BAYOU TEXAR SUB-BASIN WORK PLAN

BAYOU TEXAR

NORTHWEST FLORIDA WATERSHEDS PARTNERSHIP PROGRAM
PENSACOLA BAY WATERSHED
JANUARY 2026

NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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Acknowledgements

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Executive Summary

The **Northwest Florida Watersheds Partnership Program (Program)** is a collaborative, multi-party initiative to proactively address critical water resource issues within priority sub-basins of the Northwest Florida Water Management District (District). The Program is being implemented in coordination with local and county governments, regional entities, and other interested parties to maximize effectiveness.

The Bayou Texar sub-basin is the priority sub-basin within the Pensacola Bay watershed. This work plan describes the sub-basin, the critical water resource issues, and strategies and proposed projects that can be implemented to address these issues. The Bayou Texar watershed is approximately 12,155 acres in size and consists of two main segments – Carpenter Creek and Bayou Texar. Watershed elevations range from -1 foot below sea level to 162 feet above sea level. Carpenter Creek forms the headwaters starting just north of Interstate 10 near Olive Road and is approximately 6,805 acres. The creek flows approximately four and a half miles southeast before forming Bayou Texar. The Bayou Texar portion of the watershed is approximately 5,350 acres and empties into Pensacola Bay, just north of the Three Mile Bridge. This watershed contains the oldest communities in the Pensacola Bay system and the Carpenter Creek portion has suffered from the impacts of urbanization including severe erosion, channel modifications, loss of habitat and impacts to water quality. Restoration of the creek and bayou, addressing water quality impacts and providing public recreation access points to celebrate some of the historically/culturally important community treasures such as “Aunt Jenny’s Swimming Hole” are some of the results restoration partners hope to achieve. Currently, 90% of the watershed is developed. As of the 2020 census the sub-basin’s population was 95,563. The population is estimated to grow by approximately 5% by 2045.

Carpenter Creek Headwater Area Along Olive Road

The majority of sub-basin's urbanization occurred by the late 1970s, following construction of several bridges in the 1950s and 1960s. Sacred Heart Hospital relocated into the basin in 1965, and Cordova Mall opened in 1971. By 1976, the commercial corridor along 9th Avenue was fairly developed. A second commercial corridor established along North Davis Highway anchored by University Mall in 1974. As a result of the development and loss of open space, addressing the significant erosion, sedimentation, and water quality issues will require innovative solutions and partnerships. Water quality impairments within the sub-basin include Carpenter Creek for Fecal Coliform and Bayou Texar for Fecal Coliform and metals.

Successful restoration and protection of the Bayou Texar sub-basin will involve restoring creek channels and floodplains, improving the quality and size of riparian buffers, addressing the sources of water quality impairments, improving the protection and conservation of water supply resources, improving coordination between restoration partners, and increasing monitoring activities to track and evaluate progress.

Addressing critical water resource issues will require a multi-year effort. Future projects, in addition to those identified within this work plan, will likely be needed to fully address water resource issues and challenges within the Bayou Texar sub-basin. Many of the identified projects provide multiple water resource benefits. As of January 2026, 23 projects have been proposed, at an estimated total cost of **$216.5 million**. The current funding need is estimated at **$187.1 million**. Project types include:

- Potable water transmission system improvements
- Floodplain expansion and restoration
- Stormwater system expansion and treatment improvements
- Living shoreline assistance and education

The following document provides an introduction to the Northwest Florida Watersheds Partnership Program (Section I), overview of the Pensacola Bay Watershed (Section II), details the characteristics of the Bayou Texar sub-basin (Section III), discusses the current issues and challenges (Section IV), the proposed management strategies and projects (Section V), and monitoring, metrics and next steps (Section VI).

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I. Introduction

The **Northwest Florida Watersheds Partnership Program** is a collaborative, multi-party initiative to proactively address critical water resource issues within priority sub-basins within the Northwest Florida Water Management District (District). While shovel-ready projects will be a high priority for implementation, funding is also anticipated to be available for design, feasibility studies, planning, and, where needed, data collection to determine causes of water resource issues or to track improvements. For the first year of the program, efforts will focus on one priority sub-basin within each of the District's seven major watersheds. The program is being implemented in coordination with local and county governments, regional entities, and other interested parties to maximize effectiveness. Partners include the Florida Department of Environmental Protection; Florida Department of Agriculture and Consumer Services; the Florida Fish and Wildlife Conservation Commission; the Choctawhatchee Basin Alliance; and the three Panhandle Estuary Programs: Pensacola and Perdido Bays, Choctawhatchee Bay, and St. Andrew and St. Joseph Bays.

To select priority sub-basins, objective criteria were developed using best-available geographic information system (GIS) datasets and applied to evaluate and rank the 114 sub-basins within the District's seven major watersheds. Evaluation criteria focused on water quality, aquatic habitat restoration, and water supply and considered factors such as water quality impairments, established total maximum daily loads, population growth, and location within a Water Resource Caution Area or Area of Resource Concern. The highest-ranked candidate sub-basins within each watershed were presented at a series of six public workshops held in October 2025. Input received during the workshops and through on-line surveys, together with information regarding proposed projects, was also utilized in the evaluation process to select a single priority sub-basin within each major watershed. Additional details regarding evaluation process can be found in Appendix A.

The Bayou Texar sub-basin was selected as the priority sub-basin within the Pensacola Bay watershed. This sub-basin encompasses two major features: Carpenter Creek, which includes the basin's headwater area and flows southeastward around 5 miles before it transitions into Bayou Texar, which is also around 5 miles in length flowing southeast then south where it empties into Pensacola Bay. This work plan describes the sub-basin's characteristics, critical water resource issues, and strategies and proposed projects that can be implemented to address these issues.

The goal of this work plan is to provide an integrated framework for a multi-year collaborative effort to improve the environmental resources, ecological functions, and public benefits of Bayou Texar.

Specific objectives of the Program and this work plan include:

- Describe critical water resource issues, with a focus on water quality, aquatic habitat, and water supply needs,
- Determine strategies and projects needed to address the most critical issues including project costs and funding needs,
- Provide an integrated and holistic approach framework that recognizes and incentivizes projects with multiple resource benefits,
- Secure and leverage funding and associated resources needed to implement priority strategies and projects,

- Protect and improve the quality of waters directly influenced by the Bayou – Texar sub-basin, as well as within the larger Pensacola Bay watershed,
- Enhance, protect and sustain aquatic and wetland habitats with the [insert sub-basin name], together with their economic, recreational, and other societal benefits for the community and for natural systems,
- Enhance the resilience and sustainability of aquatic habitats and water supplies,
- Track project implementation metrics and trends in environmental conditions to monitor and evaluate success and inform an adaptive management approach to enhance strategies and maximize the program's effectiveness.

Accomplishing these objectives will require extensive collaboration and coordination among state and local government agencies, federal agencies, nonprofit organizations, and the private sector to maximize synergy between projects and achieve lower overall restoration costs.

II. Overview of Pensacola Bay Watershed

The Pensacola Bay System covers over 6,800 square miles, 4.35 million acres of northwest Florida and southern Alabama. This system includes the combined drainage areas of Escambia, Blackwater, and Yellow River watersheds. The overall watershed includes the Florida Panhandle's largest metropolitan area, a number of other inland and coastal communities, and conservation lands that protect and sustain natural resources. Ecologically diverse, this watershed includes alluvial and blackwater rivers, floodplain swamps, tidal marshes, seagrasses, and oyster beds among other types of natural communities (NWFWMD Pensacola Bay System SWIM Plan 2017).

The overall watershed, including Alabama's portion, lies within the Gulf Coastal Plain physiographic region, which is characterized by gently rolling hills, sharp ridges, prairies, and alluvial floodplains underlain by sediments of sand, gravel, porous limestone, chalk, marl, and clay. Within this greater physiographic region, the Florida portion of the watershed contains two localized physiographic regions: the Western Highlands and the Gulf Coastal Lowlands (USGS 2013). The Northern Highlands region is characterized by greater topographic relief than the Gulf Coastal Lowlands and contains extensive clay deposits overlying limestone bedrock of the Citronelle formations, ancient delta deposits of clays, clayey sands, and gravel. The Western Highlands extend from 378 feet in elevation in Alabama down to a relict marine terrace of approximately 100 feet (Rupert 1993). The rolling hills of the Western Highlands have sandy soils and generally dry conditions, with groundwater emerging from lower slopes to create hillside seepage bogs (Wolfe et al. 1988).

The estuarine embayments are within the Gulf Coastal Lowlands; a region 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 the growth and melting of ice caps. Dunes, barrier islands, beach ridges, and other topographical features were stranded inland as seas receded. Land surfaces are generally level and less than 100 feet above sea level. Substantial areas are less than 30 feet above sea level and are characterized by extensive wetlands. Higher elevations are present in the general area of Pensacola, on the west side of Escambia Bay and the north side of Pensacola Bay. (NWFWMD 2017).

Figure 1. Pensacola Bay System Watershed

III. Sub-Basin Characteristics

Extent and Topography

The Bayou Texar watershed is primarily comprised of urban land uses with the remaining area consisting of rangeland, water, wetlands, upland forest, and barren land. The watershed is approximately 12,155 acres in size and consists of two main segments – Carpenter Creek and Bayou Texar (Figure *2*). Watershed elevation ranges from -1 foot below sea level to 162 feet above sea level (Figure 3). Carpenter Creek forms the headwaters starting just north of Interstate 10 (Wood Environment & Infrastructure Solutions, Inc., 2020) near Olive Road and is approximately 6,805 acres. The creek flows approximately four and a half miles southeast before forming Bayou Texar. The Bayou Texar portion of the watershed is approximately 5,350 acres which empties into Pensacola Bay, just north of the Three Mile Bridge.

Carpenter Creek is the sole significant tributary to Bayou Texar. The Carpenter Creek portion of the watershed and its headwaters are in south-central Escambia County, north of Interstate 10 and west of Interstate 110. The creek generally flows southeast and is bridged by Olive Road, I-10, Burgess Road, I-110, Davis Highway, Airport Boulevard, Brent Lane, 9th Avenue, and 12th Avenue where it becomes Bayou Texar.

Bayou Texar is generally located in southern Escambia County. The bayou is approximately 3.7 miles long, generally oriented in a north/south direction, with widths varying from more than 1,000 feet in the south to less than 150 feet in the north. Bayou Texar is one of Pensacola's most important sub-watersheds and recreational waterbodies for watersports, swimming, and fishing.

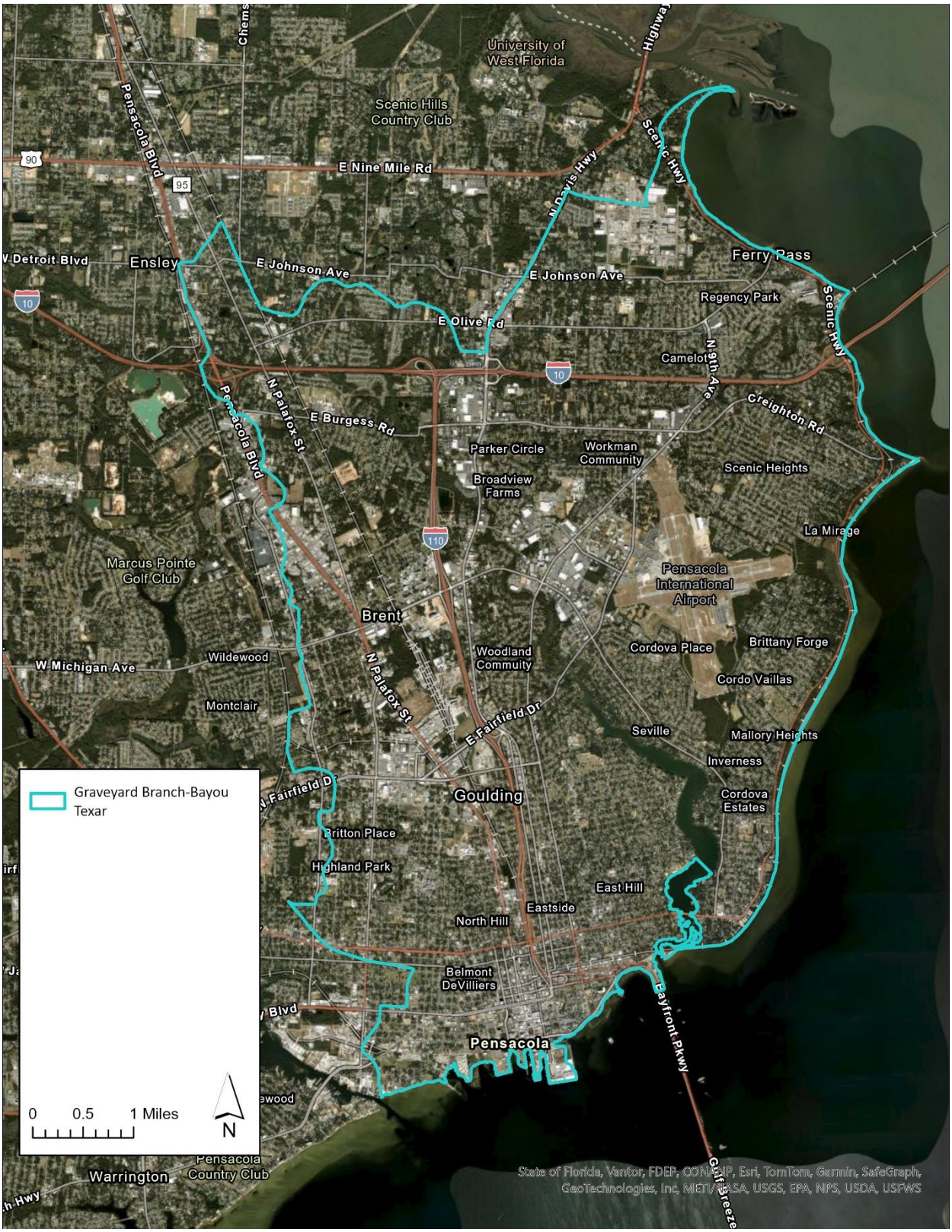

Figure 2. Bayou Texar Sub-basin

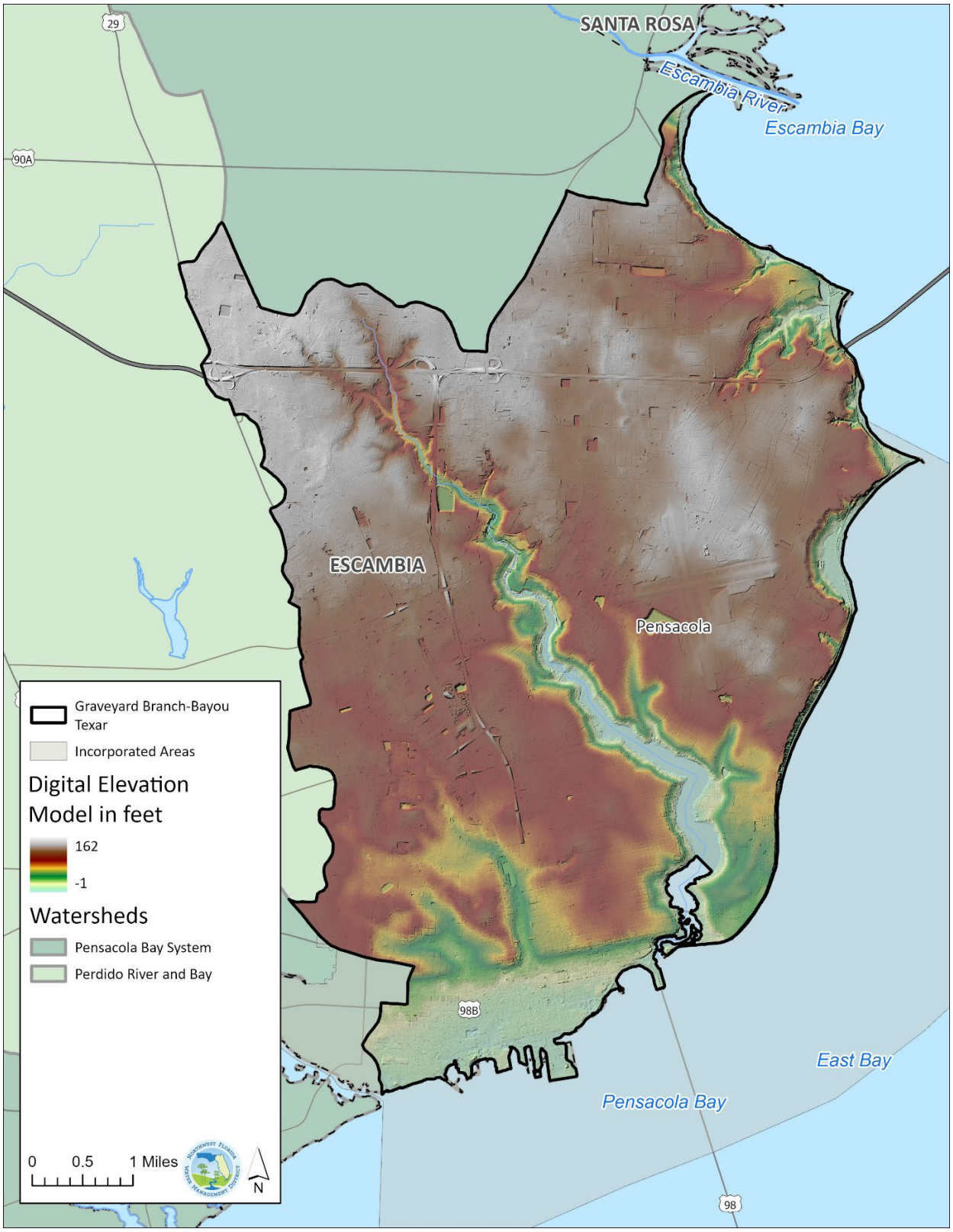

Figure 3. Land Surface Elevation in the Bayou Texar Sub-basin

Sub-basin Functions, Benefits, and Uses

Carpenter Creek and Bayou Texar have always been a significant cultural part of the watershed's communities. Documented by The Cultural Landscape Foundation's (TCLF) "Landslide" webpage regarding Carpenter Creek (https://www.tclf.org/sites/default/files/microsites/landslide2021/locations/carpenter.html), the creek was a central element in everyday life. Documented examples include community members cooling off in "Aunt Jenny's Swimming Hole", using the creek waters to wash their laundry and, the New Hope Baptist Church holding baptisms in the flowing water. The creek was also used commercially back in the 18th Century to transport logs and lumber from a sawmill constructed along the creek to industrial wharves along Bayou Texar. Bayou Texar is also a significant recreational source for the community, with favorite activities including water skiing, paddling, fishing, and swimming. The bayou also provides critical habitat for both bird and fish species such as saltmarsh areas at both the northern and southern areas of the bayou (Figure 4). Unfortunately, both the creek and bayou have seen a tremendous amount of residential and commercial development, which oftentimes included encroachment into the riparian buffers and floodplains. This has resulted in significant impacts including erosion, flooding, and decreases in water quality.

Figure 4. Bayou Texar Saltmarsh at Southern End of the Bayou

Hydrology

Three unnamed tributaries combine to form Carpenter Creek with the center tributary being the most defined. Beginning at a springhead near Olive Road (on property recently purchased by the county), the creek winds its way under I-10, I-110, and Davis Highway, under 9th Avenue past the mall and multiple shopping centers, then opens up past 12th Avenue into Bayou Texar (UF IFAS Weekly "What is it?" by Carrie Stevenson accessed December 18, 2025 https://blogs.ifas.ufl.edu/escambiaco/2021/02/17/weekly-what-is-it-carpenters-creek/). The three

tributaries are created mainly by seepage flows and stormwater flowing from the roads and developed areas.

Carpenter Creek (WBID 676) is located in the western portion of the city of Pensacola. The creek flows south for 4.7 miles before it forms Bayou Texar (WBID 738). The bayou flows 3.8 miles in a north-south direction and is 1,400 feet wide in the middle. The bayou's largest source of fresh water is from Carpenter Creek with other sources being overland flow along the banks of the bayou via stormwater outfalls, surface flow, and groundwater discharge. Saline waters enter the bayou from Pensacola Bay to the south (*Florida Department of Environmental Protection, September 2012*).

Political Subdivisions

While Bayou Texar falls entirely within the city of Pensacola's boundary, Carpenter Creek's headwaters lay within Escambia County and as the creek flows southeast it enters the city's jurisdiction about a third of the way down its length. Fortunately, there is a robust partnership between the city, county and the Pensacola Perdido Bays Estuary Program that has resulted in securing funding for the Watershed Restoration Plan as well as several of the top priority projects.

Population and Population Growth

The 2024 population estimate for Escambia County was 336,358 (University of Florida, 2023). The projected 2045 BEBR population is 375,132, which represents an 11.5-percent increase. The population within the Bayou Texar sub-basin has been relatively stable with just a 5-percent (4,379) increase between 2010 and 2020. However, the population within the basin is projected to increase by roughly 13 percent by 2045 (14,575).

Table 1. Population within the Bayou Texar sub-basin

Year	2010	2020	2045
Population	91,184	95,563	110,138
Change		4,379	14,575
Percent Change		5	13.23

Land Use

Land use in the watershed is predominately residential and commercial. The riparian areas of the bayou are almost fully developed with single-family residential homes. Minimal natural riparian buffers exist, which has diminished the diversity and density of native vegetation. Additionally, most single-family residential neighborhoods were developed before stormwater treatment and attenuation requirements were in place, resulting in untreated stormwater entering the bayou through numerous outfalls along the waterfront. Urban development and Urban and Built Up represents 78 percent of the basin and Transportation, Communication, and Utilities making up an approximately 12 percent, for a total of 90 percent of the basin. Agriculture, Barren Land, Rangeland, Upland Forest, Water and Wetland combined account for the remaining 9 percent (Table 2 and Figure 5).

Table 2. 2022 Land-Use Estimates for the Bayou Texar Sub-basin

Land Use Description	Land Use Code	Total Acreage	Percent
Agriculture	2000	3	0.01
Barren Land	7000	112	0.44
Rangeland	3000	52	0.21
Transportation, Communication, and Utilities	8000	3,010	11.80
Upland Forest	4000	1,628	6.38
Urban and Built Up	1000	19,966	78.23
Water	5000	356	1.39
Wetlands	6000	395	1.55
Total	N/A	25,523	100

The majority of urbanization in the watersheds had taken place by the late 1970s, following the construction of a series of bridges across the creek and bayou constructed in the 1950s and 1960s. Sacred Heart Hospital relocated to its current location in 1965, and Cordova Mall opened in 1971. By 1976, the commercial corridor along 9th Avenue, anchored by the mall, hospital, and airport, was fairly developed. A second commercial corridor along North Davis Highway was anchored with the opening of University Mall in 1974. Residential suburban development continued throughout the watershed, but large tracts of intact forest along Carpenter Creek remained. (Wood Environment & Infrastructure Solutions, Inc., 2020). This pattern of growth has continued up to today with only about 10 percent of the undeveloped acreage remaining with much of that area belonging to the creek, bayou, and remnant riparian and floodplain areas.

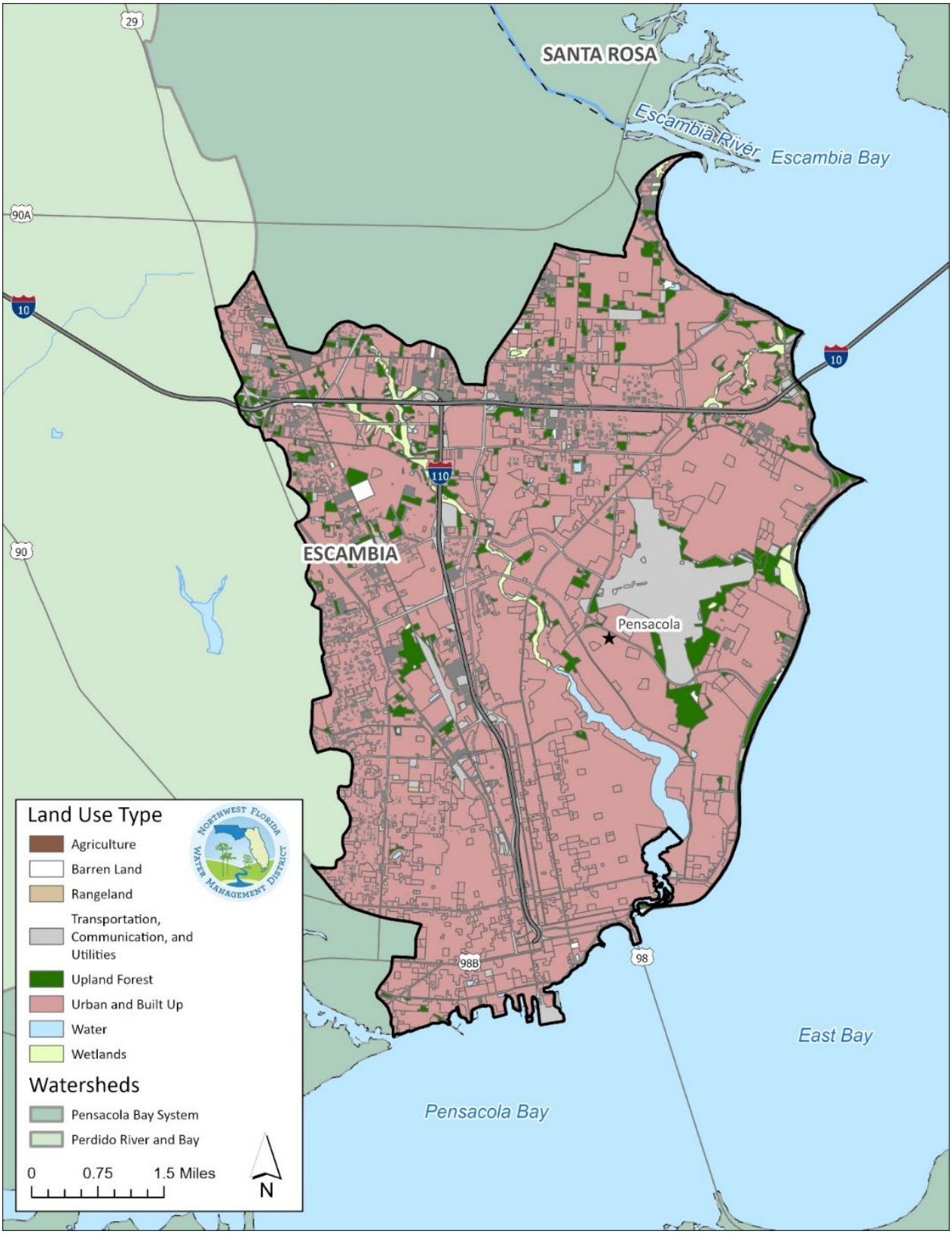

Figure 5. Land Use within the Bayou Texar Sub-basin

Floodplains and Flood Protection

As noted above, land use in the watershed is predominately residential and commercial. The riparian areas of the bayou are almost fully developed with single-family residential homes. Very limited natural riparian buffers exist, which has diminished the diversity and density of native vegetation. Additionally, most of the single-family residential neighborhoods were developed before state or municipal stormwater treatment and/or attenuation requirements were established. Untreated stormwater enters the bayou through numerous outfalls along the waterfront (Wood Environment & Infrastructure Solutions, Inc., 2020). Between the loss of riparian buffers and floodplains and the largely unattenuated input of stormwater, the creek has become subject to frequent flashy flow events which further erode the channel and floodplain. Numerous directly connected impervious surfaces throughout the watersheds create a flashy hydrograph and have led to bank erosion and subsequent downstream sedimentation.

Additional stressors are not ubiquitous along the drainage network but collectively include hardening of the creek banks associated with development, development within the riparian zone, creek crossings by multiple road and highway bridges, fragmentation, and channel straightening, to name a few. These factors contribute to hydrologic impacts on riparian habitats, loss of instream fish habitat, increased colonization by non-native invasive species, reduced water quality, and reduced recreational values (Wood Environment & Infrastructure Solutions, Inc., 2020). Cumulatively, these stressors increase the likelihood of flooding events even though the basin has a low percentage of AE and VE flood zones (Table 3 and Figure 6). Without remedial actions, this cycle of flash flooding, leading to erosion, leading to further creek degradation, leading to additional flash flooding will continue.

Table 3. Flood Zones within the Bayou Texar Sub-Basin

Flood Zone	Description	Acres	Percent of Basin Area
AE	1% Annual chance of flooding, near river, stream, or lake	1,101	4.3
VE	1% Annual chance of flooding, coastal, threat of storm surge	107	0.4
X	Less than 1% Annual chance of flooding	24,316	95.3
Total		25,504	100

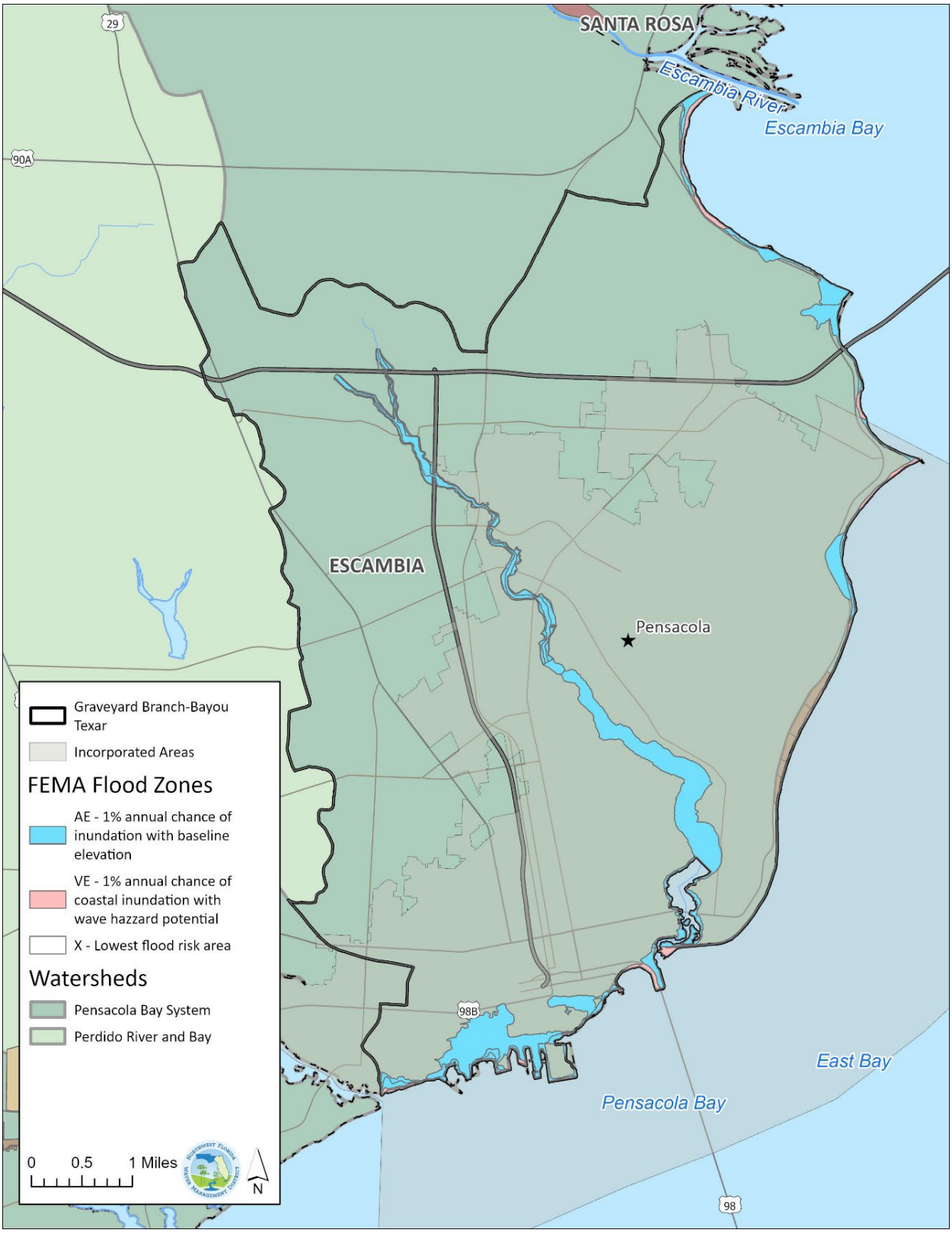

Figure 6. Flood Zones within the Bayou Texar Sub-Basin

Water Quality

Numerous studies have been undertaken over the last several decades that have documented contamination by fecal coliform and Enterococcus bacteria, likely in part originating from sedimentation inputs from Carpenter Creek and various stormwater outfalls. Legacy contaminants such as heavy metals, polychlorinated biphenyl (PCB), polycyclic aromatic hydrocarbons (PAHs), and pesticides have been found in the bayou sediments as well. Contamination of surface waters and sediments is compounded by the constricted mouth of the bayou, the low tidal amplitude, and the short tidal duration. (*Wood Environment & Infrastructure Solutions, Inc., 2020*)

Both Carpenter Creek and Bayou Texar are listed as impaired for fecal coliform, and Bayou Texar is also listed as impaired for metals by the Florida Department of Environmental Protection (FDEP). A Total Maximum Daily Load (TMDL) was established for Fecal Coliform by DEP (2012). Based on the TMDL, target reductions for Fecal Coliform bacteria were set at 49 percent for Carpenter Creek and 28 percent for Bayou Texar (Table 4 and Figure 7).

Table 4. Total Maximum Daily Load (TMDL) and Reduction Targets Established by the Florida Department of Environmental Protection (2012) within the Bayou Texar Sub-basin

Waterbody	WBID	TMDL (counts/100mL)	WLA* for Wastewater (counts/100mL)	WLA* for NPDES Stormwater (Percent reduction)	LA** (Percent reduction)	Parameters Not Attaining Standards
Carpenter Creek	676	400	N/A	49	49	Fecal Coliform
Bayou Texar	738	400	N/A	28	28	Fecal Coliform

**WLA Waste Load Allocation*
***LA Load Allocation*

In 2019, Escambia County funded the development of the *Carpenter Creek & Bayou Texar Watershed Management Plan*. Volume 3 of the plan focused on the Watershed Assessment and included two major parts: Volume 3A Hydrologic & Hydraulic Assessment Report and Volume 3B Water Quality Assessment Report. A water quality assessment, which included both an informal impairment and trend analysis, was conducted as part of this plan.

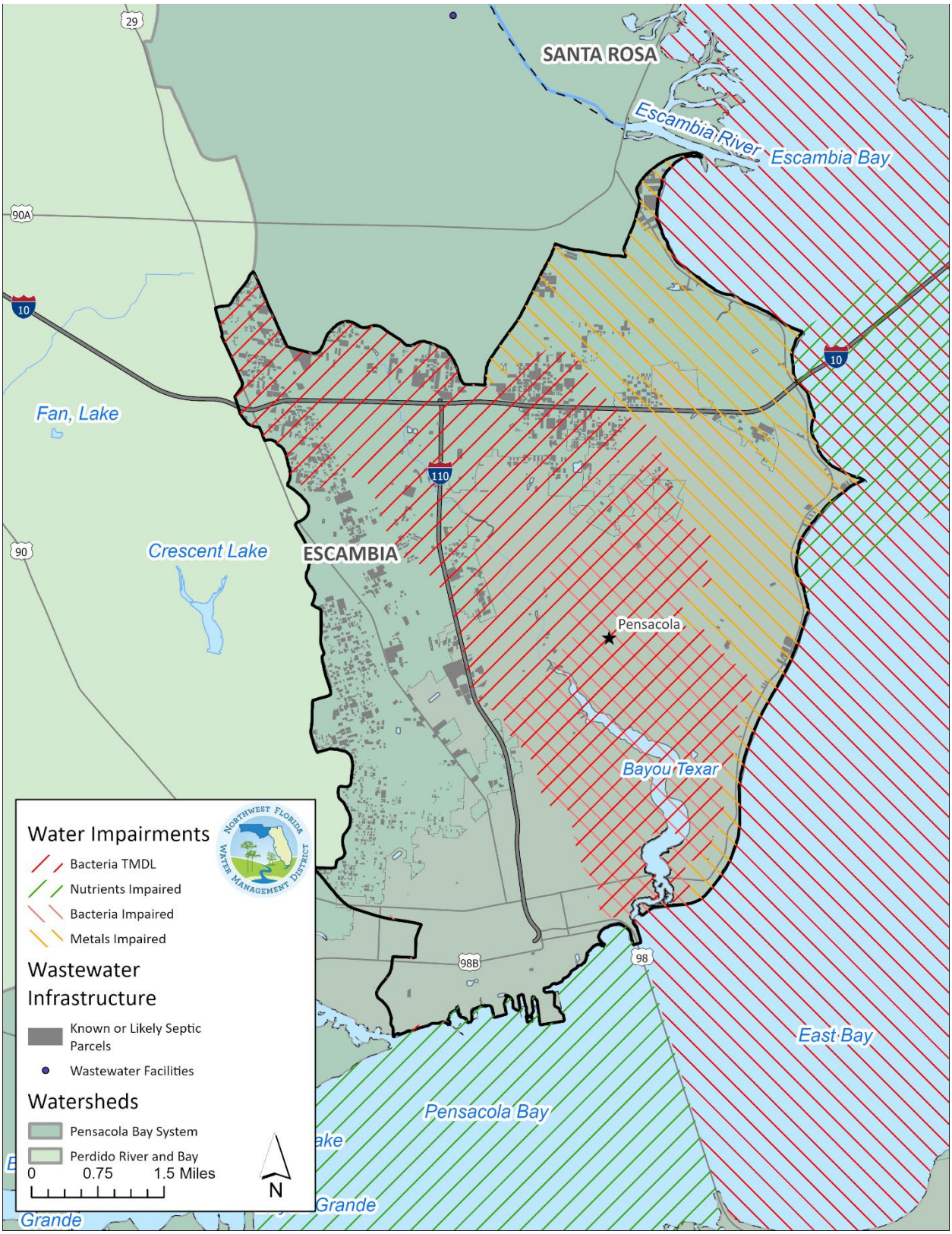

Figure 7. Impaired Waters of the Bayou Texar Sub-basin

The primary source of water quality data used in the analysis was the FDEP Impaired Water Rule (IWR) Database, Run 60. Raw data for Carpenter Creek (Waterbody ID [WBID] 676) and Bayou Texar (WBID 748) which were exported from the IWR Microsoft Access database. To obtain the most recent water quality data for these two WBIDs, additional data were retrieved from the FDEP's Watershed Information Network (WIN) using the online WIN Advanced View and Extraction System (WAVES). Escambia County provided three additional datasets that were included in the analysis. One dataset was from an intensive weekly sampling project focused on fecal coliform, *E. coli*, and field parameters conducted between May and July 2014. The second dataset from the county contained monthly bacteria, nutrient, and field parameter results from January 2020 to December 2020. The county also provided nutrient data collected between March and April 2021 that was part of a special Carpenter Creek tributary sampling event. (*Wood Environment & Infrastructure Solutions, Inc., 2020*).

Appendix B contains tables excerpted from the appendices of the Carpenter Creek & Bayou Texar Watershed Management Plan Volume 3B Water Quality Assessment report which summarize the analysis results. The first set of tables summarize the percent exceedances and the second evaluates the trends. The trend results include two timelines, 2017-2020 and 2010-2020. Major water quality impairment concerns noted in the report and summarized in the consultant's (*WSP*) April 2024 presentation include:

- Total Nitrogen (TN)
- Fecal indicator bacteria (FIB)
- Dissolved oxygen
- Significant TN load at 9th Ave

The TN concentration at Carpenter Creek and 9th Avenue was significantly decreasing between 2010 and 2020 but was significantly increasing between 2017 and 2020. The TN load between 2017 and 2020 was double the amount between 2010 and 2016. The TN and bacteria data had a large number of samples and percentages of sample exceedances in both Bayou Texar and Carpenter Creek. The dissolved oxygen levels had significantly decreasing trends at multiple locations.

Generally speaking, one of the typical causes of low dissolved oxygen is from excess nutrients entering a surface water. Excess nutrients can cause algal blooms to occur which result in the rapid reduction of dissolved oxygen levels. Known sources of excess nutrient in surface waters include septic tanks, discharges from sewer infrastructure such as lift stations and transmission lines and excess fertilizers contained in stormwater. Figure 7 above includes map of known septic systems in the basin.

Water Supply

Public supply is the largest water-use sector, with Pensacola and the surrounding unincorporated areas served by Emerald Coast Utilities Authority (ECUA). The sand-and-gravel aquifer is the primary water source for Escambia County. Within this sub-basin, the sand-and-gravel aquifer is also utilized for landscape irrigation and institutional uses. The sand-and-gravel aquifer ranges in thickness from approximately 150 to 250 feet in southern Escambia County (Roaza et al. 1993; Figure 23) and is comprised of three hydrostratigraphic zones (NWFWMD 2023). The uppermost zone, the surficial zone, consists of fine to medium-grained sand, with gravel beds and lenses (Randazzo and Jones, 1997) and varies in thickness from a few feet to tens of feet. The underlying low-permeability zone consists of fine

sand to clay, ranging in thickness from 20 feet to 100 feet in Escambia County (NWFWMD 2023). The leaky nature of the low-permeability zone enables water from the surficial zone to move vertically through this layer and recharge the main-producing zone (NWFWMD 2023). The main-producing zone consists of highly productive sand and gravel layers interbedded with clayey layers and is the primary zone utilized by public water supply wells. Well yields often exceed 1,000 gallons per minute (gpm) and may reach 2,500 gpm (NWFWMD 2023). Recharge occurs locally and water levels generally reflect rainfall variations. Groundwater in the sand-and-gravel aquifer moves along flow paths to discharge at supply wells, as baseflow to Carpenter Creek, and as groundwater discharge to Escambia and Pensacola bays.

The sand-and-gravel aquifer is highly vulnerable to contamination from activities occurring at the land surface. The city of Pensacola has a wellhead protection ordinance in place to protect potable supply wells, which prohibits certain land uses, facilities, and activities within 200 feet of specific listed well locations. Water quality in the sand-and-gravel aquifer is good in most areas; however, localized areas of groundwater contamination or clean-up activities are present west of Bayou Texter along part of the I-110 corridor. Water treatment improvements are identified within the ECUA Capital Improvements Plan, including treatment improvements needed at the Royce Street production well, located within this sub-basin (ECUA 2025). In 2024, within Escambia County there was 11.61 mgd of potable offset reuse or approximately 55 percent of all wastewater treatment facility (WWTF) flows. The ECUA owns and operates three large reuse systems in Escambia County. All three ECUA facilities have advanced treatment levels and disinfection levels range from basic to high. Reclaimed water has been provided by ECUA for power generation, industrial, and for public access uses.

IV. Current issues and challenges

In addition to the nutrient and bacteria issues noted in the Water Quality section above, the watershed also needs significant habitat restoration. Urban stream syndrome, caused by erosion and channel modification from development, non-attenuated stormwater, gray vs. green infrastructure, and diminishment of the protective riparian zone, has dramatically changed the Carpenter Creek stream pattern and profile (Wood Environment & Infrastructure Solutions, Inc., 2020). Impacts caused by urban stream syndrome include flashier flows, decreased water quality, unstable and eroded channels and banks, and loss of diverse aquatic life with a shift towards invasive and more tolerant species. Urban Stream Syndrome is a “self-feeding” cycle. As the creek system becomes “flashier”, more erosion occurs, which in turn further alters the system. In addition to the damage to the creek system itself, the system’s degradation is also jeopardizing several structures located along the creek. Emergency stabilization measures have been implemented at several locations, some of which have created additional impacts on the creek. Displaced sediments from channel modifications and erosion in the upper headwaters have accumulated in the lower reaches of the creek and have significantly altered the mouth of Carpenter Creek that discharges into upper Bayou Texar.

Significant sedimentation loading to the creek (up to 40 times greater than average), directly connected impervious surfaces throughout the watershed which have created a “flashy hydrograph” that has led to bank erosion and subsequent downstream sedimentation and water quality impairments (https://www.ppbep.org/what-we-do/restoration/carpenter-creek).

Water Quality and Stream Restoration

Fortunately, this basin has recently seen a significant investment from Escambia County, the city of Pensacola, the Pensacola Perdido Bay Estuary Program, FDEP, and others to assess the watershed and develop remedial actions. In September 2019 Escambia County funded the development of the Carpenter Creek & Bayou Texar Watershed Management Plan (https://myescambia.com/docs/default-source/upload/carpenter-creek-bayou-texar-watershed-management-plan.pdf?sfvrsn=db6b8969_1). The plan development included significant public involvement and ultimately identified a prioritized list of 15 projects that once implemented is estimated to result in the removal of approximately 3,300 lbs/year of total nitrogen (TN), 118.5 lbs/year of total phosphorus (TP), and 2,224.8 tons/year of sediment, while allowing for restoration of approximately 2.4 miles of stream/creek length and approximately 27.5 acres of wetlands.

The single most impactful site-specific concept, in terms of potential pollutant removal and restoration, is "The Creek from Davis Highway to 9th Avenue (Site 10)" (Carpenter Creek & Bayou Texar Watershed Management Plan Volume 4A). This concept is estimated to allow for the removal of approximately 1,954 lbs/year of TN and 2,000 tons/year of sediment, with the potential restoration of approximately 1.3 miles of stream/creek length and 14.6 acres of wetlands. This sub-basin plan will support the implementation of the Carpenter Creek restoration plan by providing implementation funds, helping to raise awareness of the restoration needs and priorities, and supporting the pursuit and acquisition of grant funding for project implementation.

Water Supply

Water supply from the sand-and-gravel aquifer is generally of good quality and sufficient quantities are available to meet projected future water demands. There are additional opportunities for water conservation measures to reduce future water demands on the sand-and-gravel aquifer. Measures could include plumbing retrofits, appliance rebates, and measures that enhance the efficiency of landscape irrigation use.

The sand-and-gravel aquifer is highly vulnerable to impacts from land use activities. Areas of groundwater contamination exist within the sub-basin. Wellhead protection ordinances are in place; however, in some areas, on-site treatment may be needed. Continued coordination and planning among the City of Pensacola, Escambia County, and ECUA can ensure that existing and future well sites are protected.

Changes in regulated contaminants are a continuing concern for local governments and utilities. Water utilities must track and plan for potential changes in drinking water regulations. For example, ECUA is implementing a project to verify that lead pipes are not present within its service area in response to EPA's Lead and Copper Rule Improvements (ECUA 2025). Most of the water service lines have been surveyed and no evidence of lead pipelines has been found (ECUA 2025). An area of ongoing concern for many utilities is changes in regulations regarding per- and polyfluoroalkyl substances (PFAS). PFAS is a category of human-made chemicals that have been widely used in a variety of products and industries, such as firefighting foams, protective coatings, and surfactant applications among many other uses and products (National Groundwater Association, 2025).

Additionally, aging water system pipes can be subject to leakage and infiltration, necessitating repair or replacement. Population growth and new development may also require increased pipe diameters or

water line extensions. Associated improvements may include booster pumps, modernized metering and data systems, and looping and sectionalization of water distribution systems. In some portions of the ECUA system, water treatment improvements, such as granular activated carbon filter replacements, may be needed at specific well sites.

Data and Knowledge Gaps

Based on the recommendations presented in the preliminary water quality data gap analysis, included in Volume 2, Appendix F of the Carpenter Creek & Bayou Texar Watershed Management Plan, the county enhanced its existing ambient water quality monitoring program to include additional monitoring stations and parameters. These additional data informed the development of the restoration plan.

Risks and Vulnerabilities

Given the amount of investment, studies, and public outreach conducted to develop the Carpenter Creek restoration plan, there is wide support and confidence that the proposed set of projects will succeed in restoring the watershed. The greatest vulnerability identified is the amount of private property needed to implement the restoration projects. The Estuary Program is addressing this by creating a Carpenter Creek Stewardship Committee composed of citizens, agencies, non-profit entities, and local government representatives to help raise awareness and support for project implementation.

V. Management Strategies and Projects

Table 5 summarizes management strategies recommended to address the water resource challenges described above. Each approach identified addresses multiple issue areas and objectives, reflecting the interrelated nature of water resource attributes and conditions and the fact that most projects can be designed to achieve multiple complementary outcomes.

Consistent with the SWIM plan (2017), the management strategies and projects incorporated within this work plan are based on a watershed approach to protecting and restoring water resources. A watershed approach is predicated on recognition that the character and quality of a waterbody are defined by conditions across the contributing drainage basin. In other words, managing pollutant sources and protecting the extent and functions of floodplains, wetlands, upland forests, and tributary stream systems across a watershed are essential for protecting a given waterbody and downstream receiving waters.

One of the key activities of the District's Watersheds Partnership Program is to help coordinate restoration activities among key partners and stakeholders to help maximize efficiency and synergy between projects, shift to a more proactive approach to restoring and protecting the District's watersheds, and help increase funding for project implementation. This work plan will have a coordinator assigned who will serve as the "traffic control" function to ensure effective implementation of this plan and identify necessary changes to adaptively manage as progress is made and conditions change.

Table 5. Recommended Management Strategies for the Bayou Texar Sub-basin

Management Strategy	Issue Areas Addressed	Objectives	Description
Creek and Aquatic Habitat Restoration	• Aquatic and Wetland Habitats	Sustained aquatic and wetland ecosystems	Restoration of creek bed and floodplain
Stormwater Retrofits	• Water quality • Aquatic and Wetland Habitats • Flooding and Coastal Resilience	Improved water quality Improved flood protection and resilience Sustained aquatic and wetland ecosystems	Retrofit stormwater systems to incorporate BMPs to improve flood protection and downstream water quality. Identify and implement specific BMPs effective for treating bacteria, suspended solids, and nutrients
Septic Tank Abatement	• Water Quality • Aquatic and Wetland Habitats	Improved water quality Sustained aquatic and wetland ecosystems	Connect structures served by OSTDS to central sewer systems, where feasible. Alternatively, modern nutrient reducing septic systems can be installed. Either approach would require funding to incentivize connections or conversions.
Sanitary Sewer System Improvements	• Water Quality • Aquatic and Wetland Habitats	Improved water quality Sustained aquatic and wetland ecosystems	Design, permitting, and construction of retrofits to existing sanitary sewer systems to reduce inflow and infiltration of stormwater.
Green Infrastructure	• Water Quality • Aquatic and Wetland Habitats • Flooding and Coastal Resilience	Improved water quality Improved flood protection and resilience Sustained aquatic and wetland ecosystems Improved public access	Apply “nature-based,” green infrastructure methods for multipurpose projects. Projects frequently involve integrating stormwater BMPs, buffer zones, greenways, and living shorelines into public parks and transportation systems.
Monitoring and Assessment	• Water Quality • Aquatic and Wetland Habitats • Flooding and Coastal Resilience	Improved understanding of current conditions and trends	Continuing ongoing monitoring will enable tracking of progress to achieve water quality goals

Proposed Activities and Projects

Fortunately, there has been a significant amount of work conducted to develop, prioritize and implement restoration projects for the Bayou Texar watershed. In 2019, Escambia County developed the Carpenter Creek and Bayou Texar Watershed Management Plan (WMP) with RESTORE Direct Component (Pot 1) funds. The WMP identified 15 priority projects, designed to improve creek conditions, downstream water quality, and community access to the creek. (Pensacola & Perdido Bays Estuary Program website accessed December 18, 2025 https://www.ppbep.org/what-we-do/restoration/carpenter-creek). Three of the 15 projects were identified as "catalyst" projects, and the Estuary Program is currently implementing the top priority of the three – the Carpenter Creek Restoration Project. The two-page fact sheet describing the project can be found here: https://www.ppbep.org/PDFs/What%20We%20Do%20/Carpenter%20Creek/Project-Fact-Sheet.pdf. This project will design the Carpenter Creek restoration for the 2.5-mile section between Interstate 110 and 12th Avenue. This project includes two phases and will result in 100% designs. The Estuary Program has all of Phase 1 and 80% of Phase 2 funded.

Proposed projects known at the time of this writing are listed in Table 6. Projects currently proposed include a mixture of water quality and restoration projects, as well as estuary program support Projects listed, details, and cost estimates will be updated in cooperation with local governments and other cooperators within the planning area.

Table 6. Proposed Projects and Funding Needs Identified in the Bayou Texar Sub-basin

Project Name	Lead and Project Partners	Water Resource Benefits	Description	Estimated Total Cost	Funding Need
Carpenter Creek Restoration	PPBEP; City of Pensacola; Escambia County	• Reduce flood staging by 1 foot • Reduce sediment loading by 2,000 tons annually • Reduce nitrogen loading by 2,500 lbs annually • Restore ~20 acres of wetlands and ~2.5 miles of creek	Property acquisition and restoration of Carpenter Creek between I-110 and 12th Avenue, including BMPs, stormwater retrofits, and green infrastructure.	$28,000,000	$2,000,000
Carpenter Creek Restoration (Sewer)	Emerald Coast Utilities Authority (ECUA)	• Reduce inflow & infiltration • Prevent sanitary sewer overflows	Gravity sewer line rehabilitation and relocation within the Carpenter Creek riparian corridor between I-110 and 12th Avenue.	$5,000,000	$5,000,000
Oyster Restoration Initiative	PPBEP; NWFLWMD; FWC; TNC; DEP	• Restore ~1,500 acres (600 ha) of oyster habitat• Phase 1: 245 acres (100 ha)	Design, permitting, and multi-phase implementation of large-scale oyster reef restoration throughout the Pensacola Bay System.	$50,000,000	$50,000,000
Oyster Shell Recycling Program	PPBEP; Franklin's Promise Coalition; Santa Rosa County; Escambia County	• Provide recycled shell for local oyster restoration projects	Expand and sustain restaurant-based oyster shell collection program for use in living shoreline and reef projects.	$100,000	$100,000
Living Shoreline Assistance Program	Pensacola & Perdido Bays Estuary Program (PPBEP)	• Stabilize eroding shorelines with nature-based solutions • Enhance nearshore habitat	Cost-share and technical assistance program for private and community living shoreline projects.	$200,000	$200,000
Comprehensive Monitoring Program	Pensacola & Perdido Bays	• Fill critical data gaps in water quality,	Implement priority monitoring identified in the Comprehensive Monitoring Strategy and State of the Bays reporting.	$150,000	$150,000

Project Name	Lead and Project Partners	Water Resource Benefits	Description	Estimated Total Cost	Funding Need
	Estuary Program (PPBEP)	seagrass, fisheries, sediments, and toxins • Support adaptive management			
Lateral Line Cost Share Program	Emerald Coast Utilities Authority (ECUA) with PPBEP, City of Pensacola, Escambia County	• Reduce I&I from private lateral lines • Decrease sanitary sewer overflows	Cost-share program to repair/replace defective private sewer laterals in high-I&I hotspots.	$500,000	$500,000
Stormwater Master Plan	PPBEP and regional local governments	• Region-wide priority project identification • Consistent stormwater standards and TMDL alignment	Develop a Regional Stormwater Master Plan, compound flood model, adaptation plan, and guidance manual.	$2,000,000	$2,000,000
Pensacola & Perdido Bays Estuary Program Restoration Initiative	Pensacola & Perdido Bays Estuary Program (PPBEP) – Matt Posner, Point of Contact	• Oyster restoration • Water quality improvements • Monitoring • Community grant program	Implement the CCMP through direct restoration actions and the PPBEP Community Grant Program.	$975,000	$6,784,259
Olive Road Drainage Improvements	Escambia County	• Reduce stormwater flooding and pollutant loading	Multiple phases of drainage improvements; CBDG-funded phase at 90% design.	$18,000,000	$9,000,000
Carpenters Creek Riparian Habitat Restoration		• Remove debris and invasive species • Restore native riparian vegetation	Restoration of riparian corridor from headwaters to I-110.	TBD	TBD
Carpenter Creek Hydrologic Restoration		• Restore natural hydrology and floodplain function	Hydrologic restoration project; Statement of Work nearly complete.	TBD	TBD

Project Name	Lead and Project Partners	Water Resource Benefits	Description	Estimated Total Cost	Funding Need
Hollice T. Williams Stormwater Park Improvements	City of Pensacola	• Decrease flooding • Improve water quality • Enhance community resiliency and urban nature-scape	The project will focus on improving the 1.3 mile long park, largest in Pensacola, under I-110 expanding and beautifying the stormwater pond and connecting the park and pond to the surrounding neighborhoods. The current pond, known as Long Hollow Stormwater Pond is undersized and the expansion will help decrease flooding and improve water quality. Within the footprint of the Hollice T. Williams Stormwater Park are planned multiple Water Quality and Stormwater Attenuation improvements. These include a stormwater lift station, multiple LID stormwater improvements, below grade exfiltration trenches, bioretention swales, rain gardens, community resiliency, and urban nature-scape.	$17,250,000	$17,250,000
Maritime Park and Bruce Beach Breakwater and Mooring Field	City of Pensacola	• Provide aquatic habitat • Improve water quality • Protect shoreline from erosion	Install a breakwater in Pensacola Bay near two City parks, Maritime and Bruce Beach. The breakwater would provide aquatic habitat and improve water quality while also protecting Pensacola's shoreline from erosion. The mooring field would provide a way for visitors and residents to enjoy our local waterways. Conceptual renderings and cost estimates are complete.	$48,500,000	$48,500,000

Project Name	Lead and Project Partners	Water Resource Benefits	Description	Estimated Total Cost	Funding Need
Wayside Park Seawall	City of Pensacola	• Provide resiliency against sea level rise and storms • Create habitat for aquatic species • Improve water quality	The project will focus on the replacement of a failed seawall on the east side of Wayside Park. This same park includes the City of Pensacola's visitor center. In addition to the new seawall, a living shoreline will be incorporated to provide resiliency against the anticipated sea level rise as well as wave action in storms and hurricanes. The living shoreline will also provide habitat for aquatic species and improve water quality.	$14,400,000	$14,400,000
Bayou Texar Project at OJ Semmes Elementary	City of Pensacola	• Provide stormwater treatment and attenuation • Reduce nutrients discharging to Bayou Texar	The project will focus on water quality improvements within the city owned Semmes Park. A significant stormwater basin contributes to and through this park. This discharge ultimately ends up in Bayou Texar with no nutrient reduction opportunities. This project will create stormwater ponds within Semmes Park to intercept this water, provide treatment and attenuation, and then discharge clean water out to Bayou Texar.	$830,000	$830,000

Project Name	Lead and Project Partners	Water Resource Benefits	Description	Estimated Total Cost	Funding Need
Main Street Drainage Improvements Project - Phase 3	City of Pensacola	• Reduce flooding • Improve stormwater quality and nutrient reduction	This phase of flood mitigation for Main Street is focused on both flood reduction and resiliency but has a heavy emphasis on stormwater quality. Specifically, the proposed stormwater conveyance system will be fitted with a proprietary stormwater treatment device, known as a tree well. This tree well incorporates both activated media and tree roots which serve to both filter out and uptake nutrients. In addition, adjacent to the outfall from this, we wish to implement water quality and habitat improvements in the form of rock breakwater features coupled with living shoreline techniques. These rock breakwater features act as a baffle system to improve water quality.	$6,200,000	$6,200,000
E. Texar Drive Stormwater Improvements Project	City of Pensacola	• Provide stormwater treatment and nutrient reduction	The project will focus on water quality improvements for stormwater on E. Texar Drive, between 9th Avenue and OJ Semmes Elementary School. This discharge from a substantial basin ultimately ends up in Bayou Texar with no nutrient reduction opportunities. This project will retrofit the existing stormwater conveyance system with proprietary stormwater filtration devices to provide treatment and nutrient reduction and ultimately discharge clean water out to Bayou Texar.	$4,140,000	$4,140,000

Project Name	Lead and Project Partners	Water Resource Benefits	Description	Estimated Total Cost	Funding Need
S. Devilliers Street Drainage Improvements Project	City of Pensacola	• Reduce flooding • Improve stormwater quality and nutrient uptake	Flooding currently occurs along S. Devilliers Street between Main Street and Government Street. This project, while incorporating flood mitigation, is also focused on stormwater quality. Specifically, the proposed stormwater conveyance system will be fitted with proprietary stormwater treatment devices for filtering out and uptake of nutrients. The initial "inflow" into the system will also be fitted with tree wells which incorporate both activated media and tree roots to both filter out and uptake nutrients.	$2,850,000	$2,850,000
Oakfield Acres/ Palafox Street Drainage	Escambia County	• Upgrade storm system to current drainage standards • Improve conveyance and capacity	The scope of services will analyze the existing capacity of the downstream pipe system, address the current conditions of the conveyance system, and provide solutions to upgrade (when possible) the storm system to current drainage standards, within the Beverly Parkway Basin Study to include, Branches O, N, & P (in order of priority), with Q in parallel with other branches. Branch O would include a new stormwater pond located south of Majors Road with conveyance.	$15,000,000	$15,000,000
St. Mary Avenue Drainage Improvements	Escambia County	• Alleviate flooding • Install new storm drain system and replace ditch	The St. Mary Avenue Drainage Improvements project is in District 3. The purpose of the project is to alleviate flooding in the area with the installation of a new storm drain system as well as removal and replacement of the existing ditch located at the intersections of North S Street and St. Mary Avenue and North Q Street and St. Mary Avenue.	$379,706	$379,706

Project Name	Lead and Project Partners	Water Resource Benefits	Description	Estimated Total Cost	Funding Need
Oakfield Acres/Belle Meade Drainage Improvements	Escambia County	• Upgrade storm system to current drainage standards • Improve stormwater runoff in filled swales	The Oakfield Acres and Belle Meade Subdivisions are existing developments located in the Oakfield Community Redevelopment Agency (CRA) District, located south of Burgess Road, north of Hancock Lane, east of the CSX Railroad and west of Carpenters Creek. Most of the infrastructure built with these developments involved overland stormwater flow in road swales and along the internal roadways. Over the years, these road swales have been filled in and are not allowing for adequate stormwater runoff as originally intended. This scope of services will analyze the existing capacity of the downstream pipe system, address the current conditions of the conveyance system, and provide solutions to upgrade (when possible) the storm system to current drainage standards.	$1,575,000	$1,575,000
Pensacola & Perdido Bays Estuary Program Support	NWFWMD Pensacola & Perdido Bays Estuary Program	• Community engagement, proposal development and coordination activities	Base funding for the Estuary Program to support key activities generally not supported by grant funding. These activities include development of grant proposals, outreach and coordination activities with key stakeholders such as local government staff, NGOs, citizens, etc.	$400,000	$200,000
				$216,449,706	$187,058,965

VI. Monitoring, Metrics and Next Steps

Setting clear resource protection and restoration goals with associated metrics and monitoring to evaluate progress are essential for achieving the stated objectives. Metrics will be developed cooperatively with local governments and other cooperators to track completion and quantify the benefits of funded projects and monitor trends in environmental indicators. This sub-basin work plan will be updated periodically using adaptive management principles to ensure continued effectiveness.

Examples of metrics for the Bayou Texar sub-basin may include:

- Sub-basin-level:
  - Water quality data and trends
  - Aquatic habitat area and trends
- Project level:
  - Project status (percent complete)
  - Quantifiable project benefits achieved
  - Project targets/objectives met
- Funding and expenditures:
  - Percent of current budget allocated
  - Percent of budget remaining
  - Total estimated project funding cost
  - Total estimated remaining project funding needs

Maintaining a publicly accessible website for the program will facilitate effective monitoring of work plan implementation, project status and metrics, funding needs, and water quality and habitat trends. Additionally, the website will enhance public awareness regarding water resources within the Bayou Texar sub-basin. The website will include information regarding:

- Project status
- Funding and expenditures
- Water quality trends

During 2026, the District, local governments, and state and regional agencies will work collaboratively to refine and prioritize critical water resource issues, as well as the strategies and projects to address the identified issues within the Bayou Texar. This work plan is anticipated to be finalized by the summer of 2026. As program funding is obtained, the District and project partners will implement the prioritized projects approved by the District's Governing Board.

Work plans will be updated periodically to reflect progress achieved, new information, or additional proposed projects and remaining funding needs. A program website will be created to track project progress, metrics, and expenditures and to share information regarding trends in water quality and aquatic habitat and water supply improvements achieved by program implementation.

VII. References and Resources

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Appendix A. Sub-Basin Prioritization Process

Overview of Prioritization Process

The District's 114 HUC-10 sub-basins were analyzed for water quality, water supply, and natural areas criteria using multiple different GIS layers. From this initial analysis, the top-ranked basins from each watershed were selected based on a natural break in scores within each watershed. In total, 34 HUC-10 candidate basins were selected from the seven watersheds. The District then hosted public workshops for each watershed to discuss the candidate sub-basins with the public. Online surveys were also created to expand the opportunity for public input on the sub-basins. The District also reviewed planned projects within the 34 candidate sub-basins based on available information from local governments and utilities. The public feedback from the workshops, online surveys, and project information were then scored and added to each sub-basin's GIS analysis scores to create the final overall scores. The top-ranked candidate sub-basin per watershed was then recommended for the development of a sub-basin workplan. The recommended priority sub-basins were presented to and approved by the District Governing Board on December 10, 2025. Additional details regarding the prioritization process are provided below.

Public Input

During October 2025, the District hosted public workshops for each of the seven watersheds to share information about the program and obtain input regarding the prioritization of sub-basins for work plan development. In addition to the public meetings, the District solicited public input regarding the selection of priority sub-basins within each watershed including water resource areas of concern via online surveys. This public input was a major component in the prioritization process. Scoring was based on survey priority rank responses where basins receiving the highest priority votes for their watershed were awarded the highest points.

Consideration of Proposed Projects

The availability of proposed projects within sub-basins was also considered in the prioritization process. The District requested and reviewed information on current and future projects related to water quality improvement, habitat restoration, and water supply from the public, local governments, and utility companies. Scoring was based on project status where basins including shovel-ready projects received the highest points.

Water Quality Criteria

GIS Layers Assessed: FDEP Statewide Basin Management Action Plan (BMAP) General Areas, FDEP Waters Not Attaining Standards (WNAS), FDEP Alternative Restoration Plans, FDEP Total Maximum Daily Load (TMDL), EPA Established Total Maximum Daily Load (TMDL), NWFWMD Drinking Water Facilities, NWFWD Locally Provided Water Infrastructure, NWFWMD Treatment and Pump Stations, FDEM Storm Surge Zones Tiled, FEMA Flood Special Hazard Area

Analysis Process:

GIS layers depicting the features BMAP area, WNAS, Alternative Restoration Plans, FL TMDL, EPA TMDL, and Storm Surge Zones were overlayed on the District HUC-10 layer and inspected to verify what basins contain each target feature. All basins containing the targeted feature were then awarded points for that parameter.

The FEMA Flood Special Hazard layer was queried to isolate areas susceptible to a 1% chance of annual flooding. The new layer was then spatially isolated to the District HUC-10 basin layer. The sub-basins

were then evaluated for total acreage and percent of the sub-basin represented by floodplain and scored using a four-quartile system.

The NWFWMD Drinking Water Facilities, Locally Provided Water Infrastructure, and Treatment and Pump Stations (critical assets) were spatially isolated to the FEMA Flood Special Hazard layer then spatially joined to the District HUC 10 layer. The count of each identified critical asset in the FEMA Flood Special Hazard Layer was then summed per sub-basin and scored using a using a four-quartile system.
Scores for all water quality fields were then summed to create the sub-basins overall water quality score.

Water Supply Criteria

GIS Layers Assessed: NWFWMD Planning Region 2, NWFWMD Water Resource Caution Areas, NWFWMD Areas of Resource Concern, FGS Potentiometric Surface Map, Census Bureau 2010 and 2020 Census Block Points

Analysis Process:

GIS layers depicting the features NWFWMD Planning Region 2, Water Resource Caution Areas, Areas of Resource Concern, and FGS Potentiometric Surface Map were overlayed on the District HUC-10 layer and inspected to verify what basins contain the target feature. The FGS Potentiometric Surface Map was analyzed by identifying all sub-basins intersecting and located south of the zero-contour line. All basins containing the targeted feature were then awarded points for that parameter.

The 2010 and 2020 Census Block points were both joined to the District HUC-10 layer and exported to excel. The difference in population and the percent change from 2010 to 2020 was then calculated and sorted from largest to smallest. Each sub-basin was then scored individually for both parameters where 1 equals the smallest amount of population or percent of population change. The two scores were then averaged together and re-scored using a 1-to-10-point scale where 1 represents the lowest 10% of the averaged population score. Additionally, an estimated future population change was also conducted by analyzing BEBR data. The 2020 Census Block Points were joined with the District counties layer and exported. All exported points were then sorted by county and summed. The percent of the county population was calculated for each point's unique ID number. The determined percentage was then multiplied by the estimated 2045 BEBR County Population Estimate to give each point its estimated 2045 estimated population. Using the points' unique ID number, each point was matched to its sub-basin using the previous join to the District HUC-10 layer. The populations for each sub-basin were then summed. The future estimated population was then assessed using the same process as the one described above for the other population analyses. The sum of both scores was then averaged.
Scores for all water supply fields were then summed to create the sub-basins overall water supply score.

Natural Areas Criteria

GIS Layers Assessed: NWFWMD 2010 Land Use, NWFWMD 2022 Land Use

Analysis Process:

All 6000 level Florida Land Cover Classification System (FLUCCS) codes were isolated for the 2010 and 2022 layers. Both revised layers were then isolated to the District HUC-10 basins. The natural areas exported were then summed by sub-basin. The total acreage difference and percent acreage change was then calculated for each sub-basin and scored on a 1 to point 10 scale where 1 represents the least amount of natural area change. The two scores for each sub-basin were then added together.

Table A.1 GIS Layers Assessed Reference Table

Layer Name	Year Data Updated	Location
FDEP Statewide Basin Management Action Plan (BMAP) General Areas	2025	Statewide Basin Management Action Plan (BMAP) General Areas | Florida Department of Environmental Protection Geospatial Open Data
FDEP Waters Not Attaining Standards (WNAS)	2025	Waters Not Attaining Standards (WNAS) | Florida Department of Environmental Protection Geospatial Open Data
FDEP Alternative Restoration Plans	2025	Alternative Restoration Plans | Florida Department of Environmental Protection Geospatial Open Data
FDEP Total Maximum Daily Load (TMDL)	2025	Florida Total Maximum Daily Load (TMDL) | Florida Department of Environmental Protection Geospatial Open Data
EPA Established Total Maximum Daily Load (TMDL)	2025	EPA Established Total Maximum Daily Loads (TMDLs) | Florida Department of Environmental Protection Geospatial Open Data
NWFWMD Drinking Water Facilities (Isolated from parent data set by District)	2024	Critical Infrastructure | Florida Department of Environmental Protection Geospatial Open Data
NWFWD Locally Provided Water Infrastructure (Isolated from parent data set by District))	2024	Critical Infrastructure | Florida Department of Environmental Protection Geospatial Open Data
NWFWMD Treatment and Pump Stations (Isolated from parent data set by District)	2024	Critical Infrastructure | Florida Department of Environmental Protection Geospatial Open Data
FDEM Storm Surge Zones Tiled	2022	Storm Surge Zones | Florida State Emergency Response Team
FEMA Flood Special Hazard Area	2024	FEMA Flood Zones | Florida Department of Environmental Protection - MapDirect
NWFWMD Planning Regions	2023	Water Supply Planning Regions | NWFWMD - Open Data

NWFWMD Water Resource Caution Areas	2023	Water Resource Caution Area | NWFWMD - Open Data
NWFWMD Areas of Resource Concern	2023	Resource Concern Area | NWFWMD - Open Data
FGS Potentiometric Surface Map (Isolated from parent data set by District)	2025	Upper Floridan Aquifer Potentiometric Surface | Florida Department of Environmental Protection Geospatial Open Data
US Census Bureau 2010 Block Points	2025	USA Census BlockGroup Points - Overview
US Census Bureau 2022 Block Points	2025	USA Census Block Points - Overview
NWFWMD 2010 Land Use	2024	District Land Use 2010 | NWFWMD - Open Data
NWFWMD 2022 Land Use	2024	NWFWMD 2022 Land Use | Florida Department of Environmental Protection Geospatial Open Data

Appendix B: Carpenter Creek & Bayou Texar Watershed Management Plan Volume 3B Water Quality Assessment Report Summary Tables

Table B2-4: Summary of Chl-a, TN, TP, and *E. coli* data and exceedances in Carpenter Creek.

Year	Chl-a (AGM)	Chl-a (count)	TN (AGM)	TN (count)	TP (AGM)	TP (count)	E. coli (count)	E. coli (exceedances)	Percent E. coli Exceedance
2010	ID	0	**0.73**	4	0.008	4	0	ID	ID
2011	ID	0	0.59	4	0.011	4	0	ID	ID
2012	ID	0	**0.69**	4	0.013	4	0	ID	ID
2013	ID	0	**0.74**	4	0.010	4	0	ID	ID
2014	0.46	2	**0.82**	6	0.008	6	45	19	**42**
2015	ID	0	0.63	4	0.008	4	0	ID	ID
2016	ID	0	0.55	4	0.011	4	60	26	**43**
2017	0.76	8	**0.87**	10	0.006	11	64	28	**44**
2018	0.54	9	**0.87**	12	0.008	13	66	23	**35**
2019	0.53	12	**0.94**	14	0.007	14	68	15	**22**
2020	1.38	8	**0.80**	8	0.006	9	60	20	**33**
2021	0.86	5	**0.92**	2	0.006	5	0	ID	ID

Table B2-5: Exceedances of *E. coli* criterion by the station from 2010 to Present in Carpenter Creek.

Station.ID	E. coli (count)	E. coli (exceedances)	Percent E. coli Exceedance
CC @ 9th	85	30	**35**
CC @ Bayou	60	19	**32**
CC @ Burgess	60	9	**15**
CC @ Davis	73	51	**70**
CC @ Olive	60	13	**22**
Other	25	9	**36**

Table B2-6: Summary of Chl-a, TN, TP, and *E. coli* data and exceedances in Bayou Texar.

Year	Chl-a (AGM)	Chl-a (count)	Total TN (count)	TN (exceedances)	Percent TN Exceedance	Total TP (count)	TP (exceedance)	Percent TP Exceedance	Total Enterococci (count)	Enterococci (exceedances)	Percent Enterococci Exceedance
2010	ID	0	8	4	**50**	7	0	0	24	3	**13**
2011	ID	0	8	4	**50**	8	0	0	20	6	**30**
2012	ID	0	8	5	**63**	8	0	0	27	4	**15**
2013	ID	0	8	6	**75**	8	0	0	20	3	**15**
2014	ID	0	8	5	**63**	8	1	**13**	19	7	**37**
2015	ID	0	7	2	**29**	7	0	0	18	7	**39**
2016	ID	0	7	2	**29**	7	0	0	20	5	**25**
2017	2.7	8	15	6	**40**	16	0	0	65	12	**18**
2018	3.0	4	17	10	**59**	17	0	0	86	30	**35**
2019	2.9	4	14	10	**71**	19	0	0	86	25	**29**
2020	4.6	12	24	15	**63**	28	1	4	41	11	**27**
2021	2.3	2	0	ID	ID	4	0	0	0	ID	ID

Table B2-7: Exceedances of *E. coli*, TN, and TP criterion by the station from 2010 to Present in Bayou Texar.

Station.ID	TN (count)	Total TN (exceedances)	Percent TN Exceedance	Total TP (count)	Total TP Exceedances	Percent TP Exceedance	Total Enterococci (count)	Total Enterococci (exceedances)	Percent Enterococci Exceedance
Texar @ 12th	53	49	**92**	55	1	2	48	23	**48**
Texar @ Bayview	41	6	**15**	39	0	0	297	71	**24**
Texar @ Hyde	12	3	**25**	15	1	7	35	7	**20**
Texar @ Seville	12	11	**92**	14	0	0	37	11	**30**
Texar off DeSoto	6	0	0	12	0	0	9	1	**11**

Table B2-8: Summary Mann-Kendall Trend Test results from individual stations and WBIDs using quarterly data.

ID – Insufficient data to perform analysis. * - Analysis was performed on prewhitened data.

Station or WBID	Time Period	Parameter	Sen's Slope	Tau	p-value	Trend
CC @ 9th	2017-2020	Total Nitrogen	**0.07**	**0.61**	**0.05**	**Significant Increasing Trend**
		Total Phosphorus	-0.01	-0.55	0.08	No Significant Trend
		Chlorophyll a (corrected)	0.14	0.22	0.56	No Significant Trend
		E. coli	-48.67	-0.33	0.33	No Significant Trend
		Nitrate-Nitrite	0.04	0.22	0.56	No Significant Trend
		Dissolved Oxygen*	0.05	0.04	0.88	No Significant Trend
CC @ Bayou	2017-2020	Total Nitrogen	ID	ID	ID	ID
		Total Phosphorus	ID	ID	ID	ID
		Chlorophyll a (corrected)	ID	ID	ID	ID
		E. coli	-50	-0.55	0.08	No Significant Trend
		Nitrate-Nitrite	ID	ID	ID	ID
		Dissolved Oxygen*	0.02	0.02	0.96	No significant Trend
CC @ Burgess	2017-2020	Total Nitrogen	ID	ID	ID	ID
		Total Phosphorus	ID	ID	ID	ID
		Chlorophyll a (corrected)	ID	ID	ID	ID
		E. coli	ID	ID	ID	ID
		Nitrate-Nitrite	ID	ID	ID	ID
		Dissolved Oxygen*	0.92	0.2	0.47	No significant Trend
CC @ Davis	2017-2020	Total Nitrogen	-0.01	-0.125	0.73	No Significant Trend
		Total Phosphorus	-0.01	-0.28	0.42	No Significant Trend
		Chlorophyll a (corrected)	ID	ID	ID	ID
		E. coli	-68.5	-0.17	0.61	No Significant Trend
		Nitrate-Nitrite	-0.03	-0.44	0.17	No Significant Trend
		Dissolved Oxygen*	0.10	0.03	0.89	No Significant Trend
CC @ Olive	2017-2020	Total Nitrogen	ID	ID	ID	ID
		Total Phosphorus	ID	ID	ID	ID
		Chlorophyll a (corrected)	ID	ID	ID	ID
		E. coli	-2	-0.08	0.87	No Significant Trend
		Nitrate-Nitrite	ID	ID	ID	ID
		Dissolved Oxygen*	0.37	0.02	0.96	No Significant Trend
Texar @ 12th	2017-2020	Total Nitrogen	0.04	0.17	0.61	No Significant Trend
		Total Phosphorus	-0.01	0	1	No Significant Trend
		Chlorophyll a (corrected)	0.03	0.17	0.61	No Significant Trend
		Enterococci	5.25	0.29	0.30	No Significant Trend
		Nitrate-Nitrite*	0.14	0.17	0.39	No Significant Trend
		Dissolved Oxygen*	-0.90	-0.23	0.22	No Significant Trend
Texar @ Bayview	2017-2020	Total Nitrogen	-0.01	0.00	1.00	No Significant Trend
		Total Phosphorus	ID	ID	ID	ID
		Chlorophyll a (corrected)	ID	ID	ID	ID
		Enterococci	ID	ID	ID	ID
		Nitrate-Nitrite*	-0.01	-0.11	0.72	No Significant Trend
		Dissolved Oxygen	0.475	0.33	0.734	No Significant Trend
CC @ 9th	2010-2020	Total Nitrogen	**-0.02**	**-0.25**	**0.04**	**Significant Decreasing Trend**
		Total Phosphorus	-0.01	-0.22	0.06	No Significant Trend
		Chlorophyll a (corrected)	ID	ID	ID	ID
		E. coli	ID	ID	ID	ID
		Nitrate-Nitrite	**-0.07**	**-0.33**	**<0.01**	**Significant Decreasing Trend**
		Dissolved Oxygen	**-0.03**	**-0.30**	**<0.01**	**Significant Decreasing Trend**
CC @ Davis	2010-2020	Total Nitrogen	0.01	0.06	0.61	No Significant Trend
		Total Phosphorus	-0.01	-0.12	0.31	No Significant Trend
		Chlorophyll a (corrected)	ID	ID	ID	ID
		E. coli	ID	ID	ID	ID
		Nitrate-Nitrite	**0.01**	**0.01**	**0.01**	**Significant Increasing Trend**

Station or WBID	Time Period	Parameter	Sen's Slope	Tau	p-value	Trend
		Dissolved Oxygen	-0.04	-0.09	0.51	No Significant Trend
Texar @ 12th	2010-2020	Total Nitrogen	-0.02	-0.20	0.10	No Significant Trend
		Total Phosphorus	-0.01	-0.09	0.50	No Significant Trend
		Chlorophyll a (corrected)	ID	ID	ID	ID
		Enterococci	ID	ID	ID	ID
		Nitrate-Nitrite	**-0.03**	**-0.32**	**<0.01**	**Significant Decreasing Trend**
		Dissolved Oxygen	-0.13	-0.24	0.07	No Significant Trend
Texar @ Bayview	2010-2020	Total Nitrogen	-0.01	-0.19	0.12	No Significant Trend
		Total Phosphorus*	-0.01	-0.01	0.62	No Significant Trend
		Chlorophyll a (corrected)	ID	ID	ID	ID
		Enterococci	-0.61	-0.61	0.65	No Significant Trend
		Nitrate-Nitrite*	0.05	0.07	0.53	No Significant Trend
		Dissolved Oxygen	**-0.08**	**-0.27**	**<0.05**	**Significant Decreasing Trend**
Carpenter Creek (WBID 676)	2017-2020	Total Nitrogen	-0.09	-0.25	0.40	No Significant Trend
		Total Phosphorus	0.01	0.08	0.86	No Significant Trend
		Chlorophyll a (corrected)	0.11	0.25	0.40	No Significant Trend
		E. coli	-1.5	-0.04	1.0	No Significant Trend
		Nitrate-Nitrite	-0.09	-0.33	0.23	No Significant Trend
		Dissolved Oxygen*	-0.10	-0.07	0.75	No Significant Trend
Bayou Texar (WBID 738)	2017-2020	Total Nitrogen	0.09	0.42	0.13	No Significant Trend
		Total Phosphorus	-0.01	-0.04	1.0	No Significant Trend
		Chlorophyll a (corrected)	0.71	0.5	0.06	No Significant Trend
		Enterococci	-1.5	-0.04	1.0	No Significant Trend
		Nitrate-Nitrite	-0.07	-0.42	0.13	No Significant Trend
		Dissolved Oxygen*	-0.28	-0.08	0.69	No Significant Trend
Carpenter Creek (WBID 676)	2010-2020	Total Nitrogen	0.02	0.15	0.21	No Significant Trend
		Total Phosphorus	**-0.01**	**-0.25**	**0.03**	**Significant Decreasing Trend**
		Chlorophyll a (corrected)	0.05	0.31	0.21	No Significant Trend

Station or WBID	Time Period	Parameter	Sen's Slope	Tau	p-value	Trend
		E. coli*	210	0.19	0.26	No Significant Trend
		Nitrate-Nitrite*	0.20	0.09	0.39	No Significant Trend
		Dissolved Oxygen	**-0.09**	**-0.27**	**0.03**	**Significant Decreasing Trend**
Bayou Texar (WBID 738)	2010-2020	Total Nitrogen*	-0.14	-0.13	0.22	No Significant Trend
		Total Phosphorus	-0.01	-0.15	0.21	No Significant Trend
		Chlorophyll a (corrected)	0.71	0.5	0.06	No Significant Trend
		Enterococci	1.48	0.02	1	No Significant Trend
		Nitrate-Nitrite	**-0.03**	**-0.38**	**<0.01**	**Significant Decreasing Trend**
		Dissolved Oxygen	**-0.07**	**-0.28**	**0.03**	**Significant Decreasing Trend**