape irrigation
DeFuniak Springs WWTP	Walton	1.50	0.62	Sprayfield
Freeport WWTP	Walton	0.60	0.25	RIB
Point Washington WWTF	Walton	2.00	0.82	Public Access Reuse
Sandestin WWTP	Walton	4.00	3.13	Public Access Reuse
Seacrest WWTF	Walton	2.00	0.82	Public Access Reuse
South Walton Utility Company WWTP	Walton	2.75	1.41	RIB; public access reuse
Walton Correctional Institution WWTP	Walton	0.26	0.11	RIB
Chipley WWTP	Washington	1.20	0.66	Sprayfield; golf course irrigation; landscape irrigation; reuse at facility
Ebro Greyhound Park WWTF	Washington	0.025	0.017	RIB
Harvest Vineyard Mission Church WWTP	Washington	0.01	0.00	RIB
Northwest Florida Reception Center WWTF	Washington	0.46	0.43	RIB
Sunny Hills WWTP	Washington	0.05	0.02	RIB
Vernon WWTF	Washington	0.21	0.09	Sprayfield

Source: FDEP 2017

*See Parts II-VII of Chapter 62-610, F.A.C. for more information.

** FDEP Annual Reuse Inventory only includes facilities permitted at 0.1 mgd or greater.

[1]There is no wastewater treatment facility in Ft. Walton Beach; wastewater flows are collected and treated at the Okaloosa County Arbennie Pritchett WRF, which along with Hurlburt Field AWTP (Pensacola River and Bay watershed), then return treated flows to the city as reuse water.

Sources: FDEP 2015b; NOAA2015a; USGS 2015, 2016a.

Figure 3-4 Permitted Wastewater Facilities within the Choctawhatchee River and Bay Watershed

There are currently no Superfund sites within the watershed; however, one facility (the former West Florida Scrap Metal in Fort Walton Beach) is registered under the state-funded cleanup program. The state-funded program is designed to address sites where there are no viable responsible parties, the site poses an imminent hazard, and the site does not qualify for Superfund or is a low priority for the EPA. West Florida Scrap Metal is a former landfill approximately 1.5 miles northwest of Bass Lake, which drains into Dons Bayou and eventually Choctawhatchee Bay.

3.2 Natural Systems

As discussed in Section 3.1, SAIC (2006) evaluated unpaved road stream crossings, crossover sites, and proximity sites across the Florida portion of the Choctawhatchee River watershed. Nearly 100 high priority sites were identified, including road-stream crossing sites, drain crossovers, and proximity sites. In addition to affecting water quality, sedimentation from unpaved roads and other sources directly impacts benthic habitats through smothering, altering channel dimensions, and changing substrate composition. Submerged aquatic vegetation and mussel habitats are among those that can be degraded or lost. Seagrasses in downstream estuarine waters are impacted by resulting turbidity.

Yarbro and Carlson (2016) reported that Choctawhatchee Bay seagrass coverage in 2007 was 1,915 acres, a 55% decline from 1992 reported coverage of 4,261 acres. Declining seagrass area and diminished water clarity was attributed to the effects of stormwater runoff, including turbidity and salinity effects, associated with river discharge and runoff from urbanized areas. Initial evaluation of imagery collected in 2015, however, indicates substantial recovery of seagrasses, particularly along the south shore of the bay between Joes Bayou and Fourmile Point (Carlson 2017). Mapped area suggests about 5,733 acres of

seagrass within the bay in 2015. Historic observations suggest that seagrass beds within Choctawhatchee Bay are subject to shifts in coverage area, depending on complex interactions between variable factors, including water clarity, salinity fluctuation and stratification, physical disturbance, and recruitment.

As described by Livingston (1987), western Choctawhatchee Bay in particular received many years of generally untreated stormwater runoff, with resulting impacts to benthic habitats, water quality, and sediment quality. Given this, there is a potential for legacy pollutants within the sediment profile that can reenter the water column, as well as continuing to degrade benthic habitat. The National Oceanic and Atmospheric Administration (NOAA) (1997) evaluated sediment toxicity in Florida Panhandle estuaries. Sediment samples were collected at 37 sites in Choctawhatchee Bay in 1994. Evidence of toxicity was found at all stations, with the highest levels in Cinco, Garnier, Boggy, Tom's, Rocky, and LaGrange bayous, and Destin Harbor. Concentrations of contaminants were generally higher in bayous than in the main bay. The highest polycyclic aromatic hydrocarbon concentrations were in Cinco Bayou. Concentrations of polychlorinated biphenyls were found to be high in Cinco and Boggy bayous, and lead and mercury concentrations were relatively high in Garnier, Cinco, Boggy, and Rocky bayous.

The marsh at Live Oak Point has been extensively altered by mosquito control ditch excavation, particularly within the northern portion of the marsh. While the ditch areas host shellfish and finfish, they also act as the terminus for stormwater conveyances that send untreated stormwater runoff into the bay. Additionally, Live Oak Point has experienced considerable erosion along its northern shoreline.

Geselbracht *et al.* (2015) conducted an analysis of St. Andrew and Choctawhatchee bays using the Sea Level Affecting Marshes Model (SLAMM) to evaluate changes in community composition under five different scenarios, ranging from 0.39 to 2.0 meters of sea level rise by the year 2100. The results indicate that tidal fresh marsh and irregularly flooded marsh communities have the potential to be affected, including within the vicinity of the Choctawhatchee River delta, Live Oak Point, and other littoral areas along the bay. Adaptation strategies, including living shorelines, oyster reefs, wetland and upland habitat restoration, water flow preservation, and sediment management to support vulnerable marsh, mangrove forest and dry land areas were suggested for planning consideration.

3.3 Floodplains and Floodplain Management

Floodplains protect water quality by allowing storage of floodwaters, reducing runoff velocity and preventing erosion and sedimentation. Floodplains also attenuate potential flood effects while providing an ecological link between aquatic and upland ecosystems and habitat for many terrestrial and aquatic species. Development of and encroachment into floodplains, reduces water storage capacity, increases flood heights and velocities, and degrades natural systems in areas beyond the encroachment itself.

Maintaining the hydrological integrity of the floodplain can benefit surface water systems in drought conditions, as well as flood conditions. Floodplain vegetation reduces evaporation and increases soil water storage capacity. Riparian wetlands, marshes, and floodplain forests help to slow stormwater runoff, protecting water quality and regulating the release of water into streams and aquifers.

Riverine floods are common along the Choctawhatchee River. Federal Emergency Management Agency digital flood maps indicate that 404,299 acres (approximately 30 percent) of the watershed are delineated as Special Flood Hazard Area (Figure 2-4). The coastal extent of the watershed, proximate to the Gulf of Mexico and Choctawhatchee Bay, is also subject to periodic coastal flooding associated with storms. Flood protection needs are closely related with stormwater management, as well as land use planning and land development regulation. Optimally, stormwater management systems provide both flood protection and water quality treatment.

4.0 Watershed Protection and Restoration

4.1 Management Practices

Watershed protection and restoration is inherently a collaborative effort on the part of state, regional, and federal agencies; local governments; nongovernmental organizations; the business community; and the public. Implementation is conducted at the watershed, sub-watershed, and local scale. Recommended management strategies are described below.

4.1.1 Nonpoint Source Pollution Abatement

Addressing NPS pollution is a vital part of watershed management in the Choctawhatchee River and Bay watershed. As described above, stormwater runoff carries pollutants from the landscape that diminish water quality, and it can physically impact streams and aquatic habitats. Multiple strategies can be employed to collectively reduce NPS pollution and protect and improve water quality and watershed resources.

Stormwater Retrofit

Among the most effective means of reducing NPS pollution is to retrofit existing stormwater management systems to add treatment and restore or approximate natural hydrology. In addition to improving water quality, appropriately designed retrofit projects improve flood protection, reduce physical disturbance from erosion and sedimentation, and provide aesthetic and recreational use benefits.

Implementation may include a mixture of traditional and nonstructural approaches. There are numerous methods of stormwater management and treatment, among which are wet and dry detention ponds, infiltration systems, stormwater harvesting, wetland treatment systems, stormwater separator units, vegetated swales and buffers, pervious pavement, bioretention, ditch blocks, green roofs, and chemical (alum) treatment. Specific measures employed depend on site conditions, including soils, water table conditions, flow, intended uses, and available land area. Optimally, a treatment train approach is employed, addressing hydrology and water quality treatment across a basin. Implementation is best accomplished within a wider, watershed context that incorporates initiatives such as Florida Friendly Landscaping (section 373.185, F.S.) and public outreach and awareness.

Within the Choctawhatchee River and Bay watershed, the greatest need and potential for stormwater retrofit is within municipal and transitional areas with relatively dense development and significant areas of impervious surface, most prominently in the vicinity of the bay. Local governments normally take the lead in implementing stormwater retrofit projects, as they most commonly own, operate, and maintain stormwater management systems.

Agricultural Best Management Practices

Best management practices are practical measures that act together or individually to protect water resources and fish and wildlife habitat. Such practices were pioneered for agriculture but have also been developed and effectively applied to silvicultural and urban land uses. Best management practices reduce soil loss, nutrient enrichment, sedimentation, discharge of chemical pollutants, and other adverse impacts (see, for example, Wallace *et al.* 2017, among many others). Implementation also often benefits stream bank stability and fish and wildlife habitat. In addition to protecting water and habitat quality and conserving water, BMPs can reduce costs to producers by increasing operational efficiency and effectiveness.

Agricultural BMPs include both structural and nonstructural controls. Examples are cover crops, contour farming, terracing, tree planting, integrated pest management, mobile irrigation laboratory applications, sod-based crop rotation, fertigation, and many other tools and services. The Florida Department of Agriculture and Consumer Services has developed, evaluated, and approved BMPs that are specific to individual agricultural operations within Florida watersheds. Guidance for and assistance in enrolling in approved BMPs are provided by FDACS. Cost share programs are also conducted both by FDACS and the District. Additionally, FWC provides technical assistance to private landowners through its Landowner Assistance Program.

Implementation of approved BMPs or water quality monitoring is required in basins with adopted BMAPs. Whether required or not, however, BMPs are effective means of protecting and restoring watershed resources and functions and are recommended land use practices for implementation of this plan.

Within the Choctawhatchee River and Bay watershed, the most extensive and concentrated areas of agricultural land use are in the northeastern section of the watershed within Holmes, Jackson, and Washington Counties, notably including the Holmes Creek and Wright's Creek sub-basins (Figure 2-7). Within these areas, agricultural BMPs have significant potential to further protect and improve water quality and aquatic habitat conditions.

Silviculture Best Management Practices

The Florida Forest Service (FDACS 2008) defines silviculture BMPs as "the minimum standards necessary for protecting and maintaining the State's water quality as well as certain wildlife habitat values, during forestry activities." These practices are protective of water resources, including streams, downstream receiving waters, sinkholes, lakes, and wetlands. The FFS provides specific guidance on BMPs (FDACS 2008) and has established compliance monitoring requirements and procedures. FDEP (1997) evaluated the effectiveness of silviculture BMPs and concluded that forestry operations conducted in accordance with the BMP manual resulted in no major adverse habitat alterations.

The primary BMPs established for forestry are special management zones (SMZs). These zones provide buffering, shade, bank stability and erosion-control, as well as detritus and woody debris. They are intended to protect water quality by reducing or eliminating sediment, nutrients, logging debris, chemicals, and water temperature fluctuations. They also maintain forest attributes that provide wildlife habitat. Widths of SMZs vary depending on the type and size of the waterbody, soils, and slope. Specific SMZs are described as follows.

1) The **Primary Zone** varies between 35 and 200 feet and applies to perennial streams, lakes, and sinkholes, OFWs, Outstanding Natural Resource Waters (ONRW), Class I Waters, and, in some cases, wetlands. A primary zone generally prohibits clear-cut harvesting within 35 feet of perennial waters and within 50 feet of waters designated OFW, ONRW, or Class I. Other operational prescriptions also apply to forestry practices to protect water and natural resources.
2) The **Secondary Zone** applies to intermittent streams, lakes, and sinkholes. Unrestricted selective and clear-cut harvesting is allowable, but mechanical site preparation, operational fertilization, and aerial application or mist blowing of pesticide, are not. Loading decks or landings, log bunching points, road construction other than to cross a waterbody, and site preparation burning on slopes exceeding 18 percent are also prohibited. These zones vary in width between 0 and 300 feet.
3) The **Stringer** provides for trees to be left on or near both banks of intermittent streams, lakes, and sinkholes to provide food, cover, nesting, and travel corridors for wildlife.

Other BMPs detailed in the Florida silviculture BMP manual include practices for forest road planning, construction, drainage, and maintenance; stream crossings; timber harvesting; site preparation and planting; fire line construction and use; pesticide and fertilizer use; waste disposal; and wet weather operations. The BMP manual further includes specific provisions to protect wetlands, sinkholes, and canals. Associated with the BMP manual are separate forestry wildlife best management practices for state imperiled species (FDACS 2014).

Given that the Choctawhatchee River and Bay watershed is predominantly forested (Table 2-1; Figure 2-4), silviculture BMPs are some of the most important tools for protecting water quality and wetland and aquatic habitat quality within the watershed. The significant relief that exists within the central and northern watershed (Figure 2-3) suggests application of SMZs may be particularly useful for protecting downstream aquatic habitats from further impacts.

Low Impact Development

Inclusive of green infrastructure, urban best management practices, and Florida Friendly Landscaping, low impact development represents a framework for implementing innovative stormwater management, water use efficiency, and other conservation practices during site planning and development. Benefits include reduced runoff and NPS pollution, improved flood protection, and reduced erosion and sedimentation. Some specific practices include the following.

- Minimized effective impervious area
- Vegetated swales and buffers
- Bioretention cells
- Rain gardens
- Infiltration and exfiltration systems
- Community greenways
- Green roofs
- Certification programs, such as Florida Water Star[SM], and the Florida Green Building Coalition

For transportation infrastructure, practices recommended to protect water quality and floodplain and wetland functions include incorporating bridge spans that accommodate bank-full stream flows while maintaining intact floodplain, wetland, and wildlife passage functions.

Riparian Buffers

A riparian buffer zone is an overlay that protects an adjoining waterbody from effects of adjacent development, such as runoff, NPS pollution, erosion, and sedimentation. A buffer zone in this context refers to an area along the shoreline that is maintained in or restored to generally natural vegetation and habitat. In this condition, an intact buffer zone helps to simultaneously achieve three important goals: water quality protection, shoreline stability, and fish and wildlife habitat. Associated with these are other benefits, including aesthetic improvements and public access and recreation. These benefits are achievable for riparian areas along all types of waterbodies: stream/riverine, estuarine, lacustrine, wetlands, and karst features.

In general, the wider the buffer zone, the better these goals may be achieved, although specific requirements are defined based on community goals. Limited areas, for example, might be developed into recreational sites, trails, or other access points. Table 4-1 is a representation of generalized buffer zones, adapted from USFWS documentation, listing benefits provided by buffers of successively larger widths. Complicating buffer zone design is the fact that different sites have different ecological and physical characteristics. These characteristics (type of vegetation, slope, soils, etc.), when accounted for, would lead to different buffer widths for any given purpose. Alternatives to fixed-width buffer policies include tiered systems that can be adapted to multiple goals and site-specific characteristics and uses. Wenger

(1999) and Wenger and Fowler (2000) provide additional background, detail, and guidance for the design of buffer zone systems and policies.

Table 4-1 Generalized Buffer Zone Dimensions

Benefit Provided:	Buffer Width: 30 ft	50 ft	100 ft	300 ft	1,000 ft	1,500 ft
Sediment Removal	●	●	●	●	●	●
Maintain Stream Temperature	🐟	🐟	🐟	🐟	🐟	🐟
Nitrogen Removal		●	●	●	●	●
Contaminant Removal		●	●	●	●	●
Large Woody Debris for Stream Habitat		🐟	🐟	🐟	🐟	🐟
Effective Sediment Removal			●	●	●	●
Short-Term Phosphorus Control			●	●	●	●
Effective Nitrogen Removal			●	●	●	●
Maintain Diverse Stream Invertebrates			🐟	🐟	🐟	🐟
Bird Corridors				🐦	🐦	🐦
Reptile and Amphibian Habitat					🐦	🐦
Habitat for Interior Forest Species					🐦	🐦
Flatwoods Salamander Habitat – Protected Species						🦎

Key

Water quality protection ●
Aquatic habitat enhancement 🐟
Terrestrial riparian habitat 🐦
Vulnerable species protection 🦎

Adapted from USFWS 2001

Basinwide Sedimentation Abatement

Unpaved roads frequently intersect and interact with streams, creating erosion and runoff conditions that transport roadway materials directly into streams, smothering habitats and impacting water quality and the physical structure of the waterbodies. Borrow pits have also caused progressive erosion conditions that smother streams, severely damaging or destroying habitats and diminishing water quality. Existing impacts and future risks are most pronounced in the upper portion of the Choctawhatchee River and Bay watershed, given the slopes and prevalent soils.

Given the site-specific and physical nature of the impacts, efforts taken at the local and regional level can lead to significant restoration of aquatic habitat conditions and improved water quality. Corrective actions may include replacing inadequate culverts with bridge spans that maintain floodplains and flows, hilltop-to-hilltop paving, use of pervious pavement, establishment of catch basins to treat and manage stormwater, and establishment of vegetated or terraced basins to eliminate gulley erosion.

In addition to addressing unpaved roads and gully erosion sites, application of construction BMPs, to include sediment and erosion controls, protects water and habitat quality, as well as the physical structure of streams and other waterbodies. Extremely heavy and sustained precipitation events are common in

northwest Florida; thus, for large-scale construction and transportation projects, BMPs should be designed to accommodate and prevent erosion and sedimentation during large storm systems, which frequently overwhelm conventional erosion controls.

4.1.2 Ecological Restoration

A wide array of measures may be employed to restore natural and historic functions to former or degraded wetland, aquatic, stream, riparian, and estuarine habitats. Enhancement actions, such as improving vegetation conditions, invasive exotic plant removal, and prescribed fire, are also often discussed in the context of restoration. Wetland, hydrologic, floodplain, shoreline, and stream restoration are discussed further below.

Wetland, Hydrologic and Floodplain Restoration

Wetland restoration includes actions to reestablish wetland habitats, functions, and hydrology. It frequently involves substrate composition and profile restoration and vegetation community reestablishment, including shrub reduction, exotic species removal, application of prescribed fire, and replanting.

Hydrologic and floodplain restoration include actions to reestablish pathways and the timing of surface water flow. Actions include removing fill, replacing bridges and culverts with appropriate designs, establishing low-water crossings, restoring pre-impact topography and vegetation, and abandoning unneeded roads through fill removal and replanting. Restoration activities can have broad water resource benefits, including improved water quality, enhanced fish and wildlife habitat, and other restored wetland functions.

There is significant potential for hydrologic restoration of urban wetlands and waterbodies, as well as within stream systems and larger wetland systems. Wetland restoration, including habitat enhancement and vegetation restoration, is broadly applicable and scalable throughout the watershed. Hydrologic restoration needs have also been identified for the coastal dune lakes, particularly to reestablish hydrologic connections between lake segments that have been bisected by roadways, as well as hydrologic connectivity with the Gulf of Mexico.

Shoreline Restoration

Shoreline restoration refers to measures taken to restore previously altered shorelines and to protect eroding or threatened shorelines. Such restoration is accomplished using “living shorelines” techniques, which are a set of evolving practices that incorporate intertidal and shoreline habitats to protect shorelines while also enhancing or restoring natural communities, processes, and productivity. When planned and implemented appropriately, such efforts result in direct and tangible benefits for residents and the larger community, including fish and wildlife, improved water quality, shoreline protection, and aesthetic improvements.

Shoreline restoration in this context is particularly applicable as a strategy for extensive segments of altered and hardened shorelines on Choctawhatchee Bay. Some of the urbanized bayous of the bay may offer restoration opportunities along relatively low-energy shorelines.

Stream Restoration

Stream restoration includes actions to restore the hydrology, aquatic habitat, and riparian vegetation of streams that may have been impacted by inadequate culverts, road crossings, impoundments, erosion and

sedimentation, runoff or other hydrologic effects of adjacent or upstream development. This may include restoring natural hydrology, wetlands, storage/treatment, and riparian vegetation along stormwater conveyances. In-stream restoration actions include efforts to reestablish natural channel and floodplain process and should accompany efforts to address offsite processes (runoff, erosion, sedimentation, etc.) that created the original impacts.

The topographic relief within the upper watershed (Figure 2-3), as well as surrounding land uses, suggests there may be potential for stream restoration within this area. Additionally, some tidal creek drainages entering the bay may offer additional opportunities to reestablish natural stream habitats and tidal marsh vegetation and to reconnect floodplain area.

Estuarine Habitat Restoration

Implementation of wetland and shoreline restoration, as described above, as well as aquatic habitat restoration and enhancement can be implemented in a complementary manner to improve and restore estuarine habitat and productivity. Well-established, contiguous marshes; seagrass beds; and oyster reefs provide habitat for a wide range of marine species, including recreational and commercially valuable seafood species.

Emergent marshes and oyster reefs serve as an important buffer between uplands and estuaries, filtering pollutants and consuming nutrients before they enter the water and reducing waves before they reach land. These communities promote sediment accumulation and shoreline stabilization, attenuate wave energy, protect marsh habitat, and buffer upland areas against wind and wave activity that expedite erosion. Each oyster can filter vast quantities of water, removing suspended particles that would otherwise reduce sunlight penetration needed for healthy seagrass beds.

4.1.3 Wastewater Management and Treatment Improvements

Septic to Sewer Connections

Among the promising approaches for correcting impacts and impairments are actions to improve the management and treatment of domestic wastewater. While expensive and engineering-intensive, such actions are technically feasible, proven approaches to improving water quality and aquatic habitat conditions, as well as public uses and benefits.

Extending sewer service to areas that currently rely on conventional onsite treatment and disposal systems for wastewater treatment and disposal is effective in reducing nutrient loading to ground and surface waters. As outlined above, there are over 33,000 known or likely conventional septic systems in the Choctawhatchee River and Bay watershed. As illustrated by Figure 3-2, these are concentrated throughout the northern portion of the watershed, as well as within the eastern direct drainage to Choctawhatchee Bay. Connecting residences and businesses in these areas to centralized wastewater treatment systems has the potential to substantially improve wastewater treatment and reduce loading of nutrients and other pollutants to these waterbodies and to downstream receiving waters.

Advanced Onsite Systems

Where extension of sewer service is not economically feasible due to the spatial distribution of rural populations, there is potential for installation of advanced onsite systems. These systems achieve water quality treatment that significantly exceeds that provided by conventional systems. In particular, advanced passive systems are being developed to provide cost-effective and practical systems for reducing nitrogen

and other pollutants from onsite sewage systems (FDOH 2015a). Pilot projects underway in different regions of the state.

Water Reclamation and Reuse

For the purposes of this plan, water reuse refers to the deliberate application of reclaimed water for a beneficial purpose, with reclaimed water being water that has received at least secondary treatment and basic disinfection (Chapter 62-10, F.A.C.; Section 373.019, F.S.). Beneficial purposes include reusing reclaimed water to offset a current or known future potable water demand or other documented watershed and water resource challenges. Specific purposes include landscape and golf course irrigation, industrial uses, and other applications. Water reuse can be a key strategy in reducing or eliminating wastewater discharges and associated pollution of surface waters.

Centralized Wastewater Treatment Upgrade and Retrofit

For centralized wastewater treatment systems, conversion to advanced wastewater treatment has proven an effective means of reducing the release of nutrients and other pollutants to surface and ground waters. Additionally, there may be needs to rehabilitate existing sewer systems, including to correct inflow and infiltration problems and to reduce the number and severity of sanitary sewer overflow incidents. Accomplishing these actions can be expensive and difficult, given the need to retrofit existing systems in often highly developed areas. Upon completion, however, notable improvements can be achieved for water quality, public recreational uses, and fisheries.

4.1.4 Land Conservation

While the Choctawhatchee River and Bay watershed benefits from extensive public land areas that protect water quality and wetland and aquatic habitats and provide for public access and use, there are still opportunities to further protect water resources through the conservation of sensitive areas, including riverine, stream-front, and estuarine shorelines. Additionally, resource conservation can be accomplished at a sub-basin or project-level scale to augment other strategies, including stormwater retrofit and hydrologic restoration, and to provide for compatible public access and recreation.

As demonstrated through the Florida Forever program and other state, federal, local, and private initiatives, preserving sensitive lands can be an effective part of protecting water quality and habitat, as well as preserving floodplain and wetland functions. Where land is acquired fee simple by public agencies, other benefits, such as public access and recreation, are also achieved. Resource protection can be achieved through less than fee, as well as fee simple acquisition.

4.1.5 Public Awareness and Education

Public awareness and education efforts span multiple purposes and are an essential component of many of the other actions described here. Among the purposes of awareness and education efforts are:

- Technical outreach to assist in implementing specific programs (for example, best management practices);
- Informing members of the public about the purpose and progress of implementation efforts;
- Providing opportunities for public engagement and participation, as well as public feedback and program accountability; and
- Providing broad-based educational efforts to inform members of the public and specific user groups about watershed resources, their benefits, and personal practices to ensure their protection.

Examples of educational activities include technical training for BMPs, school programs (e.g., Grasses in Classes), public events, citizen science and volunteer programs, and project site visits.

Watershed stewardship initiatives can bring together multiple partners such as federal, state, and local agencies; non-profit groups; and citizen volunteers by identifying common program goals and intended outcomes. Having a variety of participants may offer important insight and expertise, shared experiences through lessons learned, and pooling of available resources to implement projects. Specific program examples include, but are not limited to: Walk the WBIDs; Grasses in Classes; Offer Your Shell to Enhance Restoration (OYSTER); homeowner oyster gardening program; rain garden/rain barrel workshops; storm drain labeling; marina BMPs; landowner cost-share assistance programs for living shorelines; elected official information and training sessions; spring break restoration projects; and messaging through outlets such as public service announcements, social media, events, and festivals (e.g., Bay Day, Earth Day).

4.1.6 Options for Further Study and Analysis

Additional work is needed to further advance the scientific understanding of resource conditions and restoration needs and opportunities. Additional analytical work can also support improved project planning and application of innovative methods for improved resource management.

- Develop improved and more detailed assessments of environmental conditions and trends, to include water quality, biology, and habitat.
- Develop a watershed-wide NPS pollution potential assessment, at the 12-digit HUC level, to include analysis of land uses, applied loading rates, and potential BMP application.
- Develop innovative project designs to treat water currently discharged to the bay via mosquito control ditches, as well as restoring wetland and floodplain functions.
- Identify estuarine sites with the potential for seagrass or other benthic habitat restoration through improved water quality treatment and water management within specific contributing basins.
- Complete a current, basin-wide analysis and prioritization of sedimentation sources and sites, to include unpaved road stream crossings, borrow pits, gulley erosion sites, and other erosion and sedimentation sources.
- Develop a spatial analysis of OSTDS, to include pollutant loading estimates and estimates of potential pollutant load reduction and average receiving waterbody pollutant concentrations following connection to central sewer and/or conversion to advanced onsite systems. Delineate target areas for central sewer connections and for advanced onsite systems.
- Develop a hydrodynamic model to improve the understanding of estuarine circulation, with application for estuarine and littoral restoration planning.
- Develop updated, regionally specific storm surge, floodplain, and sea level rise models to support project planning, floodplain protection, and adaptation planning, and to further the understanding of drivers of coastal habitat change.
- Evaluate the feasibility and potential benefits of proposed innovative and large-scale projects. Also identify and evaluate the potential for unintended adverse effects. Examples of such projects may include, but are not limited to:
  - Pumped and tidal flow-through circulation systems
  - Regional-scale shoreline habitat development proposals
  - Stream channel reconfiguration

  - Dredged material removal and disposal
  - Benthic dredging

- Develop improved metrics for monitoring and evaluating projects, programs, and environmental conditions and trends.
- Develop analysis of oyster/shellfish habitat, conditions, and trends.
- Establish a framework for detecting the effects of climate change and ocean acidification on coastal marine resources in the region.
- Conduct monitoring and evaluate potential effects of herbicides, pharmaceuticals, endocrine disruptors, and other contaminants of emerging concern.
- Review past projects completed, identifying specific project outcomes and lessons learned.
- Identify locally sensitive indicators of biological condition for dominant diversity-building habitats.
- Develop online consolidation of past and present environmental information, including natural resource coverages, research activities, restoration progress, monitoring results, TMDL updates, and regulatory actions.
- Evaluate integrated water resource management approaches with application to specific water resource challenges in northwest Florida, potentially further developing plans for the reuse of reclaimed water and stormwater harvesting.

4.2 Implementation

Table 4-2 outlines the planning progression of priorities, objectives, and selected management options and approaches for the Choctawhatchee River and Bay watershed. These, in turn, inform and guide specific SWIM projects listed in Section 4.3.

Table 4-2 Watershed Priorities, Objectives, and Management Options

Watershed Priorities	Objectives	Management Options
Water Quality • Stormwater runoff and NPS pollution • Inadequate treatment from conventional OSTDS • Point source discharges • Needs and opportunities for improved wastewater collection and treatment • Sedimentation and turbidity from unpaved roads and other erosion sources • Elevated nutrient concentrations in Cypress Spring • Water quality impairments for listed stream and estuarine waters, to include nutrients, dissolved oxygen, and bacteria • Vulnerability of seagrasses, bayous, and other estuarine habitats • Vulnerability of coastal dune lakes	Improve treatment of urban stormwater, including from: - Urban bayou basins - Mosquito control ditches - Older developed areas Protect and, as needed, restore water quality in impacted or designated priority areas: - Urban bayous - OFWs - Holmes Creek basin - Coastal dune lakes Restore water quality in impaired riverine, stream, and estuarine waters to meet state standards. Restore reduce mean NO_{2+3} concentrations in Cypress Spring to achieve 0.35 mg/L standard. Reduce basinwide NPS pollution from agricultural areas and erosion sites basin-wide. Reduce sedimentation from unpaved roads, borrow pits, and landscape erosion.	Stormwater retrofit projects Conversion of septic systems to central sewer Agricultural and silvicultural BMPs Evaluation and deployment of advanced passive onsite systems Upgrades to wastewater infrastructure Fee simple and less-than-fee protection of floodplains, riparian habitats, and other sensitive lands Floodplain and wetland restoration Riparian buffer zones Water reclamation and reuse Evaluate, prioritize, and address unpaved roads and associated erosion at stream crossings. Evaluate and address other erosion sites, such as borrow pits and gullies

Table 4-2 Watershed Priorities, Objectives, and Management Options

Watershed Priorities	Objectives	Management Options
Floodplain Functions • Headwater degradation and channelization • Diminished or disconnected floodplain area • Riparian buffer loss	Protect and reestablish functional floodplain area. Prioritize and correct hydrological alterations, including channelized streams.	Natural channel stream restoration Fee simple and less-than-fee protection of floodplains, riparian habitats, and other sensitive lands Protection and enhancement of riparian buffer zones Development and dissemination of detailed elevation (LiDAR) data Stormwater retrofit projects Continued flood map updates and detailed flood risk studies Hydrologic restoration to restore floodplain functions and restore natural hydrology Fee simple and less-than-fee protection of floodplains, riparian habitats, and other sensitive lands

Table 4-2 Watershed Priorities, Objectives, and Management Options

Watershed Priorities	Objectives	Management Options
Natural Systems • Wetland loss and degradation • Physically altered and impacted tributary streams • Vulnerability of estuarine habitats • Saltwater intrusion that could alter brackish and freshwater habitats • Shoreline destabilization and erosion • Need for improved understanding of current and potential effects of sea level rise	Protect and if necessary restore major wetlands and floodplains, including: - Live Oak Point salt marsh - Choctawhatchee River delta - Choctawhatchee River floodplain - Rocky Creek floodplain - Hogtown Bayou basin - Coastal dune lake headwaters - Littoral marsh habitat Protect and restore riparian and littoral habitats along streams, lakes, and estuarine shorelines. Where needed, restore wetland and stream hydrology. Restore tributary stream channels and floodplain connection, including bayou drainages, other tidal creeks, mosquito control drainages, and tributaries in agricultural areas. Ensure restoration projects are compatible with coastal change. Restore and enhance estuarine benthic habitats. Restore seagrass beds, including through water quality improvement. Reduce sedimentation from unpaved roads, borrow pits, and landscape erosion	Wetland hydrologic and vegetation restoration and enhancement Protection and enhancement of riparian buffer zones Living shorelines techniques for shoreline protection and restoration Natural channel stream restoration Fee simple and less-than-fee protection of floodplains, riparian habitats, and other sensitive lands Development and dissemination of detailed elevation (LiDAR) data Benthic habitat restoration where water quality and hydrologic conditions are appropriate; may include seagrass beds and oyster reef habitats and potentially sediment removal Evaluate, prioritize, and address unpaved roads and associated erosion at stream crossings. Evaluate and address other erosion sites, such as borrow pits and gullies Coastal adaptation and land use planning Coastal infrastructure retrofits to enhance adaptation capacity Enhancement and application of tools to identify resources most vulnerable to sea level rise effects

Table 4-2 Watershed Priorities, Objectives, and Management Options

Watershed Priorities	Objectives	Management Options
Education and Outreach • Needs for: - Public understanding of practices to protect water resources - Opportunities for public participation - Improved BMP technical support	Support agricultural, silvicultural, and urban BMPs. Expand education and outreach about watershed resources and personal practices to protect water and habitat quality. Create long-term partnerships among stakeholders, including government, academic institutions, non-governmental organizations, businesses, residents, and others, to maximize effectiveness of project implementation. Build the capacity of landowners, agricultural producers, and others to protect watershed resources, functions, and benefits.	Technical BMP education and training Demonstration projects Collaborative community initiatives, with opportunities for business participation and sponsorship Internet access for public participation and to make program information and resource data continually available Dissemination of information about watershed resources and benefits via multiple approaches – Internet, publications, school programs, and workshops. Dissemination of information about resource programs, outcomes, and opportunities for participation Classroom programs, including hands-on restoration activities Community awareness and education events and programs Hands-on, citizen science, including volunteer participation monitoring and restoration programs Education and technical training workshops and resources for local government officials

4.3 Priority Projects

Projects proposed to address above-described priorities and objectives are listed below and described in more detail on the following pages. Priority projects, as described herein, comprise strategies intended to address identified issues that affect watershed resources, functions, and benefits. These are intended to support numerous site-specific tasks and activities, implemented by governmental and nongovernmental stakeholders for years to come. Most address multiple priorities, as indicated in Table 4-3. The projects included are generally limited to those within the scope and purview of the SWIM program. With each project, conceptual scopes of work are presented, as are planning level cost estimates. Specific details, tasks, and costs will be developed and additional actions may be defined to achieve intended outcomes as projects are implemented. No prioritization or ranking is implied by the order of listing. Project evaluation and ranking will occur in multiple iterations in the future and will vary based on funding availability, specific funding source eligibility criteria, and cooperative participation.

Table 4-3 Recommended Projects: Choctawhatchee River and Bay SWIM Plan

PROJECT	WATERSHED PRIORITIES			
	WQ	FLO	NS	EDU
Stormwater Planning and Retrofit	✓	✓	✓	
Septic Tank Abatement	✓			
Advanced Onsite Treatment Systems	✓			
Agriculture and Silviculture BMPs	✓	✓	✓	✓
Basinwide Sedimentation Abatement	✓	✓	✓	
Riparian Buffer Zones	✓	✓	✓	✓
Hydrologic and Wetland Restoration	✓	✓	✓	
Estuarine Habitat Restoration	✓		✓	
Strategic Land Conservation	✓	✓	✓	
Watershed Stewardship Initiative	✓	✓	✓	✓
Sub-basin Restoration Plans	✓	✓	✓	✓
Wastewater Treatment and Management Improvements	✓		✓	
Interstate Coordination	✓			
Analytical Program Support	✓	✓	✓	✓
Comprehensive Monitoring Program	✓	✓	✓	✓

WQ – Water Quality
FLO – Floodplain Functions
NS – Natural Systems
EDU – Education and Outreach

Stormwater Planning and Retrofit

Strategic Priorities:
✓ Water Quality ✓ Floodplain Functions ✓ Natural Systems
Supporting Priorities:
✓ Stormwater runoff and NPS pollution ✓ Water quality impairments for listed stream and estuarine waters ✓ Vulnerability of estuarine habitats ✓ Vulnerability of coastal dune lakes
Objectives:
✓ Improve treatment of urban stormwater. ✓ Protect and, as needed, restore water quality in impacted or designated priority areas. ✓ Restore water quality in impaired riverine, stream, and estuarine waters to meet state standards.
Lead Entities:
✓ Local governments ✓ Estuary Program
Geographic Focus Areas:
All developed areas of the watershed. Specific project focus areas include, but are not limited to: ✓ Western Choctawhatchee Bay ✓ Urban bayous ✓ Special resource waters, including OFWs, coastal dune lakes, and Holmes Creek ✓ Gap Creek basin ✓ Mosquito control ditch basins ✓ Coastal dune lake basins
Planning Level Cost Estimate:
>$39,000,000

Description:

This strategy consists of retrofitting stormwater management systems to improve water quality, as well as to improve flood protection and accomplish other associated benefits. In addition to constructing new facilities, the project includes evaluation and improvement of existing systems and adding additional BMPs within a treatment train to improve overall performance within a given basin.

Scope of Work:

1. Prioritize basins and sites based on water quality, hydrologic, and land use data, together with consideration of local priorities, opportunities for partnerships, and other factors (as outlined in Section 4.4).
2. Support stormwater master planning at the local and regional level.
3. Develop project-specific implementation targets and criteria, to include pollutant load reductions, success criteria, and measurable milestones.
4. Develop a public outreach and involvement plan to engage citizens in the project's purposes, designs, and intended outcomes. The plan should include immediate neighbors that would be affected by the proposed project and other interested citizens and organizations.
5. Develop detailed engineering designs, with consideration of multipurpose facilities, innovative treatment systems where applicable, and treatment train approaches for basin-level stormwater management and treatment.
6. Install/construct individual retrofit facilities.
7. Monitor local water quality, including upstream/downstream and/or before and after implementation, as well as trends in receiving waters.
8. Analyze data to identify water quality trends in receiving waters.

Outcomes/Products:

1. Completed stormwater retrofit facilities
2. Improved water quality and flood protection
3. Data evaluation and system validation, with lessons applicable to future projects.

Septic Tank Abatement

Description:

This strategy consists of converting OSTDS to central sewer to reduce pollutant export and improve surface and ground water quality. To facilitate accomplishment, among the project goals is to reduce or eliminate connection costs to homeowners.

Scope of Work:

1. Prioritize areas of need through spatial analysis of OSTDS distribution, proximity to karst and other sensitive resources, proximity to existing infrastructure, and resource monitoring data.
2. In cooperation with local governments and utilities, complete alternatives analysis, considering sewer extension, advanced onsite systems, and other approaches as appropriate.
3. Develop project-specific implementation targets and criteria, to include pollutant load reductions, success criteria, and measurable milestones.
4. Initiate a public outreach and involvement plan to engage the public in the project's purposes, designs, and intended outcomes.
5. Work with directly affected residents throughout the project; coordinate with neighborhoods and individual homeowners.
6. Install sewer line extensions, connect residences and businesses, and abandon septic tanks.
7. Monitor bacteria, nutrients, and other parameters in nearby groundwater and surface waterbodies.
8. Analyze data to identify changes in trends of target pollutants.

Strategic priority:
✓ Water Quality ✓ Natural Systems
Supporting Priorities:
✓ Inadequate treatment from conventional OSTDS ✓ Needs and opportunities for improved wastewater collection and treatment ✓ Elevated nutrient concentrations in Cypress Spring ✓ Water quality impairments for listed stream and estuarine waters
Objectives:
✓ Protect and, as needed, restore water quality in impacted or designated priority areas. ✓ Restore water quality in impaired riverine, stream, and estuarine waters to meet state standards. ✓ Restore reduce mean NO_{2+3} concentrations in Cypress Spring to achieve 0.35 mg/L standard.
Lead Entities:
✓ Utilities, local governments
Geographic Focus Areas:
✓ Eastern Choctawhatchee Bay ✓ Residential lands widely distributed across the northern watershed.
Planning Level Cost Estimate:
>$20,000,000

Outcomes/Products:

1. Completed implementation plans, prioritizing areas for septic-to-sewer conversion.
2. Improved surface and groundwater quality

Advanced Onsite OSTDS

Description:

This strategy consists of installation of advanced OSTDS to reduce pollutant loading. This approach is most appropriate in areas remote from existing central sewer infrastructure or likely extensions. It may be considered an adjunct to the Septic Tank Abatement project.

Strategic priority:
✓ Water Quality
✓ Natural Systems
Supporting Priorities:
✓ Inadequate treatment from conventional OSTDS
✓ Needs and opportunities for improved wastewater collection and treatment
✓ Water quality impairments for listed stream and estuarine waters
✓ Vulnerability of estuarine habitats
Objectives:
✓ Protect and, as needed, restore water quality in impacted or designated priority areas.
✓ Restore water quality in impaired riverine, stream, and estuarine waters to meet state standards.
Lead Entities:
✓ Utilities, local governments
Geographic Focus Areas:
✓ Choctawhatchee River basin
✓ Holmes Creek basin
✓ Residential lands widely distributed across the northern watershed
Planning Level Cost Estimate:
$15,000,000 (initial implementation)

Scope of Work:

Planning

1. Prioritize areas of need through spatial analysis of OSTDS distribution, proximity to karst and other sensitive resources, proximity to existing infrastructure, and resource monitoring data.
2. In cooperation with FDOH and FDEP, evaluate passive technology onsite systems.
3. In cooperation with local governments, conduct outreach to property owners to facilitate installation of advanced onsite systems as an alternative to conventional OSTDS.
4. Develop project-specific implementation targets and criteria, to include pollutant load reductions, success criteria, and measurable milestones.
5. Install/construct advanced OSTDS based on prioritization of sites and funding availability.
6. Monitor bacteria, nutrients, and other parameters in nearby groundwater and surface waterbodies.
7. Analyze data to identify changes in trends of target pollutants.

Outcomes/Products:

1. Improved surface and groundwater quality.

Agriculture and Silviculture BMPs

Description:

This strategy consists of development and implementation of agriculture and silviculture BMPs to reduce basinwide NPS pollution, protect habitat, and promote water use efficiency.

Scope of Work:

1. In consultation with FDACS and NRCS, develop a comprehensive inventory of employed agriculture and silviculture BMPs and identify potential gaps and/or potential improvements for implementation in the watershed.
2. In cooperation with FDACS FFS, evaluate relationships between forest management practices and hydrologic and water quality effects.
3. Based on funding resources, develop plans for cost-share or other assistance for implementation.
4. Develop an outreach plan to engage agricultural producers and forestry practitioners; supporting technical training and participation in developing implementation strategies.
5. Conduct program outreach to support implementation of property-specific approved BMPs, potentially including annual cost-share grant cycles as defined by funding sources.
6. Work with FDACS to offer free technical assistance in the design and implementation of property- and resource-specific BMPs.
7. Monitor local water quality, including upstream/downstream and/or before and after project implementation, as well as trends in receiving waters. Additionally, conduct monitoring of participant experiences, encouraging feedback throughout and following implementation.
8. Analyze data to identify water quality trends.

Strategic Priorities:

- ✓ Water quality
- ✓ Floodplain Functions
- ✓ Natural Systems
- ✓ Education and Outreach

Supporting Priorities:

- ✓ Sedimentation and turbidity from unpaved roads and other erosion sources
- ✓ Elevated nutrient concentrations in Cypress Spring
- ✓ Water quality impairments for listed stream and estuarine waters, to include nutrients, dissolved oxygen, and bacteria
- ✓ Headwater degradation and channelization
- ✓ Riparian buffer loss

Objectives:

- ✓ Protect and, as needed, restore water quality in priority areas.
- ✓ Restore water quality in impaired waters to meet state standards.
- ✓ Reduce mean NO_{2+3} concentrations in Cypress Spring to 0.35 mg/L.
- ✓ Reduce basinwide NPS pollution from agricultural areas and erosion sites.
- ✓ Reduce sedimentation from unpaved roads, borrow pits, and landscape erosion.
- ✓ Protect and restore riparian habitats.

Lead Entities:

- ✓ NWFWMD
- ✓ FDEP
- ✓ FDOH
- ✓ FWC
- ✓ Private landowners
- ✓ NRCS
- ✓ IFAS
- ✓ Estuary Program

Geographic Focus Areas:

For agriculture, the primary focus is within the northern section of the watershed within Holmes, Jackson, and Washington Counties, including the Holmes Creek and Wright's Creek sub-basins.

For silviculture BMPs, the focus is basinwide.

Planning Level Cost Estimate:

- ✓ $1,000,000 annually

Outcomes/Products:

1. Improved water quality
2. Improved capacity on the part of landowners to implement practices protective of water quality and watershed resources

Basinwide Sedimentation Abatement

Description:

This strategy consists of development and implementation of activities related to sedimentation abatement to improve surface water quality and aquatic habitat quality. It may include any or all activities aimed at preventing and mitigating sedimentation and restoring impacted sites. Planning should be informed by the Water Quality Improvements to Enhance Fisheries Habitat in the Lower Choctawhatchee River Basin – Phase I, funded by NFWF through GEFB.

Strategic Priorities:
✓ Water Quality ✓ Floodplain Functions ✓ Natural Systems
Supporting Priorities:
✓ Stormwater runoff and NPS pollution ✓ Sedimentation and turbidity from unpaved roads and other erosion sources
Objectives:
✓ Protect and, as needed, restore water quality in impacted or designated priority areas ✓ Restore water quality in impaired riverine, stream, and estuarine waters to meet state standards ✓ Reduce basinwide NPS pollution from agricultural areas and erosion sites basin-wide. ✓ Reduce sedimentation from unpaved roads, borrow pits, and landscape erosion.
Lead Entities:
✓ Local governments ✓ State and federal agencies ✓ Choctawhatchee Basin Alliance ✓ Estuary Program
Geographic Focus Areas:
✓ Watershed-wide, particularly within rural counties ✓ Sites identified in the Lower Choctawhatchee River Basin assessment
Planning Level Cost Estimate:
$3,000,000 annual cost

Scope of Work:

1. Review existing inventories of sedimentation sites and identify gaps.
2. Prioritize sites based on inventory and site evaluation, as well as consideration of water quality, other resource data, severity of impacts, and cumulative sub-basin effects.
3. Consider annual grant program for local governments to address high priority sites.
4. Develop individual site plans; detail proposed improvements and cost estimates.
5. Execute on-the-ground construction projects.
6. Implement complementary initiatives that may include education and outreach, development of new/improved BMPs, inspection programs, cost-share programs, training, demonstration projects, and maintenance.
7. Incorporate individual site improvements within geodatabase.
8. Monitor local water quality and habitat quality, including upstream/downstream and/or before and after implementation.
9. Analyze data to identify water quality trends.

Outcomes/Products:

1. Improved water quality, both onsite and in receiving riverine waters
2. Improved aquatic habitat quality, including for sensitive species such as Gulf Sturgeon and freshwater mussels
3. Improved water quality in Choctawhatchee Bay

Riparian Buffer Zones

Description:

This strategy consists of protection and restoration of riparian buffers to protect or improve water quality, habitat, and shoreline stability.

Scope of Work:

1. Coordinate planning and implementation with other projects to achieve overarching objectives.
2. Conduct screening evaluation of riparian areas; classify sites based on character and function.
3. Prioritize sites based on potential for protection or restoration of riparian habitat and function.
4. Conduct outreach to local governments and private landowners to identify sites for implementation. Develop site specific implementation options, including overlay zones and vegetation restoration.
5. Develop individual site plans, which detail proposed improvements and cost estimates.
6. Coordinate and support implementation by property owners and local governments.
7. Implement complementary initiatives that may include education and outreach, inspection programs, training, demonstration projects, and maintenance.
8. Conduct outreach by providing signage, tours, public access amenities, or similar for specific sites.
9. Monitor local water quality and habitat quality, including upstream/downstream and/or before and after project implementation.
10. Analyze data to identify water quality trends.

Outcomes/Products:

1. Improved protection of water quality, habitat, and shoreline stability
2. Establishment of demonstration sites to promote additional implementation of buffer zone concepts by private landowners and local governments

Strategic Priorities
✓ Water Quality ✓ Floodplain Functions ✓ Natural Systems ✓ Education and Outreach
Supporting Priorities:
✓ Stormwater runoff and NPS pollution ✓ Sedimentation and turbidity of unpaved roads and other erosion sources ✓ Vulnerability of coastal dune lakes ✓ Headwater degradation and channelization ✓ Riparian buffer loss ✓ Vulnerability of estuarine habitats ✓ Shoreline destabilization and erosion
Objectives:
✓ Protect and, as needed, restore water quality in impacted or designated priority areas ✓ Protect and if necessary restore major wetlands and floodplains. ✓ Protect and restore riparian and littoral habitats along streams, lakes, and estuarine shorelines. ✓ Support agricultural, silvicultural, and urban BMPs. ✓ Ensure restoration projects are compatible with coastal change. ✓ Restore and enhance estuarine benthic habitats.
Lead Entities:
✓ Private landowners ✓ Local governments ✓ Estuary Program ✓ Choctawhatchee Basin Alliance
Geographic Focus Areas:
Watershed-wide; estuarine, stream, lake, and riverine shorelines; headwater streams
Planning Level Cost Estimate:
TBD* *Variable; includes passive implementation by property owners.

Hydrologic and Wetland Restoration

Description:

This strategy consists of implementation of a broad array of hydrologic and wetland protection and restoration measures to improve and protect surface water quality and to restore aquatic and wetland habitats. Such measures include but are not limited to vegetation reestablishment, restoration and enhancement of hydrologic connectivity, stream channel restoration, and floodplain reconnection and restoration.

Target areas include sites where floodplain storage has been diminished or where wetland hydrology has been disrupted. Additional focus areas include sites containing impediments to hydrological function such as culverts, dikes, levees, barriers to tidal flow, and barriers to freshwater exchange.

Scope of Work:

1. Conduct a site inventory and evaluation, to include channelized streams, drained/filled wetlands, road fill, and other areas conveying water. Evaluate freshwater and tidal drainage patterns and any restrictions in tidal flow. This includes initial desktop data collection and analysis, together with field data collection and site evaluation.
2. Identify restoration options, to include hydrologic reconnection (e.g., fill removal, low water crossings), tidal creek restoration, natural channel stream restoration, floodplain reestablishment, vegetation community reestablishment, tidal and riparian marsh restoration, and other options based on site characteristics and historic habitats.
3. Prioritize sites based on inventory and site evaluation, as well as consideration of water quality, other site and resource data, severity of impacts, cumulative effects, land ownership, and accessibility.
4. Conduct public outreach adaptable to specific project sites. Characterize individual projects with a list of stakeholders for each site. For project sites adjacent to communities or private property, as well as those with significant public visibility, consider demonstration sites, public meetings, site visits, project website, and other forms of engagement.

Strategic Priorities:

- ✓ Water Quality
- ✓ Floodplain Functions
- ✓ Natural Systems

Supporting Priorities:

- ✓ Water quality impairments for listed stream and estuarine waters, to include nutrients, dissolved oxygen, and bacteria
- ✓ Headwater degradation and channelization
- ✓ Diminished or disconnected floodplain area
- ✓ Wetland loss and degradation
- ✓ Physically altered and impacted tributary streams

Objectives:

- ✓ Restore water quality in impaired riverine, stream, and estuarine waters to meet state standards.
- ✓ Protect and reestablish functional floodplain area.
- ✓ Prioritize and correct hydrological alterations, including channelized streams.
- ✓ Protect and if necessary restore major wetlands and floodplains
- ✓ Ensure restoration projects are compatible with coastal change

Lead Entities:

- ✓ FWC
- ✓ NWFWMD
- ✓ FDEP
- ✓ USFWS
- ✓ Estuary Program
- ✓ Choctawhatchee Basin Alliance

Geographic Focus Areas:

- ✓ Coastal dune lakes
- ✓ Hogtown Bayou basin
- ✓ Tidal creeks
- ✓ Tributary streams affected by road crossings and channelization
- ✓ Urbanized drainage basins

Planning Level Cost Estimate:

TBD*

*Costs variable depending on specific sites.

5. Develop detailed site restoration designs for priority sites, taking into account public input and preferences.
6. Execute on-the-ground restoration projects.
7. Monitor local water quality and physical and biological site characteristics, including before and after implementation.
8. Analyze data to identify water quality trends.
9. Communicate results to watershed stakeholders and participating agencies.

Outcomes/Products:

1. Restored wetland, aquatic, and floodplain habitats and functions
2. Improved protection of water quality and natural systems
3. Established demonstration sites to promote additional implementation by private landowners and local governments

Estuarine Habitat Restoration

Description:

This strategy consists of activities related to estuarine habitat restoration to improve surface water quality, aquatic habitats, and coastal resiliency. Implementation should be coordinated with other project options, to include stormwater retrofits and other NPS pollution abatement, and upstream wetland and hydrologic restoration.

Scope of Work:

1. Conduct a site inventory and evaluation, to include evaluation of such factors as need for stabilization, habitat stability, stressors impacting shorelines, projected sea level rise, shoreline profile, ecosystem benefits, property ownership, public acceptance, and feasibility.
2. Identify project options, which may include, but are not limited to:
   a) Restoration/establishment of riparian and littoral vegetation communities
   b) On previously altered shorelines, establishment of living shorelines, which may include oyster or limerock breakwaters, substrate augmentation, and marsh vegetation establishment
   c) Restoration/creation of oyster reefs.
   d) Restoration of seagrass beds.
   e) Removal of barriers to fish passage.
   f) Identify and evaluate estuarine shorelines susceptible to erosion and at risk of hardening or other alteration.
   g) In cooperation with resource agencies, develop BMPs for living shoreline projects.
   h) Implement public outreach and education on options for protecting and restoring functional and resilient littoral habitats.
3. Prioritize sites based on inventory and site evaluation, as well as consideration of water quality, other site and resource data, severity of impacts, cumulative effects, land ownership, and accessibility. Coordinate directly with riparian landowners.
4. Develop demonstration projects on public lands.
5. Conduct public outreach adaptable to specific project sites. For project sites adjacent to communities or private property, as well as those with significant public visibility, consider demonstration sites, public meetings, site visits, volunteer participation, project website, and other forms of engagement. Extend opportunities for participation to property owners, local governments, and other stakeholders.

Strategic priorities:

- ✓ Water Quality
- ✓ Floodplain Functions
- ✓ Natural Systems

Supporting Priorities:

- ✓ Stormwater runoff and NPS pollution
- ✓ Inadequate treatment from conventional OSTDS
- ✓ Needs and opportunities for improved wastewater collection and treatment
- ✓ Sedimentation and turbidity from unpaved roads and other erosion sources
- ✓ Water quality impairment
- ✓ Vulnerability of seagrasses, bayous, and other estuarine habitats

Objectives:

- ✓ Protect and restore water quality in impacted or designated priority areas.
- ✓ Improve treatment of urban stormwater.
- ✓ Ensure restoration projects are compatible with coastal change.
- ✓ Restore and enhance estuarine benthic habitats.
- ✓ Reduce sedimentation from unpaved roads, borrow pits, and landscape erosion.

Lead Entities:

- ✓ FWC
- ✓ FDEP
- ✓ USFWS
- ✓ Choctawhatchee Basin Alliance
- ✓ Estuary Program

Geographic Focus Areas:

Choctawhatchee Bay and tidal tributaries

Planning Level Cost Estimate:

TBD*

*Cost estimates will await completion of site inventory and evaluation.

6. Develop detailed site restoration designs for priority sites, taking into account public input and preferences.
7. Execute on-the-ground restoration projects.
8. Monitor water quality and habitat conditions before and after construction
9. Compile and evaluate data to determine trends and to objectively measure project benefits and outcomes.
10. Evaluate and implement needed design adjustments or maintenance needs, such as the need to replant certain areas or remove invasive species.

Outcomes/Products:

1. Restored wetland and estuarine habitats and functions.
2. Improved protection of water quality and natural systems.
3. Establishment of demonstration sites to promote additional implementation by private landowners and local governments

Strategic Land Conservation

Description:

This strategy supports protection of floodplains, riparian areas, and other lands with water resource value to protect and improve surface water quality, with additional benefits for floodplain function and fish and wildlife habitat.

Scope of Work:

1. Use approved management plans and lists (such as the Florida Forever Work Plan) to complete an inventory of potential acquisition projects.
2. Evaluate whether potential sites augment other projects.
3. Identify potential funding sources that allow land acquisition as a component of achieving stated goals.
4. Where landowners have expressed interest, conduct a site analysis to include potential for achieving intended outcomes and potential for augmenting other projects.
5. Accomplish acquisition in accordance with statutory requirements.
6. Develop and implement restoration/ enhancement plans if appropriate.
7. Implement long-term monitoring program for conservation easements.

Outcomes/Products:

1. Improved long-term protection of water quality, habitat, and floodplain functions

Strategic priorities:
✓ Water Quality
✓ Floodplain Functions
✓ Natural Systems
Supporting Priorities:
✓ Stormwater runoff and NPS pollution
✓ Sedimentation and turbidity from unpaved roads and other erosion sources
✓ Water quality impairments for listed stream and estuarine waters, to include nutrients, dissolved oxygen, and bacteria
✓ Headwater degradation and channelization
✓ Diminished or disconnected floodplain area
✓ Riparian buffer loss
✓ Wetland loss and degradation
✓ Vulnerability of coastal dune lakes
✓ Vulnerability of estuarine habitats
✓ Shoreline destabilization and erosion
Objectives:
✓ Protect and, as needed, restore water quality in impacted or designated priority areas.
✓ Protect and if necessary restore major wetlands and floodplains.
✓ Protect and restore riparian and littoral habitats along streams, lakes, and estuarine shorelines.
Lead Entities:
✓ FDEP
✓ Private landowners and working forests
✓ Local governments
Geographic Focus Areas:
✓ Natural Bridge Creek
✓ Shoal River Buffer/Upper Shoal River
✓ South Walton Coastal Ecosystem
Planning Level Cost Estimate:
$6,000,000* *50% of DEP-estimated land value for designated projects

Watershed Stewardship Initiative

Description:

The purpose of the watershed stewardship initiative is to create experiences that result in action-oriented tasks leading to improvements in water quality, tangible improvements in habitat quality, and public knowledge of and appreciation of watershed resources and functions. Outreach activities should be well structured, project-oriented, and include hands-on activities, as well as education about personal practices to protect watershed resources.

Scope of Work:

1. Develop a comprehensive inventory of current watershed stewardship and education efforts underway within the watershed, including funding sources for each.
2. Evaluate initiatives ongoing elsewhere within the state and the country.
3. Analyze the feasibility of combining efforts and resources, where practical and beneficial, with existing community-based initiatives.
4. Identify potential gaps and/or additional areas of focus.
5. Continue existing programs and implement new individual programs based on availability of funding.
6. Include hands-on activities, such as vegetation planting, invasive species removal, site tours, project demonstrations, and monitoring.
7. Implement technical training for landowners, including for implementation of agricultural and silvicultural BMPs, as well as urban BMPs and pollution prevention practices.
8. Monitor program accomplishments and outcomes, including through feedback from participant and citizen surveys.

Outcomes/Products:

1. Improved long-term protection of water quality, habitat, and floodplain functions
2. Improved capability on the part of property owners to implement BMPs
3. Improved public understanding of watershed resources, functions, and public benefits
4. Improved public understanding of, and participation in, resource programs and projects

Strategic priorities:

- ✓ Water Quality
- ✓ Floodplain Functions
- ✓ Natural Systems
- ✓ Education and Outreach

Supporting Priorities:

- ✓ Water quality impairments for listed stream and estuarine waters
- ✓ Vulnerability of estuarine habitats
- ✓ Vulnerability of coastal dune lakes
- ✓ Needs for improved public understanding and participation; as well as for improved BMP technical support

Objectives:

- ✓ Restore water quality in impaired riverine, stream, and estuarine waters to meet state standards.
- ✓ Expand education and outreach about watershed resources and personal practices to protect water and habitat quality
- ✓ Create long-term partnerships among stakeholders, including government, academic institutions, non-governmental organizations, businesses, residents, and others, to maximize effectiveness of project implementation.
- ✓ Build the capacity of landowners, agricultural producers, and others to protect watershed resources, functions, and benefits.

Lead Entities:

- ✓ Choctawhatchee Basin Alliance
- ✓ Estuary Program
- ✓ Local governments
- ✓ FDEP
- ✓ FDACS
- ✓ NWFWMD
- ✓ FWC
- ✓ IFAS extension service

Geographic Focus Areas:

- ✓ Watershed-wide

Planning Level Cost Estimate:

$50,000 annually

Sub-basin Restoration Plans

Description:

1. Evaluate and identify priority sub-basins in cooperation with local initiatives, state and federal agencies, and local governments.
2. Develop a scoping document outlining actions to be undertaken, customized for specific areas and needs.
3. Develop a public outreach and engagement plan to facilitate participation by affected neighborhoods and stakeholders.
4. With public and agency participation, identify specific goals for waterbody protection and restoration.
5. Incorporate separate strategies, including stormwater retrofit planning; OSTDS abatement; floodplain, wetland and hydrologic restoration; monitoring; and public outreach and engagement.
6. Identify separate actions and project types that can cumulatively achieve identified goals.
7. Implement public outreach and engagement by conducting field visits, public meetings, and providing innovative hands-on engagement opportunities. Coordinate with established watershed groups.
8. Implement selected actions.
9. Monitor program accomplishments and outcomes, including through feedback from participants and surveys of affected residents. Conduct monitoring pre- and post-implementation and of environmental trends within affected waterbodies.

Strategic priorities:
✓ Water Quality ✓ Floodplain Functions ✓ Natural Systems ✓ Education and Outreach
Supporting Priorities:
✓ All supporting priorities
Objectives:
✓ All identified objectives
Lead Entities:
✓ Local governments ✓ Choctawhatchee Basin Alliance ✓ Estuary Program ✓ FDEP ✓ FWC ✓ NWFWMD
Geographic Focus Areas:
Targeted sub-basins within the watershed, including, but not limited to: ✓ Bayou sub-basins ✓ Holmes Creek basin ✓ Hogtown Bayou basin ✓ Coastal dune lakes ✓ Spring contribution areas
Planning Level Cost Estimate:
TBD* *Costs depend on specific projects included

Outcomes/Products:

1. Focused restoration plans, specific to priority waterbodies and basins
2. Improved water quality and aquatic and wetland habitat quality

Wastewater Treatment and Management Improvements

Strategic priorities:
✓ Water Quality
Supporting Priorities:
✓ Inadequate treatment from conventional OSTDS ✓ Point source discharges ✓ Needs and opportunities for improved wastewater collection and treatment
Objectives:
✓ Protect and, as needed, restore water quality in impacted or designated priority areas. ✓ Restore reduce mean NO2+3 concentrations in Cypress Spring to achieve 0.35 mg/L standard.
Lead Entities:
✓ Local governments ✓ Utilities
Geographic Focus Areas:
✓ Watershed-wide ✓ Systems within spring contribution areas ✓ Systems proximate to coastal drainages ✓ Wastewater utilities with opportunities for water reclamation and reuse and integrated water resource management
Planning Level Cost Estimate:
>$50,000,000

Description:

This strategy consists of development and implementation of upgrades to centralized wastewater treatment collection systems to reduce pollutant loading within the watershed. Additional opportunities exist for water reclamation and reuse.

Scope of Work:

1. In cooperation with utilities and local governments, evaluate existing wastewater systems to identify areas and components with upgrade opportunities, as well as sewer service extension needs.
2. Prioritize systems based on factors such as age, pollutant discharge, apparent leakage, capacity, and access.
3. Develop detailed cost estimates. Show cost estimates for areas with outdated sewer systems that need to be upgraded, areas with a high density of septic tanks that can connect to a central water system, and areas where upgrades are needed, but are determined to be lower in priority.
4. Implement/construct enhanced wastewater treatment and water reclamation and reuse systems.
5. In accordance with wastewater permits, monitor water quality in proximate surface and ground waters.
6. Evaluate data to identify trends of target pollutants.

Outcomes/Products:

1. Improved water and aquatic habitat quality
2. Reduced wastewater discharges into the environment, coupled with improved conservation of potable water resources

Interstate Coordination

Description:

This strategy consists of activities related to interstate coordination to improve and protect surface water quality in the basin

Scope of Work:

1. Develop a comprehensive plan for coordination between interstate agencies within the watershed. Evaluate case studies of successful interstate programs.
2. Develop a comprehensive list that contains contact information for the various jurisdictions within the watershed. Develop an email distribution list, SharePoint group, and/or website to foster easy file and information sharing. Partnership entities should include USDA, Alabama Department of Economic and Community Affairs Office of Water Resources, other state agencies, local government, and non-profit organizations.
3. Compare areas of study and possible gaps in information.
4. Coordinate with Barbour, Bullock, Coffee, Covington, Crenshaw, Dale, Geneva, Henry, Houston, and Pike counties in Alabama on development of sub-basin plans, agricultural/silvicultural BMPs, and sediment abatement issues.
5. Continually inform and engage all stakeholders during progress or discussions of watershed issues. Hold regular open joint meetings between stakeholders from both states.
6. Coordinate closely on all implementation projects for stormwater management, hydrologic alteration/restoration, sedimentation, agricultural BMPs, etc. Utilize a publicly shared file and discussion tool (such as a website) to house the status and outcome(s) of all implementation projects within the watershed (within both states).

Strategic priorities:
✓ Water Quality ✓ Natural Systems ✓ Education and Outreach
Supporting Priorities:
✓ Stormwater runoff and NPS pollution ✓ Sedimentation and turbidity from unpaved roads and other erosion sources ✓ Needs for improved BMP technical support, opportunities for public participation, and public understanding of practices to protect water resources
Objectives:
✓ Reduce basinwide NPS pollution from agricultural areas and erosion sites basin-wide. ✓ Reduce sedimentation from unpaved roads, borrow pits, and landscape erosion. ✓ Create long-term partnerships among stakeholders, including government, academic institutions, non-governmental organizations, businesses, residents, and others, to maximize effectiveness of project implementation.
Lead Entities:
✓ NWFWMD ✓ FDEP ✓ Choctawhatchee, Pea, and Yellow Rivers Watershed Management Authority ✓ Estuary Program
Geographic Focus Areas:
Watershed-wide with focus on northern extents of the watershed where Florida and Alabama interface
Planning Level Cost Estimate:
$25,000 annually

Outcomes/Products:

1. Progress toward basin approach to watershed protection
2. Expanded public participation and knowledge of watershed resources and management needs

Analytical Program Support

Description:

This strategy is intended to support dedicated scientific assessment and analysis to improve watershed management, protection, and restoration. The tasks involved are inherently progressive and will therefore change and be redefined as information is developed and in response to ongoing and future conditions and management actions.

Scope of Work:

Integral components of this strategy include but are not limited to the actions presented below.

Strategic Priorities:
✓ All identified program priorities
Supporting Priorities:
✓ All identified program priorities
Objectives:
✓ All watershed objectives
Lead Entities:
✓ State and federal resource agencies ✓ US EPA ✓ USFWS ✓ NWFWMD ✓ Choctawhatchee Basin Alliance ✓ Estuary Program ✓ Educational and research institutions
Geographic Focus Areas:
Watershed-wide, including across jurisdictional boundaries
Planning Level Cost Estimate:
TBD* *Costs highly variable

1. For specific resource functions and at the sub-basin level, develop and refine metrics for evaluating conditions and guiding implementation
2. In support of Urban Stormwater Retrofits, develop a stormwater pollutant loading analysis to include NPS pollutant loading estimates at the sub-basin level and pollutant load reduction estimates based on proposed or potential BMPs and facilities. Develop planning level estimates of potential water quality effects (pollutant concentrations) for receiving waterbodies.
3. Also in support of Urban Stormwater Retrofits, evaluate existing stormwater management systems to identify potential or needed improvements.
4. Evaluate innovative methods and designs to improve stormwater treatment, wastewater treatment and management, and ecological restoration.
5. In support of Septic Tank Abatement and implementation of Advanced Onsite Systems, develop a spatial analysis of OSTDS to include pollutant loading estimates and estimates of potential pollutant load reduction following connection to central sewer and/or conversion to advanced onsite systems. In cooperation with local governments and utilities, delineate proposed target areas for central sewer connections and for advanced onsite systems.
6. In support of Agricultural and Silvicultural BMPs, develop an agricultural NPS pollution abatement plan. For this purpose, develop nonpoint source pollutant loading estimates at the sub-basin level for watershed areas that are substantially agricultural in land use, and develop pollutant load reduction estimates and targets based on application of proposed or potential BMPs. Develop planning level estimates of water quality effects (pollutant concentrations) for receiving waterbodies.
7. Inventory, evaluate, and prioritize unpaved road stream crossings and other sedimentation sites in support of Basinwide Sedimentation Abatement.
8. Evaluate the site-specific feasibility and potential benefits and impacts of proposed innovative and/or large-scale projects, which may include but are not necessarily limited to:
    a. Regional-scale shoreline habitat development proposals
    b. Passive and/or pumped estuarine flushing systems

c. Proposals for major hydrologic alterations, such as causeway alterations, locks and dams, and barrier island pass alteration and maintenance
d. Stream channel reconfiguration
e. Benthic dredging
f. Dredged material removal and disposal

9. Identify estuarine sites with the potential for seagrass or other benthic habitat restoration through improved water quality treatment and water management within specific contributing basins.
10. Identify and describe the conditions, status, and trends of oyster and shellfish habitat within the bay.
11. Develop and refine hydrodynamic and water quality modeling tools. Develop specific management applications in cooperation with resource agencies and other public and nonprofit initiatives.
12. Evaluate effects of land use and management, to include forest management practices, on water quality. Identify and/or refine management options to protect and improve water quality.
13. Identify and describe long-term trends with respect to wetland and aquatic habitats, aquatic plants, and water chemistry. Identify management implications and recommendations.
14. Develop improved quantitative and qualitative metrics for evaluating conditions and guiding program and project implementation.

Outcomes/Products:

1. Improved understanding of watershed challenges and opportunities
2. Updated project priorities
3. Innovative project planning
4. Improvement in scientific basis for management strategies and actions
5. Improved understanding of quantitative potential of and expectations for environmental change in response to resource management
6. Improved metrics for evaluating conditions and guiding and tracking program implementation
7. Reduced risks of unintended adverse environmental or economic effects

Comprehensive Monitoring Program

Strategic priorities:
✓ All identified program priorities
Supporting Priorities:
✓ All identified program priorities
Objectives:
✓ All watershed objectives
Lead Entities:
✓ CBA ✓ State resource agencies ✓ NWFWMD ✓ Federal resource agencies ✓ Local governments ✓ Estuary Program ✓ Community-based watershed monitoring initiatives ✓ Institutions of higher education; other environmental and watershed organizations
Geographic Focus Areas:
✓ Watershed-wide
Planning Level Cost Estimate:
$300,000 annually

Description:

This strategy provides for monitoring of program and project implementation, project outcomes, water quality, and habitat quality.

Scope of Work:

1. Identify appropriate parameters, to include environmental conditions and trends, and program parameters.
2. Establish a comprehensive and cumulative geodatabase of projects.
3. Further clarify and incorporate indicators at the watershed and subwatershed level.
4. Delineate sensitive/priority areas, e.g., proximity to surface waters and karst.
5. Develop public outreach application/website to communicate program implementation, outcomes, and trend data.
6. Develop an inventory of organizations (and associated contacts) that currently or previously conducted field monitoring within the watershed, including funding sources for each. Evaluate the feasibility of combining efforts and resources, where practical and beneficial.
7. Identify potential gaps and/or additional areas of focus.
8. Develop core sampling designs for field monitoring. Determine optimal site distribution.
9. If appropriate, develop and implement a volunteer pool and volunteer training program.
10. Establish cooperative efforts with existing community initiatives and state and local agencies.
11. Support equipment acquisition where needed.
12. Where existing initiatives are not in place, consider developing a citizen water quality monitoring volunteer pool for target areas within the watershed.
13. Periodically conduct a comprehensive evaluation, at the watershed level, of program implementation, outcomes, and resource trends.

Outcomes/Products:

1. Improved long-term protection of water quality, habitat, and floodplain functions
2. Evaluations of project and program effectiveness, facilitating feedback and adaptive management
3. Improved public understanding of watershed resources, functions, and public benefits
4. Communication of program accomplishments to the public, elected officials, and stakeholders
5. Improved program accountability to the public and stakeholders
6. Improved public understanding of, and participation in, resource programs and projects

4.4 Project Criteria and Guidelines

This section outlines recommended guidelines to be applied to project development and prioritization. These items are not intended to be pass-fail for projects, but rather identify provisions that should receive consideration in project development and evaluation. Criteria specific to any given prioritization or funding decision are often defined, at least in part, by the funding resources under consideration. Individual sources of funding often are guided by criteria and guidelines established by statute or program documentation.

Generally suggested criteria for project evaluation are as follows.

1. Projects with responsible parties that will implement, operate, and maintain the completed facilities should be given priority consideration. Responsible parties optimally have dedicated sources of funding that will facilitate long-term operation and maintenance. Examples may include stormwater utilities and local option sales taxes.
2. Restoration that is substantially self-sustaining should be considered. Optimally, funded projects should not require continual or frequent human intervention beyond basic maintenance.
3. Responsible parties should support long-term monitoring to facilitate verification, lessons learned, and adaptive management. Long-term monitoring is also beneficial to support verification, lessons learned, and adaptation.
4. For restoration projects, sites and systems should be selected such that they reflect and are adaptable to natural variability. Restored habitats, for example, should be adaptable to cyclic climatic conditions (e.g., seasonal, hydrologic), discrete events (e.g., coastal storms), and long-term changes in the environment (e.g., climate change and sea level rise).
5. Cost effectiveness, technical feasibility, and regulatory factors are criteria to be considered in any prioritization and funding decision.

4.5 Funding Sources

Funding sources change over time. An outline of current funding sources, including descriptions of eligibility and project types contemplated, is provided in Table 4.4. These include Deepwater Horizon related sources and state, federal, and local government programs. Private funding sources, including from nonprofit organizations and private grant programs, may also be available.

Table 4-4 Funding Sources and Eligibility

Funding Source	Eligibility	Project Types
RESTORE Act		
Equal State Allocation (also known as Direct Component or Bucket/Pot 1)	75% of funds allocated to the eight disproportionately affected Panhandle coastal counties: Bay, Escambia, Franklin, Gulf, Okaloosa, Santa Rosa, Wakulla, and Walton. Remainder of funds allocated to the 15 non-disproportionately affected Gulf Coast counties, including Jefferson County in northwest Florida.	• Restoration and protection of the natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches and coastal wetlands; • Mitigation of damage to fish, wildlife and natural resources; • Implementation of a federally-approved conservation management plan; • Workforce development and job creation; • Improvements to state parks located in coastal areas affected by the *Deepwater Horizon* oil spill; • Infrastructure projects benefitting the economy or ecological resources; including port infrastructure; • Coastal flood protection and related infrastructure; • Promotion of tourism and Gulf seafood consumption; or • Administrative costs and planning assistance.
Gulf Coast Ecosystem Restoration Council (also known as The RESTORE Council or Bucket/Pot 2)	Project selection based on Comprehensive Plan developed by the RESTORE Council with input from the public.	The Initial Comprehensive Plan adopts five goals: • Restore and Conserve Habitat; • Restore Water Quality; • Replenish and Protect Living Coastal and Marine Resources; • Enhance Community Resilience; or • Restore and Revitalize the Gulf Economy.
Oil Spill Restoration Impact Allocation (also known as The Gulf Consortium, or Bucket/Pot 3)	The Gulf Consortium, consisting of 23 Gulf Coast counties, is developing the State Expenditure Plan for Florida that must be submitted by the Governor to the RESTORE Council for its review and approval.	All projects, programs, and activities in the State Expenditure Plan that contribute to the overall ecological and economic recovery of the Gulf Coast (same project types as listed under the Equal State Allocation above).
NOAA RESTORE Act Science Program (also known as Bucket/Pot 4)	• Institutions of higher education; • Non-profit organizations; • Federal, state, local and tribal governments; • Commercial organizations; and • U.S. territories.	Research, observation, and monitoring to support the long-term sustainability of the ecosystem, fish stocks; fish habitat; and the recreational, commercial, and charter fishing industry in the Gulf of Mexico, including: • Marine and estuarine research; • Marine and estuarine ecosystem monitoring and ocean observation; • Data collection and stock assessments; • Pilot programs for fishery independent data and reduction of exploitation of spawning aggregations; • Cooperative research; or • Administrative costs.

Funding Source	Eligibility	Project Types
Centers of Excellence (also known as Bucket/Pot 5)	University of South Florida, Florida Institute of Oceanography is administering Florida's Centers of Excellence Program.	• Coastal and deltaic sustainability, restoration, and protection, including solutions and technology that allow citizens to live in a safe and sustainable manner in a coastal delta in the Gulf Coast Region; • Coastal fisheries and wildlife ecosystem research and monitoring in the Gulf Coast Region; • Offshore energy development, including research and technology to improve the sustainable and safe development of energy resources in the Gulf of Mexico; • Sustainable and resilient growth, economic and commercial development in the Gulf Coast Region; and • Comprehensive observation, monitoring, and mapping of the Gulf of Mexico.
Other Deepwater Horizon Funding		
Natural Resource Damage Assessment (NRDA)	Trustee Implementation Groups develop restoration projects guided by the programmatic restoration plan finalized in 2016. Public may submit project ideas & comment on plans.	The final plan takes a comprehensive and integrated ecosystem-level approach to restoring the Gulf of Mexico: • Restore and Conserve Habitat • Restore Water Quality • Replenish and Protect Living Coastal and Marine Resources • Provide and Enhance Recreational Opportunities
National Fish and Wildlife Foundation (NFWF)	NFWF manages the Gulf Environmental Benefit (GEBF) fund established in 2013. In consultation with FWC and FDEP, NFWF identifies priority restoration and conservation projects for GEBF funding.	Projects that: • Restore and maintain the ecological functions of landscape-scale coastal habitats, including barrier islands, beaches & coastal marshes; • Restore and maintain the ecological integrity of priority coastal bays and estuaries; and • Replenish and protect living resources including oysters, red snapper and other reef fish, Gulf Coast bird populations, sea turtles and marine mammals.
Federal Sources		
NOAA Coastal Resilience Grants	• Non-profit organizations • Institutions of higher education • Regional organizations • Private entities • States, territories and federally recognized Indian tribes • Local governments	• Strengthening Coastal Communities: activities that improve capacity of coastal jurisdictions (states, counties, municipalities, territories, and tribes) to prepare and plan for, absorb impacts of, recover from, and/or adapt to extreme weather events and climate-related hazards. • Habitat Restoration: activities that restore habitat to strengthen the resilience of coastal ecosystems and decrease the vulnerability of coastal communities to extreme weather events and climate-related hazards.
NOAA Office of Education Grants	Educational institutions and organizations for education projects and programs	• Environmental Literacy Program provides grants and in-kind support for programs that educate and inspire people to use Earth systems science to improve ecosystem stewardship and increase resilience to environmental hazards. • Bay Watershed Education and Training (B-WET) provides competitive funding to support meaningful watershed educational experiences for K–12 audiences • Cooperative Science Centers provide awards to educate and graduate students who pursue degree programs with applied research in NOAA mission-related scientific fields.

Funding Source	Eligibility	Project Types
US EPA Environmental Education Grants	• Local education agencies • State education or environmental agencies • Colleges or universities • Non-profit organizations • Noncommercial educational broadcasting entities • Tribal education agencies	Environmental education projects that promote environmental awareness and stewardship and help provide people with the skills to take responsible actions to protect the environment. This grant program provides financial support for projects that design, demonstrate, and/or disseminate environmental education practices, methods, or techniques.
US EPA – Exchange Network Grant Program	States, territories and federally recognized Indian tribes	Promotes improved access to, and exchange of, high-quality environmental data from public and private sector sources.
US EPA - Water Infrastructure Finance and Innovation Act (WIFIA) Program	• States, territories and federally recognized Indian tribes • Partnerships and joint ventures • Corporations and trusts • Clean Water and Drinking Water State Revolving Fund (SRF) programs	Accelerates investment in water infrastructure by providing long-term, low-cost supplemental loans for regionally and nationally significant projects.
State Sources		
FDEP (WMDs) Spring Restoration Program	•Local governments •Public and non-profit utilities •Private landowners	State Spring Restoration funding efforts include land acquisition and restoration, septic to sewer conversion, and other projects that protect or restore the quality or quantity of water flowing from Florida's springs.
FDEP Special Management Area Grants	State agencies and water management districts	Research or coordination efforts in areas of special management. Examples of areas of special management would include, but not be limited to Areas of Critical State Concern, Critical Wildlife Areas, Aquatic Preserves, National Estuary Programs, and Surface Water Improvement and Management waterbodies
FDEP Coastal Partnership Initiative	Coastal counties and municipalities within their boundaries required to include a coastal element in the local comprehensive plan	Coastal resource stewardship and working waterfronts projects.
FDEP Beach Management Funding Assistance (BMFA) Program	• Local governments • Community development districts • Special taxing districts	Beach restoration and nourishment activities, project design and engineering studies, environmental studies and monitoring, inlet management planning, inlet sand transfer, dune restoration and protection activities, and other beach erosion prevention related activities consistent with the adopted Strategic Beach Management Plan.
FDEP Florida Communities Trust	Local governments and eligible non-profit organizations	Acquisition of land for parks, open space, greenways and projects supporting Florida's seafood harvesting and aquaculture industries.
Florida Forever	Funding is appropriated by the legislature distributed by the FDEP to state agencies	Acquisition of public lands in the form of parks, trails, forests, wildlife management areas, and more.
FDEP Coastal and Estuarine Land Conservation Program	States that have a coastal zone management program approved by NOAA or a National Estuarine Research Reserve (NERR)	Acquisition of property in coastal and estuarine areas that have significant conservation, recreation, ecological, historical, or aesthetic values, or that are threatened by conversion from a natural or recreational state to other uses.

Funding Source	Eligibility	Project Types
FDEP Clean Vessel Act Grants	Facilities that provide public access to pump-out equipment	Construction, renovation or installation of pump out equipment or pump out vessels.
FDEP Clean Water State Revolving Fund Loan Program (CWSRF)	Project sponsors	Planning, designing, and constructing water pollution control facilities.
FDEP Clean Water State Revolving Fund Program Small Community Wastewater Construction Grants	Small communities and wastewater authorities	This grant program assists in planning, designing, and constructing wastewater management facilities. An eligible small community must be a municipality, county, or authority with a total population of 10,000 or less, and have a per capita income (PCI) less than the State of Florida average of $26,503.
FDEP 319 grants	• State and local governments • Special districts, including water management districts • Nonprofit public universities and colleges • National Estuary Programs	Projects or programs that reduce NPS pollution. Projects or programs must be conducted within the state's NPS priority watersheds, including SWIM watersheds and National Estuary Program waters. All projects should include at least a 40% nonfederal match.
FDEP 319 Education Grants	Local governments in Florida	For projects that provide education and outreach about nonpoint source pollution in the adopted Basin Management Action Plan (BMAP) areas.
FDEP TMDL Water Quality Restoration Grants	Local governments and water management districts	Projects that: • Reduce NPS loadings from urban areas affecting verified impaired waters. • Are at least the 60% design phase. • Have permits issued or pending. • Include storm monitoring to verify load reduction. • Will be completed within three years of appropriation. • Include a minimum of 50% match with at least 25% provided by the local government. • Allocate grant funds to construction of BMPs, monitoring, or related public education.
FDACS Rural and Family Lands Protection Program	Agricultural landowners	State conservation easements that: • Protect valuable agricultural lands. • Ensure sustainable agricultural practices and reasonable protection of the environment. • Protect natural resources in conjunction with economically viable agricultural operations.
FDACS Forest Stewardship Program	Private forest landowners with at least 20 acres of forest land	Cost-share grants for implementation of stewardship to improve and maintain timber, wildlife, water, recreation, aesthetics, and forage resources.
FDACS Endangered and Threatened Plant Conservation Program	Private individuals and non-federal government entities	Actions that restore and maintain populations of listed plants on public land and on private lands managed for conservation purposes.

Funding Source	Eligibility	Project Types
Natural Resources Conservation Service	Private agricultural producers, landowners, and local governments	• Conservation Innovation Grants (CIG) stimulate development and adoption of innovative conservation approaches and technologies. • The Environmental Quality Incentives Program (EQIP) provides financial and technical assistance to agricultural producers that address natural resource concerns and improve water and air quality, conserve ground and surface water, reduce soil erosion and sedimentation, or improve or create wildlife habitat • Emergency Watershed Protection Program includes assistance to remove debris from streams, protect streambanks, establish cover on critically eroding lands, repair conservation practices, and purchase of floodplain easements.
Florida Fish and Wildlife Conservation Commission Wildlife Grants Program	State fish and wildlife agencies	Projects identified within State Wildlife Action Plan, including fish and wildlife surveys, species restoration, habitat management, and monitoring.
Florida Fish and Wildlife Conservation Commission Landowner Assistance Program	Private landowners	Cooperative and voluntary effort between landowners, the FWC, and the USFWS to improve habitat conditions for fish and wildlife.
Local Governments		
Local Government General Revenue	Defined by local statute. Generally local projects as approved by elected body, frequently leveraging state, federal, and other funding sources.	Defined by local statute and elected board.
Utility Funds – Stormwater and Wastewater	Utility projects benefiting rate payers. May leverage other local, state, and federal funding.	Stormwater and wastewater capital improvement and maintenance projects.

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Appendix A Implementation and Achievements of the Previous SWIM Plan

Previous SWIM Plan Issues and Priorities

The Choctawhatchee River and Bay Watershed SWIM Plan was developed in 1996 to provide a framework and cooperative funding mechanism for the District to work with local governments, state and federal agencies, and private initiatives to address cumulative anthropogenic impacts on water quality and aquatic habitats. The priority issues identified in the plan include the need for improved stormwater treatment, the prevention of NPS pollution, continued improvement in the management and treatment of domestic and industrial wastewater, and habitat protection and restoration. When the plan was updated in 2002, the same issues were identified. The specific management priorities identified include:

- Reduce and minimize pollution from urban stormwater runoff and other NPSs;
- Implement cooperative restoration projects, focused on water quality and aquatic, wetland, and riparian habitats;
- Identify water and sediment quality and trends;
- Maintain historic freshwater inflow to the system;
- Inform residents within the watershed about preservation efforts and personal actions that can be taken to protect and restore watershed resources; and
- Facilitate resource management on a watershed basis, promoting coordination across local jurisdictional and state lines and agency areas of responsibility.

Progress toward Meeting Plan Goals and Objectives

The 18 projects identified in the 1996 SWIM Plan were carried forward to the 2002 updated plan. As shown in Table A-1, the District proposed funding for 11 of the projects over five years in an amount totaling approximately $4.4 million.

Table A-1 2002 SWIM Plan Project Schedule and Cost Estimates

ID	Projects	Fiscal Year Estimates (not necessarily funded)				
		01-02	02-03	03-04	04-05	05-06
	Water Quality					
Q1	Ecological Assessment					
Q2	Shoreline Buffer Zones		$20,000	$20,000		
Q3	Land Use/Land-cover Assessment					
Q4	NPS Pollution Abatement	$10,000	$200,000	$200,000	$200,000	$200,000
Q5	Point Source Assessment					
Q6	Pollution Load Reduction Goals					
Q7	Urban Stormwater	$250,000	$600,000	$500,000	$500,000	$500,000
Q8	Urban BMP Demonstration	$170,000				
Q9	Long-Term Monitoring Plan					
	Biological Resources					
B1	Land Acquisition Assessment		$15,000	$15,000	$15,000	$15,000
B2	Ecological Restoration	$250,000	$100,000	$100,000	$100,000	$100,000
B3	Seagrass Assessment		$20,000	$30,000		
B4	Tidal Marsh Assessment				$20,000	$20,000
B5	Recreational Impact Assessment					
B6	Erosion Assessment					
	Public Awareness					
P1	Public Awareness	$35,000	$25,000	$25,000	$25,000	$25,000
	Coordination					
C1	Planning and Administration	$25,000	$10,000	$10,000	$10,000	$10,000
C2	Interstate Coordination	$10,000	$10,000	$10,000	$10,000	$10,000
	TOTAL					
	Planned Expenditures 02-06	**$750,000**	**$1,000,000**	**$910,000**	**$880,000**	**$880,000**

Source: NWFWMD 2002

Since the 2002 SWIM Plan, significant progress has been made on addressing a number of the issues and priorities identified. Reflecting the shared responsibility inherent in watershed management, accomplishments should be recognized on the part of numerous watershed stakeholders, including local governments, state and federal agencies, academic institutions, and others. Among the noteworthy accomplishments are:

- Implementation of dedicated plans and programs to retrofit stormwater systems and improve water quality treatment by the cities of Niceville, Fort Walton Beach, and Destin, as well as Okaloosa and Walton counties, and Eglin AFB;
- Implementation of ERP by the District and FDEP;
- Continued development and implementation of water and habitat quality monitoring, restoration, and public awareness programs by the CBA;
- Completion of assessments and implementation of initial projects to address sedimentation from unpaved roads throughout the watershed;
- Implementation of local projects with grant funding from the Florida Forever program, including projects to achieve unpaved road sedimentation abatement, stormwater retrofit for water quality improvement, tidal creek restoration, and hydrologic restoration;
- Continued improvements in wastewater treatment and in developing the reuse of reclaimed water; and
- Habitat restoration projects to include living shoreline and shoreline marsh restoration and wetland restoration.

Cooperative projects that have been implemented or are ongoing in the watershed are listed in Table A-2. The District's Consolidated Annual Reports (http://www.nwfwater.com/Data-Publications/Reports-Plans/Consolidated-Annual-Reports) provide listings and descriptions of specific projects that have been completed or initiated under the auspices of the SWIM, Florida Forever, and other related programs.

Table A-2 Project Implementation

Project	General Description	Lead Entity	Corresponding SWIM Project	Status
Cypress Spring Protection and Restoration	Fee and/or less-than-fee acquisition of up to 308 acres at Cypress Spring. Also includes limited restoration and access improvements.	NWFWMD	NPS Pollution Abatement	In progress
Live Oak Point Ecological Restoration	Shoreline restoration at Live Oak Point. 550 linear feet of oyster shell break-water constructed and .13 acres of marsh created.	NWFWMD	Ecological Restoration	Completed 2008
Holmes County Unpaved Road Project	Stabilization of unpaved road/stream crossing to reduce sediment loads and stormwater impacts to tributary of the Choctawhatchee River.	Holmes County	NPS Pollution Abatement	Completed 2006
Oyster Lake Restoration	Replaced two culverts with bridges to restore natural flows between coastal dune lake, adjacent wetlands, and the Gulf. Included removal of Oyster Lake Causeway.	Walton County	Ecological Restoration	Completed 2010
Hammock Point Water Quality Improvements	Retrofit of stormwater drainage system by stabilizing unpaved roads and installing sediment removal units on Choctawhatchee Bay.	Walton County	NPS Pollution Abatement	Completed 2006
Valparaiso Restoration	Three wetland treatment systems constructed to treat runoff from 162 acres draining to Choctawhatchee Bay. Established natural riparian vegetation at several sites along the bay.	City of Valparaiso	Ecological Restoration	Completed 2004
Lower Choctawhatchee Stream Crossing Stabilization	Stabilization of eight road/stream crossings to reduce sediment loading.	Orange Hill SWCD	NPS Pollution Abatement	Completed 2006
Rolling Pines Road Stormwater Improvement	Road stabilization and stormwater improvements including swales along approx. 3.44 miles of road discharging into several lakes in recharge area.	Washington County	NPS Pollution Abatement	Completed 2009

Project	General Description	Lead Entity	Corresponding SWIM Project	Status
Choctawhatchee Bay Stormwater Improvement Phase I	Roadway stabilization to eliminate sedimentation and to provide stormwater treatment for the sub-basin prior to discharge into Choctawhatchee Bay.	Walton County	NPS Pollution Abatement	Completed 2008
City of Chipley Reuse Improvements	Development of facility capacity to provide public access reclaimed water, reduce surface water discharge, and reduce demand on Floridan aquifer	City of Chipley	Point Source Assessment	Completed 2008
Vernon Stormwater Retrofit	Construction of stormwater pond to treat a 15 acre area that discharges to Holmes Creek.	City of Vernon	Urban Stormwater	Completed 2009
Santa Rosa Sound Ecosystem Restoration	Restoration of tidal creek on Santa Rosa Sound.	CBA	Ecological Restoration	Completed 2010
Morrison Springs Stormwater Improvement	Stormwater improvements to reduce runoff and protect water quality. Includes boardwalk across sensitive wetlands.	Walton County	NPS Pollution Abatement	Completed 2008
Lower Choctawhatchee Bay Stormwater Initiative	Installation of a four separator units to treat 283-acre area discharging to Choctawhatchee Bay.	City of Fort Walton Beach	Urban Stormwater	Completed 2010
Chain Lake Road Stabilization	Installation of a concrete bridge along Chain Lakes Road at Pine Log Creek; removal of sediment from 200 ft. of stream, and stabilization of approx. one mile of roadway with swales and ditch blocks.	Washington County	NPS Pollution Abatement	Completed 2009
River Road Stabilization	Stabilization of approx. three miles of road that crosses Gum Creek and Yates Mill Pond, including swales and ditch blocks.	Washington County	NPS Pollution Abatement	Completed 2010
Mainsail Drive Stormwater Retrofit	Stormwater retrofit for 3.95 acres discharging to Rocky Bayou and Choctawhatchee Bay. Exfiltration trench installed to treat stormwater runoff in existing ditch/swale systems.	Okaloosa County	Urban Stormwater	Completed 2010
Eglin Parkway Stormwater Initiative	Installation of pollutant separator unit to treat stormwater from urbanized 62-acre contributing basin.	City of Fort Walton Beach	Urban Stormwater	Completed 2010

Project	General Description	Lead Entity	Corresponding SWIM Project	Status
Rocky Drive Stormwater Retrofit	Retrofit of 6.2 acres discharging to Rocky Bayou and Choctawhatchee Bay. Exfiltration trench installed to treat stormwater runoff in existing ditch/swale systems.	Okaloosa County	Urban Stormwater	Completed 2010
Lower Turkey Creek Basin Retrofit	Construction of a regional stormwater treatment facility to treat 25 acres discharging into Turkey Creek, within the Boggy Bayou basin.	City of Niceville	Urban Stormwater	Completed 2007
Clement Taylor Park Aquatic Ecosystem Restoration	Construction of stormwater treatment pond and wetland system planted with native vegetation. Replaced existing control structures.	CBA	Urban Stormwater	Completed 2009
City of Freeport Reuse Project	Installation of approximately 10 miles of reuse distribution lines, 750,000 gallon storage tank, and on-site quality and equipment controls for monitoring.	City of Freeport	Point Source Assessment	Completed 2009
Cessna Park Stormwater Remediation	Stormwater retrofit and habitat enhancement project at Cessna Park, along Hogtown Bayou. Implemented stormwater BMPs and removed old septic tank.	CBA	Urban Stormwater	Completed 2007
Highway 285 Reclaimed Water Main Upgrade	Construct 12" reclaimed water main to serve a growing customer base.	City of Niceville	Point Source Assessment	Completed 2015
Overbrook Pond	Engineering design and surveying for stormwater retrofit. MOEX funding with construction coordinated by DEP.	FDEP	Urban Stormwater	Completed 2015
Tanglewood Pond	Engineering design and surveying for stormwater retrofit. MOEX funding with construction coordinated by DEP.	FDEP	Urban Stormwater	Completed 2015
City of Bonifay Planning for Reuse of Reclaimed Water	Planning and geotechnical evaluation of feasibility of water reclamation and reuse.	City of Bonifay	Point Source Assessment	In progress
City of Fort Walton Beach Reclaimed Water System Improvements	Installation of booster pump station, hydropneumatic tank, and storage tank to provide reclaimed water to an cemetery and planned athletic complex.	City of Fort Walton Beach	Point Source Assessment	In progress

Project	General Description	Lead Entity	Corresponding SWIM Project	Status
Hightower Streambank Restoration	Spring bank stabilization, construction of parking area stormwater facilities, and access stabilization.	NWFWMD	NPS Pollution Abatement	In progress
Live Oak Landing Streambank Restoration	Spring bank stabilization, construction of parking area stormwater facilities, and access stabilization.	NWFWMD	NPS Pollution Abatement	In progress
Cotton Landing - Holmes Creek Springs Complex	Stabilize and restore stream banks at Cotton Landing on Holmes Creek.	NWFWMD	NPS Pollution Abatement	In progress

Appendix B Related Resource Management Activities

Much of the progress to date is attributable to cooperative efforts made on the part of local governments, state and federal agencies, the District, and private initiatives. Many programs and projects share common goals, and their implementation is most frequently accomplished through coordinated planning, funding, management, and execution. This section describes historical and ongoing activities and programs to address resource issues within the watershed.

Special Resource Management Designations

Outstanding Florida Waters

The FDEP designates Outstanding Florida Waters (OWFs) under section 403.061(27), F.S., which are then approved by the Environmental Regulation Commission. An OFW is defined by FDEP as a waterbody "…worthy of special protection because of its natural attributes." A number of waterbodies and segments in the watershed have been recognized and receive additional regulatory protection through designation as OFWs, per Section 62-302.700, F.A.C. Designated OFWs include:

- Choctawhatchee River
- Rocky Bayou Aquatic Preserve
- Rocky Bayou State Park
- Point Washington State Forest
- Falling Waters State Park
- Topsail Hill Preserve State Park
- Ponce de Leon Springs State Park
- Grayton Beach State Park
- Eden Gardens State Park
- Gulf Islands National Seashore

Aquatic Preserves

Florida currently has 41 aquatic preserves, managed by FDEP, encompassing approximately 2.2 million acres of submerged lands that are protected for their biological, aesthetic, and scientific value. As described in Chapter 18-20, F.A.C., aquatic preserves were established for the purpose of being preserved in an essentially natural or existing condition so that their aesthetic, biological, and scientific values may endure for the enjoyment of future generations. Rocky Bayou Aquatic Preserve includes the majority of Rocky Bayou in Okaloosa County. Details on Rocky Bayou Aquatic Preserve and its management may be found at http://www.dep.state.fl.us/coastal/sites/rocky/.

Conservation Lands

The Choctawhatchee River and Bay watershed has extensive conservation and protected lands (Figure B-1). Over 376,000 acres, or 26 percent, of the watershed consists of conservation lands which are listed with short descriptions in Appendix G.

The NWFWMD owns and manages over 60,000 acres within the watershed, primarily the Choctawhatchee River and Holmes Creek WMA. Land management includes prescribed burning, forest management, groundcover restoration, reforestation, streambank restoration and protection, and support for compatible public access and recreation. The Choctawhatchee River and Holmes Creek WMA consists primarily of floodplain forests and adjacent uplands.

Also within Florida's portion of the watershed are a number of state parks, preserves, and forests, including Grayton Beach, Rocky Bayou, Falling Waters, Topsail Hill Preserve, Deer Lake, and Eden Garden State Parks, as well as the Point Washington and Pine Log state forests. Additionally, The Nature Conservancy owns and manages the Choctawhatchee River Delta Preserve at the mouth of the Choctawhatchee River and the Rock Hill Preserve in the upper reaches of the watershed near Chipley.

The watershed also includes the Devil's Swamp and Nokuse mitigation banks, privately-owned mitigation banks with service areas within the watershed.

The U.S. Department of Defense owns and manages over 234,000 acres of property across the watershed. The Northwest Florida Greenway Corridor initiative was established in 2001 as a partnership of the Economic Development Council (EDC) of Okaloosa County, Eglin AFB, the FDEP, and TNC (EDC 2016). The goal of the initiative is to protect and sustain existing military land and airspace, promote industry growth, preserve environmental quality and biodiversity, maintain economic viability of timber land, and create additional recreational value (EDC 2016). The intention of the initiative is to protect a corridor connecting the Apalachicola National Forest and the region including Eglin AFB, Choctawhatchee River and Holmes Creek WMA, and Nokuse Plantation.

Another ongoing land conservation effort in the watershed is the Gulf Coastal Plain Ecosystem Partnership (GCPEP), a program for restoring and conserving longleaf pine ecosystems, which currently includes 13 public and private landowners and over 1.25 million acres (The Longleaf Alliance 2016). Among participants in the GCPEP are Florida State Lands, the NWFWMD, Nokuse Plantation, TNC, the Florida Forest Service, the Conecuh National Forest, U.S. Department of Defense, and FWC.

Within Alabama's portion of the watershed, conservation lands include the Geneva State Forest and portions of the Conecuh National Forest.

Gulf Ecological Management Sites

The Choctawhatchee River and Bay watershed also includes one designated GEMS, the Rocky Bayou Aquatic Preserve. The GEMS Program is an initiative of the Gulf of Mexico Foundation, the EPA Gulf of Mexico Program, and the five Gulf of Mexico states (Gulf of Mexico Foundation 2015). Designated GEMS are considered high priority for protection, restoration, and conservation by state and federal authorities due to unique ecological qualities such as habitats significant to fish, wildlife, or other natural resources (Gulf of Mexico Foundation 2015).

Critical and Strategic Habitat Conservation Areas

As described above, portions of the Choctawhatchee and Pea rivers and Choctawhatchee Bay are designated critical habitat for the threatened Gulf Sturgeon, and the Choctawhatchee River and Holmes, Wrights, Sandy, Bruce, Natural Bridge, and Alligator creeks include critical habitat for five species of listed freshwater mussels.

Portions of the watershed have also been identified by the FWC as Strategic Habitat Conservation Areas (SHCAs). These areas are important habitats that do not have conservation protection and would increase the security of rare and imperiled species if they were protected. Within the Choctawhatchee River and Bay watershed, SHCAs have been identified for several species including the pine barrens frog (*Hyla andersonii*), the Gulf salt marsh snake (*Nerodia clarkii clarkii*), the Cooper's hawk (*Accipiter cooperii*), the Scott's seaside sparrow (*Ammodramus maritimus peninsulae*), and the Florida black bear (*Ursus americanus*). Strategic Habitat Conservation Areas occur along the watershed's streams and tributaries in associated bay swamp, cypress/pine/cabbage palm wetland forests, and mixed forests; in Walton County, adjacent to Choctawhatchee Bay near Live Oak Point; and lands adjacent to the Choctawhatchee River WMA (Endries *et al.* 2009).

The FDACS publishes a list of the protected plants of Florida (Weaver and Anderson 2010). Appendix D provides the list of species that are protected and tracked for the watershed, as well as their habitat requirements.

Deepwater Horizon: RESTORE Act, Natural Resource Damage Assessment (NRDA), and NFWF Projects

The FDEP and the FWC are the lead state agencies in Florida for responding to the impacts of the 2010 Deepwater Horizon oil spill and the resulting restoration process. Restoration projects submitted through the FDEP are considered for funding under the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast Act (RESTORE Act) Comprehensive Plan Component, the NRDA, and the NFWF's GEBF.

RESTORE Act

The RESTORE Act of 2012 allocates to the Gulf Coast Restoration Trust Fund 80 percent of administrative and civil penalties resulting from the oil spill. The primary means of allocation under the RESTORE Act are as follows:

Direct Component Funds ("Bucket 1"): Seven percent of these funds will be directly allocated to counties affected in Florida (5.25 percent to the eight disproportionately affected counties in the Panhandle from Escambia to Wakulla counties; and 1.75 percent to the non-disproportionately impacted Gulf Coastal counties). To receive funds under the Direct Component, each county is required to submit a Multiyear Implementation Plan, subject to review by the U.S. Department of the Treasury, detailing the county's plan to expend funds for a set of publically vetted projects and goals.

Comprehensive Plan Component ("Bucket 2"): A portion of RESTORE funds will go toward projects with a wider geographic benefit (multiple states). These projects are selected by the Gulf Coast Ecosystem Restoration Council, which includes the five Gulf States and six federal agencies. Projects can be submitted by the Council members and federally recognized Native American tribes.

Spill Impact Component ("Bucket 3"): Each of the five Gulf states will receive these funds to implement a State Expenditure Plan. In Florida, this plan is being developed through the Gulf Consortium, which was created by inter-local agreement among Florida's 23 Gulf Coast counties. Projects will be submitted by each of the 23 counties on Florida's Gulf Coast.

Natural Resource Damage Assessment

The Oil Pollution Act of 1990 authorizes certain state and federal agencies to evaluate the impacts of the Deepwater Horizon oil spill. This legal process, known as Natural Resource Damage Assessment (NRDA), determines the type and amount of restoration needed to compensate the public for damages caused by the oil spill. The FDEP and FWC are co-trustees on the Deepwater Horizon Trustee Council.

National Fish and Wildlife Foundation

The National Fish and Wildlife Foundation (NFWF) established the GEBF to administer funds arising from plea agreements that resolve the criminal cases against BP and Transocean. The purpose of the GEBF, as set forth in the plea agreements, is to remedy harm and eliminate or reduce the risk of future harm to Gulf Coast natural resources. The plea agreements require the NFWF to consult with state and federal resource agencies in identifying projects. The FWC and the FDEP work directly with the NFWF to identify projects for the state of Florida, in consultation with the USFWS and NOAA. From 2013 to 2018, the GEBF will receive a total of $356 million for natural resource projects in Florida. However, the allocation of funds is not limited to five years.

NFWF funded the development of the 2017 SWIM plan updates through the GEBF. Additionally, there are several projects funded by NFWF in the watershed at the time of this writing. The Boggy Bayou Watershed Water Quality Improvement project includes land acquisition, construction of a stormwater treatment facility, creation of habitat and living shorelines, removal of exotic species, and restoration of emergent grasses. The Destin Harbor, Joe's Bayou, and Indian Bayou Water Quality Improvement project includes six projects in three focal areas of Destin to improve surface water quality by construction of stormwater treatment facilities. The Water Quality Improvements to Enhance Fisheries Habitat in the Lower Choctawhatchee River Basin – Phase I seeks to improve water quality and enhance fish spawning and rearing habitat by reducing upstream sediment loading through the improvement of unpaved stream crossings. The Restoration of Florida's Coastal Dune Lakes project will remove invasive species and use fire management to restore wetland habitat and increase freshwater flows into priority coastal dune lakes. These lake systems provide unique habitat for a wide variety of fish and wildlife and exist as a natural estuarine transition between the Gulf of Mexico and upland areas.

The Nature Conservancy (TNC): Watershed Management Planning

The Nature Conservancy facilitated a community-based watershed management planning process in 2014 and 2015 along Florida's Gulf Coast for the following six watersheds: Perdido Bay, Pensacola Bay, Choctawhatchee Bay, St. Andrew and St. Joseph bays, Apalachicola to St. Marks, and the Springs Coast. The process was designed to:

- Develop watershed-based plans that identify the most pressing environmental issues affecting each watershed and solutions that address the issues, regardless of political jurisdiction and funding source.
- Create long term partnerships among stakeholders in each watershed and across the regions to maximize effectiveness of project implementation and funding efforts.
- Provide a screening tool to evaluate the project priorities of these watershed plans for potential RESTORE funding by the communities, FDEP, FWC, NFWF, Mitsui Oil Exploration Company, Ltd. (MOEX) Offshore, and the Gulf Coast Restoration Council (TNC 2014).

The TNC Plan developed for Choctawhatchee Bay identifies 23 projects to address seven major actions:

- Protect, restore, create and/or manage natural habitat and resources and increase buffer areas;
- Increase cooperation and coordination for management, monitoring, funding, implementation, outreach, enforcement;
- Reduce impacts to groundwater and ensure adequate fresh water availability;
- Reduce and treat stormwater;
- Reduce nutrient loading;
- Reduce sedimentation; and
- Increase economic diversification.

To complete the planning process and ensure that all of the priority issues are identified and addressed, the plan recommended the updating of the 2002 Choctawhatchee River and Bay Watershed SWIM Plan (TNC 2014).

Monitoring

FDEP/NWFWMD

Long-term trends in the water quality of Florida's waters are monitored by FDEP's Surface Water Temporal Variability (SWTV) and Groundwater Temporal Variability (GWTV) Monitoring Networks. The SWTV Network includes two sites on the Choctawhatchee River and one on Alaqua Creek. Parameters monitored include color alkalinity, turbidity, suspended and dissolved solids, nutrients, total

organic carbon, chlorides, sulfate, metals (calcium, potassium, sodium, magnesium), pH, conductivity, temperature, DO, total coliform bacteria, fecal coliform bacteria, enterococci bacteria, and escherichia bacteria. Bi-annual biological sampling is also performed to evaluate the ecological health of the waters. These water quality stations are on gauged streams, which provide for calculated stream discharges (FDEP 2006).

The FDEP's Northwest District has collected considerable biological data and conducted biological evaluations of numerous stream and other aquatic habitat sites throughout the watershed. Some of this work has been conducted in partnership with Eglin AFB. Biological reconnaissance evaluations have been conducted at 44 stream sites (FDEP 2006).

The biological data collected by the FDEP Northwest District includes Stream Condition Index ratings, Wetland Condition Index ratings, and Bioassessment data, all are reported and accessible in the STOrage and RETrieval (STORET) database. The data is also included in the Impaired Surface Waters Rule (IWR) assessments.

Florida Department of Agriculture and Consumer Services (FDACS)

To minimize the risk of shellfish-borne illness, the FDACS continually monitors and evaluates shellfish harvesting areas and classifies them accordingly. It also ensures the proper handling of shellfish sold to the public. Under the SEAS program, FDACS monitors bottom and surface temperature, salinity, dissolved oxygen, surface pH, turbidity, fecal coliform bacteria, water depth, and wind direction and speed at 58 sites in Choctawhatchee Bay. The data set for Choctawhatchee Bay begins in 1987 and continues to the present.

Florida Department of Health

The Florida Healthy Beaches Program was begun by the FDOH as a pilot beach monitoring program in 1998, with expansion to include all the state's coastal counties in August 2000 (FDOH 2005). Walton County and Okaloosa County health departments monitor enteric bacteria at recreational bay and Gulf beaches and issue health advisories or warnings when bacterial counts are too high (FDEP 2006). Beaches that have more than 21 beach closures in a year are classified as "impaired" by FDEP. The FDEP identified nine beach segments as verified impaired for bacteria in the Choctawhatchee River and Bay watershed (FDEP 2014b).

Choctawhatchee Basin Alliance

With a network of volunteers, the Choctawhatchee Basin Alliance (CBA) of Northwest Florida State College monitors more than 140 sites in Choctawhatchee Bay, Choctawhatchee River, and Walton County's 15 coastal dune lakes. Parameters monitored at these sites include total nitrogen (TN), total phosphorus (TP), color, *Secchi* depth, and chlorophyll-*a*. Also monitored at the CBA sites are dissolved oxygen, temperature, salinity, turbidity, and pH. The data is entered in the FDEP's statewide water quality database, STORET (CBA 2016b). The CBA also conducts monitoring of Seagrasses and oyster reefs. The overall monitoring effort was initiated in 1996, establishing a long-term database of conditions and trends.

In addition to providing a long-term database, the monitoring programs support and augment other programs, including habitat restoration, oyster shell recycling, educational programs in schools and the community, and engagement with local governments, state and federal agencies, and the public. Additional information on the CBA's programs may be found at http://www.basinalliance.org/.

Aqualab (Okaloosa County)

The Okaloosa Aqualab, a volunteer water quality monitoring program sponsored by the Okaloosa County Environmental Council, with technical and laboratory assistance provided by the FDEP, collects monthly samples from 28 sites in Choctawhatchee Bay, Destin Harbor, and the GIWW. Parameters monitored include BOD, chlorophyll-*a*, color, nutrients, pH, fixed solids, precipitation, salinity, *Secchi* depth, conductivity, temperature, turbidity, fecal coliform bacteria, wind direction, and velocity. The data is entered in the FDEP's statewide water quality database, STORET, and is summarized in a monthly report (Choctawhatchee Bay Water Quality Report) posted on the FDEP Northwest District website (FDEP 2016c).

Alabama Water Watch

Alabama Water Watch helps support the training and coordination of volunteer monitoring initiatives throughout Alabama. Basic parameters monitored include pH, temperature, total alkalinity, total hardness, dissolved oxygen, and turbidity. Additional monitoring of biological parameters is also conducted at some sites. Other monitoring activities in Alabama, including those conducted by the GSA and ADEM, measure a wide array of chemical, biological, and physical parameters, depending on specific program or project purposes (ADEM 2014b).

Florida LakeWatch

The University of Florida's LakeWatch volunteer monitoring program collects water quality data at dozens of sites within the watershed. Parameters monitored include total nitrogen, total phosphorus, chlorophyll-*a*, and *Secchi* depth, which are collected monthly at lake stations and some stream stations by citizen volunteers. Data are sometimes collected on aquatic vegetation (FDEP 2003).

Submerged Aquatic Vegetation Monitoring

Submerged aquatic vegetation abundance and health varies within the watershed. Most areas appear to be declining. In addition to the loss of seagrasses due to limited sunlight, they are also being damaged by boat propellers in shallow waters. Public education and marking of navigation channels can help reduce these occurrences.

Since 2009, the FWC's Fish and Wildlife Research Institute (FWRI) has monitored changes in the extent, density, and patchiness of seagrass in the Big Bend region as part of the statewide Seagrass Integrated Mapping and Monitoring (SIMM) program. The FWRI also is currently conducting a study to identify the roadblocks to SAV recovery, which may be different from the causes for their losses.

Water Quality Protection and Restoration

Water quality in the Choctawhatchee River and Bay watershed is protected through several programs working together to restore water quality and prevent degradation. These programs include FDEP's adopted TMDLs; BMPs for silviculture, agriculture, and construction; regulatory programs including NPDES, domestic and industrial wastewater permits, stormwater permits, and ERP; and local efforts to retrofit stormwater infrastructure to add or improve water quality treatment. Additionally, water quality is protected through conservation, mitigation, and management programs that protect water resources, aquifer recharge areas, floodplains, and other natural systems. These programs include the Florida Forever Work Plan, regional mitigation for state transportation projects, and spring protection and restoration. The following subsections provide an overview of these programs and their contribution to water quality restoration and protection.

Total Maximum Daily Loads (TMDLs)

Total maximum daily loads are developed for waterbodies that are verified as not meeting adopted water quality standards to support their designated use. They provide important water quality goals to guide restoration activities and identify reductions in pollutant loading required to restore water quality. Total maximum daily loads are implemented through development and adoption of BMAPs that identify the management actions necessary to reduce the pollutant loads. Basin Management Action Plans are developed by local stakeholders in close coordination with the FDEP.

National Pollutant Discharge Elimination System (NPDES) Permitting

The FDEP implements the NPDES stormwater program in Florida under delegation from the EPA. The program requires regulation of stormwater runoff from MS4s generally serving populations of more than 10,000 and denser than 1,000 per square mile, construction activity disturbing more than one acre of land, and ten categories of industrial activity. An MS4 can include roads with drainage systems, gutters, and ditches, as well as underground drainage, operated by local jurisdictions, the FDOT, universities, local sewer districts, hospitals, military bases, and prisons.

All point sources that discharge to surface waterbodies require a NPDES permit. These permits can be classified into two types: domestic or industrial wastewater discharge permits, and stormwater permits. All communities' NPDES-permitted point sources may be affected by the development and implementation of a TMDL. National Pollutant Discharge Elimination System permits include "reopener clauses" that allow the FDEP to incorporate new discharge limits when a TMDL is established.

Domestic and Industrial Wastewater Permits

In addition to NPDES-permitted facilities and all discharge to surface waters, Florida also regulates domestic and industrial wastewater discharges to groundwater via land application. Since groundwater and surface water are so intimately linked in much of the state, reductions in loadings from these facilities may be needed to meet water quality goals for surface waters.

Best Management Practices (BMPs)

Best management practices may include structural controls (such as treatment ponds) or nonstructural controls (such as street sweeping and public education). Many BMPs have been developed for urban stormwater to reduce pollutant loadings and peak flows. These BMPs accommodate site-specific conditions, including soil type, slope, depth to groundwater, and the use designation of receiving waters.

The Florida Watershed Restoration Act (Chapter 99-223, Laws of Florida) increased the emphasis on implementing BMPs to reduce NPS pollutant discharges from agricultural operations. It authorized the FDEP and the FDACS to develop interim measures and agricultural BMPs. While BMPs are adopted by rule, they are voluntary if not covered by regulatory programs. If adopted by rule and the FDEP verifies their effectiveness, then implementation provides a presumption of compliance with water quality standards, similar to that granted a developer who obtains an ERP (FDACS 2016b). Best management practices have been adopted into rules for silviculture, row crops, container plants, cow/calf, and dairies.

Over the last several years, the FDACS has worked with farmers, soil and water conservation entities, the UF-IFAS, and other interests to improve product marketability and operational efficiency of agricultural BMPs, while at the same time promoting water quality and water conservation objectives. In addition, programs have been established and are being developed to create a network of state, local, federal, and private sources of funds for developing and implementing BMPs.

Environmental Resource Permitting (ERP)

Florida established the ERP program to prevent stormwater pollution to Florida's rivers, lakes, and streams, and to help provide flood protection. The ERP program regulates the management and storage of surface waters and provides protection for the vital functions of wetlands and other surface waters. Environmental resource permits are designed to obtain 80 percent average annual load reduction of total suspended solids. In northwest Florida, the ERP program is jointly implemented by the NWFWMD and the FDEP.

Regional Mitigation for State Transportation Projects

Under Section 373.4137, F.S., the NWFWMD offers mitigation services to the FDOT for road projects with unavoidable wetland impacts when the use of private mitigation banks is not feasible. As required by this statute, a regional mitigation plan (a.k.a., Umbrella Plan) has been developed, and is annually updated, to address the FDOT mitigation needs submitted to the NWFWMD. Components of the Umbrella Plan include the federally permitted "In-Lieu Fee Program" instrument and other mitigation projects (NWFWMD 2016c). The plan is developed and implemented in consultation with the FDOT, the FDEP, the USACE, the EPA, the USFWS, the U.S. National Marine Fisheries Service, and the FWC.

Since 1997, the NWFWMD has implemented mitigation including six sites in the Choctawhatchee River and Bay watershed: Choctawhatchee-Caryville, Devils Swamp, Lafayette Creek, Live Oak Point, Plum Creek, and the Sand Hill Lakes Mitigation Bank. Additional details are available at http://www.nwfwmdwetlands.com/.

Florida Forever Work Plan

Florida Forever is Florida's conservation and recreation lands acquisition program. Under section 373.199, F.S., and the Florida Forever Five Year Work Plan, a variety of projects may be implemented, including capital projects, land acquisition, and other environmental projects. Since its inception, the District's land acquisition program has sought to bring as much floodplain as possible of the major rivers and creeks under public ownership and protection (NWFWMD 2016b). Florida Forever, as well as its predecessor state funding programs, was a major funding source for the acquisition of the Choctawhatchee River and Holmes Creek WMA. The currently approved Florida Forever lands acquisition list includes Florida's First Magnitude Springs, Natural Bridge Creek, and South Walton County Ecosystem projects (FDEP 2016b).

Minimum Flows and Levels (MFLs)

Section 373.042, F.S., requires each water management district to develop MFLs for specific surface and groundwaters within their jurisdiction. The MFLs for a given waterbody is the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area. Minimum flows and levels are calculated using best available data and consider natural seasonal fluctuations; non-consumptive uses; and environmental values associated with coastal, estuarine, riverine, spring, aquatic, and wetlands ecology as specified in Section 62-40.473, F.A.C. (NWFWMD 2016f).

The process of establishing MFLs involves a series of steps including identification of priority waterbodies, data collection, technical assessments, peer review, rule-making and rule adoption. Adopted MFLs are considered when reviewing consumptive use permit applications. A recovery or prevention strategy must be developed for any waterbody where consumptive uses are currently or anticipated to result in flows or levels below an adopted MFL.

The technical evaluation for each MFL is expected to require approximately five years of data collection and analysis. Data collection has begun and will occur concurrently for several waterbodies. Starting in 2018, one MFL assessment is expected to be completed annually within the NWFWMD. Within the Choctawhatchee River and Bay watershed, MFL initiation for the Floridan Aquifer Coastal Region II began in 2014 and technical assessment is estimated to be completed in 2020 (NWFWMD 2016).

University of Florida Institute of Food and Agricultural Sciences Extension

The University of Florida Institute of Food and Agricultural Sciences Extension service is a federal-state-county partnership that focuses on research, teaching, and extension to "develop knowledge in agriculture, human and natural resources, and the life sciences, and enhance and sustain the quality of human life by making that information accessible" (UF-IFAS 2016a).

Several UF-IFAS programs and partnerships help protect water resources across the Choctawhatchee River and Bay watershed and the state of Florida. Such programs and partnerships include the Fisheries and Aquatic Sciences and Marine Sciences Program, the Aquatic and Invasive Plants Center, the Florida Cooperative Fish and Wildlife Research Unit, the Florida Partnership for Water, Agriculture and Community Sustainability, the Natural Resources Leadership Institute, the Wetland Biogeochemistry Laboratory, the Sea Grant, and the Shellfish Aquaculture Extension among others (UF-IFAS 2016a).

To promote environmentally sound forestry practices, the UF-IFAS offers the voluntary Forest Stewardship Program, which seeks to help private landowners develop a plan to increase the economic value of their forestland while maintaining its environmental integrity (UF-IFAS 2016b). The Extension also works with farmers and property owners across the state to minimize the need for commercial pesticides and fertilizers, through environmentally friendly BMPs.

Spring Protection and Restoration

Since 2013, Florida has made substantial commitments to protect and restore Florida's springs, their ecological value, and the associated public benefits. More than $33 million in grant funds have been approved as of 2016, leveraging an additional $14 million in local and federal funds. Projects funded to date in the Choctawhatchee watershed include Cypress Spring protection and restoration and Cotton Landing (Holmes Creek) restoration.

FDEP Ecosystem Restoration Section

The FDEP (through funding from the USFWS Coastal Program and other sources) has identified living shoreline restoration sites within the Choctawhatchee River and Bay watershed to aid in shoreline stabilization, biodiversity, and water quality (FDEP 2015e). Living shorelines are constructed of oyster shells, limestone rock, or other substrate conductive to the natural environment. These created shorelines provide a physical barrier for the mainland during storms, and aid in sediment stabilization through the use of planted native vegetation (FDEP 2015e). Recent living shoreline projects are located in Niceville (five properties), Freeport (eight properties), La Mar West Condos, Cunningham, Little, and Woodward (FDEP 2015e).

Planning and Coordination within Alabama

The Choctawhatchee-Pea-Yellow Rivers Clean Water Partnership is part of the statewide river basin management initiative called the Alabama Clean Water Partnership, a coalition of public and private individuals, companies, organizations and governing bodies working together to protect and preserve water resources and aquatic ecosystems throughout the state and in the shared watersheds of neighboring

states. The partnership, established in 2001, is sponsored by the Choctawhatchee, Pea, and Yellow Rivers Watershed Management Authority. Together, they developed the Choctawhatchee-Pea-Yellow Rivers Watershed Management Plan in 2006 (Alabama Clean Water Partnership [ACWP] 2006). The Authority developed a manual of recommended practices for maintenance and service of unpaved roads, and the Center for Environmental Research and Service at Troy State University facilitated education and training for local government officials and others concerning control of sediment from unpaved roads and other sources. The ADEM has conducted sub-watershed assessments in the Choctawhatchee–Pea River watershed and has developed TMDLs for sub-basins in Alabama considered impaired under Alabama water quality guidelines. Additional monitoring is being conducted by Alabama Water Watch and other volunteer organizations (ADEM 2016c).

County and City Initiatives

The cities of Niceville, Destin, and Fort Walton Beach have developed stormwater master plans, as have Okaloosa and Walton counties. Municipalities and the counties have implemented multiple stormwater retrofit projects to restore water quality and provide improved flood protection.

Natural Resource Management at Eglin AFB

The U.S. Air Force owns 234,381 acres of conservation lands within the Choctawhatchee River and Bay watershed (FNAI 2016b). Eglin AFB, located north of Choctawhatchee Bay, is the largest forested military reservation in the U.S. and provides habitat for 106 rare and endangered species including animals such as the red-cockaded woodpecker and reticulated flatwoods salamander, as well as 55 state-listed plant species. The AFB spans 40 miles of Choctawhatchee Bay shore line and 20 miles of the Gulf of Mexico shoreline, and includes 55 acres of lakes and 186 miles of streams. The property also hosts 34 of the watershed's 36 FNAI recognized natural communities (Secretary of Defense 2013). Consequently, management actions on Air Force property have the potential to substantially influence water and habitat quality at the scale of the drainage basin.

Approximately 404,000 acres of Eglin AFB are managed under the Base's Integrated Natural Resources Management Plan (INRMP), which is updated every five years and is signed by Eglin, the FWC, and the USFWS (Secretary of Defense 2013). Additionally, the base maintains an interactive web-based INRMP that functions as an adaptive management tool. In 2013, Eglin's Natural Resources Team exceeded the goal of rehabilitating wetland riparian and 20 threatened and endangered species sites as specified in the INRMP Erosion Control Component Plan. Other ongoing initiatives at the base include fish and wildlife management, invasive species control and pest management, and forest management using prescribed fires and other BMPs (Secretary of Defense 2013).

Other Programs and Actions

Local governments and organizations are active participants in the restoration projects being or expected to be funded through the RESTORE Act, the NRDA, and the NFWF. These organizations have also been longstanding partners in monitoring water quality and environmental health throughout the watershed. They have also been key partners in developing stormwater master plans and retrofit projects to reduce and treat stormwater, as well as building community support for watershed protection through the creation of citizen advisory councils and volunteer organizations.

Several citizen or citizen-government groups with a primary interest in protecting or enhancing water resources are active in the Choctawhatchee River and Bay watershed. Most organizations have a specific geographic focus at either the watershed or waterbody level. Identified organizations include:

- **Choctawhatchee Basin Alliance** – As described above, the CBA conducts restoration, outreach, and education efforts within the watershed. The CBA has also conducted habitat demonstration projects around the bay to demonstrate the value and feasibility of establishing native shoreline vegetation, and has established education and outreach initiatives within the community and in partnership with area schools.
- **Coastal Dune Lakes Advisory Board** – The Walton County Board of County Commissioners created the Coastal Dune Lakes Advisory Board in 2002. In 2008, the county developed a management plan and manual to guide the Advisory Board and County Commissioners on protecting the 15 coastal dune lakes in the county (Hoyer and Canfield 2008). The protections include a Coastal Dune Lakes Protection Zone that encompasses all lands within an area beginning at the mean or ordinary high water line of the coastal dune lakes and their tributaries and extending 300 feet landward (Walton County 2012).
- **Gulf Coastal Plain Ecosystem Partnership** – The Gulf Coastal Plain Ecosystem Partnership is a voluntary partnership between ten private and public land owners in western Florida and includes the following governmental, business, and environmental interests: the U.S. Department of Defense, FDEP, Florida Division of Forestry, International Paper, Conecuh National Forest (in Alabama), Nokuse Plantation, NWFWMD, National Park Service, FWC, and TNC. The parties operate together under a 1996 Memorandum of Understanding for the management of about one million acres of northwest Florida and south Alabama. The partnership provides a collaborative approach to the preservation and management of natural lands through a set of land management principles directed at ecosystem preservation including prescribed burning, recovering listed species, restoring aquatic habitat, providing public outreach, and sharing and exchanging relevant information and technology on new land management and protection techniques. Through collaboration and the pooling of resources, the partners are able to leverage the purchase of additional conservation lands (Longleaf Alliance 2016).

Appendix C Geology and Soils in the Choctawhatchee River and Bay Watershed

The Choctawhatchee River and Bay watershed encompasses two localized physiographic regions in Florida: the Northern Highlands and the Gulf Coastal Lowlands. Both physiographic regions exhibit unique geology and soils. The watershed follows much of the general stratigraphy of the western Florida Panhandle. Relic marine terraces characteristic of the watershed have been formed through erosion by marine currents and waves during sea level fluctuations, as well as through down-cutting by freshwater streams. Younger fluvial systems create incised stream valleys and ravines on the older sediments, often exposing deeper-lying limestone formations.

Near-surface formations include dolomitic limestones, sandy-clayey limestones, and finally, shell beds, clayey sands, and sands (Scott 2001; USDA 1975, 1979, 1989, 1995, 2014). Well-drained sandy soils that develop in the watershed's surface strata offer opportunities for development, while the Quaternary sands along the coast attract millions of visitors to the watershed's beaches and barrier islands each year.

Within Florida's portion of the watershed, the northern extent of the basin is underlain by the Miocene Alum Bluff group and Citronelle formations. Sediment of the Alum Bluff is generally composed of quartz sands, clays, and shell beds typical of a shallow water marine environment, and is generally covered by the younger Citronelle formation, unless the Citronelle sediments has been locally eroded. Deposits of the Citronelle formation range from clay through gravel, but sands are the most common size fraction. The deposits are commonly cross-bedded, lenticular, graveliferous sands with thin to thick discontinuous beds of clay and varying amounts of silt that can weakly indurate the sediment. Overlying most geologic formations in the watershed are unconsolidated Holocene siliciclastic sediments (nearly pure quartz sands with minor heavy mineral sands) (Scott 2001; USDA 1975, 1979, 1989, 1995, 2014). These sands were deposited during sea level fluctuations prior to the permanent land emergence of the Florida plateau during the Miocene epoch (23.3 to 5.3 million years ago). There are isolated exposures of Eocene-aged Ocala Limestone in the northern reaches of the Choctawhatchee River, as well as Wrights Creek near the Alabama border. Younger limestone outcrops occur along Holmes Creek. The Oligocene and Eocene formations, especially the Ocala Limestone, are typically massive, fossiliferous limestones, generally with well-developed secondary porosity and a greater ability to transmit water These sediments are marine in origin and are primarily comprised of fossils that include foraminifera, mollusks, and echinoids (Green *et al.* 2002).

Soils are an important natural resource across the Choctawhatchee River and Bay watershed. They provide some of the best farming in Florida, protect water quality by intercepting runoff, store soil organic carbon, and help mitigate flooding. The following soils are found in the Florida portion of the Choctawhatchee River and Bay watershed:

Ultisols. Ultisols are intensely-weathered soils of warm and humid climates, and are usually formed on older geologic formations in parent material that is already extensively weathered (i.e., upland areas of the watershed). They are generally low in natural fertility and high in soil acidity, but contain subsurface clay accumulations that give them a high nutrient retention capacity. In the Choctawhatchee River and Bay watershed, the majority of ultisols are found in upland areas and adjacent to Choctawhatchee Bay where the landscape has been relatively stable over recent geologic time (Collins 2010). Ultisols are the primary agricultural soils of the watershed, as their high clay content contributes to nutrient and water retention, when properly managed.

Entisols. Entisols are young soils that show little development, have no diagnostic horizons, and are largely unaltered from their parent material, which can be unconsolidated sediment or rock (USDA

2014b). Entisols occur in the upland portion of the watershed near Mossy Head and on the coast's barrier islands where surficial processes are active and parent materials have not undergone substantial weathering (Collins 2010).

Spodosols. Spodosols are sandy, acidic soils, often found in cool, moist climates such as coastal conifer forests (USDA 2014b). They are easily identified by their strikingly-colored horizons, which form as a result of leaching and accumulation processes. Spodosols occur near Choctawhatchee Bay and older portions of the barrier peninsulas and barrier islands (Collins 2010). In these areas, the landscape is more stable and conducive to soil development. The presence of spodosols indicates an area that was historically dominated by a pine over-story.

Inceptisols. Inceptisols are described as soils in the beginning stages of soil profile development, as the differences between soil horizons are just beginning to appear in the form of color variation due to accumulations of small amounts of clay, salts, and organic material. Inceptisols occur near Choctawhatchee Bay, the floodplain along the Choctawhatchee River, and on portions of the watershed's barrier peninsulas and barrier islands (Collins 2010).

Histosols. Histosols are described as soils without permafrost and predominantly composed of organic material in various stages of decomposition. These soils are usually saturated, resulting in anaerobic conditions, faster rates of decomposition, and increased organic matter accumulation. Histosols generally consist of at least half organic materials and are common in wetlands (USDA 2014b). Histosols can be found along the Choctawhatchee River, its tributaries to the east, and throughout the Choctawhatchee River Water Management Area, which buffers the Choctawhatchee River throughout the watershed. Histosols cover approximately 15,943 square kilometers in the state of Florida and store more organic carbon than any other soil type (Kolka et. al. 2016; Vasques et. al. 2010). Drainage of wetland areas and the associated decomposition of organic matter stored in histosols is a well-documented source of atmospheric carbon dioxide (CO_2) and methane.

Appendix D Threatened and Endangered Species within the Watershed

This appendix lists species that are protected and tracked for the watershed, as well as their habitat requirements (FNAI 2010; FWC 2016; USFWS 2016a; USFWS 2016b):

Plants:

Scientific Name	Common Name	Regulatory Designation			Natural Communities
		FNAI	State	Federal	
Andropogon arctatus	Pinewood Bluestem	S3	T	N	Lacustrine: wet pine flatwoods, seepage wetlands, bogs, wet pine savannas
Asclepias viridula	Green Milkweed	S2	T	N	Palustrine: wet prairie, seepage slope Riverine: seepage stream banks Terrestrial: mesic flatwoods, drainage ditches
Asplenium verecundum	Delicate Spleenwort	S1	E	N	Terrestrial: rockland hammocks, limestone outcrops, grottoes, and sinkholes
Aster hemisphericus	Aster	S1	E	N	Terrestrial: upland mixed forest, on sandstone outcrop
Aster spinulosus	Pinewoods Aster	S1	E	N	Palustrine: seepage slope Terrestrial: sandhill, scrub and mesic flatwoods
Baptisia megacarpa	Apalachicola Wild Indigo	S2	E	N	Palustrine: floodplain forest Terrestrial: upland mixed forest, slope forest
Bigelowia nuttallii	Nuttall's Rayless Goldenrod	S1	E	N	Riverine: seepage stream banks Terrestrial: scrub, upland pine forest - sandstone outcrops
Brickellia cordifolia	Flyer's Nemesis	S1	E	N	Terrestrial: upland hardwood forest, near streams
Sideroxylon lycioides	Buckthorn	N	E	N	Palustrine: bottomland forest, dome swamp, floodplain forest Terrestrial: upland hardwood forest
Sideroxylon thornei	Thorn's Buckthorn	N	E	N	Palustrine: hydric hammock, floodplain swamp
Arnoglossum diversifolia	Indian-plantain	N	T	N	Palustrine: forested wetland
Calamintha dentata	Toothed Savory	S3	T	N	Terrestrial: longleaf pine-deciduous oak sandhills, planted pine plantations, sand, open and abandoned fields, and roadsides
Calamovilfa curtissii	Curtiss's Sandgrass	S3	T	N	Palustrine: mesic and wet flatwoods, wet prairie, depression marsh Terrestrial: mesic flatwoods
Callirhoe papaver	Poppy Mallow	S2	E	N	Terrestrial: upland mixed forest, roadsides; edge or understory

Scientific Name	Common Name	Regulatory Designation			Natural Communities
		FNAI	State	Federal	
Calycanthus floridus	Sweetshrub	S2	E	N	Terrestrial: upland hardwood forest, slope forest, bluffs Palustrine: bottomland forest, stream banks, floodplains
Calystegia catesbaeiana	Catesby's Bindweed	SH	E	N	Terrestrial: Longleaf pine-wiregrass sandhill
Carex baltzellii	Baltzell's Sedge	S3	T	N	Terrestrial: slope forest, moist sandy loam; moist sandy loam
Cheilanthes microphylla	Southern Lip Fern	S3	E	N	Terrestrial: upland mixed forest, shell mound, rockland hammock; on limestone
Chrysopsis cruseana	Cruise's Goldenaster	S2	E	N	Terrestrial: coastal dunes, coastal strand, coastal grassland; openings and blowouts
Chrysopsis godfreyi	Godfry's Goldenaster	S2	E	N	Terrestrial: grassland/herbaceous, sand/dune, shrubland/chaparral
Cleistes divaricata	Spreading Pogonia	N	T	N	Palustrine: wet flatwoods
Coelorachis tuberculosa	Florida Jointail	S3	T	N	Lacustrine: shallow water Palustrine: herbaceous wetland, temporary pool
Coreopsis integrifolia	Fringeleaf Tickseed	S1	E	N	Lacustrine: forested wetland, riparian
Cornus alternifolia	Pagoda Dogwood	S2	E	N	Palustrine: creek swamps Terrestrial: slope forest, upland hardwood forest, bluffs
Crataegus phaenopyrum	Washington Hawthorn	S1	E	N	Palustrine: basin swamp, basin marsh, edges of wet areas
Cryptotaenia canadensis	Honewort	S1	E	N	Palustrine: floodplain forest, bottomland forest Riverine: alluvial stream bank
Cuphea aspera	Tropical Waxweed	S1	E	N	Palustrine: wet prairie, seepage slope Terrestrial: mesic flatwoods
Dirca palustris	Leatherwood	S2	E	N	Terrestrial: shrub
Drosera filiformis	Threadleaf Sundew	S1	E	N	Lacustrine: exposed lake bottoms
Drosera intermedia	Water Sundew	S3	T	N	Lacustrine: sinkhole lake edges Palustrine: seepage slope, wet flatwoods, depression marsh Riverine: seepage stream banks, drainage ditches
Eriocaulon nigrobracteatum	Darkheaded Hatpins	S1	E	N	Palustrine: wet boggy seepage slopes, mucky soils
Euphorbia commutata	Wood Spurge	S2	E	N	N/A
Forestiera godfreyi	Godfrey's Swamp Privet	S2	E	N	Terrestrial: forest-hardwood, on wooded slopes of lake & river bluffs

Scientific Name	Common Name	Regulatory Designation			Natural Communities
		FNAI	State	Federal	
Gentiana pennelliana	Wiregrass Gentian	S3	E	N	Palustrine: seepage slope, wet prairie, roadside ditches Terrestrial: mesic flatwoods, planted slash pine
Hexastylis arifolia	Heartleaf Wild Ginger	S3	T	N	Riverine: seepage stream bank Terrestrial: slope forest
Hymenocallis henryae	Henry's Spiderlilly	S2	E	N	Palustrine: dome swamp edges, wet prairie, wet flatwoods, baygall edges, swamp edges Terrestrial: wet prairies and flatwoods
Hypericum lissophloeus	Smoothbark St. John's-wort	S2	E	N	Lacustrine: sandhill upland lake margins Terrestrial: sandhill margins
Ilex amelanchier	Serviceberry Holly	S2	T	N	N/A
Isotria verticillata	Whorled Pogonia	S1	E	N	Terrestrial: sloped forest
Juncus gymnocarpus	Coville's Rush	S2	E	N	N/A
Justicia crassifolia	Thickleaved Waterwillow	S2	E	N	Palustrine: dome swamp, seepage slope Terrestrial: mesic flatwoods
Kalmia latifolia	Mountain Laurel	S3	T	N	Riverine: seepage stream bank Terrestrial: slope forest, seepage stream banks
Lachnocaulon digynum	Panhandle Bog Buttons	S3	T	N	Riverine: pool Palustrine: bog/fen, forested wetland
Liatris provincialis	Godfrey's Gayfeather	S2	E	N	Terrestrial: sandhill, scrub, coastal grassland; disturbed areas
Lilium catesbaei	Catesby Lily	N	T	N	Palustrine: wet prairie, wet flatwoods, seepage slope Terrestrial: mesic flatwoods, seepage slope; usually with grasses
Lilium michauxii	Carolina Lily	S2	E	N	N/A
Linum westii	West's Flax	S2	E	N	Palustrine: dome swamp, depression marsh, wet flatwoods, wet prairie, pond margins
Lupinus westianus	Gulf Coast Lupine	S2	T	N	Terrestrial: beach dune, scrub, disturbed areas, roadsides, blowouts in dunes
Macranthera flammea	Hummingbird Flower	S2	E	N	Palustrine: seepage slope, dome swamp edges, floodplain swamps Riverine: seepage stream banks Terrestrial: seepage slopes
Magnolia ashei	Ashe's Magnolia	S2	E	N	Terrestrial: slope and upland hardwood forest, ravines
Magnolia pyramidata	Pyramid Magnolia	S3	E	N	Terrestrial: slope forest

Scientific Name	Common Name	Regulatory Designation			Natural Communities
		FNAI	State	Federal	
Malaxis uniflora	Green Addersmouth	S3	E	N	Palustrine: floodplain forest Terrestrial: slope forest, upland mixed forest
Malus angustifolia	Southern Crabapple	N	T	N	N/A
Marshallia obovata	Barbara's Buttons	S1	E	N	Terrestrial: sandhill, upland mixed forest
Marshallia ramosa	Barbara's Buttons	S1	E	N	Terrestrial: upland pine forest, with wiregrass
Matelea alabamensis	Alabama Spinypod	S2	E	N	Terrestrial: bluff, slope forest, upland hardwood forest; on slopes
Matelea baldwiniana	Baldwin's Spinypod	S1	E	N	Terrestrial: bluff, upland mixed forest, bottomland forest, roadsides; calcareous soil
Matelea flavidula	Yellow-flowered Spinypod	S1	E	N	Terrestrial: moist, nutrient-rich forests , wooded slopes
Myriophyllum laxum	Piedmont Water-milfoil	S3	N	N	Riverine: creek, pool, spring/spring brook Palustrine: riparian, temporary pool
Nyssa ursina	Bog Tupelo	S2	N	N	Open bogs, wet flatwoods, and swamps, often with titi
Oxypolis greenmanii	Giant Water-dropwort	S3	E	N	Palustrine: dome swamp, wet flatwoods, ditches: in water
Pachysandra procumbens	Allegheny Spurge	S1	E	N	Terrestrial: upland mixed forest, bluff; calcareous soil
Panicum nudicaule	Naked-stemmed Panicgrass	S3	LT	N	N/A
Paronychia chartacea	Papery Whitlow-wort	S1	E	T	Terrestrial: karst sandhill lake margins
Pellaea atropurpurea	Hairy Cliff-brake Fern	S1	E	N	Terrestrial: upland glade
Phoebanthus tenuifolius	Narrowleaf Phoebanthus	S3	LT	N	Terrestrial: sandy pinelands
Physocarpus opulifolius	Ninebark	S1	E	N	Riverine: seepage stream banks
Pinckneya bracteata	Fever Tree	N	T	N	Palustrine: creek swamps, titi swamps, bogs
Pinguicula ionantha	Panhandle Butterwort	S2	E	T	Palustrine: wet flatwoods, wet prarie, bog; in shallow water Riverine: seepage slope; in shallow water. Also, roadside ditches and similar habitat
Pinguicula lutea	Yellow Butterwort	N	T	N	Palustrine: flatwoods, bogs

Scientific Name	Common Name	Regulatory Designation			Natural Communities
		FNAI	State	Federal	
Pinguicula planifolia	Swamp Butterwort	N	T	N	Palustrine: wet flatwoods, seepage slopes, bog, dome swamp, ditches; in water
Pinguicula primuliflora	Primrose-flowered Butterwort	S3	E	N	Palustrine: bogs, pond margins, margins of spring runs
Platanthera blephariglottis	Whitefringed Orchid	N	T	N	N/A
Platanthera ciliaris	Yellowfringed Orchid	N	T	N	Palustrine: bogs, wet flatwoods Terrestrial: bluff
Platanthera clavellata	Green Rein Orchid	SH	E	N	Lacustrine: seepages, springs (usually wooded); shrub borders of acid bogs; swamp woods; creek floodplains; occasionally open fens; and in the northern or mountainous part of its range, seepage slopes or sunlit stream beds, disturbed sites, such as abandoned quarries, roadbanks, ditches, and sandy-acid mine tailings
Platanthera integra	Orange Rein Orchid	S3	E	N	Palustrine: wet prairie, seepage slope Terrestrial: mesic flatwoods
Plantanthera nivea	Snowy Orchid	N	T	N	Palustrine: bogs
Podophyllum peltatum	Mayapple	S1	E	N	Terrestrial: mesic hardwood forests, dry-mesic oak-hickory forests
Polygonella macrophylla	Largeleaf jointweed	S2	T	N	Terrestrial: scrub, sand pine/oak scrub ridges
Polymnia laevigata	Tennessee Leaf-cup	S1	E	N	Terrestrial: rich wooded slopes in light to dense shade of mixed mesophytic woods
Quercus arkansana	Arkansas Oak	S3	T	N	Terrestrial: Sandy or sandy clay uplands or upper ravine slopes near heads of streams in deciduous woods.
Rhexia parviflora	Apalachicola Meadow-beauty	S2	E	N	Palustrine: dome swamp margin, seepage slope, depression marsh; on slopes; with hypericum
Rhexia salicifolia	Panhandle Meadow-beauty	S2	T	N	Lacustrine: full sun in wet sandy or sandy-peaty areas of sinkhole pond shores, interdunal swales, margins of depression, marshes, flatwoods, ponds and sandhill upland lakes
Rhododendron austrinum	Florida Flame Azalea	S3	E	N	Lacustrine: shaded ravines & in wet bottomlands on rises of sandy alluvium or older terraces
Rhodedendron chapmanii	Chapman's Rhododendron	S1	E	E	Palustrine: seepage slope (titi bog) Terrestrial: mesic flatwoods; ecotone between flatwoods or more xeric longleaf communities and titi bogs

Scientific Name	Common Name	Regulatory Designation			Natural Communities
		FNAI	State	Federal	
Rhynchospora crinipe	Hairype-duncled Beakrush	S1	N	N	Riverine: stream and riversides on narrow streamside shelves, sand-clay bars, and occasionally rooted in streambeds
Rudbeckia nitida	St. John's Susan	S2	E	N	Palustrine: wet flatwoods and prairies, roadside ditches
Ruellia noctiflora	Nightflowering Ruellia	S2	E	N	Lacustrine: moist to wet coastal pinelands, bogs, low meadows, open pine savannahs
Salix eriocephala	Hearleaved Willow	S1	E	N	Palustrine: floodplain swamp, alluvial woodlands
Salvia urticifolia	Nettle-leaved Sage	S1	E	N	Terrestrial: upland glade
Sarracenia leucophylla	Whitetop Pitcher Plant	S3	E	N	Palustrine: wet prairie, seepage slope, baygall edges, ditches
Sarracenia psitticina	Parrot Pitcher Plant	N	T	N	Palustrine: wet flatwoods, wet prairie, seepage slope
Sarracenia purpurea	Decumbent Pitcher Plant	N	T	N	Palustrine: bogs
Sarracenia rubra	Sweet Pitcher Plant	S3	N	LT	Palustrine: bog, wet prairie, seepage slope, wet flatwoods Riverine: seepage stream banks
Scutellaria floridana	Florida Skullcap	S1	E	T	Palustrine: seepage slope, wet flatwoods, grassy openings Terrestrial: mesic flatwoods
Silene virginica	Fire Pink	S1	E	N	N/A
Spigelia gentianoides	Gentian Pinkroot	S1	E	E	Terrestrial: mixed hardwood forest; rich humus
Spiranthes laciniata	Lace-lip Ladies'-tresses	N	T	N	Palustrine: wet flatwoods
Stachydeoma graveolens	Mock Pennyroyal	S2	E	N	Palustrine: forested wetland Terrestrial: forest edge, forest/woodland, savanna, woodland - conifer
Stewartia malacodendron	Silky Camelia	S3	E	N	Palustrine: baygall Terrestrial: slope forest, upland mixed forest; acid soils
Trillium lancifolium	Narrowleaf Trillium	S2	E	N	Palustrine: bottomland forest Terrestrial: upland mixed forest, slope forest
Verbesina chapmanii	Chapman's Crownbeard	S3	T	N	Palustrine: seepage slope Terrestrial: mesic flatwoods with wiregrass
Xanthorhiza simplicissima	Yellowroot	S1	E	N	Riverine: seepage stream; sandy banks
Xyris isoetifolia	Quillwort Yelloweyed Grass	S1	E	N	Lacustrine: sandhill upland lake margins Palustrine: wet flatwoods, wet prairie

Scientific Name	Common Name	Regulatory Designation			Natural Communities
		FNAI	State	Federal	
Xyris longisepala	Kral's Yelloweyed Grass	S2	E	N	Lacustrine: sandhill upland lake margins
Xyris stricta var. obscura	Pineland Yelloweyed Grass	S1	N	N	N/A
Xyris scabrifolia	Harper's Yelloweyed Grass	S3	T	N	Palustrine: seepage slope, wet prairie, bogs

Animals:

Scientific Name	Common Name	Regulatory Designations			Natural Communities
		FNAI	State	Federal	
Invertebrates					
Caecidotea sp.	Econfina Springs Cave Isopod	S1	N	N	N/A
Dasyscias franzi	Shaggy Ghostsnail	S1	N	N	N/A
Hamiota australis	Southern Sandshell		FE	E	
Panopea bitruncata	Atlantic Geoduck	S3?	N	N	N/A
Pleurobema strodeanum	Fuzzy Pigtoe	S?	E	T	Riverine Habitat
Villosa choctawensis	Choctaw Bean	S?	E	E	Riverine Habitat
Fusconaia burkei	Tapered Pigtoe		FT	E	Riverine Habitat
Fish					
Acipenser oxyrhyncus desotoi	Gulf Sturgeon	S2	FT	T	Estuarine: various Marine: various habitats Riverine: alluvial and blackwater streams
Ameirus serracanthus	Spotted Bullhead	S3	N	N	Riverine: deep holes of small to medium rivers with slow to swift currents and rock substrates or sand bottoms; it also occurs over mud bottoms, typically near stumps, in impoundments
Atractosteus spatula	Alligator Gar	S3	N	N	Riverine: sluggish pools of large rivers and their bayous, oxbow lakes, swamps, and backwaters, rarely brackish or marine waters along the coast

Scientific Name	Common Name	Regulatory Designations			Natural Communities
		FNAI	State	Federal	
Amphibians					
Ambystoma bishopi	Reticulated Flatwoods Salamander	S2S3	FT	T	Lacustrine: shallow water Palustrine: forested wetland, herbaceous wetland, riparian, scrub-shrub wetland, temporary pool Terrestrial: forest - conifer, forest/woodland, savanna, woodland - conifer
Ambystoma bishopi	Flatwoods Salamander	S2S3	N	T	Lacustrine: shallow water Palustrine: forested wetland, herbaceous wetland, riparian, scrub-shrub wetland, temporary pool Terrestrial: forest - conifer, forest/woodland, savanna, woodland - conifer
Lithobates capito	Gopher Frog	S3	SSC	N	Terrestrial; sandhill, scrub, scrubby flatwoods, xeric hammock (reproduces in ephemeral wetlands within these communities)
Reptiles					
Alligator mississippiensis	American Alligator	S4	SSC	T	Estuarine: herbaceous wetland Riverine: big river, creek, low gradient, medium river, pool, spring/spring brook Lacustrine: shallow water Palustrine: forested wetland, herbaceous wetland, riparian, scrub-shrub wetland
Caretta caretta	Atlantic Loggerhead Turtle	S3	FT	T	Terrestrial: sandy beaches; nesting
Chelonia mydas	Atlantic Green Turtle	S2	FE	E	Terrestrial: sandy beaches; nesting
Crotalus adamanteus	Eastern Diamondback Rattlesnake	S3	N	N	Palustrine: riparian Terrestrial: grassland/herbaceous, old field, savanna, shrubland/chaparral, woodland - conifer, woodland - hardwood, woodland - mixed
Dermochelys coriacea	Leatherback Turtle	S2	FT	T	Terrestrial: sandy beaches; nesting
Drymarchon kolpobasileus	Eastern Indigo Snake	S3	FT	T	Estuarine: tidal swamp Palustrine: hydric hammock, wet flatwoods Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal
Gopherus polyphemus	Gopher Tortoise	S3	ST	N	Terrestrial: sandhills, scrub, scrubby flatwoods, xeric hammocks, coastal strand, ruderal
Graptemys barbouri	Barbour's Map Turtle	S2	SSC	N	Palustrine: floodplain stream, floodplain swamp Riverine: alluvial stream

Scientific Name	Common Name	Regulatory Designations			Natural Communities
		FNAI	State	Federal	
Lepidochelys kempii	Kemp's Ridley	S1	E	E	Terrestrial: sandy beaches; nesting
Macrochelys temminckii	Alligator Snapping Turtle	S3	SSC	N	Estuarine: tidal marsh Lacustrine: river floodplain lake, swamp lake Riverine: alluvial stream, blackwater stream
Nerodiaclarkii clarkii	Gulf Salt Marsh Snake	S3?	N	N	Estuarine: herbaceous wetland, scrub-shrub wetland
Pituophis melanoleucas mugitus	Florida Pine Snake	S3	ST	N	Lacustrine: ruderal, sandhill upland lake Terrestrial: sandhill, scrubby flatwoods, xeric hammock, ruderal
Birds					
Ammodramus maritimus peninsulae	Scott's Seaside Sparrow	S2	ST	N	N/A
Aramus guarauna	Limpkin	S3	N	N	Estuarine: scrub-shrub wetland Palustrine: forested wetland, herbaceous wetland, riparian
Calidris canutus rufa	Red knot	S2	N	T	Estuarine: bays, tidal flats, salt marshes Terrestrial: sandy beaches Marine: aerial, near shore
Charadrius alexandrius	Snowy Plover	S2	ST	N	Estuarine: exposed unconsolidated substrate Marine: exposed unconsolidated substrate Terrestrial: dunes, sandy beaches, and inlet areas.
Charadrius melodus	Piping Plover	S2	ST	T	Estuarine: exposed unconsolidated substrate Marine: exposed unconsolidated substrate Terrestrial: dunes, sandy beaches, and inlet areas. Mostly wintering and migrants.
Cistothorus Palustris marianae	Marian's Marsh Wren	S3	ST	N	N/A
Egretta caerulea	Little Blue Heron	S4	ST	N	Estuarine: herbaceous wetland, lagoon, scrub-shrub wetland, tidal flat/shore Riverine: low gradient Lacustrine: shallow water Palustrine: forested wetland, herbaceous wetland, riparian, scrub-shrub wetland
Egretta rufescens	Reddish Egret	S2	ST	N	Estuarine: tidal swamp, depression marsh, bog, marl prairie, wet prairie Lacustrine: flatwoods/prairie lake, marsh lake Marine: tidal swamp

Scientific Name	Common Name	Regulatory Designations			Natural Communities
		FNAI	State	Federal	
Egretta thula	Snowy Egret	S3	N	N	Estuarine: bay/sound, herbaceous wetland, lagoon, river mouth/tidal river, scrub-shrub wetland, tidal flat/shore Riverine: low gradient Lacustrine: shallow water Palustrine: forested wetland, herbaceous wetland, riparian
Egretta tricolor	Tricolored Heron	S4	ST	N	Estuarine: bay/sound, herbaceous wetland, lagoon, river mouth/tidal river, scrub-shrub wetland, tidal flat/shore Riverine: low gradient Lacustrine: shallow water Palustrine: forested wetland, herbaceous wetland, riparian
Eudocimus albus	White Ibis	S4	N	N	Estuarine: bay/sound, herbaceous wetland, lagoon, river mouth/tidal river, scrub-shrub wetland, tidal flat/shore Riverine: low gradient Lacustrine: shallow water Palustrine: forested wetland, herbaceous wetland, riparian
Falco peregrinus	Peregrine Falcon	S2	N	N	Marine: aerial Estuarine: aerial, bay/sound, herbaceous wetland, lagoon, river mouth/tidal river, tidal flat/shore Riverine: aerial Lacustrine: aerial Palustrine: aerial, herbaceous wetland, riparian Terrestrial: cliff, desert, shrubland/chaparral, tundra, urban/edificarian, woodland - conifer, woodland - hardwood, woodland - mixed
Falco sparvarius paulus	Southeastern American Kestrel	S3	ST	N	Estuarine: various habitats Palustrine: various habitats Terrestrial: open pine forests, clearings, ruderal, various
Haematopus palliatus	American Oystercatcher	S2	SSC	N	Estuarine: tidal flat/shore Terrestrial: bare rock/talus/scree, sand/dune
Haliaeetus leucocephala	Bald Eagle	S3	N	T	Estuarine: marsh edges, tidal swamp, open water Lacustrine: swamp lakes, edges Palustrine: swamp, floodplain Riverine: shoreline, open water Terrestrial: pine and hardwood forests
Myctera americana	Wood Stork	S2	FT	E	Estuarine: marshes Lacustrine: floodplain lakes, marshes (feeding), various Palustrine: marshes, swamps, various

Scientific Name	Common Name	Regulatory Designations			Natural Communities
		FNAI	State	Federal	
Pandion haliatus	Osprey	S3S4	SSC	N	Marine: near shore Estuarine: bay/sound, herbaceous wetland, lagoon, river mouth/tidal river Riverine: big river, medium river Lacustrine: deep water, shallow water Palustrine: forested wetland, riparian Terrestrial: cliff
Picoides borealis	Red-cockaded Woodpecker	S2	FE	E	Terrestrial: mature pine forests
Rhynchops niger	Black Skimmer	S3	ST	N	Marine: near shore Estuarine: bay/sound, herbaceous wetland, lagoon, river mouth/tidal river, tidal flat/shore Riverine: big river, low gradient Lacustrine: deep water, Shallow water Palustrine: riparian Terrestrial: sand/dune
Sterna antillarum	Least Tern	S3	T	N	Estuarine: various Lacustrine various Riverine: various Terrestrial: beach dune, ruderal. Nests common on rooftops
Sterna maxima	Royal Tern	S3	N	N	Marine: near shore Estuarine: bay/sound, lagoon, river mouth/tidal river, tidal flat/shore Terrestrial: sand/dune
Sterna sandvicensis	Sandwich Tern	S2	N	N	Marine: near shore Estuarine: bay/sound, lagoon, river mouth/tidal river, tidal flat/shore Terrestrial: sand/dune
Mammals					
Mustela frenata olivacea	Southeastern Weasel	S3	N	N	Palustrine: forested wetland, riparian Terrestrial: forest - hardwood, old field, woodland - conifer, woodland - hardwood, woodland - mixed
Myotis grisescens	Gray Bat	S1	FE	E	Palustrine: caves, various Terrestrial: caves, various
Myotis sodalis	Indiana bat	SA	FE	E	Palustrine: various Terrestrial: various
Peromyscus polionotus allophrys	Choctawhatchee Beach Mouse	S1	FE	E	Terrestrial: beach dune, coastal scrub
Peromyscus polionotus peninsularis	St. Andrews Beach Mouse	S1	FE	N	Terrestrial: beach dune, coastal scrub
Sciuris niger shermani	Sherman's Fox Squirrel	S3	SSC	N	Terrestrial: woodland - conifer, woodland - mixed

Scientific Name	Common Name	Regulatory Designations			Natural Communities
		FNAI	State	Federal	
Trichechus manatus	West Indian Manatee	S2	FE	E	Estuarine: submerged vegetation, open water Marine: open water, submerged vegetation
Ursus americanus floridanus	Florida Black Bear	S2	N	N	Palustrine: forested wetland, riparian Terrestrial: forest - hardwood, forest - mixed

Sources: FNAI 2010; FWC 2016; USFWS 2016.

Key:
FNAI STATE ELEMENT RANK
S1 = Critically imperiled in Florida because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
S2 = Imperiled in Florida because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
S3 = Either very rare and local in Florida (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
S4 = Apparently secure in Florida (may be rare in parts of range).
S5 = Demonstrably secure in Florida.
SH = Of historical occurrence in Florida, possibly extirpated, but may be rediscovered (e.g., ivory-billed woodpecker).
SX = Believed to be extirpated throughout Florida.
SU = Unrankable; due to a lack of information no rank or range can be assigned.
SNA = State ranking is not applicable because the element is not a suitable target for conservation (e.g. a hybrid species).
SNR = Element not yet ranked (temporary).

FEDERAL LEGAL STATUS
C = Candidate species for which federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as Endangered or Threatened.
E = Endangered: species in danger of extinction throughout all or a significant portion of its range.
E, T = Species currently listed endangered in a portion of its range but only listed as threatened in other areas
E, PDL = Species currently listed endangered but has been proposed for delisting.
E, PT = Species currently listed endangered but has been proposed for listing as threatened.
E, XN = Species currently listed endangered but tracked population is a non-essential experimental population.
T = Threatened: species likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.
PE = Species proposed for listing as endangered
PS = Partial status: some but not all of the species' infraspecific taxa have federal status
PT = Species proposed for listing as threatened
SAT = Treated as threatened due to similarity of appearance to a species which is federally listed such that enforcement personnel have difficulty in attempting to differentiate between the listed and unlisted species.
SC = Not currently listed, but considered a "species of concern" to USFWS.

STATE LEGAL STATUS
C = Candidate for listing at the Federal level by the U. S. Fish and Wildlife Service
FE = Listed as Endangered Species at the Federal level by the U. S. Fish and Wildlife Service
FT = Listed as Threatened Species at the Federal level by the U. S. Fish and Wildlife Service
FXN = Federal listed as an experimental population in Florida
FT(S/A) = Federal Threatened due to similarity of appearance
ST = State population listed as Threatened by the FFWCC. Defined as a species, subspecies, or isolated population which is acutely vulnerable to environmental alteration, declining in number at a rapid rate, or whose range or habitat is decreasing in area at a rapid rate and as a consequence is destined or very likely to become an endangered species within the foreseeable future.
SSC = Listed as Species of Special Concern by the FFWCC. Defined as a population which warrants special protection, recognition, or consideration because it has an inherent significant vulnerability to habitat modification, environmental alteration, human disturbance, or substantial human exploitation which, in the foreseeable future, may result in its becoming a threatened species. (SSC* for Pandion haliaetus (Osprey) indicates that this status applies in Monroe county only.)
N = Not currently listed, nor currently being considered for listing.

Plants: Definitions derived from Sections 581.011 and 581.185(2), Florida Statutes, and the Preservation of Native Flora of Florida Act, 5B-40.001. FNAI does not track all state-regulated plant species; for a complete list of state-regulated plant species, call Florida Division of Plant Industry, 352-372-3505 or see: http://www.doacs.state.fl.us/pi/.

E = Endangered: species of plants native to Florida that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue; includes all species determined to be endangered or threatened pursuant to the U.S. Endangered Species Act.

T = Threatened: species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in number as to cause them to be Endangered.

N = Not currently listed, nor currently being considered for listing.

Appendix E Habitats and Natural Communities

The FNAI defines a natural community as a distinct and recurring assemblage of populations of plants, animals, fungi, and microorganisms naturally associated with each other and their physical environment. Based on GIS analysis, there are 36 unique natural communities recognized by the FNAI within Florida's portion of the Choctawhatchee River and Bay watershed (FNAI 2010). Habitats and Natural Communities were identified using the 2010 Florida Land Use, Cover and Forms Classification System (FLUCFS) data from the NWFWMD, as well as 2004-2013 statewide land use and land cover datasets. Data were modified and refined based on aerial photograph signatures and field observations. Below are community descriptions (excerpts from FNAI 2010) with some site-specific information about many of the communities in the watershed.

Upland Communities	
Bluff	Bluff is a habitat characterized as a steep slope with rock, sand, and/or clay substrate that supports sparse grasses, herbs, and shrubs. This community can be found on the Gulf beaches of Walton County (Blue Mountain Beach) and the north shore of Choctawhatchee Bay along Highway 98.
Mesic Flatwoods	Mesic flatwoods can be found on the flat sandy terraces left behind by Plio-Pleistocene high sea level stands. Mesic flatwoods consist of an open canopy of tall pines (commonly longleaf pine or slash pine) and a dense, low ground layer of shrubs, grasses (commonly wiregrass), and forbs. The most widespread natural community in Florida, mesic flatwoods are home to many rare plants and animals such as the frosted flatwoods salamander (*Ambystoma cingulatum*), the reticulated flatwoods salamander (*Ambystoma bishop*) the red-cockaded woodpecker (*Leuconotopicus borealis*), and many others. Mesic flatwoods require frequent fire (two to four years) and all of its constituent plant species recover rapidly from fire, including many rare and endemic plants. In the Panhandle north of the Cody Scarp, mesic flatwoods occupy relatively small, low-lying areas (FNAI 2010).
Sandhill	Sandhill communities are characterized by broadly-spaced pine trees with a deciduous oak understory sparse midstory of deciduous oaks and a moderate to dense groundcover of grasses, herbs, and low shrubs. Species typical of sandhill communities include longleaf pine (*Pinus palustris*), turkey oak (*Quercus laevis*), and wiregrass (*Aristida stricta var. beyrichiana*). Sandhill is observed on crests and slopes of rolling hills and ridges with steep or gentle topography. Sandhill communities are important for aquifer recharge, as sandy soils allow water to infiltrate rapidly, resulting in sandy, dry soil, with little runoff evaporation. Fire is a dominant environmental factor in sandhill ecology and is essential for the conservation of native sandhill flora and fauna. Conservation lands at Eglin AFB (Santa Rosa, Okaloosa, and Walton counties) host exemplary sandhill communities (FNAI 2010).
Scrub	Scrub is a community composed of evergreen shrubs, with or without a canopy of pines, and is found on well-drained, infertile, narrow sandy ridges distributed parallel to the coastline. Signature scrub species include three species of shrubby oaks, Florida rosemary (*Ceratiola ericoides*), and sand pine (*Pinus clausa*), which may occur with or without a canopy of pines. Scrub is characterized by burn intervals of five to 40 years, depending on the dominant vegetation. Within the Choctawhatchee River and Bay watershed, exemplary scrub community can be found at Topsail Hill State Park (Walton County) (FNAI 2010).

Scrubby Flatwoods	Scrubby flatwoods have an open canopy of widely-spaced pine trees (commonly longleaf or slash pines) and a low, shrubby understory which differ structurally from scrub communities in the respect that scrub flatwoods lack continuous shrubby oak cover. Understory vegetation consists largely of scrub oaks and saw palmetto, often interspersed with barren areas of exposed sand. Scrubby flatwoods occur on slight rises within mesic flatwoods and in transitional areas between scrub and mesic flatwoods. Scrubby flatwoods are inhabited by several rare plant and animal species including the Florida mouse (*Podomys floridanus*), Florida scrub-jay (*Aphelocoma coerulescens*) (peninsular Florida only), gopher tortoise (*Gopherus polyphemus*), the Florida gopher frog (*Rana capito*), goldenaster (*Chrysopsis floridana*), and large-plumed beaksedge (*Rhynchospora megaplumosa*) (FNAI 2010).
Terrestrial Caves	Terrestrial caves are cavities below the surface that lack standing water. These caves develop in areas of karst topography; water moves through underlying limestone, dissolving it and creating fissures and caverns. Most caves have stable internal environments with temperature and humidity levels remaining fairly constant. In areas where light is present, some plants may exist, although these are mostly limited to mosses, liverworts, ferns, and algae. Subterranean natural communities such as terrestrial caves are extremely fragile because the fauna they support are adapted to stable environments and do not tolerate environmental changes (FNAI 2010).
Upland Hardwood Forests	Upland hardwood forests are described as having a well-developed, closed-canopy dominated by deciduous hardwood trees such as southern magnolia (*Magnolia grandiflora*), pignut hickory (*Carya glabra*), sweetgum (*Liquidambar styraciflua*), Florida maple (*Acer saccharum ssp. floridanum*), live oak (*Quercus virginiana*), American beech (*Fagus grandifolia*), white oak (*Q. alba*), and spruce pine (*Pinus glabra*), and others. This community occurs on mesic soils in areas sheltered from fire, on slopes above river floodplains, in smaller areas on the sides of sinkholes, and occasionally on rises within floodplains. It typically supports a diversity of shade-tolerant shrubs, and a sparse groundcover. Upland hardwoods occur throughout the Florida Panhandle and can be found in upland portions of the watershed (FNAI 2010).
Wet Flatwoods	Wet flatwoods are pine forests with a sparse or absent midstory. The typically dense groundcover of hydrophytic grasses, herbs, and low shrubs occurring in wet flatwoods can vary depending on the fire history of the system. Wet flatwoods occur in the ecotones between mesic flatwoods and shrub bogs, wet prairies, dome swamps, or strand swamps and are common throughout most of Florida. Wet flatwoods also occur in broad, low flatlands, frequently within a mosaic of other communities. Wet Flatwoods often occupy large areas of relatively inaccessible land, providing suitable habitat for the Florida black bear (*Ursus americanus floridanus*) as well as a host of rare and endemic plant species (FNAI 2010). Good examples of this community type can be found in the Point Washington State Forest and many other areas within the watershed.
Xeric Hammock	Xeric hammock is an evergreen forest typically dominated by sand live oak (*Quercus geminata*), found on deep, fine sand substrate, where fire exclusion allows for the establishment of an oak canopy. In these areas, xeric hammock can form extensive stands or as small patches within or near sandhill or scrub. These forests are also found on high islands within flatwoods or less commonly on a high, well-drained ridge within a floodplain where fire-exclusion allows for the establishment of an oak canopy. Xeric hammocks are inhabited by several rare animals including the gopher frog (Rana capito), gopher tortoise (*Gopherus polyphemus*), eastern diamondback rattlesnake (*Crotalus adamanteus*), and the Florida pine snake (*Pituophismelanoleucus mugitus*). Xeric hammock is most common in the central peninsula and is less common north of the Cody Scarp where clay-rich soils create mesic conditions. Conservation lands at Eglin AFB (Santa Rosa, Okaloosa, and Walton counties) host exemplary xeric hammock communities (FNAI 2010).

Coastal Communities	
Beach	The beach is the immediate shoreline area of the Gulf of Mexico and consists of white quartz sand. It has few plants, except along the extreme inner edge at the base of the dunes. Organic marine debris, including seaweed and driftwood, typically form a wrack line on the shore. The upper beach area at the base of the foredune is an unstable habitat and is continually re-colonized by annuals, trailing species, and salt-tolerant grasses (FNAI 2010). Beach habitat is found along the entire Gulf front, especially at tidal passes, and some bay front shorelines in the watershed.
Beach Dune	The beach dune community includes seaward dunes that have been shaped by wind and water movement. This community is composed primarily of herbaceous plants such as pioneer grasses and forbs, many are coastal specialists. The vegetated upper beach and foredune are often sparsely covered by plants adapted to withstand the stresses of wind, water, and salt spray, or to rapidly recolonize after destruction. Many rare shorebirds use the Florida Panhandle's beach dunes for nesting. This community is also a major nesting area for loggerhead, green, Kemp's Ridely, and leatherback sea turtles. Gulf Islands National Seashore (Okaloosa County) and Topsail Hill State Park (Walton County) host exemplary dune beach communities (FNAI 2010).
Coastal Grasslands	Coastal grassland, found primarily on broad barrier islands and capes, is a predominantly herbaceous community found in the drier portion of the transition zone between the beach dune and coastal strand or maritime hammock communities. Several rare animals use coastal grasslands for foraging and nesting, including neo-tropical migratory birds and the Choctawhatchee beach mouse (*Peromyscus polionotus allophrys*) - one of four rare subspecies of beach mouse along the Florida Panhandle Coast. Coastal grassland can form from two major processes: the seaward build-up of a barrier island, which protects inland ridges from sand burial and salt spray, or the development of a new foredune ridge, which protects the previously overwashed area behind it. In the Choctawhatchee River and Bay watershed, Gulf Islands National Seashore (Okaloosa County) and Topsail Hill State Park (Walton County) host exemplary coastal grassland communities (FNAI 2010).
Coastal Strand	Coastal strand is an evergreen shrub community growing on stabilized coastal dunes, often with a smooth canopy due to pruning by wind and salt spray. It usually develops as a band between dunes dominated by sea oats along the immediate coast, and maritime hammock, scrub, or mangrove swamp (in peninsular Florida) communities further inland. This community is very rare on the Florida Panhandle coast where the transition zone is occupied by scrub or coastal grassland communities (FNAI 2010). This community type exists in relatively small, remnant pockets within the watershed and in one large private parcel in the Seacrest area.
Maritime Hammock	Maritime hammock is a predominantly evergreen hardwood forest that occurs on deep well-drained sandy soils or sandy soils mixed with shell fragments. Maritime hammock forests grow on stabilized coastal dunes at various distances from the shoreline. Maritime hammocks provide migrating songbirds with crucial resting and foraging areas on their fall and spring migrations to and from the tropics. On the Florida Panhandle coast, maritime hammock is found only in isolated pockets where shell is mixed with sandy substrate (FNAI 2010). This community type can be found on the seaward side of old dune ridges in the city of Destin and extensively in the Camp Helen State Park.
Shell Mounds	Shell mounds are relics of generations of Native Americans who lived along the Florida coast and discarded clams, oysters, whelks, and other shells in small hills. These mounds of shell support an assemblage of calciphilic (calcium loving) plant species. Originally, there were many such shell mounds along coastal lagoons and near the mouths of rivers; however, due to the higher elevation and use of shell as construction material, undisturbed shell mounds are presently very rare. When found, they are surrounded by and restricted to salt marshes. Shell mounds are dispersed along the coast throughout Florida, including the Florida panhandle. The Fort Walton Temple Mound located in Fort Walton Beach (Walton County) is evidence that Native Americans inhabited the coastal Choctawhatchee River and Bay watershed, and as a result, the coastline is likely spotted with associated shell mound ecological communities (FNAI 2010).

Transitional and Wetland Communities	
Basin Marsh	Basin marshes, unlike depression marshes, are marshes that lack a fire-maintained matrix community and rather, occur in relative isolation as larger landscape features. Basin marshes are regularly inundated freshwater from local rainfall, as they occur around fluctuating shorelines, on former "disappearing" lake bottoms, and at the bead of broad, low basins marking former embayments of the last high-sea level stand. Species composition is heterogeneous both within and between marshes and generally includes submerged, floating, and emergent vegetation with intermittent shrubby patches. Common species include maidencane (*Panicum hemitomon*), sawgrass (*Cladium sp.*), bulltongue arrowhead (*Sagittaria lancifolia*), pickerelweed (*Pontederia cordata*), and cordgrass (*Spartina sp.*) (FNAI 2010).
Basin Swamp	Basin swamp is a wetland vegetated with hydrophytic trees, commonly including pond cypress (*Taxodium ascendens*) and swamp tupelo (*Nyssa sylvatica var. biflora*) and shrubs that can withstand an extended hydro-period. Basin swamps are characterized by highly variable species composition and are expressed in a variety of shapes and sizes due to their occurrence in a variety of landscape positions including old lake beds or river basins, or ancient coastal swales and lagoons that existed during higher sea levels. Basin swamps can also exist around lakes and are sometimes headwater sources for major rivers. Many basin swamps have been heavily harvested and undergone significant hydrological changes due to the conversion of adjacent uplands to agricultural and silvicultural lands (FNAI 2010).
Baygall	Baygall is an evergreen-forested wetland dominated by bay species including loblolly bay (*Gordonia lasianthus*), sweetbay (*Magnolia virginiana*), and/or swamp bay (*Persea palustris*). This community can be found on wet soils at the base of slopes or in depressions; on the edges of floodplains; and in stagnant drainages. Baygalls are not generally influenced by flowing water, but may be drained by small blackwater streams. Most baygalls are small; however, some form large, mature forests, called "bay swamps." The dominance of evergreen bay trees rather than a mixture of deciduous and evergreen species can be used to distinguish baygall from other forested wetlands (FNAI 2010).
Bog	Bog habitat typically includes areas of saturated substrates, often deep peat, and acidic conditions, with the dominant vegetation consisting of sedges and grasses. Bog habitat is often surrounded by a transition zone of trees and shrubs between the bog and upland area. This community type can be found on Eglin AFB as well as in north Walton County.
Coastal Interdunal Swales	Coastal interdunal swales are marshes, moist grasslands, dense shrublands, or damp flats in linear depressions that occur between successive dune ridges as sandy barrier islands, capes, or beach plains. Dominant species tend to vary based on local hydrology, substrate, and the age of the swale, but common species include sawgrass (*Cladium sp.*), hairawn muhly (*Muhlenbergia capillaris*), broomsedge (*Andropogon virginicus*), seashore paspalum (*Paspalum vaginatum*), sand cordgrass (*Spartina bakeri*), and saltmeadow cordgrass (*Spartina patens*). For example, hurricanes and large storm events can flood swales with salt water, after which they become colonized, often temporarily, by more salt-tolerant species. Salt water intrusion and increased sand movement after storm events can reset successional processes of interdunal swale communities. Within the watershed, the Gulf Islands National Seashore (Okaloosa County) supports exemplary coastal interdunal swale communities (FNAI 2010).

Dome Swamp	Dome swamp is an isolated, forested, and usually small depression wetland consisting of predominantly pond cypress (*Taxodium ascendens*) and/or swamp tupelo (*Nyssa sylvatica var. biflora*). This community occurs within a fire-maintained community such as mesic flatwoods and commonly occupies depressions over a perched water table. Smaller trees grow on the outer edge of the swamp where the water is shallow, while taller trees grow deeper in the swamp interior creating the characteristic dome shape. Shrubs are typically sparse to moderate, but dome swamps with high fire frequencies or fire exclusion, the shrub layer may be absent. Many dome swamps form when poor surface drainage causes the dissolution of limestone bedrock, creating depressions which fill in with peat or marl. Surficial runoff from the surrounding uplands supplies much of the water within dome swamps. Consequently, water levels in these communities fluctuate naturally with seasonal rainfall changes. Dome swamps may also be connected directly to the aquifer, where groundwater influences the hydrological regime. Thus dome swamps can function as reservoirs that recharge the aquifer. Logging, nutrient enrichment, pollution from agricultural runoff, ditching, impoundment, and invasive exotic species invasion have degraded dome swamps. Some dome swamps have been used as treatment areas for secondarily-treated wastewater. Exemplary dome swamp communities can be found throughout conservation lands of the Eglin AFB (FNAI 2010).
Hydric Hammock	Hydric hammock is an evergreen hardwood and/or palm forest with a variable understory typically dominated by palms and ferns. This community occurs on moist soils, often with limestone very near the surface. While species composition varies, the community generally has a closed-canopy of oaks and palms, an open understory, and a sparse to a moderate groundcover of grasses and ferns. Hydric hammock occurs on low, flat, wet sites where limestone may be near the surface and soil moisture is kept high mainly by rainfall accumulation on poorly-drained soils. During heavy rains, sheet flow is slowed across the forested-floor of a hammock, resulting in greater absorption into the soil. Hammocks adjacent to salt marshes protect inland areas from damage during hurricanes and major storms (FNAI 2010). Good examples of this community type can be found in the Coffeen Nature Preserve located between Sandestin and Topsail Hill Preserve State Park within the watershed.
Floodplain Swamp	Floodplain swamp is a closed-canopy forest community of hydrophytic trees such as bald cypress (*Taxodium distichum*), water tupelo (*Nyssa aquatica*), swamp tupelo (*N. sylvatica var. biflora*), or ogeechee tupelo (*N. ogeche*). Floodplain swamp occurs on frequently- or permanently-flooded hydric soils adjacent to stream and river channels and in depressions and oxbows within the floodplain. The understory and groundcover are sparse in floodplain swamps, which can also occur within a complex mosaic of communities including alluvial forest, bottomland forest, and baygall. As rivers meander, they create oxbows and back swamps that are important breeding grounds for fish when high water connects them to the river. Floodplain swamp communities provide important wildlife habitat, contribute to flood attenuation, and help protect the overall water quality of streams and rivers. These communities may also transform nutrients or act as a nutrient sink depending on local conditions. This makes floodplain swamps useful for the disposal of partially-treated wastewater. Artificial impoundments on rivers can severely limit the seasonal flooding effects that maintain healthy floodplain systems; particularly, the stabilization of alluvial deposits and the flushing of detritus (FNAI 2010). Floodplain swamp communities are distributed throughout Florida's river systems including the Choctawhatchee River and Holmes Creek, which support exemplary floodplain swamps.
Seepage Slope	Seepage slope is an open, grass sedge-dominated community consisting of wiregrass, toothache grass, pitcherplants, plumed beaksedge, flattened pipewort, and woolly huckleberry. Seepage slopes are kept continuously moist by groundwater seepage. This community occurs in topographically variable areas, with 30- to 50-foot elevational gradients, frequently bordered by well-drained sandhill or upland pine communities. The soil is often soft and mucky underfoot, in contrast to the firm texture of the bordering sandhill and upland pine soils. Seepage slopes range from the Alabama border eastward to Calhoun County in the inland portions of the Florida Panhandle. The conservation lands of Eglin AFB (Brier Creek; Okaloosa County) host exemplary seepage slope communities (FNAI 2010).

Wet Prairie	Wet prairie is an herbaceous community usually occurring on acidic, continuously wet, but not inundated, soils. This community can be found on somewhat flat or gentle slopes between lower lying depression marshes, shrub bogs, or dome swamps or on slightly higher wet or mesic flatwoods. Wet prairies in northern Florida are some of the most diverse communities in the U.S., with an average of over 20 species per square meter in some places and over 100 total species in any given stand. The Panhandle is a hotspot for rare plants of the wet prairie community with 25 out of the 30 rare species found in this community; 12 of these are endemic to the Panhandle (FNAI 2010).
Aquatic Communities	
Blackwater Streams	Blackwater streams are perennial or intermittent seasonal watercourses laden with tannins (natural organic chemicals), particulates, and dissolved organic matter and iron. These dissolved materials result from the streams' origins in extensive wetlands with organic soils that collect rainfall and discharge it slowly to the stream. The dark-colored water reduces light penetration and, inhibits photosynthesis, and prevents the growth of submerged aquatic plants. Blackwater streams are frequently underlain by limestones and have sandy bottoms overlain by organics that have settled out of suspension. Blackwater streams are the most widely distributed and numerous riverine systems in the southeast Coastal Plain (FNAI 2010) and found draining into most creeks, streams and bayous in the watershed.
Coastal Dune Lakes	Coastal dune lakes are naturally-formed fresh water basins that exhibit cyclical hydrology through intermittent connectivity to sources of salt water. Consequently, coastal dune lakes are known to have a high biodiversity, with species characteristic of fresh, estuarine, and marine environments. Coastal dune lakes (listed in Section 2.3) provide an important stopover point for migrating neo-tropical birds and are popular recreation spots for the coastlines' residents and frequent visitors. These rare lakes have withstood natural processes such as hurricanes, droughts, and land subsidence, and have been identified as imperiled by the Florida Natural Areas Inventory due to their global rarity. Coastal dune lakes (listed in section 2.3 for the watershed) are extremely vulnerable to hydrological manipulations such as excessive withdrawals of ground water that could lower the water table, as well as saltwater intrusion. Groundwater pollution, especially chemical pollution from the surrounding coastal communities, could significantly alter the nutrient balance and produce devastating effects on the fauna and flora (FNAI 2010).
Sandhill Upland Lakes	Sandhill upland lakes are shallow-rounded solution depressions in sandy upland communities that lack significant surface inflows or outflows. Instead, water is largely derived from lateral ground water seepage and/or from artesian sources connected with the underlying limestone aquifer. Sandhill upland lakes are generally permanent water bodies, although water levels may fluctuate substantially. Vegetation is largely restricted to a narrow band along the shore, and may include hydrophytic grasses and herbs or a dense shrub thicket, depending on fire frequency and water fluctuations. Sandhill upland lakes are extremely vulnerable to hydrological manipulations such as excessive groundwater withdrawals that could lower the regional water table. Additionally, groundwater pollution can significantly alter the nutrient balance of sandhill upland lakes, causing significant damage to flora and fauna. Furthermore, chemical pollution in sandhill lakes can result in groundwater contamination because they often function as aquifer recharge areas (FNAI 2010). The northern portion of the Choctawhatchee River and Bay watershed (Walton and Washington counties) consists of the Sand Hill Lakes region, as well as Spring Lake, which are good examples of sandhill upland lakes.

Seepage Streams	Seepage streams may be perennial or intermittent seasonal as they originate from shallow groundwater percolating through sandy upland soils. Seepage streams are small magnitude features, and unlike other stream communities in Florida, they lack a deep aquifer water source and extensive swamp lowlands surrounding their head waters. Seepage streams are generally sheltered by a dense overstory of broad-leaved hardwoods which block out most sunlight. Filamentous green algae occur sporadically within the stream, while vegetation at the water's edge may include mosses, ferns and liverworts. Seepage streams are often associated with seepage slope and slope forest communities near their head waters, and bottomland forest, alluvial forest and floodplain swamp communities near their mouths. The waters of seepage streams is filtered by percolation through deep soils which slows the release of rainwater and buffers temperature extremes, creating low flow rates of clear, cool, unpolluted water. Seepage streams are generally confined to areas where topographic relief is pronounced such as northern Florida (FNAI 2010), but are also found on Eglin AFB as well as Deer Lake State Park.
Sinkhole Lakes	Sinkhole lakes typically form in deep, funnel-shaped depressions in limestone bedrock and are moderately widespread in the karst regions of the Florida Panhandle. Sinkhole depressions are geologic features which are relatively permanent; however, water levels may fluctuate dramatically due to hydrologic connectivity with the aquifer. Sinkhole lakes are characterized by clear, alkaline water with high concentrations of calcium, bicarbonate, and magnesium. The vegetation in some sinkhole lakes is absent or limited to a narrow fringe of emergent species at the edge of the water, while other sinkhole lakes are completely covered by floating vegetation. Sinkhole Lakes are considered endangered in Florida due to the threat of erosion which destroys the surrounding vegetation and pollutes the aquifer with which these lakes are closely connected (FNAI 2010). Sinkhole lakes are rather rare in the Choctawhatchee River and Bay watershed.
Spring-run Streams	Spring-run streams generally have sandy or limestone bottoms and derive most of their water from artesian openings to the underlying aquifer, making their waters clear, circumneutral, mineral-rich, and cool. These conditions are highly conducive for plant growth, thus, spring-run streams are extremely productive aquatic habitats. Good examples in the watershed are listed and described in Section 2.3. Agricultural, residential, and industrial pollutants that enter the groundwater may infiltrate the deep aquifer that feeds a Spring-run stream. Herbicides applied to control aquatic plant growth are particularly detrimental because they can induce eutrophication in spring run streams. Overuse and misuse of spring-run streams from recreation is also a threat to this unique community (FNAI 2010).
Estuarine and Marine Communities	
Salt Marsh	Salt marsh is a largely herbaceous tidal zone community commonly consisting of saltmarsh cordgrass (*Spartina alterniflora*), which dominates the seaward edge, and needle rush (*Juncus roemerianus*), which dominates higher, less frequently flooded areas. Salt marshes form where the coastal zone is protected from large waves, either by the topography of the shoreline, a barrier island, or by location along a bay or estuary. Salt marshes support a number of rare animals and plants, and provide nesting habitat for migratory and endemic bird species. Many of Florida's extensive salt marshes are protected in aquatic preserves, but the loss of marshes and adjacent seagrass beds due to human impacts such as shoreline development, ditching, and pollution and natural stressors, such as sea level rise, have vastly reduced their numbers. Salt marshes are instrumental in attenuating wave energy and protecting shorelines from erosion (FNAI 2010) and are found in the coastal/ estuarine portion of the watershed.

Seagrass Beds	Seagrass beds consist of expansive stands of submerged aquatic vascular plants including turtlegrass (*Thalassia testudinum*), manateegrass (*Syringodium filiforme*), and shoalweed (*Halodule wrightii*), which occur predominantly in subtidal zones in clear low-energy coastal waters. Seagrass beds occur on unconsolidated substrates and are highly susceptible to changes in water temperature, salinity, wave-energy, tidal activity, and available light. This natural community supports a wide variety of animal life including manatees, marine turtles, and many fish, particularly spotted sea trout (*Cynoscion nebulosus*), spot (*Micropogonias undulates*), sheepshead, (*Archosargus probatocephalus*), and redfish *(Sciaenops ocellatus*). Pollution, particularly sedimentation and wastewater/sewage, have led to the widespread loss of seagrasses in nearly every bay in the Florida Panhandle (FNAI 2010).
Oyster/Mollusk Reef	Oyster/Mollusk reef consists of expansive concentrations of sessile mollusks, which settle and develop on consolidated substrates including rock, limestone, wood, and other mollusk shells. These communities occur in both the intertidal and subtidal zones to a depth of 40 feet. In Florida, the American oyster (*Crassostrea virginica*) dominates mollusk reef communities, but other organisms including species of sponge, anemones, mussels, the burrowing sponge anemones, mussels, clams, barnacles, crabs, amphipods, and starfish live among or within the reef itself. Mollusks are filter-feeders that remove toxins from polluted waters and improve overall water quality (FNAI 2010). However, higher levels of toxins and bacteria can contaminate and close areas for commercial harvest and human consumption.
Unconsolidated (Marine) Substrate	Unconsolidated (marine) substrate consists of coralgal, marl, mud, mud/sand, sand or shell deposited in expansive, open areas of subtidal, intertidal, and supratidal zones. Unconsolidated substrates support large populations of tube worms, sand dollars, mollusks, isopods, amphipods, burrowing shrimp, and an assortment of crabs, but lack dense populations of sessile plant and animal species. Unconsolidated substrates are an important feeding ground for bottom-feeding fish, shorebirds, and invertebrates. These areas also grade into a variety of other natural communities, making them the foundation for the development of other marine and estuarine habitats. Unconsolidated substrate communities are found throughout the estuarine and riverine portions of the watershed. They are susceptible to many types of disturbances including vehicle traffic, low dissolved oxygen levels, as well as the accumulation of metals, oils, and pesticides in the sediment (FNAI 2010).

Source: FNAI 2010.

Appendix F 2016 FDEP Verified Impaired Waterbody Segments in the Choctawhatchee River and Bay Watershed

All states are required to submit lists of impaired waters that are too polluted or degraded to meet water quality standards and their designated use (potable, recreational, shellfish harvesting) to the EPA under section 303(d) of the Clean Water Act (EPA 2016a). The following table provides a list of 2016 FDEP designated and impaired waters in the Choctawhatchee River and Bay watershed.

Waterbody Segment ID	Water Segment Name	County	Waterbody Class[1]	Parameters Assessed Using the Impaired Waters Rule (IWR)
731	Alaqua Bayou	Walton	3M	Nutrients (Chlorophyll-a)
351	Alaqua Creek	Walton	3F	Fecal Coliform
123	Alligator Creek	Jackson, Washington	3F	Fecal Coliform
742	Basin Bayou	Walton	2	Fecal Coliform
786A	Bass Lake	Okaloosa	3F	Dissolved Oxygen (Percent Saturation)
786A	Bass Lake	Okaloosa	3F	Nutrients (Total Nitrogen)
679	Black Creek	Walton	2	Fecal Coliform
8010A	Blue Mountain Beach	Walton	3M	Bacteria (Beach Advisories)
692	Boggy Bayou	Okaloosa	3M	Nutrients (Chlorophyll-a)
692	Boggy Bayou	Okaloosa	3M	Nutrients (Total Nitrogen)
778CD	Camp Timpoochee	Okaloosa, Walton	2	Bacteria (Beach Advisories)
778A	Choctawhatchee Bay	Okaloosa	2	Bacteria (in Shellfish)
778A	Choctawhatchee Bay (Lower Segment)	Okaloosa	2	Fecal Coliform
778A	Choctawhatchee Bay (Lower Segment)	Okaloosa	2	Nutrients (Total Nitrogen)
778A	Choctawhatchee Bay (Lower Segment)	Okaloosa	2	Nutrients (Total Phosphorus)
778B	Choctawhatchee Bay (Middle Segment1)	Okaloosa	2	Bacteria (Shellfish Harvesting Classification)
778B	Choctawhatchee Bay (Middle Segment1)	Okaloosa	2	Nutrients (Chlorophyll-a)
778B	Choctawhatchee Bay (Middle Segment1)	Okaloosa	2	Nutrients (Total Nitrogen)
778C	Choctawhatchee Bay (Middle Segment2)	Okaloosa, Walton	2	Bacteria (Shellfish Harvesting Classification)
778C	Choctawhatchee Bay (Middle Segment2)	Okaloosa, Walton	2	Fecal Coliform (3)

Waterbody Segment ID	Water Segment Name	County	Waterbody Class[1]	Parameters Assessed Using the Impaired Waters Rule (IWR)
778C	Choctawhatchee Bay (Middle Segment2)	Okaloosa, Walton	2	Nutrients (Total Nitrogen)
778D	Choctawhatchee Bay (Upper Segment)	Walton	2	Dissolved Oxygen (Percent Saturation)
778D	Choctawhatchee Bay (Upper Segment)	Walton	2	Nutrients (Chlorophyll-a)
778D	Choctawhatchee Bay (Upper Segment)	Walton	2	Nutrients (Total Nitrogen)
49B	Choctawhatchee River	Walton, Washington	3F	Iron
49F	Choctawhatchee River	Holmes	3F	Iron
778AD	Clement E. Taylor Park	Okaloosa	3M	Bacteria (Beach Advisories)
348Z	Cypress Springs (Washington County)	Washington	3F	Nutrients (Nitrate-Nitrite)
917A	Destin Harbor	Okaloosa	2	Fecal Coliform
881A	Direct Runoff to Bay	Walton	2	Fecal Coliform
881A	Direct Runoff to Bay	Walton	2	Fecal Coliform (3)
8009A	Dune Allen Beach	Walton	3M	Bacteria (Beach Advisories)
751	Eagle Creek	Walton	2	Fecal Coliform
778AB	East Pass	Okaloosa	2	Bacteria (Beach Advisories)
337	Flat Creek	Washington	3F	Fecal Coliform
843B	Garniers Park	Okaloosa	3M	Bacteria (Beach Advisories)
8010B	Grayton Beach	Walton	3M	Bacteria (Beach Advisories)
778AC	Gulf Island National Seashore	Okaloosa	3M	Bacteria (Beach Advisories)
8008B	Henderson Park Beach	Okaloosa	3M	Bacteria (Beach Advisories)
8010C	Holley Street Beach	Walton	3M	Bacteria (Beach Advisories)
59D	Holmes Creek (Lower Segment)	Washington	3F	Nutrients (Algal Mats)
8008C	James Lee Park	Okaloosa	3M	Bacteria (Beach Advisories)
94	Limestone Branch	Holmes	3F	Iron
692A	Lincoln Park	Okaloosa	3M	Bacteria (Beach Advisories)
80	Little Creek	Jackson	3F	Fecal Coliform
937	Mack Bayou	Walton	2	Fecal Coliform
712	Mullet Creek	Walton	2	Fecal Coliform
286	Open Creek	Holmes, Washington	3F	Dissolved Oxygen
754A	Poquito Park	Okaloosa	3M	Bacteria (Beach Advisories)

Waterbody Segment ID	Water Segment Name	County	Waterbody Class[1]	Parameters Assessed Using the Impaired Waters Rule (IWR)
722	Rocky Bayou	Okaloosa	2	Fecal Coliform
722	Rocky Bayou	Okaloosa	2	Nutrients (Total Nitrogen)
722B	Rocky Bayou State Park	Okaloosa	3M	Bacteria (Beach Advisories)
495A	Turkey Creek	Okaloosa	3F	Iron
8008E	Wayside Park	Okaloosa	3M	Bacteria (Beach Advisories)
54	Wrights Creek	Holmes	3F	Iron

Sources: FDEP 2014b; ADEM 2014a.
Notes:
* = new Florida listings since 2006
Footnote 1 - Florida's waterbody classifications:
1 - Potable water supplies
2 - Shellfish propagation or harvesting
3F - Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife in fresh water
3M - Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife in marine water
4 - Agricultural water supplies
5 - Navigation, utility, and industrial use

Appendix G Conservation Lands within Florida's Portion of the Choctawhatchee River and Bay Watershed

Within Florida's portion of the Choctawhatchee River and Bay watershed there are approximately 376,632 acres of conservation lands including 236,126 acres of federally-owned lands, 135,534 acres of state-owned lands, 207 cares of locally-owned lands, and 4,765 acres of privately owned lands, many of which are managed by public entities. Nine conservation lands within the Choctawhatchee River and Bay watershed span multiple counties, and several extend into other watersheds. The details of these conservation lands are presented in the following table:

Conservation Land	Managing Agency	County(ies)	Description	Website	Acreage Within Watershed
Federal					
Air Force Special Operations Command, Hurlburt Field	U.S. Dept. of Defense, Air Force	Okaloosa	The Hurlburt Field is dominated by mesic flatwoods and floodplain swamp. It supports a large population of reticulated flatwoods salamanders.		207
Eglin Air Force Base	US Dept. of Defense, Air Force	Escambia, Okaloosa, Santa Rosa, Walton	This WMA is managed in cooperation with the FWC and the U.S. Air Force, covering land in Santa Rosa, Okaloosa, and Walton counties.		234,174
Gulf Islands National Seashore	US Dept. of the Interior, National Park Service	Escambia, Okaloosa, Santa Rosa	This national seashore stretches 150 miles from Mississippi into Florida. In Florida, it extends from the eastern end of Perdido Key, across the mouth of Choctawhatchee Bay, to the east end of Santa Rosa Island. It also includes other barrier islands, historic sites on the Florida mainland as well as the waters in between.	http://www.nps.gov	40

Conservation Land	Managing Agency	County(ies)	Description	Website	Acreage Within Watershed
M. C. Davis Conservation Easement	US Dept. of Agriculture, Forest Service	Walton	This conservation easement is a privately owned easement with no public access that is managed by the USDA Forest Service, and is located adjacent to the M. C. Davis - Seven Runs Creek Conservation Easement.	http://www.fs.usda.gov/fnst	1,705
State					
Bruner Bay Tract	Undesignated State Land (not currently assigned to a managing agency)	Washington	The Bruner Bay Tract was formerly managed by FDACS, Division of Forestry.		44
Choctawhatchee River Tract	Undesignated State Land (not currently assigned to a managing agency)	Walton, Washington	Surrounded by NWFWMD land, this tract is completely within the floodplain of the Choctawhatchee River. The Choctawhatchee River Tract was formerly managed by FDACS, Division of Forestry.		227
Choctawhatchee River Water Management Area	Northwest Florida Water Management District	Bay, Holmes, Walton, Washington	The NWFWMD owns land along the Choctawhatchee River and Holmes Creek. This land provides habitat for a variety of wildlife including several protected species. The river itself serves as a breeding and migratory area for Alligator Gar and Gulf Sturgeon.	http://www.nwfwater.com/	62,641
Econfina Creek Water Management Area	Northwest Florida Water Management District	Bay, Jackson, Washington	Econfina Creek and its surrounding forests are found on an unusual collection of geographic features such as bluffs, deep ravines, and springs giving it an unusually high diversity of rare plants and animals.	http://www.nwfwater.com/	2,216
Eden Gardens State Park	FL Dept. of Environmental Protection, Div. of Recreation and Parks	Walton	This park includes the historic Wesley homestead land and the historic Wesley House, a renovated two-story building.	http://www.floridastateparks.org/	161

Conservation Land	Managing Agency	County(ies)	Description	Website	Acreage Within Watershed
Falling Waters State Park	FL Dept. of Environmental Protection, Div. of Recreation and Parks	Washington	Falling Waters State Park includes a cylindrical, smooth-walled sink, 100' deep by 15' wide, with an underground cavern. Natural communities include hardwood hammock and longleaf pine forest with wiregrass.	http://www.floridastateparks.org/	166
Flatwoods Salamander Critical Habitat Conservation Easement	FL Dept. of Environmental Protection, Northwest District	Walton	This is a regulatory conservation easement within the USFWS critical habitat unit (CHU RFS 6A) for the reticulated flatwoods salamander.		208
Fred Gannon Rocky Bayou State Park	FL Dept. of Environmental Protection, Div. of Recreation and Parks	Okaloosa	Fred Gannon Rocky Bayou State Park is popular for boating and fishing and includes a tract of old-growth long-leaf pine trees.	http://www.floridastateparks.org/	344
Glover Conservation Easement	Northwest Florida Water Management District	Washington	The Glover Conservation Easement is a privately owned easement on Holmes Creek that is privately owned but managed by the NWFWMD. No public access.	http://www.nwfwater.com/	1,136
Grayton Beach State Park	FL Dept. of Environmental Protection, Div. of Recreation and Parks	Walton	Grayton Beach State Park features beach and lake access, boat ramps, fishing, and other water recreation and includes coastal forests of scrub oaks, magnolias, and pine flatwoods.	http://www.floridastateparks.org/	757
Haddock Conservation Easement	Northwest Florida Water Management District	Washington	The Haddock Conservation Easement is a privately owned easement with no public access that is managed by the NWFWMD. It is located along the upper reaches of Holmes Creek north of Vernon.	http://www.nwfwater.com/	337

Conservation Land	Managing Agency	County(ies)	Description	Website	Acreage Within Watershed
Henderson Beach State Park	FL Dept. of Environmental Protection, Div. of Recreation and Parks	Okaloosa	Includes 6,000 feet of natural shoreline along the Gulf of Mexico, sand pines, scrub oaks, and dune rosemary. Recreational activities include nature trails, camp sites, boardwalks over habitat, and beach access.	http://www.floridastateparks.org/	217
Holmes Creek Tract	Undesignated State Land (not currently assigned to a managing agency)	Washington	Holmes Creek Tract, formerly managed by FL DACS, Division of Forestry, is currently owned by Trustees of the Internal Improvement Trust Fund and is located along Holmes Creek, upstream of the town of Vernon.		39
Intrawest Sandestin Company Conservation Easement	FL Dept. of Environmental Protection, Northwest District	Walton	This conservation easement is a privately owned easement with no public access that is managed by the NWFWMD. It is located along Little Black Creek, east of Freeport near the Nokuse Plantation Conservation Easements.		1,016
Loblolly Tract	Undesignated State Land (not currently assigned to a managing agency)	Washington	The Loblolly Tract, formerly managed by FL DACS, Division of Forestry, is currently owned by Trustees of the Internal Improvement Trust Fund and is located adjacent to the southwestern portion of the Haddock Conservation Easement.		38
M. C. Davis - Seven Runs Creek Conservation Easement	FL Dept. of Environmental Protection, Div. of State Lands	Walton	This conservation easement is a privately owned easement with no public access that is managed by the FDEP Division of State Lands. The M. C. Davis - Seven Runs Creek Conservation Easement is located northeast of Freeport.	http://www.dep.state.fl.us/lands	21,228

Conservation Land	Managing Agency	County(ies)	Description	Website	Acreage Within Watershed
Nokuse Plantation Conservation Easements	FL Dept. of Environmental Protection, Div. of State Lands	Walton, Washington	The largest private conservation project east of the Mississippi River, established in 2000 to preserve, protect, and restore natural landscape. The goal of this private land is to restore and preserve ecosystems that support native plants and animals (both common and endemic).	http://www.dep.state.fl.us/lands	18,884
Pine Log State Forest	FL Dept. of Agriculture and Consumer Services, Florida Forest Service	Bay, Washington	Includes forest managed for timber, wildlife, outdoor recreation, and ecological restoration.	http://www.floridaforestservice.com/index.html	6,871
Point Washington State Forest	FL Dept. of Agriculture and Consumer Services, Florida Forest Service	Walton	Made up of 10 natural communities, numerous plants and wildlife species, and outdoor recreational activities.	http://www.floridaforestservice.com/index.html	12,431
Ponce de Leon Springs State Park	FL Dept. of Environmental Protection, Div. of Recreation and Parks	Holmes, Walton	Includes the Ponce de Leon Springs that are consistently 68°F, and is fed by a convergence of underground water flows. Recreational activities include hiking nature trails, swimming in the springs, and fishing.	http://www.floridastateparks.org/	381
Seven Runs Creek Conservation Easement	FL Dept. of Environmental Protection, Div. of State Lands	Walton	The Seven Runs Creek Conservation Easement is a privately owned easement with no public access that is managed by the FDEP. The easement is located adjacent to the Choctawhatchee River Water Management Area.	http://www.dep.state.fl.us/lands	1,103
Topsail Hill Preserve State Park	FL Dept. of Environmental Protection, Div. of Recreation and Parks	Walton	Includes 3.2 miles of beaches with dunes, dune lakes, old-growth long-leaf pine, sand pine scrub, and wetlands. Recreational activities include water use, camping, and nature trails	http://www.floridastateparks.org/	1,619

Conservation Land	Managing Agency	County(ies)	Description	Website	Acreage Within Watershed
TPL Seven Runs Creek Conservation Easement	FL Dept. of Environmental Protection, Div. of State Lands	Walton	The TPL Seven Runs Creek Conservation Easement is a privately owned easement with no public access that is managed by the FDEP. The easement is located adjacent to the Choctawhatchee River Water Management Area.	http://www.dep.state.fl.us/lands	2,334
Tupelo Tract	Undesignated State Land (not currently assigned to a managing agency)	Washington	The Tupelo Tract, formerly managed by FL DACS, Division of Forestry, is currently owned by Trustees of the Internal Improvement Trust Fund and is located adjacent to the Haddock Conservation Easement.		41
Walton Conservation Easement	Northwest Florida Water Management District	Walton	The Walton Conservation Easement is a privately owned easement with no public access that is managed by the NWFWMD. It is located north of Freeport adjacent to the M. C. Davis - Seven Runs Creek Conservation Easement.	http://www.nwfwater.com/	1,094
White Conservation Easement	Northwest Florida Water Management District	Washington	The White Conservation Easement is a privately owned easement with no public access that is managed by the NWFWMD. The easement is surrounded by Choctawhatchee River Water Management Area lands.	http://www.nwfwater.com/	1
Local					
Stallworth Lake Preserve	Walton County	Walton	The Stallworth Lake Preserve includes undeveloped beachfront property adjacent to Topsail Hill Preserve State Park. This site provides habitat for the Federally endangered Choctawhatchee beach mouse.	http://www.beachesofsouthwalton.com/todo_nature.aspx	2

Conservation Land	Managing Agency	County(ies)	Description	Website	Acreage Within Watershed
Morrison Springs Recreational Facility	Walton County	Walton	The Morrison Springs Recreational Facility consists of spring surrounded by mature cypress trees and floodplain forest; upland areas consist of planted pine.	http://www.beachesofsouthwalton.com/todo_nature.aspx	199
Grayton Dunes Park	Walton County	Walton	The park is a beach access that is undeveloped except for a boardwalk with an observation deck. The dunes are marked off, but vehicles are allowed on the beach. Western Lake, on the eastern edge of the park, opens periodically and exchanges water with the Gulf. The beach may provide nesting habitat for loggerhead sea turtles.		6
Private					
Rock Hill Preserve	The Nature Conservancy	Washington	Well-known by botanists and geologists, the sandstone outcroppings on this preserve are the only ones known in Florida. They support plants and lichens typically found in more northern areas and that are unusual or endemic to Florida.	http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/florida/index.htm	367
Sandhill Lakes Conservation Easement	Nokuse Plantation, Inc.	Walton	This conservation easement protects a series of sandhill lakes adjacent to Nokuse Plantation.	http://www.nokuse.org	130
Beulah A. Laidlaw Preserve	Bay County Audubon Society, Inc.	Washington	Beulah A. Laidlaw Preserve is primarily comprised of wooded hills grading into cypress wetlands.	http://www.baycountyaudubon.org/	272
Coffeen Nature Preserve	Coffeen Land Trust	Walton	Coffeen Nature Preserve is a privately owned dune lake system; including hydric hammock, scrub, scrubby flatwoods, wet flatwoods, mesic flatwoods and beach dunes.		218

Conservation Land	Managing Agency	County(ies)	Description	Website	Acreage Within Watershed
Devils Swamp Mitigation Bank	The St. Joe Company	Bay, Walton	This land is a mitigation bank to serve the Devil's Swamp basin within the USACE Regional General Permit and FDEP's Ecosystem Management Agreement, owned by the St. Joe Company.	http://www.joe.com/	620
Choctawhatchee River Delta Preserve	The Nature Conservancy	Walton	Part of the Gulf Coastal Plain Ecosystem Partnership (GCPEP) partnership lands, the Choctawhatchee River Delta Preserve is funded by the State Wildlife Grants Program under Florida's Wildlife Legacy Initiative.	http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/florida/index.htm	3,157

Sources: FNAI 2016a, 2016b; Florida Division of Recreation and Parks 2016a, 2016b, 2016c, 2016d, 2016e, 2016f, 2016g; Gulf of Mexico Foundation 2015; Nokuse Preserve 2016; St. Joe Company 2016.