Peace River Streambank Restoration and Myakka River Watershed Threats Assessment and Fish Assemblage Monitoring

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ABSTRACT

The Peace River (106 miles) and Myakka River (66 miles) are large blackwater rivers in peninsular Florida. Both watersheds have experienced high levels of habitat degradation due to urbanization, agriculture, industry, and altered flow regimes. The objectives of the Peace River restoration projects were to (1) complete survey, design, and permitting for the 1,000-ft restoration site by the end of the first fiscal year; (2) restore 2 degraded Peace River streambanks by the end of the second fiscal year; and (3) monitor fish communities, permanent cross sections, and photo points at restoration, reference, and impairment sites by the end of the third fiscal year. The objectives of the Myakka River Watershed threats assessment and fish assemblage monitoring project were to (1) identify and inventory the location and severity of habitat degradation throughout the navigable reaches of the Myakka River Watershed by the end of the third fiscal year; (2) identify and inventory location and Sediment Risk Index of public unpaved road-stream crossings by the end of the third fiscal year; (3) develop a prioritized restoration plan for the Myakka River Watershed by the end of the third fiscal year; and (4) conduct fish assemblage monitoring of the Myakka River to evaluate fish population metrics annually for three years.

Restoration along the Peace River was completed in June 2020 at the 450-ft streambank near Zolfo Springs and February 2021 at the 1,000-ft streambank near Arcadia. Prior to restoration, the top of the bank receded horizontally by 1.6-5.5 ft/yr at restoration sites (eroding streambanks that were restored), compared to 2.7-3.4 ft/yr at nearby impairment sites (eroding streambanks that were not restored). After restoration, top-of-bank measurements at restoration sites and nearby reference sites (non-eroding streambanks with desired condition) revealed no measurable changes at either location. Following restoration, the total erosion rate along the entire length of restoration sites declined by 87-89%. Restoration successfully stabilized both streambanks, which resembled impairment sites prior to restoration and resembled reference sites after restoration. Fish community analysis indicated that restoration did not significantly influence catch rates or species composition of fish.

Approximately 45.2 mi of the Myakka River and its tributaries were surveyed during 2019 to 2022, and 67 impairment sites were identified and assessed. Additionally, 35 unpaved road-stream crossings were assessed within the Myakka River Watershed. Prioritized restoration plans were developed and included restoration recommendations for all impairment sites and unpaved road-stream crossings that were evaluated. Annual fish-assemblage monitoring of the Myakka River was completed during 2020 to 2022. A total of 12,816 fish representing 25 families and 46 species were collected during electrofishing surveys.

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INTRODUCTION

Habitat degradation is the primary factor causing the decline of biodiversity in aquatic ecosystems of the southeastern United States (Warren et al. 2000). Many of the rivers and streams in this region, which contain the highest aquatic biodiversity in North America (Warren and Burr 1994, Lydeard and Mayden 1995), have been impacted by the effects of habitat degradation, alteration, conversion, and loss (Estevez et al. 1991). Sedimentation is the leading issue causing degradation, loss of habitat complexity, and impairment of river habitat and biological communities (Waters 1995). Sedimentation occurs naturally in rivers and is dependent on valley slope, bed and bank material, stream morphology, riparian vegetation, water supply, and woody debris (Allan 2004). However, sedimentation rates are exacerbated by anthropogenic drivers (e.g., some agricultural practices, mineral extraction, changes in stream flow, channel alterations, vegetation disturbances, and construction) that may result in river instability (Wood and Armitage 1997). Rosgen (1996) defines river stability as a river's ability in the present climate to convey sediment and streamflows while maintaining dimension, pattern, and profile without aggrading or degrading. The initial step in stabilizing and restoring natural function and biodiversity of rivers affected by habitat degradation is identifying those areas contributing to impairment throughout the system. Once impaired areas are identified, management must correct the problem through prevention, mitigation, stabilization, or restoration (Rosgen 1996).

The State Wildlife Grant program's goal listed the Peace River Watershed and the Myakka River Watershed in the highest-ranking group and second highest-ranking group of basins for habitat enhancement, respectively (FWC 2012). The habitat enhancement ranking system was based on potential for urban development, number of threats, and number of Species of Greatest Conservation Need (SGCN). One of the SWG 2012-2018 goals was to conduct a threats assessment of at least one high-ranking enhancement basin in peninsular Florida. This objective was addressed by a previous SWG, the threats assessment project on the Peace River and Withlacoochee River watersheds (Mallison et al. 2019). The next crucial step following the threats assessment project was to implement restoration based on the results. The primary goals of this project were to (1) restore and monitor 2 severely degraded streambanks

along the Peace River (450 ft and 1,000 ft in length), (2) conduct a threats assessment of the navigable portion of the Myakka River Watershed, and (3) assess the fish communities in the Myakka River. The Peace River restoration project addressed the SWG program's 2025 goals and objectives of Aquatic Habitat Resiliency by improving aquatic ecosystem habitat quality and connectivity for SGCN and supported the objective of restoring and enhancing at least 3,000 feet of stream habitat.

Study Area

The Peace River (106 miles) flows south from its headwaters in Green Swamp to Charlotte Harbor, Florida's second largest open water estuary (Figure 1). The economic value of recreational and commercial fishing in the Charlotte Harbor area was estimated to exceed $1 billion annually by the Southwest Florida Water Management District (SWFWMD 2000). While water quality in the harbor was generally considered "good", SWFWMD (2000) expressed concern regarding reduced streamflow in the Peace River and areas within the river where water quality was labeled as "impaired". Maintaining or enhancing habitat within the Peace River is imperative not only for the river ecosystem, but also for the long-term maintenance of Charlotte Harbor. In addition, the Peace River basin is home to approximately 25 state-listed freshwater obligate SGCN.

The Myakka River (66 miles) is a blackwater river that flows south from its headwaters above Flatford Swamp through a hydrologically diverse range of habitats including Upper and Lower Lake Myakka to Charlotte Harbor (Figure 1). The Myakka River, along with the Peace and Caloosahatchee rivers, comprise the three major rivers that provide freshwater inflow to Charlotte Harbor. While the Myakka River Watershed is relatively undeveloped, its greatest threats include hydrological alteration, agricultural impacts, phosphate mining, and urbanization. The Myakka River Watershed, in general, has very good water quality; however, certain sections of the river are labeled "impaired" due to coliforms, dissolved oxygen, nutrients, total suspended solids, and turbidity (Sarasota County Water Atlas 2022). In 1985, Florida legislature designated the 34-mile stretch of the Myakka River from County Road 780 south to the Sarasota/Charlotte County line as a National Wild and Scenic Waterway, which provides special protections (FLDEP 2011). Additionally, several state-listed freshwater obligate SGCN (n = 25)

occur within the Myakka River Watershed. A threats assessment of the Myakka River Watershed established an inventory and prioritization of restoration sites to be used by local, state, and federal agencies to strategize habitat enhancement.

METHODS

Peace River Streambank Restoration

Following completion of the threats assessment project on the Peace River (Mallison et al. 2019), potential restoration sites were evaluated based on location and severity of degradation. Landowners were approached to discuss opportunities for restoration, and 2 suitable sites were selected: PI057, a 1,000-ft streambank near Arcadia and PI135, a 450-ft streambank near Zolfo Springs. Necessary landowner consent was obtained, and funding applications were submitted to the SWG program and FWC's Aquatic Habitat Restoration and Enhancement Subsection (AHRE) to implement streambank restoration at these sites. Funding of $320,000 for this SWG, including Peace River and Myakka River activities, was approved for the original project period of 1 July 2019 to 30 June 2022 (later extended to 31 March 2023). AHRE funding for Peace River activities was approved for 1 January 2019 to 30 June 2021, including $40,000 for initial project design and startup, and $290,000 match-funding to meet obligations of this SWG.

Objective 1: Complete survey, design, and permitting for the 1,000-ft restoration site by the end of the first fiscal year. Project design was based off a reference-reach survey on the Peace River near each restoration site, with similar drainage areas, using a total station. Data were used to calculate restoration design parameters, which were then provided to an engineering firm to draw the restoration design in AutoCAD. A riparian vegetation survey was conducted on the reference reach to develop a planting plan (Figure 2). The riparian vegetation survey included identification of native species and their relative abundance to determine the best-suited species for restoration. Following the completion of the design and planting plan, a full design package (design, planting plan, and sediment control plan) was submitted to the Florida Department of Environmental Protection (DEP) and the United States Army Corp of Engineers (USACE) to acquire necessary permits. Note that the riparian vegetation

surveys and the 450-ft restoration site survey and design were completed prior to the beginning of SWG funding.

Objective 2: Restore 2 degraded Peace River streambanks by the end of the second fiscal year. Using natural channel design (Rosgen 2011), the project stabilized 2 severely degraded streambanks along the Peace River by installing toe wood structures, following procedures utilized by the United States Fish and Wildlife Service (USFWS) and the Florida Fish and Wildlife Conservation Commission (FWC) on the Chipola River. Toe wood structures were comprised of root wad logs cantilevered over foundation logs, which reduced erosive flows and stabilized the bank while creating an undercut bank for instream cover and fish refugia. Toe wood structures were installed below the low flow channel to inundate the wood for most of the year, thereby preventing decay. Material for toe wood structures and foundation logs was donated by landowners at each site. A bankfull bench floodplain was constructed and a terrace feature was set back above the bench. Erosion control fiber was installed, and a native planting plan included native live stakes, bare root natives, coir-wrapped sod, woody transplants, and seed planting (Figure 3). USFWS was hired under contract to complete restoration activities. FWC personnel watered new plantings up to twice per week as necessary (i.e., when rains did not occur for 3 or more days) to keep them hydrated for 6 weeks following restoration, using a 2-HP gasoline powered "trash pump" with extended hosing to pump river water onto the exposed floodplain (Figure 4). Cattle did not have access to restoration areas and therefore cattle exclusion fencing was not installed.

Objective 3: Monitor fish communities, permanent cross sections, and photo points at restoration, reference, and impairment sites by the end of the third fiscal year. Annual monitoring included fish community, river cross section, and photo point surveys at both locations (Zolfo Springs and Arcadia). All monitoring data were collected at 3 sites per location, which included 1 each of the following categories: restoration (eroding streambank that was restored), reference (non-eroding streambank with desired condition), and impairment (eroding streambank that was not restored). There were 6 monitoring sites total, collectively termed "treatments sites" in the following text. Reference and

impairment sites were in close proximity to restoration sites. All monitoring took place near baseflow water levels.

Fish communities at treatment sites were surveyed annually (beginning 1 year prior to construction) using a 16-ft electrofishing boat with a Smith-Root™ 7.5 GPP unit (Figure 5). Sampling followed FWC's Long-Term Monitoring protocol (Bonvechio 2017) developed for lotic systems to collect comprehensive fish community data (relative fish abundance, diversity, richness, etc.). However, site selection methodologies were non-standard, due to the objectives of monitoring restoration influences. To best survey the impact of restoration, all transects were positioned on the outside meander bend. Because transects spanned the entire river bend, transect length varied by site. All fish collected were measured (nearest millimeter total length) and weighed (wet weight, nearest gram) prior to being released. Fish not readily identifiable in the field were placed on ice and brought back to the lab for identification. At the end of each electrofishing transect, pedal time, starting and ending Global Positioning System (GPS) coordinates, depth range, average depth, shore type, canopy coverage, instream habitat coverage, and substrate type were recorded. Sampling was completed as planned in spring of 2019 and 2021 but was delayed until summer in 2020 (due to travel restrictions during the pandemic) and 2022 (due to low water levels in spring). Following completion of sampling in 2020, it was determined that the electrofishing gear was running at reduced efficiency that year; therefore, valid comparisons across years with 2020 data could not be made. Statistical significance was evaluated at $\alpha = 0.05$ by comparing 95% confidence intervals (mean +/- 2 standard errors).

Relative fish abundance was calculated by species and community using catch per unit distance (CPUD, number of fish collected/km). Statistical significance was evaluated at $\alpha = 0.05$ by comparing 95% confidence intervals (mean CPUD +/- 2 standard errors). Species richness was defined as the total number of fish species collected during a sampling event. The Shannon-Wiener diversity index was used to quantify species diversity as follows:

$$H' = -\sum_{i=1}^{n} pi \; x \ln (pi)$$

where n = the number of species collected and pi = the proportion of the total sample represented by the ith species (Shannon and Weaver 1949). Values of the Shannon-Wiener diversity index (H') for real biological communities often range from 1.5 to 3.5 (Stiling 1999). Evenness (E), based on the Shannon-Wiener Diversity Index, was calculated as follows (Stiling 1999):

$$\mathrm{E} = \frac{H'}{\ln(s)}$$

Evenness refers to the similarity of frequencies of different species within a biological community, and values range between 0 and 1 (with 0 representing no evenness and 1 being complete evenness).

Permanent cross sections were established at treatment sites and surveyed annually (beginning 1 year prior to construction) following a bankfull event. For each survey, a measuring tape was attached to permanent transect endpoints (marked with rebar and GPS coordinates) across the river to measure horizontal distances. Measuring stations were selected along the horizontal wherever there was a noticeable change in slope of the streambank. A laser level (Bosch GRL 250 HV Professional) and stadia rod were used to measure vertical depth to sediments at each measuring station (Figure 6). Vertical bank profile data collected from each cross section allowed researchers to calculate and compare annual erosion rates across treatments, pre and post restoration. Bank erosion rates were calculated using RIVERmorph 2021 software. Sites were chosen to reflect similar near bank shear stress.

Photo point monitoring was established at treatment sites to document changes in vegetation and physical habitats over time. Photo points consisted of repeat digital photography, at the same location, with the same field of view as the original photo. Researchers established 3-5 photo point locations at each treatment site. Photos were taken annually near baseflows, starting 1 year before construction.

Myakka River Watershed Threats Assessment and Fish Assemblage Monitoring

Objective 1: Identify and inventory the location and severity of habitat degradation throughout the navigable reaches of the Myakka River Watershed by the end of the third fiscal year. Field surveys were used to identify and assess the severity of site-specific impairments at locations along the Myakka River and its major tributaries. Field staff followed a rapid assessment methodology

developed by the USFWS (2014) and Watershed Assessment of River Stability and Sediment Supply (Rosgen et al. 2009) to identify, score, and inventory areas of habitat degradation. These methods were used on previous threats assessments on Canoe Creek, Yellow River, Chipola River, Peace River, and Withlacoochee River watersheds.

Stream and river segments were assessed by canoe, boat, airboat, or on foot to identify areas that exhibited evidence of impairment. This included active streambank erosion, streambank mass-wasting, sediment deposition, riparian zone degradation, channel alteration, and potential areas of non-point source pollution (NPSP). At each impairment site identified during the survey, scientific data were collected to complete habitat evaluation data sheets, digital photographs were taken, and GPS coordinates were recorded. Data collected at each impairment site included the following categories: (1) quantitative in-stream features (bankfull width and height, water depth at thalweg, percent canopy cover, percent macrophyte cover, and reach length of impact); (2) qualitative in-stream features (channel stability, in-stream woody material, substrate composition, bank material, fish passage ability, presence of dams or similar stream barriers, channel alteration, and shoring structures); (3) quantitative riparian features (buffer width, floodplain width, bank angle, percent bank root density, bank height, bank surface protection, and land use characterization); (4) qualitative riparian features (riparian land use, condition of forest, floodplain access, bank erosion, and livestock access); (5) presence of stream barriers and crossings, unpaved roads or paths, pipe discharges, and trash debris; and (6) paved road-stream crossing details.

Data were analyzed using a scoring system developed for threats assessments in the Florida panhandle (USFWS 2014). For each site, the scoring system generated a “Severity Score” representing the degree of impairment based on scoring of 11 risk factors (Table 1). The “Severity Scale” ranged from 0 to 16.5 and was divided into 3 categories (Herrington et al. 2011): “Low” (scores 0-4.0), “Moderate” (scores 4.25-7.25), and “High” (scores 7.5-16.5). Results from this scoring system were used to develop an inventory of site-specific impairments in the Myakka River Watershed. Additionally, a restoration recommendation was provided for each impairment site based on 3 summarized options (Table 2),

following procedures used on the Peace River and Withlacoochee River threats assessment (Mallison et al. 2019).

2020 Land Use and Land Cover (LULC) classifications for southwest Florida were downloaded from the Southwest Florida Water Management District's website (SWFWMD 2023). ArcGIS (ESRI 2011) was used to calculate the proportion of LULC classes within 500 ft of the surveyed area in the Myakka River Watershed. A Chi-squared goodness of fit test (Zar 1999) was used to test the null hypothesis, location of impairment sites is independent of LULC type, as follows:

$$X^2 = \sum_{i=1}^{n} \frac{(Oi - Ei)^2}{Ei}$$

where n = the number of LULC classes, Oi = the observed number of impairment sites within LULC class i, and Ei = expected number of impairments within LULC class i (based on the proportion of occurrence of LULC class i within the surveyed area times the total number of impairment sites that occurred). The resulting statistics were evaluated for significance at $\alpha = 0.05$.

Objective 2: Identify and inventory location and Sediment Risk Index of public unpaved road-stream crossings by the end of the third fiscal year. Unpaved road-stream crossing sites were located using GIS, Google Earth, gazetteers, and ground-truthing. At each site, data were collected to complete habitat evaluation data sheets, digital photographs were taken, and GPS coordinates were recorded. Data collected at each unpaved road-stream crossing included the following categories: (1) qualitative features (channel morphology and alteration); (2) quantitative and qualitative crossing structure features (crossing type, material, dimensions, upstream skew angle, crossing fill condition, and crossing inlet/outlet condition); and (3) quantitative and qualitative road approach features (dimensions, potential erodible volume, soil type, slope, surface material, and outlet and ditch material).

Data were analyzed using a scoring system based on the Sediment Risk Index (SRI) Manual for Unpaved Road-Stream Crossing Assessment developed by the USFWS and Three Rivers Resource Conservation and Development Council (Witmer 2009). For each site, the scoring system generated an

SRI value that represented the degree of severity of impairment based on 18 risk factors, which were given a score ranging from 0 to 5 (Figure 7). The SRI scale ranged from 12-60 and was subjectively divided into 3 categories: “Low Risk” (scores 46-60), “Moderate Risk” (scores 37-45), and “High Risk” (scores 12-36). Results from this index were used to develop an inventory and condition assessment of all accessible unpaved road-stream crossing sites in the Myakka River Watershed. For unpaved road-stream crossing sites, restoration recommendations aim to reduce common stream impacts such as sedimentation, erosion, channel alteration, fish passage blockages, loss of aquatic habitat, and lack of floodplain connectivity.

Objective 3: Develop a prioritized restoration plan for the Myakka River Watershed by the end of the third fiscal year. Identified impairment sites and unpaved road-stream crossing sites were prioritized based on severity and SRI scores, respectively. The prioritized basin restoration plan followed previous threats assessments of Canoe Creek and the Yellow, Withlacoochee, and Peace rivers. This information may be used by local, state, and federal agencies to implement and prioritize future restoration. Restoration for the Myakka River was prioritized into 3 categories including: impairment site heatmap focal areas, unpaved road-stream crossing site focal areas, and unpaved road-stream crossing site tertiary locations. Impairment site heatmap focal areas were defined as clusters of impairment sites with similar severity scores and were used to identify “hot spots” where localized stretches of streambank scored highest in terms of impairment site abundance, length, and calculated severity scores. Unpaved road-stream crossing site focal areas consisted of accessible intersections of unpaved roads and the rivers or tributaries grouped within sub-watersheds. Any remaining unpaved road-stream crossing sites were defined as unpaved road-stream crossing tertiary locations.

Objective 4: Conduct fish assemblage monitoring of the Myakka River evaluating fish population metrics annually for three years. Electrofishing surveys were conducted annually for a 3-year period on the Myakka River. The primary focus of this sampling was to collect comprehensive fish assemblage data (relative fish abundance, diversity, richness, etc.) within the entire navigable length of

the river. Fish were collected following standardized FWC Long-Term Monitoring protocol (Bonvechio 2017) developed for lotic systems. Each year, 30 randomly selected transects were sampled using pulsed, direct current, boat-mounted electrofishing (16-ft aluminum electrofishing boat with a Smith-Root™ 7.5 GPP unit). Electrofishing surveys utilized 100-meter (328 ft) transects along the shoreline. All fish collected were measured (nearest millimeter total length) and weighed (wet weight, nearest gram) prior to being released. Fish not readily identifiable in the field were placed on ice and brought back to the lab for identification. At the end of each electrofishing transect, pedal time, depth range, average depth, shore type, canopy coverage, instream habitat coverage, and substrate type were recorded. Sampling took place during the fall season when the river was typically near baseflow water levels. Relative fish abundance, species richness, diversity, and evenness were calculated as described above for the Peace River fish community monitoring.

RESULTS

Peace River Streambank Restoration

Objective 1: Complete survey, design, and permitting for the 1,000-ft restoration site by the end of the first fiscal year. The reference-reach survey at the 1,000-ft restoration site was completed in February 2020. Note that the survey for the 450-ft restoration site was completed prior to this SWG (March 2019). In April 2019, 67 native plant species were identified during riparian vegetation surveys at both restoration sites and reference sites (Table 3). Restoration designs were developed based on survey results and submitted in applications for required permits (Appendices A and B). Additionally, a consulting firm conducted a Cultural Resource Assessment Survey at both restoration sites in October 2019, and no surveyed areas were regarded as eligible for listing on the National Register of Historic Places. The permit application for the 450-ft restoration site was approved by DEP Permit No. 25-0381137-001-EI issued on 31 January 2020, and US Army Corps of Engineers Permit No. SAJ-2019-03235 issued on 10 March 2020. The permit application for the 1,000-ft restoration site was approved by

US Army Corps of Engineers Permit No. SAJ-2020-03955 issued on 25 October 2020, and DEP Permit No. 0392827-001-EI issued on 20 November 2020.

Objective 2: Restore 2 degraded Peace River streambanks by the end of the second fiscal year. Construction and planting at the 450-ft restoration site near Zolfo Springs was completed in June 2020 (Figure 8) at a cost of $138,995.46 ($308.88/ft). Revegetation included installation of 1,065 plants and 100 pounds of native plant seed mix (Table 4). During spring 2021, site inspection revealed some loss of woody plantings. In May 2021, supplemental planting was funded by AHRE ($2,496.00) and included installation of 160 plants consisting of bald cypress (*Taxodium distichum*), red maple (*Acer rubrum*), wax myrtle (*Myrica cerifera*), and pop ash (*Fraxinus caroliniana*). Construction and planting at the 1,000-ft restoration site near Arcadia was completed in February 2021 (Figure 9) at a cost of $305,000.00 ($305.00/ft). Revegetation included installation of 1,860 plants and 200 pounds of native plant seed mix (Table 5).

Objective 3: Monitor fish communities, permanent cross sections, and photo points at restoration, reference, and impairment sites (treatment sites) by the end of the third fiscal year. During 2019 to 2022, 9,535 fish representing 20 families and 37 species were collected in fish community samples on the Peace River (Table 6). This included 28 freshwater, 6 marine, and 3 euryhaline species. Most (27) species were collected at both locations, while 5 were specific to Zolfo Springs and 5 were only collected at Arcadia. Classification by group included 14 insectivores, 13 omnivores, 8 piscivores, and 2 herbivores.

Annual fish community monitoring at Zolfo Springs indicated that coastal shiner (*Notropis petersoni*) and spotted sunfish (*Lepomis punctatus*) were the most abundant species at all treatment sites before restoration (2019), comprising a combined 48-55% of the catch by number (Table 7). After restoration (2022), coastal shiner and eastern mosquitofish (*Gambusia holbrooki*) were the most abundant species collected at the impairment and reference sites, comprising 45% of the catch. At the restoration site, sailfin catfish (*Pterygoplichthys* spp.) and eastern mosquitofish were most abundant and combined

for 48% of the catch. In 2019, snook (*Centropomus undecimalis*) and Florida gar (*Lepisosteus platyrhincus*) were the dominant species by weight at all treatment sites, with a combined 56-79% of the catch by biomass (Table 8). In 2022, sailfin catfish and Florida gar were the dominant species at the reference and restoration sites, with a combined 47-56% of the catch by biomass. At the impairment site, snook and sailfin catfish dominated the catch by weight (46%) in 2022. From 2019 to 2022, species richness declined from 21 to 20 at the restoration site but increased at the impairment site (18 to 22) and the reference site (22 to 24). Diversity index values declined from 2.6 to 2.2 at the restoration site, increased from 2.1 to 2.3 at the impairment site, and did not change at the reference site (2.3). Evenness index values declined from 0.86 to 0.73 at the restoration site, increased from 0.72 to 0.75 at the impairment site, and did not change at the reference site (0.74).

Before restoration, catch rates were not significantly different ($P>0.05$) between treatment sites at Zolfo Springs for groups of fish nor for all fish combined (Table 9). The only significant differences ($P<0.05$) by species were for bluegill (*Lepomis macrochirus*) and largemouth bass (*Micropterus salmoides*), where higher CPUD was observed at the reference site than at the impairment site. In 2022, CPUD was not significantly different between treatment sites for all fish combined, invertivores, or piscivores (Table 10). CPUD for herbivores, driven by sailfin catfish, was higher at the restoration site than the 2 other sites. CPUD for omnivores, driven by Seminole killifish (*Fundulus seminolis*), was higher at the reference site than the 2 other sites. Comparing CPUD within sites revealed significant increases over the study period at the impairment and restoration sites for sailfin catfish and white catfish (*Ameiurus catus*). Decreased CPUD was observed at the restoration and impairment sites for longnose gar (*Lepisosteus osseus*) and at the restoration and reference sites for spotted sunfish. The most noteworthy observation was increased abundance and biomass (from 2019 to 2022) of non-native sailfin catfish at all sites, with significantly higher catch rates of this species observed at the restoration and impairment sites.

Annual fish community monitoring at Arcadia indicated that coastal shiner and eastern mosquitofish were the most abundant species at the impairment and restoration sites in 2020 (before restoration), comprising a combined 34-43% of the catch by number (Table 11). At the reference site,

Florida gar and redear sunfish (*Lepomis microlophus*) were the most common species collected (combined 31% of the catch). In 2022 (after restoration), coastal shiner was the most abundant species collected at all treatment sites, comprising 30-44% of the catch by number. The second-most abundant species varied by site and included eastern mosquitofish at the impairment site (13%), hogchoker (*Trinectes maculatus*) at the reference site (11%), and sailfin catfish at the restoration site (15%). In 2020, the dominant species by weight was Florida gar at the impairment site (24% of the biomass) and the reference site (38%), and grass carp (*Ptenopharyngodon idella*) at the restoration site (31%; Table 12). At all treatment sites, snook was the second-most dominant species by weight (24-32%). In 2022, sailfin catfish and redear sunfish were the dominant species by weight at the impairment and restoration sites, with a combined 58-66% of the catch by biomass. At the reference site, snook and sailfin catfish dominated the catch by weight (46%) in 2022.

Before restoration, CPUD was not significantly different between treatment sites at Arcadia for herbivores, invertivores, omnivores, or all fish combined (Table 13). Piscivores had a significantly higher CPUD at the reference site than at the 2 other sites. In 2022, CPUD was not significantly different between treatment sites for groups of fish nor for all fish combined (Table 14). The only significant difference by species was for spotted sunfish, where higher CPUD was observed at the reference site than at the impairment site. In 2022, species richness was 25 at the reference site and 24 at both the impairment and restoration sites. The diversity index value was higher at the reference site (2.4) than the restoration site (2.2) and the impairment site (2.1). The evenness index value was also higher at the reference site (0.76) than the restoration site (0.68) and the impairment site (0.65). These parameters were not calculated for 2020 (pre-restoration) due to equipment issues experienced during that year.

Annual monitoring captured 2 permanent cross section surveys before and 2 surveys after restoration at treatment sites near Zolfo Springs (Figure 10). At the 450-ft restoration site, the bank profile receded horizontally by 5.5 ft during the year before restoration and did not change during the year after restoration. In comparison, bank profile measurements revealed no change at the reference site but receded by 3.8 ft/yr at the impairment site. Erosion rates based on bank profile data averaged 0.3 ft/yr at

the impairment site and 0.1 ft/yr at the reference site (Table 15). The erosion rate at the restoration site resembled that of the impairment site before restoration and that of the reference site after restoration. Prior to restoration, the total erosion rate along the entire length of the restoration site (102 tons/yr) was similar to that of the impairment site (108 tons/yr). After restoration, the total erosion rate along the entire length of the restoration site declined by 87% to 14 tons/yr and was similar to that of the reference site (17 tons/yr). Annual photo points illustrated conditions over time at each of the treatment sites (Figure 11, restoration site; Figure 12, reference site; and Figure 13, impairment site).

Annual monitoring captured 1 permanent cross section survey before and 2 surveys after restoration at treatment sites near Arcadia, with an additional survey at the restoration site prior to construction (Figure 14). At the 1,000-ft restoration site, the bank profile receded horizontally by 1.6 ft/yr prior to restoration and did not change after restoration. In comparison, bank profile measurements revealed no change at the reference site but receded by 2.6 ft/yr at the impairment site. Erosion rates based on bank profile data averaged 0.5 ft/yr at the impairment site and -0.1 ft/yr (demonstrated aggradation) at the reference site (Table 16). Prior to restoration, erosion at the restoration site (0.4 ft/yr) resembled that of the impairment site. After restoration, the erosion rate declined to 0.1 ft/yr. Prior to restoration, the total erosion rate along the entire length of the restoration site (286 tons/yr) was most like that of the impairment site (385 tons/yr). After restoration, the total erosion rate along the entire length of the restoration site declined by 89% to 32 tons/yr. Annual photo points illustrated conditions over time at each of the treatment sites (Figure 15, restoration site; Figure 16, reference site; and Figure 17, impairment site).

Myakka River Watershed Threats Assessment and Fish Assemblage Monitoring

Objective 1: Identify and inventory the location and severity of habitat degradation throughout the navigable reaches of the Myakka River Watershed by the end of the third fiscal year. Approximately 45.2 mi of the Myakka River and its tributaries were assessed for impairments during 2019 to 2022. This included 40.9 mi of navigable portions and 4.3 mi of non-navigable portions

where permission to access was granted (Figure 18). A total of 67 impairment sites were identified, including 41 (61%) ranked "Low Severity," 20 (30%) ranked "Moderate Severity," and 6 (9%) ranked "High Severity" (Figure 19). Impairment sites totaled 16,331 ft in length, which included 8,059 ft ranked "Low Severity", 6,735 ft ranked "Moderate Severity", and 1,537 ft ranked "High Severity." Individual site summaries with restoration recommendations were completed for the 67 assessed impairment sites (Appendix C).

LULC data indicated that wetland was the dominant landscape class, comprising 72% of the area within 500 ft of the surveyed region in the Myakka River Watershed (Table 17). Impairment sites occurred in areas classified as pasture (15 impairment sites), forest (3), and wetland (49). Observed occurrence of impairment sites was significantly different than the expected occurrence based on the proportion of landscape classes ($X^2 = 83.0$, $P < 0.005$). Additionally, observed occurrence of impairment sites ranked "Moderate Severity" or "High Severity" was significantly different than the expected occurrence ($X^2 = 161.9$, $P < 0.005$). The number and severity of impairment sites were disproportionally higher in pastures than in the other landscape classes. Although pasture comprised only 3% of the surveyed area, this landscape type contained 58% of the impairment sites that were ranked "Moderate Severity" or "High Severity."

Objective 2: Identify and inventory location and Sediment Risk Index of public unpaved road-stream crossings by the end of the third fiscal year. All public and accessible private unpaved road-stream crossing sites in the Myakka River Watershed were surveyed, ranked with the SRI, and evaluated for fish passage blockage. During 2019 to 2022, 35 unpaved road-stream crossings were assessed (Figure 19). SRI scores were categorized as "Low Risk" for 31 sites (89%) and "Moderate Risk" for 4 sites (11%). No "High Risk" sites were identified. Fish passage barriers were identified at 6 sites, including 5 culvert outfall drops and 1 dam. It is important to note that dozens of additional unpaved road-stream crossings were identified but could not be assessed for SRI or fish passage blockages due to

their location on private lands where access was not authorized. Individual site summaries were completed for the 35 assessed unpaved road-stream crossings (Appendix D).

Objective 3: Develop a prioritized restoration plan for the Myakka River Watershed by the end of the third fiscal year. Data analysis revealed 5 impairment site heatmap focal areas comprising 9.3 mi, or 21% of the surveyed area, within the Myakka River Watershed (Figure 20). These impairment site focal areas contain the largest contributors to habitat degradation in the watershed, including all impairment sites that were identified in this study, and therefore are critical to management and restoration of the Myakka River. Focal areas were subjectively numbered and organized based on the degree that the heatmap highlighted impaired areas. Generally, the numbering of focal areas followed a highest to lowest degree of impairment per area. However, this should not be misinterpreted to indicate that restoration must follow that order. Appropriate restoration will ultimately depend upon agency motivation, landowner participation, and availability of funding. Overall, any restorative actions that provide functional lift to the watershed are encouraged.

Myakka River 1 focal area is a 1.9-mi reach located in the upper Myakka River in Manatee County, north of the Myakka River State Park (Figure 21). The primary riparian land use types in this focal area were pasture and to a lesser degree natural forest and residential. Myakka River 1 focal area contained 24 impairment sites with severity scores ranging from 5.0 to 8.5, including 19 sites ranked "Moderate Severity" and 5 sites ranked "High Severity" (Table 18). Impairment sites totaled 7,422 ft in length, including 6,035 ft ranked "Moderate Severity" and 1,387 ft ranked "High Severity." The primary causes of impairment were degraded riparian buffers, obvious NPSP (cattle waste), high to extreme Bank Erosion Hazard Index (BEHI) scores, and poor Pfankuch-Channel Stability ratings. The main cause of channel instability in this focal area was likely related to the impact of cattle grazing in the riparian corridor. This has led to active and mass-wasting bank erosion throughout the reach, as well as excess sediment to the channel, resulting in filling of channel habitats. Insufficient fencing was observed in this area to prevent cattle from accessing the river corridor. Regular cattle grazing within the riparian corridor

prevents establishment of vegetation that may otherwise stabilize streambanks. Due to excess sediment in this reach, several long, straight, shallow, and over-widened streambed features have formed between meander bends; these may deter aquatic species passage during periods of low flow. Additionally, river segments downstream of the focal area have been placed on the EPA 303d list of impaired waters for dissolved oxygen, coliform bacteria, and nutrients (macrophytes), which may be related to cattle waste and sediment from bank erosion entering the river. All impairment sites were located on a single privately-owned property, which could potentially make large-scale restoration a possibility if landowner participation is favorable.

Myakka River 2 focal area is a 0.5-mi reach located in the upper Myakka River Watershed in Manatee County, at the confluence of Ogleby Creek and the Myakka River (Figure 22). The primary riparian land use type in this focal area was natural forest with evidence of historic pastureland. Myakka River 2 focal area contained 15 impairment sites with severity scores ranging from 2.5 to 3.0, which all ranked “Low Severity” (Table 18). Impairment sites totaled 2,189 ft in length. The primary causes of impairment were historically eroded banks, high to very high BEHI scores, and fair Pfankuch-Channel Stability ratings. All sites lacked evidence of NPSP (cattle waste). The main causes for channel instability in this focal area were channel incision potentially due to historic cattle grazing. Although evidence of cattle was not observed during surveys, signs of historic cattle use were documented (e.g., open pasture with overgrown vegetation due to lack of grazing). Additionally, river segments downstream of the focal area have been placed on the EPA 303d list of impaired waters for dissolved oxygen, coliform bacteria, and nutrients (phosphorus and nitrogen). All impairment sites in this focal area were located on a single privately-owned property, which could potentially make large-scale restoration a possibility if landowner participation is favorable. This section of the watershed was surveyed on foot. The furthest upstream assessments were completed on Ogleby Creek, which was a higher order stream than the Myakka River at the confluence of the two channels.

Myakka River 3 focal area is a 0.1-mi reach located downstream of Myakka River 2 focal area at Crane’s Park, where state route 70 crosses the Myakka River (Figure 23). The primary riparian land use

types in this focal area were natural forest and recreational. Myakka River 3 focal area contained a single impairment site that was 700 ft in length and ranked “Moderate Severity” (Table 18). The primary causes of impairment and channel instability were actively-eroding banks, a high BEHI score, degraded riparian zones, moderate NPSP, and a fair Pfankuch channel stability rating. This focal area’s Pfankuch channel stability rated fair due to a lack of vegetated bank protection, mass erosion within the vicinity, debris jam potential, and a severe slope gradient. Additionally, river segments downstream of the focal area have been placed on the EPA 303d list of impaired waters for coliform bacteria. This impairment site is located on a Manatee County-owned property, which could provide an opportunity for multi-agency partnering in restoration efforts.

Myakka River 4 focal area is a 5.0-mi reach located in the lower Myakka River in Sarasota County (Figure 24). The primary riparian land use types in this focal area were natural forest and to a lesser degree residential, recreational, and utility. Myakka River 4 focal area contained 21 impairment sites with severity scores ranging from 1.5 to 3.25, which all ranked “Low Severity” (Table 18). Impairment sites totaled 4,995 ft in length. The primary causes of impairment and channel instability were actively-eroding to mass-wasting banks, moderate to very high BEHI scores, and degraded riparian zones. All sites had good Pfankuch channel stability ratings and lacked evidence of NPSP (cattle waste). Three sites were listed as stream and lake swamps (bottomland), and the presence of forest clearings could indicate historical use as pastureland. Overall, the riparian habitat in MR4 was in very good condition. The identified impairment sites were primarily related to recreational use, residential areas, and roads. Additionally, river segments downstream of the focal area have been placed on the EPA 303d list of impaired waters for mercury (in fish tissue). Fourteen sites in this focal area were located on Florida government-owned properties (Sarasota County and City of Venice), which could provide an opportunity for multi-agency partnering in restoration efforts. The 7 additional sites were located on 6 separate, privately-owned properties. As a result, large-scale restoration at these sites would require extensive cooperation and coordination among landowners.

Myakka River 5 focal area is a 1.8-mi reach located in the lower Myakka River in Sarasota County, upstream of Myakka River 4 focal area (Figure 25). The primary riparian land use types in this focal area were natural forest and to a lesser degree recreational. Myakka River 5 focal area contained 6 impairment sites with severity scores ranging from 1.5 to 7.5, including 5 ranked "Low Severity" and 1 ranked "High Severity" (Table 18). Impairment sites totaled 1,025 ft in length, including 875 ft ranked "Low Severity" and 150 ft ranked "High Severity." The primary causes of impairment and channel instability were actively-eroding banks, moderate to high BEHI scores, and degraded riparian zones. Additionally, river segments downstream of the focal area have been placed on the EPA 303d list of impaired waters for mercury (in fish tissue). Four sites were located on Florida government-owned properties (Sarasota County and Board of Trustees of the Internal Improvement Trust Fund of the State of Florida Division of Recreation and Parks), which could provide an opportunity for multi-agency partnering in restoration efforts. Two sites were located on one privately-owned property, which could make large-scale restoration a possibility if landowner participation is favorable.

At the northern extent of Myakka River 5 focal area, 1 impairment site ranking "High Severity" (MR026) was identified. In addition to the causes of impairment previously stated, this site had recent channelization with no recovery, slight evidence of NPSP (cattle fenced out), shoring structures (riprap), and a fish passage barrier. The main causes of impairment and channel instability were related to the presence of a failing water control structure, locally known as "Down's Dam". A breach on the east end of the structure has caused severe channel alterations and a loss of hydric hammock. It is important to note that ownership of the dam is unclaimed; the eastern shoreline is state property, and the western shoreline is private.

Unpaved road-stream crossings in the Myakka River Watershed were divided into 7 focal areas based on sub-watersheds (Figure 26). Additionally, there were 4 tertiary locations where unpaved road-stream crossings were located outside of the focal areas. The Harris Camp Focal Area contained the highest number (9) of unpaved road-stream crossing sites assessed within a sub-watershed (Table 19). "Moderate Risk" rankings (SRI scores ranging from 37 to 45) were only observed at 2 sites within

Wingate Creek Focal Area and 2 tertiary locations. In all other focal areas and tertiary locations, SRI scores ranged from 48 to 60 and ranked "Low Risk." The main causes of impairment were upstream and downstream channel alteration, inlet and outlet sedimentation, high skew angles, crossing fill condition, and potential for sedimentation from road approaches. There were 6 fish passage barriers identified in the study, including 5 caused by culvert outfall drops (3 within Harris Camp focal area and 2 within Wingate Creek focal area) and 1 caused by a dam (within Deer Prairie Creek focal area). Additionally, within Tatum Sawgrass Swamp focal area, sand bars were present which may serve as potential barriers to fish passage during low-water periods.

Objective 4: Conduct fish assemblage monitoring of the Myakka River evaluating fish population metrics annually for 3 years. Electrofishing surveys from 2020 to 2022 on the Myakka River yielded 12,816 fish representing 25 families and 46 species, including 29 freshwater, 11 marine, and 6 euryhaline species (Table 20). The eastern mosquitofish was by far the most abundant fish species collected, representing 70% of the species composition by number at a catch rate of 998 fish/km over the 3 sampling years. Following Hurricane Ian in 2022, the catch rate of 1,995 fish/km for eastern mosquitofish was approximately 300% higher than the mean catch rate from the previous 2 years, and percent composition by number that year was 86%. The second-most abundant fish species was bluegill, comprising 5% of the species composition by number at a catch rate of 75 fish/km. Popular freshwater sport fish species (bluegill, redear sunfish, largemouth bass, spotted sunfish, and warmouth [*Lepomis gulosus*]) made up 8% of fishes collected by number. Florida gar and snook were the dominant species by weight, with each comprising 31% of the total catch biomass. The highest composition marine species by weight was snook, while the hogchoker was the most abundant marine species (2% of the catch by number).

Fish communities in the Myakka River displayed low diversity (1.5) and evenness (0.39) over the study. However, these indices were heavily skewed by the unusually high catch of eastern mosquitofish in 2022. Diversity index values were 2.2 in 2020 and 2.0 in 2021 before sinking to 0.8 in 2022. Similarly,

evenness index values were 0.60 in 2020 and 0.56 in 2021 before dropping to 0.22 in 2022. Assuming 2022 was an outlier year, combined data from 2020 and 2021 (diversity = 2.1 and evenness = 0.57) would provide more representative indices for the Myakka River. Exotic fish species made up 4% of the catch by number and 19% of the biomass, and included sailfin catfish, mayan cichlid (*Cichlasoma uropthalmus*), African jewelfish (*Hemichromis bimaculatus*), blue tilapia (*Oreochromus aurea*), Asian swamp eel (*Monopterus albus*), walking catfish (*Clarias batrachus*), and brown hoplo (*Hoplosternum littorale*).

DISCUSSION AND CONCLUSIONS

Peace River Streambank Restoration

Restoration of the 450-ft site near Zolfo Springs and the 1,000-ft site near Arcadia was successful in stabilizing these streambanks along the Peace River. Prior to restoration, mass wasting at the restoration sites was comparable to that observed at corresponding impairment sites at each location. During that time, the top of the bank receded horizontally by 1.6-5.5 ft/yr at restoration sites, compared to 2.7-3.4 ft/yr at impairment sites. After restoration, top-of-bank measurements at restoration sites and reference sites revealed no changes at either location. The total erosion rate along the entire length of the restoration sites declined by 87% (Zolfo Springs) and 89% (Arcadia) following restoration. Conditions at restoration sites resembled those of impairment sites prior to restoration and resembled those of reference sites after restoration (i.e., restoration was effective in reducing erosion and achieving the desired condition).

Fish community analyses indicated that restoration did not significantly influence electrofishing catch rates nor species composition of fish. The most noteworthy change observed at a restoration site was a significant increase of non-native sailfin catfish at the 450-ft streambank near Zolfo Springs. This was not attributed to restoration activities because a significant increase of sailfin catfish was also observed at the impairment site near Zolfo Springs. Results were based on a small sample size, which presents challenges in detecting changes in fish communities due to high variance of data. Seasonal water levels varied by year and sampling was completed at base flows, which occurred in spring 2019 and 2021 but occurred in summer

2020 and 2022. Additionally, potential effects of restoration may require more time to attain, whereas this study was limited to 1-2 years post restoration. A more thorough evaluation may reveal changes to fish communities that were not observed during this study.

Myakka River Watershed Threats Assessment

Approximately 45.2 mi were surveyed in the Myakka River Watershed, and 67 impairment sites (1.5/mi) were identified and assessed. Most areas ranked "Low Severity," including 61% of the number of impairment sites and 49% of the total impaired streambank length. In comparison, 167.7 mi were surveyed on the Peace River and 512 impairment sites (3.1/mi) were identified and assessed (Mallison et al. 2019). Areas ranked "Low Severity" included 35% of the number of impairment sites and 29% of the total impaired streambank length. On the Withlacoochee River, 131.6 mi were surveyed and 24 impairment sites (0.2/mi) were identified and assessed (Mallison et al. 2019). Areas ranked "Low Severity" included 63% of the number of impairment sites and 64% of the total impaired streambank length. On the Yellow River, 209 mi were surveyed and 140 impairment sites (0.7/mi) were identified and assessed (Herrington et al. 2011). Areas ranked "Low Severity" included 63% of the number of impairment sites (total impaired streambank length was not reported). The number of impairment sites per surveyed mile on the Myakka River was about half that of the Peace River, twice that of the Yellow River, and 8 times that of the Withlacoochee River. The percentage of impairment sites ranked "Low Severity" was similar (61-63%) on these systems except for the Peace River (35%), which had a greater number and higher percentage of severe impairments.

During the Myakka River Watershed threats assessment, 35 unpaved road-stream crossings were evaluated, including 31 (89%) that were ranked "Low Risk." In comparison, 62 unpaved road-stream crossings were evaluated in the Peace River Watershed, including 45 (73%) ranked "Low Risk" (Mallison et al. 2019). In the Withlacoochee River Watershed, 20 unpaved road-stream crossings were evaluated, including 16 (80%) ranked "Low Risk" (Mallison et al. 2019). On all 3 of these systems, it was noted that several additional unpaved road-stream crossings were identified through aerial imagery analysis, but they occurred on private lands where permission to access was not obtained; therefore, the actual number

of unpaved road-stream crossings in the watershed was higher than the number evaluated. Many more (339) unpaved road-stream crossings were evaluated on the Yellow River, including a much smaller proportion (24%) ranked “Low Risk” (Herrington et al. 2011). Data indicated that unpaved road-stream crossings in the Yellow River, located in the Florida panhandle, were more frequent and more severe than those observed on the other systems, located in the Florida peninsula.

Areas of potential restoration within the Myakka River Watershed were prioritized into 5 focal areas which contained all impairment sites identified during the study. Focal areas totaled 9.3 mi in length and highlighted the 21% of the surveyed area where restoration is recommended. Restoration option 1 (Table 2) was generally recommended for impairment sites that occurred on the outside meander bend of the river, due to the high near-bank shear stress environment. Natural channel design methodologies are preferred over installation of hard structures such as gabions, concrete lined channels, rip rap, and log cribs. Conversely, areas of low near-bank shear stress, often located in straight sections of the river or inside meander bends, were generally recommended to be restored with option 2 or 3 (Table 2). On the Myakka River, option 1 was recommended for 12 impairment sites that totaled 3,366 ft in length in Myakka River focal areas 1, 4, and 5. This restoration option was highly recommended at 4 of the 6 sites ranked “High Severity,” including MR034, MR036, and MR051 (focal area 1) and MR026 (“Down’s Dam” in focal area 5). Costs using natural channel design to restore 2 streambanks on the Peace River near Zolfo Springs and Arcadia averaged $306.20/ft. At this rate, restoring 12 impairment sites on the Myakka River would cost approximately $1.03 million. For the remaining impairment sites, restoration options 2 (37 impairment sites totaling 9,872 ft of streambank) or 3 (18 impairment sites totaling 3,093 ft of streambank) were recommended. Restoration recommendations for unpaved road-stream crossings generally included paving the roads and installing resilient crossing structures that can accommodate large storm events (i.e., 100-year flows). Although 89% of the unpaved road-stream crossings ranked “Low Risk,” the cumulative erosive impact of assessed and unassessed unpaved road-stream crossings in the Myakka River Watershed are contributing to sedimentation and habitat degradation. Costs for restoration options 2 and 3 and for unpaved road-stream crossings were not estimated due to

unpredictability (i.e., restoration strategies heavily depend on needs that are specific to each site) but would undoubtedly cost less per foot than option 1. To have a positive impact on the Myakka River Watershed, restoration does not need to follow any particular order, nor do all threats need to be addressed – any effort to improve impairment sites or unpaved road-stream crossings should be encouraged.

Impairment sites in the Myakka River Watershed were disproportionally common in pastures. Of the 67 total impairment sites evaluated, 26 ranked moderate or high on the severity scale, and 24 of those occurred in areas where the primary land use was characterized as pasture during on-site field assessments. Although this landscape type was rare on the navigable portions of the Myakka River, it was common in the upper watershed north of Myakka River State Park. This includes properties in the non-navigable portions of the watershed where permission to access was not obtained. Additional impairment sites of moderate to high severity are suspected to exist within pastures that were not accessed during this study. It is important to note that the furthest upstream assessments were completed in an area where the land use was historically pasture, but cattle have been excluded since 2020 (Debi Osborne, Conservation Foundation of the Gulf Coast, personal communication). All impairment sites identified within that area showed signs of historic (not active) erosion and appeared to be recovering on their own. Planting willow (*Salix caroliniana*) or button bush (*Cephalanthus occidentalis*) stakes along these streambanks (i.e., restoration option 3) may aid in recovery and prevent degradation to the extent where more extreme and costly measures are required. In areas further downstream on the Myakka River, which are susceptible to higher forces of water and are still being used as pastureland, plantings would be insufficient to restore the shoreline integrity.

Based on LULC data, development (urban and transportation classes) comprised 10% of the surveyed area. Numerous residential areas with shoring structures (seawall and riprap) were not actively eroding and were not categorized as impairment sites. Similarly, activities such as fossil hunting (i.e., sieving through river sediment to find fossils such as mammoth bones and megalodon teeth) do not classify as impairment sites but collectively may contribute to degradation within the watershed due to

disturbance of the streambed and resulting sedimentation downstream. “Fossiling” has been a trend in the Peace River Watershed and has become increasingly popular in the Myakka River Watershed over the last several years (Chris Oliver, DEP, personal communication).

Following the threats assessment surveys, Hurricane Ian made landfall on the Gulf Coast of Florida on 28 September 2022. According to United States Geological Survey water level elevation data recorded at Myakka River gage 02298830, the peak water level on 1 October was 7.40 ft in 2021 and 12.84 ft in 2022, or a difference of 5.44 ft (USGS 2023). The DEP conducted a Myakka Wild and Scenic River Survey during 11-20 October 2022 to document conditions after major flooding and high winds associated with the hurricane. Impacts included huge loss of canopy cover, reduction of vegetation surface area, and large debris items (Chris Oliver, DEP, personal communication). Impairment sites were not inspected post-hurricane, but it is possible that conditions and severity may have been influenced by this natural disaster.

Myakka River Watershed Fish Assemblage Monitoring

Results of the Myakka River fish-assemblage monitoring were compared to a similar study conducted on the Withlacoochee River in 2016 to 2018 (Mallison et al. 2019) using the same sampling protocol. Total catch rate (CPUD for all fish) was 1,424 fish/km on the Myakka River and 1,440 fish/km on the Withlacoochee River, which represents a negligible difference of 1%. Species richness was higher on the Withlacoochee River, where 54 species from 29 families were collected (compared to 46 species from 25 families collected on the Myakka River). There were 33 species that were collected on both systems, which comprised 96% by number and 93% by weight of the total Myakka River catch. These species made up 88% by number and 57% by weight of the total Withlacoochee River catch. On both systems, the most abundant species were eastern mosquitofish and bluegill. The most noteworthy difference between the 2 systems was the absence of bowfin (*Amia calva*) on the Myakka River, which was the dominant species by weight (36% of the biomass) on the Withlacoochee River. Florida gar was the second-most dominant species by weight (19%) on the Withlacoochee River and tied with snook as the dominant species by weight (31% each) on the Myakka River. Otherwise, the common fish in the Myakka River were also common in

the Withlacoochee River, and vice versa. Indices of diversity and evenness were similar for the Myakka River (2.1 and 0.57, respectively, during 2020 and 2021) and the Withlacoochee River (2.4 and 0.59, respectively).

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FIGURES AND TABLES

Figure 1. Map of Florida illustrating the location of the Myakka River and the Peace River.

Figure 2. Riparian vegetation surveys were completed along the Peace River to develop planting plans for re-establishing native vegetation at restoration sites.

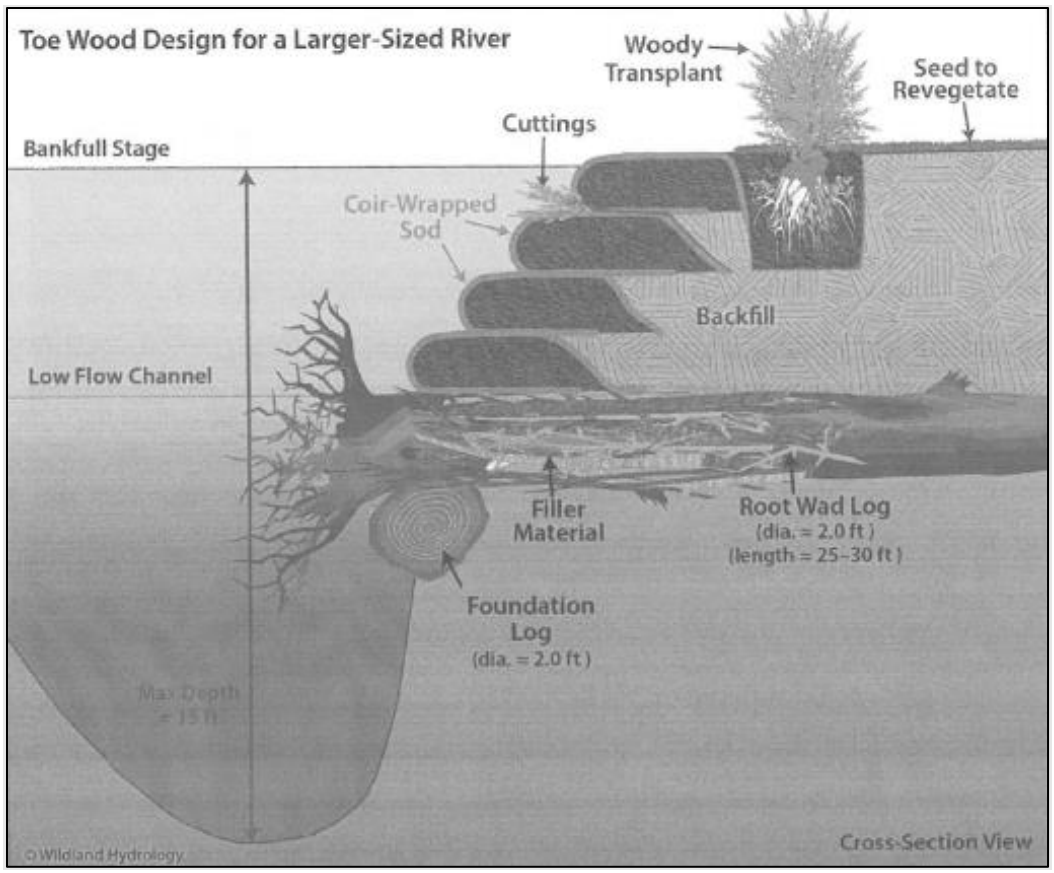


Figure 3. Graphic displays the general toe wood design for streambank restoration on large rivers (Rosgen unpublished).

Figure 4. Restoration sites were watered to keep new plantings hydrated for 6 weeks following restoration along the Peace River.

Figure 5. Fish communities were surveyed annually at treatment sites along the Peace River.

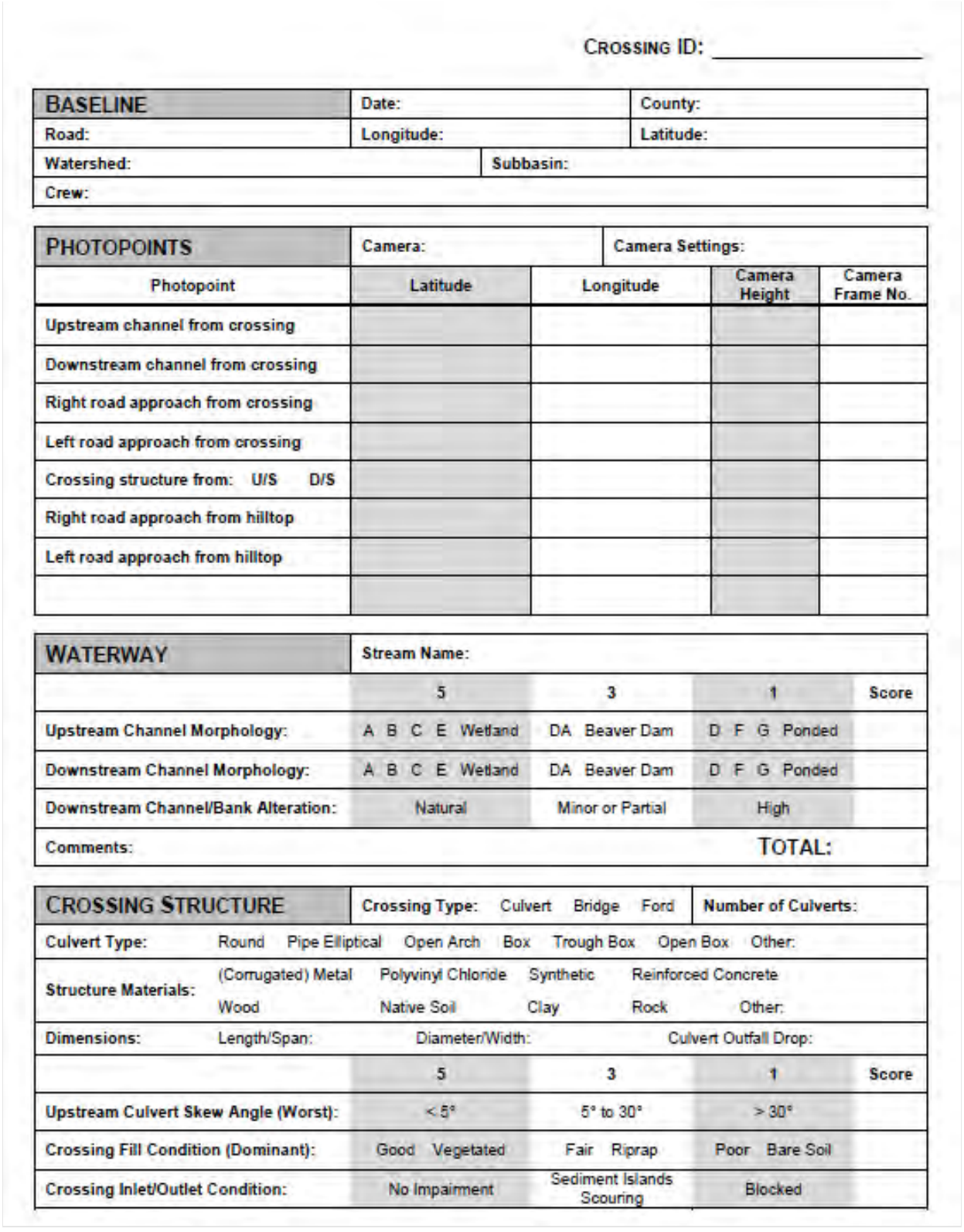
Figure 6. Cross section surveys were completed annually at treatment sites along the Peace River.

Table 1. Risk factors and scoring criteria used for evaluating impairment sites on the Myakka River (USFWS 2014).

Risk Factor	0	0.5	1	1.5	Max Possible Score
Pfankuch-Channel stability	Good		Fair	Poor	1.5
Channel alteration	None	Historic, Mostly Recovered	In Recovery	Recent, No Recovery	1.5
Bank erosion	Not Eroding	Historic	Active	Mass-wasting	1.5
BEHI	Low-Very Low	Moderate	High	Very High-Extreme	1.5
Local non-point source pollution	No Evidence	Slight	Moderate Potential	Obvious Sources	1.5
Shoring structures	Not Present			Present	1.5
Pipe discharge	Not Present			Present	1.5
Water odors	Not Present			Present	1.5
Fish passage barrier	Not Present			Present	1.5
Riparian buffer width	0	0.25	0.5	0.75	
Right bank	100ft	50-99ft	30-49ft	0-29ft	0.75
Left bank	100ft	50-99ft	30-49ft	0-29ft	0.75
Floodplain access	0.0	0.25		0.75	
Right bank	Full	Partial		None	0.75
Left bank	Full	Partial		None	0.75
Maximum 16.5					0.0 Minimum

Table 2. Restoration options for impairment sites (Mallison et al. 2019).

Restoration Option 1: Bank stabilization (mechanical). Install toe wood structures (regrade bank, place root wad logs over foundation logs, grade in a bankfull bench and low terrace, cover bank with erosion control fiber, and follow a native vegetation planting plan); install J-hook or cross vane structures if necessary; and restrict cattle, recreational, and vehicle access (pave road if necessary).
Restoration Option 2: Bank stabilization (mechanical or non-mechanical). Regrade bank if necessary (grade in a bankfull bench and low terrace, cover with erosion control fiber, and follow native vegetation planting plan) and restrict cattle, recreational, and vehicle access (pave road if necessary).
Restoration Option 3: Passive restoration (non-mechanical). Modify land use practices to reverse the cause of impairment (i.e., fence out cattle and block vehicle or recreational access) and allow bank to revegetate and restore naturally by self-recovery.



CROSSING ID: _____

BASELINE	Date:	County:
Road:	Longitude:	Latitude:
Watershed:	Subbasin:	
Crew:		

PHOTOPOINTS	Camera:	Camera Settings:		
Photopoint	Latitude	Longitude	Camera Height	Camera Frame No.
Upstream channel from crossing				
Downstream channel from crossing				
Right road approach from crossing				
Left road approach from crossing				
Crossing structure from: U/S D/S				
Right road approach from hilltop				
Left road approach from hilltop				

WATERWAY	Stream Name:			
	5	3	1	Score
Upstream Channel Morphology:	A B C E Wetland	DA Beaver Dam	D F G Ponded	
Downstream Channel Morphology:	A B C E Wetland	DA Beaver Dam	D F G Ponded	
Downstream Channel/Bank Alteration:	Natural	Minor or Partial	High	
Comments:			TOTAL:	

CROSSING STRUCTURE	Crossing Type: Culvert Bridge Ford		Number of Culverts:	
Culvert Type:	Round Pipe Elliptical Open Arch Box Trough Box Open Box Other:			
Structure Materials:	(Corrugated) Metal Polyvinyl Chloride Synthetic Reinforced Concrete Wood Native Soil Clay Rock Other:			
Dimensions:	Length/Span:	Diameter/Width:	Culvert Outfall Drop:	
	5	3	1	Score
Upstream Culvert Skew Angle (Worst):	< 5°	5° to 30°	> 30°	
Crossing Fill Condition (Dominant):	Good Vegetated	Fair Riprap	Poor Bare Soil	
Crossing Inlet/Outlet Condition:	No Impairment	Sediment Islands Scouring	Blocked	

Figure 7. Data sheet and scoring system used to evaluate unpaved road-stream crossings on the Myakka River (Witmer 2009).

CROSSING ID: _____

ROAD APPROACHES I	Right = Right Road Approach When Facing Downstream			
Dimensions (Right): Length: mi.	Width: ft.	Road Prism Fill: in.	Slope: %	
Potential Eroded Volume (Right):	Length x Width x Road Prism Fill x 16.3 =			c.y.
Dimensions (Left): Length: mi.	Width: ft.	Road Prism Fill: in.	Slope: %	
Potential Eroded Volume (Left):	Length x Width x Road Prism Fill x 16.3 =			c.y.
	5	3	1	Score
Potential Eroded Volume (Mean):	< 21 c.y.	21 to 40 c.y.	> 40 c.y.	
Soil Type: Soil K-Factor:	≤ 0.20	0.21 to 0.40	> 0.40	
Road Approach Slope (Mean): %	≤ 2.0%	2.1% to 4.0%	> 4.0%	
Road Approach Surface Material:	ALL Aggregate OR 1 AP: Aggregate 1 AP: Sand/Clay	ALL Sand/Clay OR 1 AP: Aggregate 1 AP: Native Soil	ALL Native Soil OR 1 AP: Native Soil 1 AP: Sand/Clay	
Comments:			TOTAL:	

ROAD APPROACHES II									
U/S	Left Outlet (Pick One):	Vegetated	Riprap	Synthetic	+1	Left Ditch (Pick One):	Vegetated	Riprap	Synthetic	+1
		Bare Soil	Concrete	Other	+0		Bare Soil	Concrete	Other	+0
	Right Outlet (Pick One):	Vegetated	Riprap	Synthetic	+1	Right Ditch (Pick One):	Vegetated	Riprap	Synthetic	+1
		Bare Soil	Concrete	Other	+0		Bare Soil	Concrete	Other	+0
D/S	Left Outlet (Pick One):	Vegetated	Riprap	Synthetic	+1	Left Ditch (Pick One):	Vegetated	Riprap	Synthetic	+1
		Bare Soil	Concrete	Other	+0		Bare Soil	Concrete	Other	+0
	Right Outlet (Pick One):	Vegetated	Riprap	Synthetic	+1	Right Ditch (Pick One):	Vegetated	Riprap	Synthetic	+1
		Bare Soil	Concrete	Other	+0		Bare Soil	Concrete	Other	+0
Improved Outlet System:				SUM:	___	Improved Drainage System:			SUM:	___
				IF SUM = 4, 2, or 0:	+1				IF SUM = 4, 2, or 0:	+1
				IF SUM = 1:	+2				IF SUM = 1:	+2
				IF SUM = 3:	+0				IF SUM = 3:	+0
TOTAL:						TOTAL:				

SEDIMENTATION RISK INDEX (SRI)	TOTAL SRI SCORE:
SRI scores range from 12 to 60. Low scores indicate a high risk for sedimentation from unpaved roads into streams or waterbodies.	

Figure 7. Continued.

Table 3. Common and scientific names of native plants identified during riparian vegetation surveys along the Peace River in April 2019. Underlined species were recommended for inclusion in the restoration planting plan.

Common name	Scientific name
Common ragweed	*Ambrosia artemisiifolia*
Pepper-vine	*Ampelopsis arborea*
Green silkyscale	*Anthenantia villosa*
Smooth water hyssop	*Bacopa monnieri*
Florida bully	*Bumelia reclimata*
American beautyberry	*Callicarpa americana*
Trumpet creeper	*Campsis radicans*
Greenwhite sedge	*Carex albolutescens*
Water hickory	*Carya aquatica*
Button bush	*Cephalanthus occidentalis*
Partridge-pea	*Chamaecrista fasciculata*
Nuttall's thistle	*Cirsium nuttallii*
Blue mistflower	*Conoclinium coelestinum*
Leavenworth's tickseed	*Coreopsis leavenworthii*
Fragrant flatsedge	*Cyperus odoratus*
Manyspike flatsedge	*Cyperus polystachyos*
Tropical flatsedge	*Cyperus surinamensis*
Southern crabgrass	*Digitaria ciliaris*
False daisy	*Eclipta alba*
Canadian horseweed	*Enigeron canadensis*
Oakleaf fleabane	*Erigeron quercifolius*
Baldwin's eryngo	*Eryngium baldwinii*
Dog fennel	*Eupatorium capillifolium*
Pinewoods fingergrass	*Eustachys petraea*
Pop ash	*Fraxinus caroliniana*
Elliott's milkpea	*Galactia elliottii*
Water locust	*Gleditsia aquatica*
Canadian toadflax	*Linaria canadensis*
Sweet gum	*Liquidambar styraciflua*
Piedmont primrose-willow	*Ludwigia arcuata*
Mexican primrose-willow	*Ludwigia octovalvis*
Climbing hempvine	*Mikania scandens*
Wax myrtle	*Morella cerifera*
Red mulberry	*Morus rubra*
Creeping woodsorrel	*Oxalis corniculata*
Cressleaf groundsel	*Packera glabella*
Witchgrass	*Panicum capillare*
Fall panicum	*Panicum dichotomiflorum*
Virginia creeper	*Parthenocissus quinquefolia*
Thin paspalum	*Paspalum setaceum*
Sweetscent	*Pluchea odorata*
Waterpepper smartweed	*Polygonum hydropiperoides*
Rustweed	*Polypremum procumbens*
Kiss-me-quick	*Portulaca pilosa*
Rabbit tobacco	*Pseudognaphalium obtusifolium*
Wild Coffee	*Psychotria nervosa*
Mock bishopsweed	*Ptilimnium capillaceum*
Laurel oak	*Quercus laurifolia*
Water oak	*Quercus nigra*
Live oak	*Quercus virginiana*
Swamp dock	*Rumex verticillatus*
Sable palm	*Sabal palmetto*
Carolina willow	*Salix caroliniana*
Water pimpernel	*Samolus ebracteatus*
Goatweed	*Scoparia dulcis*
Saw palmetto	*Serenoa repens*
Hemp sesbania	*Sesbania herbacea*
Sea-purslane	*Sesuvium portulacastrum*
Earleaf greenbrier	*Smilax auriculata*
Saw greenbrier	*Smilax bona-nox*
St. Augustinegrass	*Stenotaphrum secundatum*
Bald cypress	*Taxodium distichum*
Poison Ivy	*Toxicodendron radicans*
Sparkleberry	*Vaccinium arboreum*
Walter's viburnum	*Viburnum obovatum*
Hairypod cowpea	*Vigna luteola*
Muscadine	*Vitis rotundifolia*

Figure 8. Field photos before (top), during (middle), and after (bottom) restoration at the 450-ft streambank on the Peace River near Zolfo Springs, FL.

Table 4. Common and scientific name, plant type, wetland indicator, quantity, and size of species planted during streambank restoration on the Peace River near Zolfo Springs during June 2020. OBL = obligate wetland, FACW = facultative wetland, FAC = facultative, and FACU = facultative upland.

Zone 1 (water surface to bankfull)

Common Name	Scientific Name	Type	Wetland Indicator	Quantitiy	Size
water hickory	*Carya aquatica*	Tree	OBL	50	Bare Root
button bush	*Cephalanthus occidentalis*	Shrub	OBL	100	1 gal
swamp dogwood	*Cornus foemina*	Shrub	FACW	100	1 gal
pop-ash	*Fraxinus caroliniana*	Shrub	OBL	40	Bare Root
water locust	*Gleditsia aquatica*	Shrub	OBL	35	Bare Root
soft rush	*Juncus effusus*	Sedge	OBL	200	1 gal
wax myrtle	*Morella cerifera*	Shrub	FAC	100	1 gal
carolina willow	*Salix caroliniana*	Shrub	OBL	50	Bare Root
bald cypress	*Taxodium distcihum*	Tree	OBL	100	Bare Root

Zone 2 (above bankfull)

Common Name	Scientific Name	Type	Wetland Indicator	Quantitiy	Size
red maple	*Acer rubrum*	Tree	FAC	20	3 gal
american beautyberry	*Callicarpa americana*	Shrub	FACU	25	3 gal
water hickory	*Carya aquatica*	Tree	OBL	25	3 gal
button bush	*Cephalanthus occidentalis*	Shrub	OBL	25	3 gal
swamp dogwood	*Cornus foemina*	Shrub	FACW	35	1 gal
pop-ash	*Fraxinus caroliniana*	Shrub	OBL	20	3 gal
water locust	*Gleditsia aquatica*	Shrub	OBL	20	3 gal
wax myrtle	*Morella cerifera*	Shrub	FAC	30	1 gal
laurel oak	*Quercus laurifolia*	Tree	FACW	20	3 gal
water oak	*Quercus nigra*	Tree	FAC	20	3 gal
live Oak	*Quercus virginiana*	Tree	FACU	20	3 gal
bald cypress	*Taxodium distcihum*	Tree	OBL	30	3 gal

Riparian Habitat Seed Mixture

Common Name	Scientific Name	Type	Wetland Indicator	Percent	Quantity (pounds)
partridge-pea	*Chamaecrista fasciculata*	Legume	FACU	20	20
leavenworth's tickseed	*Coreopsis leavenworthii*	Flower	FACW	5	5
swamp sunflower	*Helianthus angustifolius*	Flower	FACW	5	5
switchgrass	*Panicum virgatum*	Grass	FAC	5	5
blackeyed susan	*Rudbeckia hirta*	Flower	FACU	5	5
creeping bluestem	*Schizachyrium scoparium var. stoloniferum*	Grass	FACU	30	30
Indiangrass	*Sorghastrum nutans*	Sedge	FACU	30	30

Figure 9. Field photos before (top), during (middle), and after (bottom) restoration at the 1,000-ft streambank on the Peace River near Arcadia, FL.

Table 5. Common and scientific name, plant type, wetland indicator, quantity, and size of species planted during streambank restoration on the Peace River near Arcadia during February 2021. OBL = obligate wetland, FACW = facultative wetland, FAC = facultative, and FACU = facultative upland.

Zone 1 (water surface to bankfull)

Common Name	Scientific Name	Type	Wetland Indicator	Quantitiy	Size
water hickory	*Carya aquatica*	Tree	OBL	100	Bare Root
button bush	*Cephalanthus occidentalis*	Shrub	OBL	200	1 gal
pop-ash	*Fraxinus caroliniana*	Shrub	OBL	200	Bare Root
water locust	*Gleditsia aquatica*	Shrub	OBL	50	Bare Root
soft rush	*Juncus effusus*	Sedge	OBL	500	1 gal
wax myrtle	*Morella cerifera*	Shrub	FAC	50	1 gal
carolina willow	*Salix caroliniana*	Shrub	OBL	100	Bare Root
bald cypress	*Taxodium distcihum*	Tree	OBL	100	Bare Root

Zone 2 (above bankfull)

Common Name	Scientific Name	Type	Wetland Indicator	Quantitiy	Size
red maple	*Acer rubrum*	Tree	FAC	75	3 gal
american beautyberry	*Callicarpa americana*	Shrub	FACU	60	3 gal
pop-ash	*Fraxinus caroliniana*	Shrub	OBL	50	3 gal
laurel oak	*Quercus laurifolia*	Tree	FACW	50	3 gal
water oak	*Quercus nigra*	Tree	FAC	40	3 gal
live Oak	*Quercus virginiana*	Tree	FACU	50	3 gal
saw palmetto	*Serenoa repens*	Shrub	FACU	60	7-10 ft
bald cypress	*Taxodium distcihum*	Tree	OBL	100	3 gal
Walter's Viburnum	*Viburnum obovatum*	Shrub	FACW	75	3 gal

Riparian Habitat Seed Mixture

Common Name	Scientific Name	Type	Wetland Indicator	Percent	Quantity (pounds)
partridge-pea	*Chamaecrista fasciculata*	Legume	FACU	20	40
leavenworth's tickseed	*Coreopsis leavenworthii*	Flower	FACW	5	10
swamp sunflower	*Helianthus angustifolius*	Flower	FACW	5	10
switchgrass	*Panicum virgatum*	Grass	FAC	5	10
blackeyed susan	*Rudbeckia hirta*	Flower	FACU	5	10
creeping bluestem	*Schizachyrium scoparium var. stoloniferum*	Grass	FACU	30	60
Indiangrass	*Sorghastrum nutans*	Sedge	FACU	30	60

Table 6. Total number (N) and weight (W) of fish species collected during fish community surveys on the Peace River during April 2019 to July 2022. * = non-native, H = herbivore, I = invertivore, O = omnivore, and P = piscivore; A = Arcadia, Z = Zolfo Springs, and A, Z = both Arcadia and Zolfo Springs.

Common name	Scientific name	Type	Group	Location	N	W (g)
African Jewelfish	*Hemichromis bimaculatus*	Fresh *	O	A, Z	22	80
Asian Swamp Eel	*Monopterus albus*	Salt/Fresh *	I	A, Z	82	7,655
Atlantic Needlefish	*Strongylura marina*	Salt	P	A, Z	7	7
Blue Tilapia	*Oreochromis aureus*	Salt/Fresh *	O	A, Z	124	40,657
Bluefin Killifish	*Lucania goodei*	Fresh	I	A, Z	10	6
Bluegill	*Lepomis macrochirus*	Fresh	I	A, Z	653	15,944
Bowfin	*Amia calva*	Fresh	P	A	5	12,963
Brook Silverside	*Labidesthes sicculus*	Fresh	I	A, Z	317	264
Brown Hoplo	*Hoplosternum littorale*	Fresh *	O	A, Z	6	1,421
Channel Catfish	*Ictalurus punctatus*	Fresh	O	A, Z	154	72,426
Coastal Shiner	*Notropis petersoni*	Fresh	I	A, Z	2,300	2,079
Eastern Mosquitofish	*Gambusia holbrooki*	Fresh	I	A, Z	1,286	528
Florida Gar	*Lepisosteus platyrhincus*	Fresh	P	A, Z	267	170,180
Gizzard Shad	*Dorosoma cepedianum*	Fresh	O	Z	7	482
Grass Carp	*Ctenopharyngodon idella*	Fresh *	H	A	1	8,750
Hogchoker	*Trinectes maculatus*	Salt	I	A, Z	551	796
Inland Silverside	*Menidia beryllina*	Fresh	I	A, Z	5	3
Ladyfish	*Elops saurus*	Salt	P	A	12	187
Largemouth Bass	*Micropterus salmoides*	Fresh	P	A, Z	136	41,611
Least Killifish	*Heterandria formosa*	Fresh	O	Z	14	8
Longnose Gar	*Lepisosteus osseus*	Fresh	P	A, Z	41	34,444
Mayan Cichlid	*Cichlasoma uropthalmus*	Salt/Fresh *	I	A	3	198
Pugnose Minnow	*Opsopoeodus emiliae*	Fresh	I	A, Z	163	107
Redear Sunfish	*Lepomis microlophus*	Fresh	I	A, Z	407	64,865
Sailfin Catfish	*Pterygoplichthys spp.*	Fresh *	H	A, Z	854	154,390
Sailfin Molly	*Poecilia latipinna*	Fresh	O	A, Z	142	140
Seminole Killifish	*Fundulus seminolis*	Fresh	O	A, Z	550	1,369
Snook	*Centropomus undecimalis*	Salt	P	A, Z	213	288,362
Spotted Sunfish	*Lepomis punctatus*	Fresh	I	A, Z	1,024	28,169
Striped Mojarra	*Eugerres plumieri*	Salt	I	A	19	6,547
Striped Mullet	*Mugil cephalus*	Salt	O	A, Z	24	3,294
Taillight Shiner	*Notropis maculatus*	Fresh	I	Z	30	23
Threadfin Shad	*Dorosoma petenense*	Fresh	O	Z	8	5
Walking Catfish	*Clarias batrachus*	Fresh *	O	A, Z	6	1,584
Warmouth	*Lepomis gulosus*	Fresh	P	A, Z	5	100
White Catfish	*Ameiurus catus*	Fresh	O	A, Z	86	36,601
Yellow Bullhead	*Ameiurus natalis*	Fresh	O	Z	1	383
Total					9,535	996,628

Table 7. Percent composition by number of fish collected at treatment sites (Imp = impairment, Ref = reference, and Rest = restoration) along the Peace River near Zolfo Springs during 2019 to 2022. In 2020, 1 sampling event was completed prior to restoration (May) and 2 events were completed after restoration (July).

	2019			2020			2021			2022		
Common name	Imp	Ref	Rest	Imp	Ref	Rest	Imp	Ref	Rest	Imp	Ref	Rest
African Jewelfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.3	0.0	0.0
Asian Swamp Eel	0.2	0.0	0.0	0.0	0.4	2.1	1.4	0.8	0.0	0.3	0.8	0.7
Atlantic Needlefish	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Blue Tilapia	1.7	1.3	0.9	1.7	2.6	0.3	2.9	3.3	2.0	0.4	1.7	0.0
Bluefin Killifish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Bluegill	1.7	5.8	3.3	2.3	3.1	0.6	2.9	6.6	5.1	3.1	1.4	2.2
Brook Silverside	11.7	10.8	9.1	8.5	5.9	0.6	10.0	0.0	0.0	1.7	3.1	2.7
Brown Hoplo	0.0	0.1	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.3
Channel Catfish	0.6	1.2	2.4	5.0	4.3	4.0	4.3	2.5	2.0	4.2	3.5	1.7
Coastal Shiner	34.1	30.0	24.9	10.3	2.3	2.4	0.0	0.0	0.0	29.0	15.6	19.6
Eastern Mosquitofish	6.1	5.9	4.4	8.7	7.4	7.7	0.0	0.0	0.0	16.4	29.6	20.2
Florida Gar	6.7	3.5	6.2	10.8	10.5	5.5	11.4	5.0	5.1	2.6	1.7	2.7
Gizzard Shad	0.4	0.1	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hogchoker	0.0	0.1	0.7	1.3	7.2	0.3	8.6	5.8	0.0	4.9	5.0	3.1
Inland Silverside	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0
Largemouth Bass	1.3	3.0	2.4	2.4	1.5	0.3	1.4	3.3	4.0	2.0	1.5	2.0
Least Killifish	0.0	0.1	0.4	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.8	0.2
Longnose Gar	2.4	0.3	2.4	0.0	0.0	0.6	0.0	0.0	0.0	0.3	0.3	0.2
Pugnose Minnow	3.5	5.8	2.2	0.0	4.0	2.4	0.0	0.0	0.0	0.9	1.4	1.7
Redear Sunfish	2.0	3.8	2.9	1.8	10.9	1.5	4.3	9.9	9.1	2.6	3.1	2.6
Sailfin Catfish	2.0	3.0	4.4	8.7	11.9	38.6	11.4	3.3	15.2	13.1	10.7	28.2
Sailfin Molly	0.0	0.7	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.3	0.6	0.2
Seminole Killifish	0.4	3.9	0.2	0.6	2.1	0.9	0.0	14.0	0.0	6.6	12.6	2.2
Snook	3.9	2.4	5.3	13.1	5.8	6.8	2.9	5.0	6.1	1.5	0.6	1.4
Spotted Sunfish	21.0	17.6	25.8	14.3	13.9	18.5	37.1	35.5	46.5	7.0	3.8	6.1
Striped Mullet	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Taillight Shiner	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.3	0.0
Threadfin Shad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Walking Catfish	0.0	0.0	0.0	0.0	1.0	0.6	0.0	0.8	0.0	0.0	0.1	0.0
Warmouth	0.0	0.0	0.2	0.0	0.4	0.3	0.0	0.8	0.0	0.0	0.0	0.0
White Catfish	0.2	0.5	0.4	10.7	2.1	3.4	1.4	0.8	3.0	2.3	0.4	2.0
Yellow Bullhead	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Herbivores	2.0	3.0	4.4	8.7	11.9	38.6	11.4	3.3	15.2	13.1	10.7	28.2
Invertivores	80.4	79.7	73.3	47.2	55.2	38.1	64.3	58.7	60.6	66.2	65.4	58.8
Omnivores	3.2	8.2	5.6	17.9	12.9	9.8	8.6	24.0	9.1	14.1	19.9	6.6
Piscivores	14.3	9.1	16.7	26.3	20.0	13.5	15.7	14.0	15.2	6.6	4.1	6.3

Table 8. Percent composition by weight of fish collected at treatment sites (Imp = impairment, Ref = reference, and Rest = restoration) along the Peace River near Zolfo Springs during 2019 to 2022. In 2020, 1 sampling event was completed prior to restoration (May) and 2 events were completed after restoration (July).

	2019			2020			2021			2022		
Common name	Imp	Ref	Rest	Imp	Ref	Rest	Imp	Ref	Rest	Imp	Ref	Rest
African Jewelfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Asian Swamp Eel	0.1	0.0	0.0	0.0	0.1	1.4	0.0	0.8	0.0	0.0	0.8	0.8
Atlantic Needlefish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blue Tilapia	5.0	4.2	2.7	1.8	5.9	0.0	4.9	17.9	3.5	1.9	2.6	0.0
Bluefin Killifish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bluegill	0.3	2.1	0.9	1.1	0.4	0.3	1.3	0.6	0.4	1.6	0.8	1.2
Brook Silverside	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brown Hoplo	0.0	0.2	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.4
Channel Catfish	2.4	8.9	7.8	8.1	10.3	11.4	13.5	11.5	3.9	9.5	7.0	5.9
Coastal Shiner	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.1
Eastern Mosquitofish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Florida Gar	31.8	23.9	22.1	20.7	34.1	10.0	36.9	15.8	10.9	13.7	15.7	13.0
Gizzard Shad	0.1	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hogchoker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0
Inland Silverside	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Largemouth Bass	1.0	6.9	4.3	2.2	5.5	0.0	5.9	4.2	11.4	4.9	6.0	7.4
Least Killifish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Longnose Gar	1.2	0.7	0.9	0.0	0.0	6.1	0.0	0.0	0.0	8.5	14.9	3.0
Pugnose Minnow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Redear Sunfish	0.5	2.2	1.3	0.0	2.1	0.1	0.6	3.2	1.0	3.1	11.2	8.1
Sailfin Catfish	2.5	6.6	3.4	5.8	10.1	25.4	8.8	8.3	9.2	20.1	31.0	42.9
Sailfin Molly	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Seminole Killifish	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.1	0.3	0.0
Snook	47.2	31.9	51.6	54.2	29.0	38.6	14.9	30.5	44.2	25.6	6.2	12.9
Spotted Sunfish	4.8	4.1	4.2	1.2	1.3	2.1	4.6	3.7	3.6	1.4	1.8	1.3
Striped Mullet	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Taillight Shiner	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Threadfin Shad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walking Catfish	0.0	0.0	0.0	0.0	1.1	0.8	0.0	0.5	0.0	0.0	1.1	0.0
Warmouth	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
White Catfish	3.0	6.5	0.1	4.7	0.0	3.1	8.6	2.5	11.8	8.9	0.0	2.6
Yellow Bullhead	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Herbivores	2.5	6.6	3.4	5.8	10.1	25.4	8.8	8.3	9.2	20.1	31.0	42.9
Invertivores	6.0	8.9	6.5	2.4	3.9	3.9	6.5	8.3	5.0	6.7	15.2	11.7
Omnivores	10.4	21.1	11.2	14.6	17.4	16.0	27.0	32.7	19.2	20.4	11.1	9.0
Piscivores	81.1	63.4	78.9	77.2	68.6	54.7	57.7	50.7	66.6	52.7	42.8	36.3

Table 9. Total number (N), catch per unit distance (CPUD, N/km) and weight (W, g) of fish collected during March 2019 at the treatment sites along the Peace River near Zolfo Springs. SE = standard error.

	Impairment site			Reference site			Restoration site		
Common name	N	CPUD (SE)	W (g)	N	CPUD (SE)	W (g)	N	CPUD (SE)	W (g)
Asian Swamp Eel	1	1.5 (1.9)	92	0	0 (0)	0	0	0 (0)	0
Blue Tilapia	9	13.6 (11.6)	3,804	10	14.2 (7.6)	3,262	4	7.0 (4.3)	2,567
Bluegill	9	13.6 (6.4)	248	43	61.0 (4.6)	1,605	15	26.2 (16.1)	825
Brook Silverside	63	95.5 (35.4)	58	80	113.5 (24.1)	62	41	71.6 (16.7)	41
Brown Hoplo	0	0 (0)	0	1	1.4 (1.7)	142	0	0 (0)	0
Channel Catfish	3	4.5 (3.2)	1,798	9	12.8 (3.0)	6,819	11	19.2 (7.7)	7,486
Coastal Shiner	183	277.3 (167.8)	149	223	316.3 (299.3)	233	112	195.5 (95.5)	126
Eastern Mosquitofish	33	50.0 (34.8)	19	44	62.4 (12.2)	21	20	34.9 (11.9)	7
Florida Gar	36	54.5 (17.0)	24,214	26	36.9 (20.0)	18,377	28	48.9 (15.0)	21,190
Gizzard Shad	2	3.0 (3.7)	61	1	1.4 (1.7)	305	4	7.0 (8.5)	116
Hogchoker	0	0 (0)	0	1	1.4 (1.7)	1	3	5.2 (3.7)	5
Largemouth Bass	7	10.6 (4.9)	760	22	31.2 (3.5)	5,302	11	19.2 (4.3)	4,123
Least Killifish	0	0 (0)	0	1	1.4 (1.7)	1	2	3.5 (2.1)	2
Longnose Gar	13	19.7 (4.9)	883	2	2.8 (3.5)	561	11	19.2 (2.1)	829
Pugnose Minnow	19	28.8 (15.9)	16	43	61.0 (57.0)	37	10	17.5 (8.5)	11
Redear Sunfish	11	16.7 (11.3)	343	28	39.7 (9.2)	1,686	13	22.7 (18.3)	1,201
Sailfin Catfish	11	16.7 (7.4)	1,877	22	31.2 (20.5)	5,051	20	34.9 (13.0)	3,226
Sailfin Molly	0	0 (0)	0	5	7.1 (3.5)	5	0	0 (0)	0
Seminole Killifish	2	3.0 (1.9)	15	29	41.1 (38.1)	192	1	1.7 (2.1)	5
Snook	21	31.8 (8.5)	35,921	18	25.5 (6.0)	24,502	24	41.9 (16.1)	49,396
Spotted Sunfish	113	171.2 (51.1)	3,648	131	185.8 (38.1)	3,183	116	202.4 (36.0)	4,044
Striped Mullet	0	0 (0)	0	1	1.4 (1.7)	520	0	0 (0)	0
Warmouth	0	0 (0)	0	0	0 (0)	0	1	1.7 (2.1)	49
White Catfish	1	1.5 (1.9)	2,260	4	5.7 (1.7)	4,998	2	3.5 (2.1)	121
Yellow Bullhead	0	0 (0)	0	0	0 (0)	0	1	1.7 (2.1)	383
Herbivores	11	16.7 (7.4)	1,877	22	31.2 (20.5)	5,051	20	34.9 (13.0)	3,226
Invertivores	432	654.5 (311.8)	4,573	593	841.4 (389.0)	6,828	330	575.9 (150.7)	6,260
Omnivores	17	25.8 (9.8)	7,938	61	86.5 (32.2)	16,244	25	43.6 (14.0)	10,680
Piscivores	77	116.7 (23.7)	61,778	68	96.5 (20.5)	48,742	75	130.9 (6.4)	75,587
TOTAL	537	813.6 (310.2)	76,166	744	1,055.3 (362.9)	76,865	450	785.3 (173.5)	95,753

Table 10. Total number (N), catch per unit distance (CPUD, N/km) and weight (W, g) of fish collected during June and July 2022 at the treatment sites along the Peace River near Zolfo Springs. SE = standard error.

	Impairment site			Reference site			Restoration site		
Common name	N	CPUD (SE)	W (g)	N	CPUD (SE)	W (g)	N	CPUD (SE)	W (g)
African Jewelfish	2	3.0 (3.7)	11	0	0 (0)	0	0	0 (0)	0
Asian Swamp Eel	2	3.0 (1.9)	31	6	8..5 (5.2)	403	4	7.0 (2.1)	655
Atlantic Needlefish	1	1.5 (1.9)	1	0	0 (0)	0	0	0 (0)	0
Blue Tilapia	3	4.5 (3.2)	1,473	12	17.0 (13.8)	1,254	0	0 (0)	0
Bluefin Killifish	0	0 (0)	0	2	2.8 (1.7)	2	0	0 (0)	0
Bluegill	21	31.8 (3.2)	1,245	10	14.2 (4.6)	362	13	22.7 (5.7)	958
Brook Silverside	12	18.2 (14.0)	13	22	31.2 (9.2)	17	16	27.9 (18.3)	12
Brown Hoplo	0	0 (0)	0	0	0 (0)	0	2	3.5 (2.1)	357
Channel Catfish	29	43.9 (26.2)	7,357	25	35.5 (22.6)	3,360	10	17.5 (8.5)	4,719
Coastal Shiner	199	301.5 (76.4)	242	111	157.4 (54.4)	123	115	200.7 (93.8)	114
Eastern Mosquitofish	113	171.2 (42.7)	43	211	299.3 (113.2)	64	119	207.7 (118.9)	46
Florida Gar	18	27.3 (14.0)	10,664	12	17.0 (3.0)	7,508	16	27.9 (2.1)	10,401
Hogchoker	34	51.5 (28.8)	71	36	51.1 (26.7)	73	18	31.4 (13.3)	38
Largemouth Bass	14	21.2 (3.7)	3,802	11	15.6 (6.3)	2,859	12	20.9 (12.8)	5,951
Least Killifish	0	0 (0)	0	6	8.5 (6.0)	2	1	1.7 (2.1)	1
Longnose Gar	2	3.0 (1.9)	6,563	2	2.8 (3.5)	7,099	1	1.7 (2.1)	2,396
Pugnose Minnow	6	9.1 (5.6)	4	10	14.2 (12.5)	3	10	17.5 (8.5)	6
Redear Sunfish	18	27.3 (3.2)	2,432	22	31.2 (12.2)	5,339	15	26.2 (3.7)	6,519
Sailfin Catfish	90	136.4 (14.7)	15,637	76	107.8 (38.1)	14,772	166	289.7 (5.7)	34,386
Sailfin Molly	2	3.0 (1.9)	2	4	5.7 (1.7)	3	1	1.7 (2.1)	1
Seminole Killifish	45	68.2 (14.0)	91	90	127.7 (13.8)	129	13	22.7 (10.7)	27
Snook	10	15.2 (9.3)	19,904	4	5.7 (4.6)	2,956	8	14.0 (5.7)	10,337
Spotted Sunfish	48	72.7 (14.7)	1,088	27	38.3 (3.0)	865	36	62.8 (13.3)	1,056
Taillight Shiner	2	3.0 (1.9)	2	9	12.8 (0.0)	3	0	0 (0)	0
Threadfin Shad	0	0 (0)	0	1	1.4 (1.7)	2	0	0 (0)	0
Walking Catfish	0	0 (0)	0	1	1.4 (1.7)	526	0	0 (0)	0
White Catfish	16	24.2 (4.9)	6,937	3	4.3 (3.0)	3	12	20.9 (6.4)	2,090
Herbivores	90	136.4 (14.7)	15,637	76	107.8 (38.1)	14,772	166	289.7 (5.7)	34,386
Invertivores	455	689.4 (116.3)	5,171	466	661.0 (72.9)	7,254	346	603.8 (101.1)	9,404
Omnivores	97	147.0 (41.8)	15,871	142	201.4 (22.6)	5,279	39	68.1 (16.1)	7,195
Piscivores	45	68.2 (22.5)	40,934	29	41.1 (9.7)	20,422	37	64.6 (15.4)	29,085
TOTAL	687	1,040.9 (176.2)	77,613	713	1,011.3 (113.4)	47,727	588	1,026.2 (89.1)	80,070

Table 11. Percent composition by number of fish collected at treatment sites (Imp = impairment, Ref = reference, and Rest = restoration) along the Peace River near Arcadia during 2020 to 2022. Restoration was completed in February 2021, prior to that year's sampling event.

	2020			2021			2022		
Common name	Imp	Ref	Rest	Imp	Ref	Rest	Imp	Ref	Rest
African Jewelfish	0.0	0.0	0.0	2.5	0.0	0.0	0.2	1.1	0.1
Asian Swamp Eel	0.9	2.2	0.9	0.0	0.7	0.0	0.8	2.1	1.9
Atlantic Needlefish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Blue Tilapia	0.9	0.0	0.0	0.6	1.3	13.1	0.6	0.4	0.2
Bluefin Killifish	0.0	0.0	0.0	1.8	0.7	1.2	0.0	0.0	0.0
Bluegill	3.6	11.2	1.7	3.7	21.5	34.9	7.1	10.5	9.5
Bowfin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Brook Silverside	1.8	0.0	1.7	0.0	0.0	0.0	0.9	0.7	1.2
Brown Hoplo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Channel Catfish	0.9	7.5	3.5	0.6	1.3	0.8	0.6	0.9	0.4
Coastal Shiner	15.5	1.5	20.9	0.0	0.0	0.0	43.5	29.9	34.2
Eastern Mosquitofish	27.3	10.4	13.0	0.0	0.0	0.0	12.9	8.4	9.6
Florida Gar	0.9	17.2	4.3	0.0	12.1	0.0	0.0	1.3	0.2
Grass Carp	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0
Hogchoker	3.6	1.5	2.6	23.9	20.1	1.2	9.4	11.3	4.7
Inland Silverside	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0
Ladyfish	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.6
Largemouth Bass	2.7	1.5	3.5	1.2	0.7	1.6	0.9	1.4	0.8
Longnose Gar	0.0	0.7	0.0	0.0	0.0	0.8	0.0	0.1	0.1
Mayan Cichlid	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Pugnose Minnow	0.9	0.0	0.9	0.0	0.0	0.0	1.9	1.8	0.6
Redear Sunfish	2.7	14.2	7.8	11.0	22.1	8.7	2.4	5.7	5.4
Sailfin Catfish	3.6	3.7	11.3	12.3	2.7	15.9	4.1	3.8	14.8
Sailfin Molly	10.9	0.0	1.7	31.3	0.7	9.1	1.9	0.1	0.1
Seminole Killifish	6.4	2.2	9.6	4.9	0.0	0.4	6.4	6.1	6.1
Snook	1.8	7.5	4.3	0.0	7.4	1.6	0.2	3.3	0.7
Spotted Sunfish	11.8	13.4	9.6	4.9	8.7	10.7	2.6	7.4	8.0
Striped Mojarra	1.8	0.7	0.9	0.0	0.0	0.0	0.2	0.7	0.0
Striped Mullet	0.0	0.0	0.0	1.2	0.0	0.0	2.1	0.7	0.0
Taillight Shiner	1.8	0.0	0.0	0.0	0.0	0.0	0.2	0.9	0.1
Walking Catfish	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Warmouth	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0
White Catfish	0.0	3.7	0.0	0.0	0.0	0.0	0.4	0.6	0.1
Herbivores	3.6	3.7	12.2	12.3	2.7	15.9	4.1	3.8	14.8
Invertivores	71.8	55.2	60.0	45.4	73.8	56.7	82.6	79.4	75.3
Omnivores	19.1	14.2	14.8	41.1	3.4	23.4	12.0	9.9	7.3
Piscivores	5.5	26.9	13.0	1.2	20.1	4.0	1.3	6.8	2.6

Table 12. Percent composition by weight of fish collected at treatment sites (Imp = impairment, Ref = reference, and Rest = restoration) along the Peace River near Arcadia during 2020 to 2022. Restoration was completed in February 2021, prior to that year's sampling event.

	2020			2021			2022		
Common name	Imp	Ref	Rest	Imp	Ref	Rest	Imp	Ref	Rest
African Jewelfish	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Asian Swamp Eel	2.1	0.2	0.1	0.0	0.4	0.0	2.6	1.4	5.4
Atlantic Needlefish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blue Tilapia	0.0	0.0	0.0	0.6	4.1	41.1	0.1	2.1	2.4
Bluefin Killifish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bluegill	1.8	0.6	0.2	0.8	2.9	3.7	1.7	2.4	4.5
Bowfin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5	0.0
Brook Silverside	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brown Hoplo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7
Channel Catfish	0.2	11.1	9.9	8.0	5.6	0.2	8.6	8.5	5.7
Coastal Shiner	0.2	0.0	0.0	0.0	0.0	0.0	1.6	0.2	0.5
Eastern Mosquitofish	0.3	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.1
Florida Gar	24.4	37.7	6.7	0.0	31.8	0.0	0.0	5.3	1.7
Grass Carp	0.0	0.0	31.0	0.0	0.0	0.0	0.0	0.0	0.0
Hogchoker	0.2	0.0	0.0	0.2	0.0	0.0	0.7	0.2	0.1
Inland Silverside	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ladyfish	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2
Largemouth Bass	8.6	1.3	5.1	7.0	0.7	6.2	7.0	3.7	3.0
Longnose Gar	0.0	0.6	0.0	0.0	0.0	9.4	0.0	4.2	5.4
Mayan Cichlid	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0
Pugnose Minnow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Redear Sunfish	0.9	6.9	4.3	26.4	16.0	3.8	29.2	12.0	16.2
Sailfin Catfish	16.2	2.4	9.6	41.2	2.5	25.8	37.2	7.4	42.1
Sailfin Molly	0.2	0.0	0.0	0.2	0.0	0.1	0.4	0.0	0.0
Seminole Killifish	0.6	0.0	0.1	0.2	0.0	0.0	0.6	0.2	0.3
Snook	23.9	32.1	30.1	0.0	34.1	8.5	3.4	35.0	6.1
Spotted Sunfish	4.7	0.5	0.7	0.8	1.8	1.2	2.5	1.7	4.6
Striped Mojarra	15.6	0.8	2.2	0.0	0.0	0.0	2.7	2.9	0.0
Striped Mullet	0.0	0.0	0.0	14.3	0.0	0.0	0.5	0.8	0.0
Taillight Shiner	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walking Catfish	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Warmouth	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
White Catfish	0.0	5.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0
Herbivores	16.2	2.4	40.6	41.2	2.5	25.8	37.2	7.4	42.1
Invertivores	25.9	9.1	7.5	28.3	21.2	8.7	42.1	20.9	31.4
Omnivores	1.0	16.7	10.0	23.5	9.7	41.4	10.2	14.0	10.1
Piscivores	56.9	71.8	41.9	7.0	66.6	24.1	10.5	57.7	16.4

Table 13. Total number (N), catch per unit distance (CPUD, N/km) and weight (W, g) of fish collected during June and July 2020 at the treatment sites along the Peace River near Arcadia. SE = standard error.

	Impairment site			Reference site			Restoration site		
Common name	N	CPUD (SE)	W (g)	N	CPUD (SE)	W (g)	N	CPUD (SE)	W (g)
Asian Swamp Eel	1	1.7 (2.4)	78	3	4.2 (2.0)	84	1	1.4 (2.0)	22
Blue Tilapia	1	1.7 (2.4)	1	0	0 (0)	0	0	0 (0)	0
Bluegill	4	6.8 (0.0)	67	15	20.9 (5.9)	229	2	2.8 (4.0)	59
Brook Silverside	2	3.4 (0.0)	2	0	0 (0)	0	2	2.8 (0.0)	2
Channel Catfish	1	1.7 (2.4)	6	10	14.0 (11.9)	4,118	4	5.6 (4.0)	2,788
Coastal Shiner	17	29.1 (2.4)	6	2	2.8 (4.0)	1	24	33.6 (4.0)	13
Eastern Mosquitofish	30	51.4 (33.9)	13	14	19.6 (0.0)	5	15	21.0 (5.9)	8
Florida Gar	1	1.7 (2.4)	920	23	32.1 (2.0)	14,064	5	7.0 (2.0)	1,896
Grass Carp	0	0 (0)	0	0	0 (0)	0	1	1.4 (2.0)	8,750
Hogchoker	4	6.8 (0.0)	7	2	2.8 (4.0)	1	3	4.2 (5.9)	2
Largemouth Bass	3	5.1 (7.3)	325	2	2.8 (0.0)	481	4	5.6 (4.0)	1,429
Longnose Gar	0	0 (0)	0	1	1.4 (2.0)	220	0	0 (0)	0
Pugnose Minnow	1	1.7 (2.4)	1	0	0 (0)	0	1	1.4 (2.0)	2
Redear Sunfish	3	5.1 (7.3)	34	19	26.5 (5.9)	2,564	9	12.6 (13.9)	1,225
Sailfin Catfish	4	6.8 (9.7)	611	5	7.0 (5.9)	912	13	18.2 (9.9)	2,708
Sailfin Molly	12	20.5 (9.7)	8	0	0 (0)	0	2	2.8 (4.0)	1
Seminole Killifish	7	12.0 (2.4)	22	3	4.2 (2.0)	4	11	15.4 (5.9)	37
Snook	2	3.4 (4.8)	898	10	14.0 (0.0)	11,974	5	7.0 (2.0)	8,496
Spotted Sunfish	13	22.3 (7.3)	177	18	25.1 (7.9)	202	11	15.4 (5.9)	185
Striped Mojarra	2	3.4 (0.0)	587	1	1.4 (2.0)	315	1	1.4 (2.0)	610
Taillight Shiner	2	3.4 (4.8)	1	0	0 (0)	0	0	0 (0)	0
Walking Catfish	0	0 (0)	0	1	1.4 (2.0)	207	0	0 (0)	0
Warmouth	0	0 (0)	0	0	0 (0)	0	1	1.4 (2.0)	3
White Catfish	0	0 (0)	0	5	7.0 (5.9)	1,878	0	0 (0)	0
Herbivores	4	6.8 (9.7)	611	5	7.0 (5.9)	912	14	19.6 (11.9)	11,458
Invertivores	79	135.3 (36.3)	973	74	103.4 (11.9)	3,401	69	96.6 (29.7)	2,128
Omnivores	21	36.0 (17.0)	37	19	26.5 (5.9)	6,207	17	23.8 (5.9)	2,826
Piscivores	6	10.3 (4.8)	2,143	36	50.3 (4.0)	26,739	15	21.0 (5.9)	11,824
TOTAL	110	188.4 (24.2)	3,764	134	187.2 (7.9)	37,259	115	161.1 (53.5)	28,236

Table 14. Total number (N), catch per unit distance (CPUD, N/km) and weight (W, g) of fish collected during June and July 2022 at the treatment sites along the Peace River near Arcadia. SE = standard error.

	Impairment site			Reference site			Restoration site		
Common name	N	CPUD (SE)	W (g)	N	CPUD (SE)	W (g)	N	CPUD (SE)	W (g)
African Jewelfish	1	1.1 (1.4)	2	8	7.4 (9.1)	13	1	0.9 (1.1)	6
Asian Swamp Eel	4	4.6 (2.8)	302	15	14.0 (6.8)	1,077	16	14.9 (6.4)	2,344
Atlantic Needlefish	0	0 (0)	0	0	0 (0)	0	1	0.9 (1.1)	1
Blue Tilapia	3	3.4 (2.4)	13	3	2.8 (2.0)	1,586	2	1.9 (1.1)	1,050
Bluegill	38	43.4 (12.4)	202	74	68.9 (13.9)	1,818	79	73.8 (4.1)	1,937
Bowfin	0	0 (0)	0	3	2.8 (3.4)	7,253	0	0 (0)	0
Brook Silverside	5	5.7 (1.4)	4	5	4.7 (2.3)	5	10	9.3 (8.0)	7
Brown Hoplo	0	0 (0)	0	0	0 (0)	0	2	1.9 (2.3)	749
Channel Catfish	3	3.4 (2.4)	1,015	6	5.6 (2.0)	6,460	3	2.8 (0.0)	2,460
Coastal Shiner	232	264.8 (127.4)	187	211	196.5 (68.4)	190	285	266.1 (86.3)	238
Eastern Mosquitofish	69	78.8 (33.3)	48	59	54.9 (25.0)	38	80	74.7 (48.9)	39
Florida Gar	0	0 (0)	0	9	8.4 (5.2)	4,031	2	1.9 (2.3)	732
Hogchoker	50	57.1 (20.3)	80	80	74.5 (43.4)	146	39	36.4 (10.5)	57
Inland Silverside	2	2.3 (2.8)	1	0	0 (0)	0	0	0 (0)	0
Ladyfish	1	1.1 (1.4)	6	2	1.9 (1.1)	47	5	4.7 (3.0)	76
Largemouth Bass	5	5.7 (5.0)	826	10	9.3 (5.0)	2,827	7	6.5 (6.4)	1,289
Longnose Gar	0	0 (0)	0	1	0.9 (1.1)	3,200	1	0.9 (1.1)	2,364
Mayan Cichlid	1	1.1 (1.4)	78	0	0 (0)	0	0	0 (0)	0
Pugnose Minnow	10	11.4 (5.0)	5	13	12.1 (4.1)	5	5	4.7 (4.1)	2
Redear Sunfish	13	14.8 (6.1)	3,426	40	37.2 (17.3)	9,133	45	42.0 (20.9)	7,029
Sailfin Catfish	22	25.1 (3.7)	4,371	27	25.1 (3.4)	5,654	123	114.8 (78.6)	18,293
Sailfin Molly	10	11.4 (11.9)	45	1	0.9 (1.1)	1	1	0.9 (1.1)	1
Seminole Killifish	34	38.8 (41.4)	67	43	40.0 (13.2)	122	51	47.6 (38.6)	122
Snook	1	1.1 (1.4)	402	23	21.4 (9.9)	26,714	6	5.6 (2.0)	2,656
Spotted Sunfish	14	16.0 (6.1)	298	52	48.4 (5.7)	1,314	67	62.6 (21.7)	1,992
Striped Mojarra	1	1.1 (1.4)	315	5	4.7 (4.1)	2,213	0	0 (0)	0
Striped Mullet	11	12.6 (9.8)	54	5	4.7 (5.7)	605	0	0 (0)	0
Taillight Shiner	1	1.1 (1.4)	1	6	5.6 (3.4)	4	1	0.9 (1.1)	6
White Catfish	2	2.3 (1.4)	3	4	3.7 (3.0)	1,901	1	0.9 (1.1)	3
Herbivores	22	25.1 (3.7)	4,371	27	25.1 (3.4)	5,654	123	114.8 (78.6)	18,293
Invertivores	440	502.3 (175.0)	4,947	560	521.4 (108.9)	15,943	627	585.4 (62.4)	13,651
Omnivores	64	73.1 (29.3)	1,199	70	65.2 (21.3)	10,688	61	57.0 (38.2)	4,391
Piscivores	7	8.0 (3.7)	1,234	48	44.7 (20.9)	44,072	22	20.5 (8.2)	7,118
TOTAL	533	608.4 (169.7)	11,751	705	656.4 (135.5)	76,357	833	777.8 (71.5.)	43,453

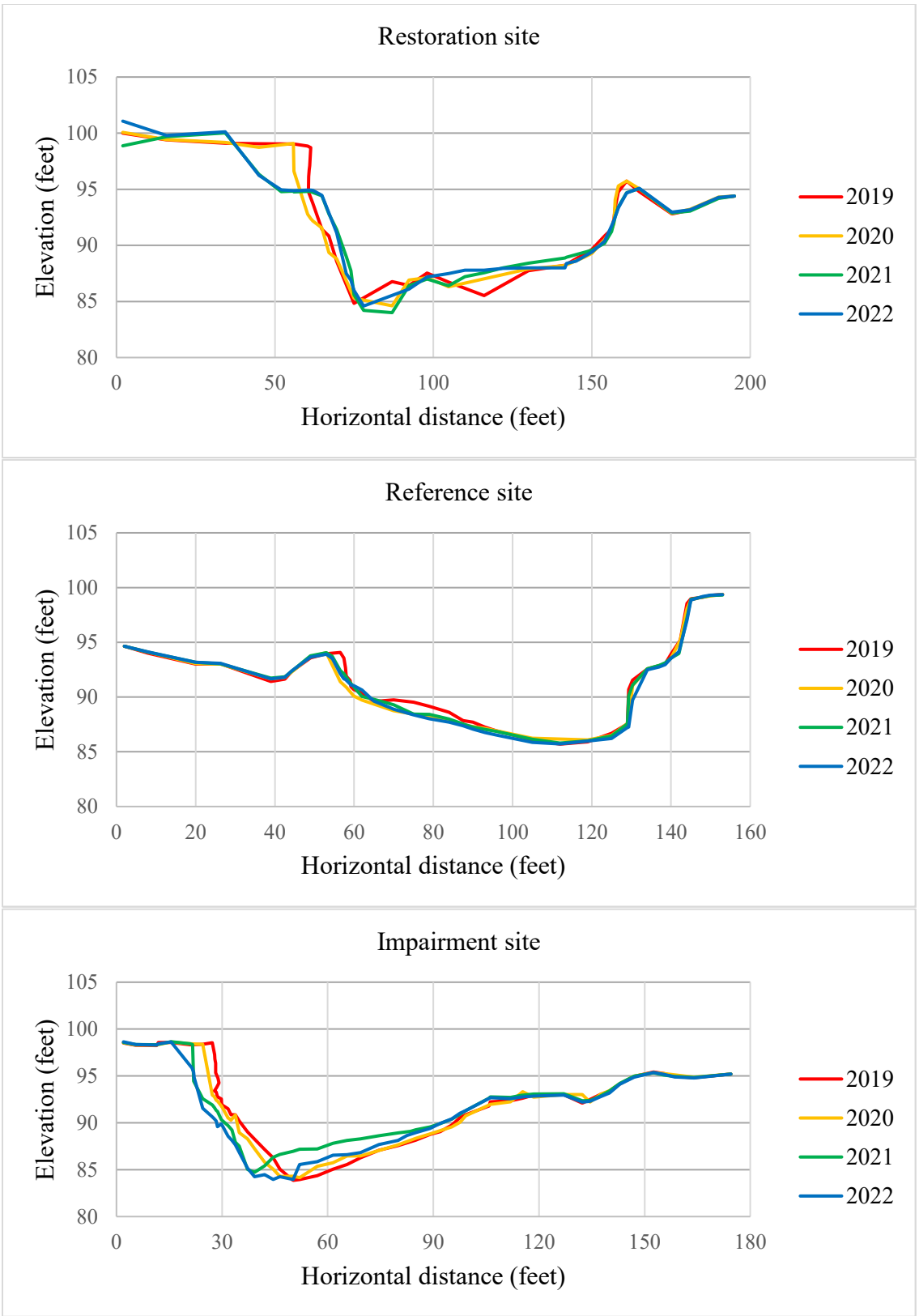


Figure 10. Cross section surveys of the restoration, reference, and impairment sites on the Peace River near Zolfo Springs, 2019 to 2022.

Table 15. Erosion rates based on bank profile surveys at the Zolfo Springs treatment areas on the Peace River during 2019 to 2022. Pre = before restoration, Post = after restoration.

	Annual Bank Erosion Rates (ft/yr)				Bank	Bank	Total Erosion
Treatment site	2019-20	2020-21	2021-22	Average	Length (ft)	Height (ft)	Rate (tons/yr)
Impairment	0.2	0.5	0.2	0.3	520	14.1	108.3
Reference	0.1	0.0	0.1	0.1	550	12.5	16.6
Restoration (Pre)	0.3			0.3	450	14.3	101.9
Restoration (Post)			0.1	0.1	450	10.5	13.6

28 March 2019 12 March 2020 1 April 2021 19 April 2022

Figure 11. Field photos from photo points REST_B1 (top), REST_B2 (middle), and REST_C1 (bottom) at the restoration site on the Peace River near Zolfo Springs during 2019 to 2022.

28 March 2019 12 March 2020 1 April 2021 19 April 2022

Figure 12. Field photos from photo points REF_A1 (top), REF_B1 (middle), and REF_C1 (bottom) at the reference site on the Peace River near Zolfo Springs during 2019 to 2022.

28 March 2019 12 March 2020 1 April 2021 19 April 2022

Figure 13. Field photos from photo points IMP_A2 (top), IMP_B1 (middle), and IMP_B2 (bottom) at the impairment site on the Peace River near Zolfo Springs during 2019 to 2022.

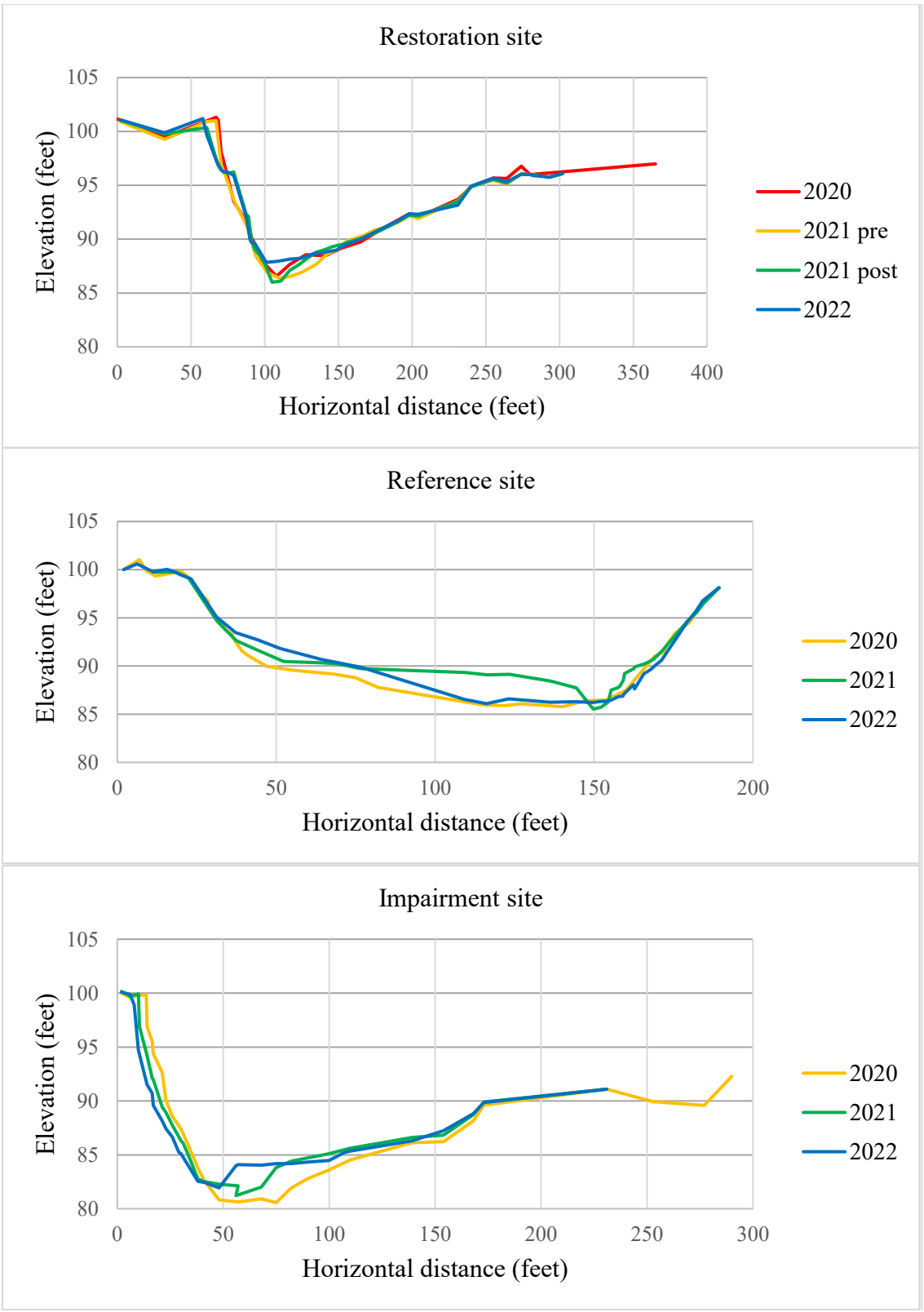


Figure 14. Cross section surveys of the restoration, reference, and impairment sites on the Peace River near Arcadia during 2020 to 2022. Pre = before restoration, post = after restoration.

Table 16. Erosion rates based on bank profile surveys at the Arcadia treatment areas on the Peace River during 2020 to 2022. Pre = before restoration, Post = after restoration.

	Annual Bank Erosion Rates (ft/yr)			Bank	Bank	Total Erosion
Treatment site	2020-21	2021-22	Average	Length (ft)	Height (ft)	Rate (tons/yr)
Impairment	0.6	0.5	0.5	820	17.9	384.5
Reference	-0.3	0.0	-0.1	1000	11.4	-78.4
Restoration (Pre)	0.4		0.4	1000	14.5	286.2
Restoration (Post)		0.1	0.1	1000	9.6	32.2

24 March 2020 21 January 2021 18 March 2021 18 April 2022

Figure 15. Field photos from photo points REST_A1 (top), REST_A2 (middle), and REST_B2 (bottom) at the restoration site on the Peace River near Arcadia during 2020 to 2022.

23 March 2020 18 March 2021 29 March 2022

Figure 16. Field photos from photo points REF_A1 (top), REF_B1 (middle), and REF_B2 (bottom) at the reference site on the Peace River near Arcadia during 2020 to 2022.

23 March 2020 18 March 2021 29 March 2022

Figure 17. Field photos from photo points IMP_A1 (top), IMP_B1 (middle), and IMP_C1 (bottom) at the impairment site on the Peace River near Arcadia during 2020 to 2022.

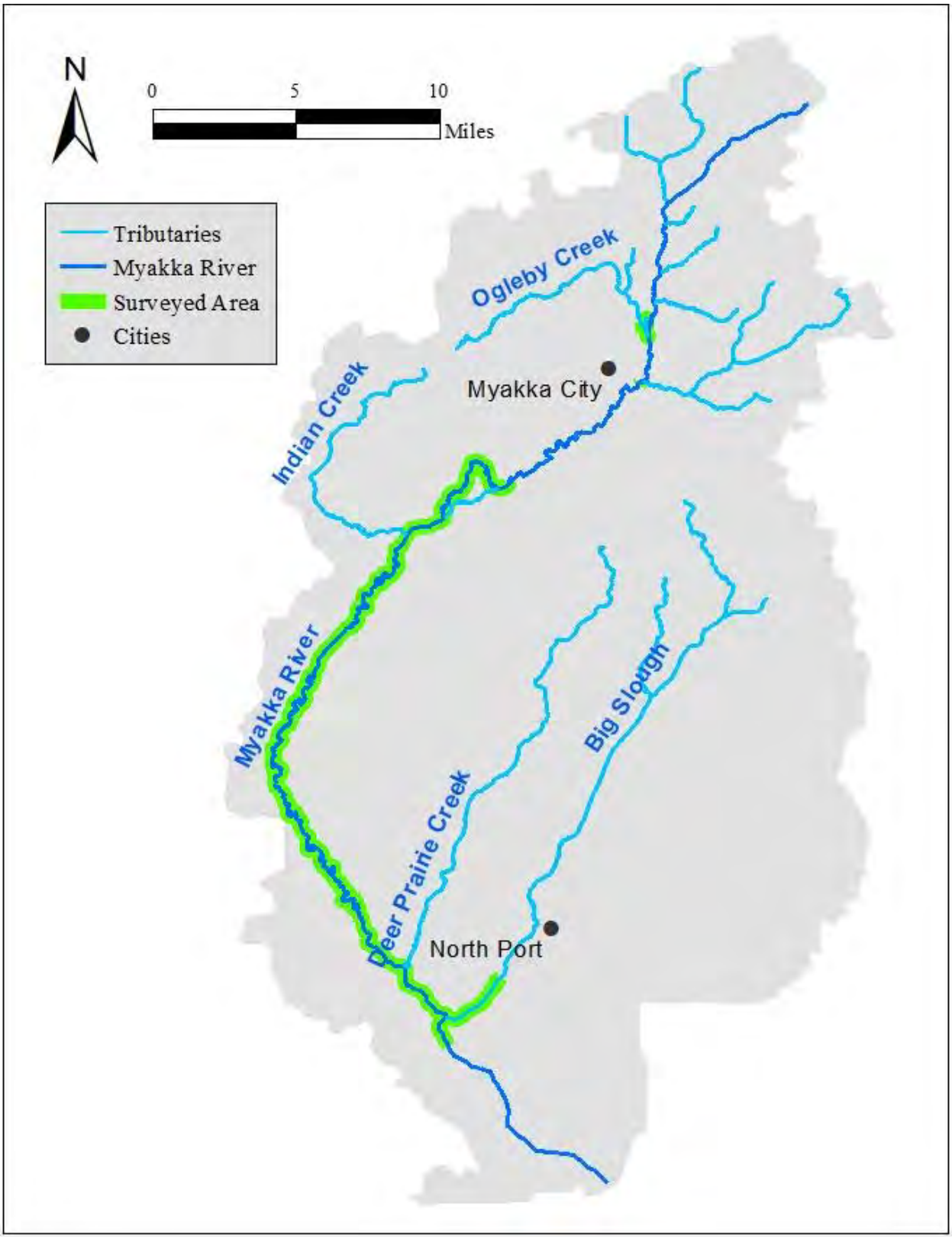


Figure 18. Area surveyed within the Myakka River Watershed during 2019 to 2022.

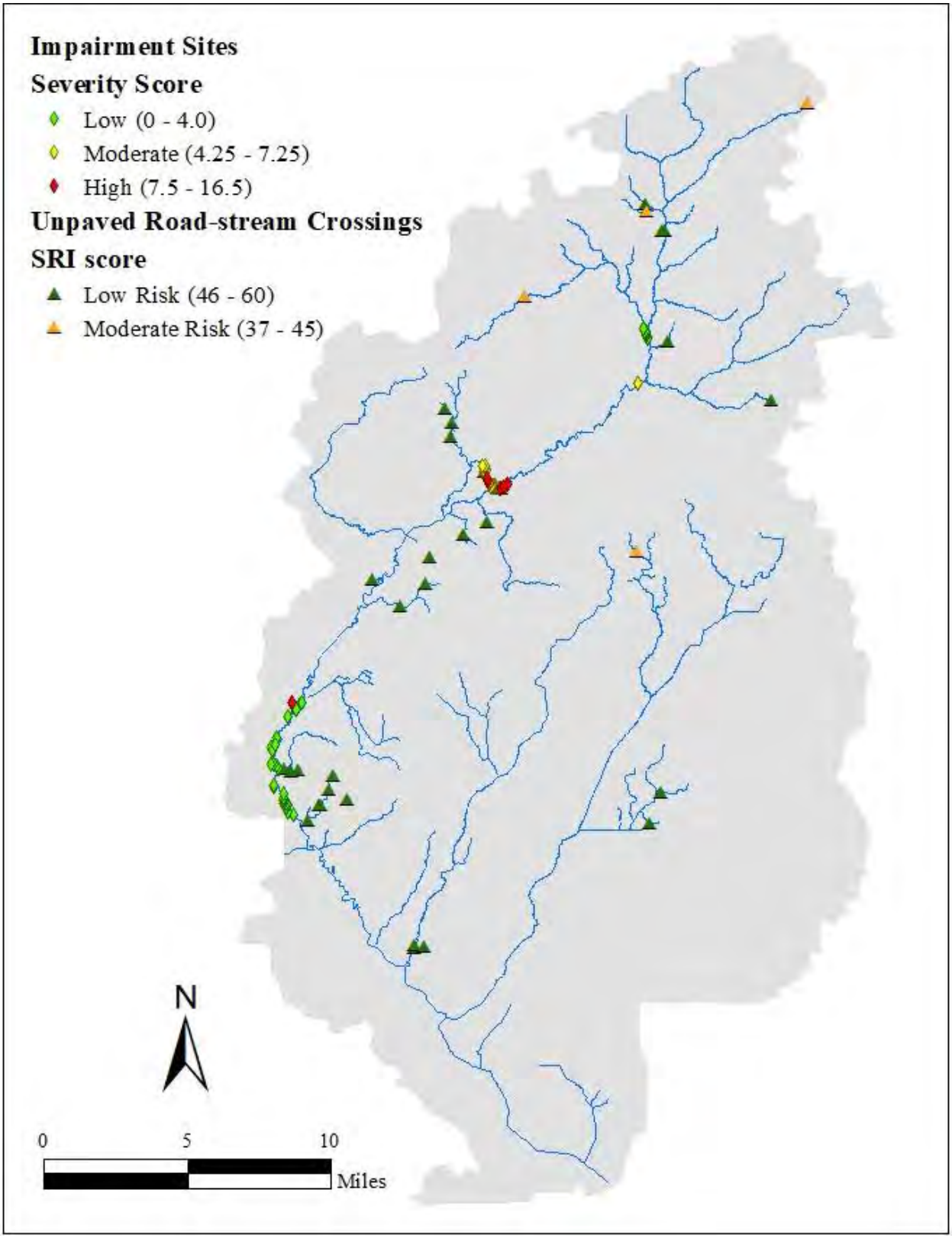


Figure 19. Location and ranking of all scored impairment sites and unpaved road-stream crossing sites in the Myakka River Watershed during 2019 to 2022. SRI = Sediment Risk Index.

Table 17. Proportion of land use and land cover classes (LULC) within 500 ft of the surveyed area; number and severity (low, moderate, or high) of impairment sites that occurred in each class; and proportion of total impairment sites that occurred in each class within the Myakka River Watershed during 2019 to 2022.

	Pecrent of	Number of impairment sites				Percent
LULC	landscape	Low	Moderate	High	Total	of total
Urban	9.3%				0	0%
Pasture	3.4%		11	4	15	22%
Range	1.5%				0	0%
Forest	12.9%	3			3	4%
Wetland	72.4%	38	9	2	49	73%
Transportation	0.4%				0	0%
Total	100.0%	41	20	6	67	100%

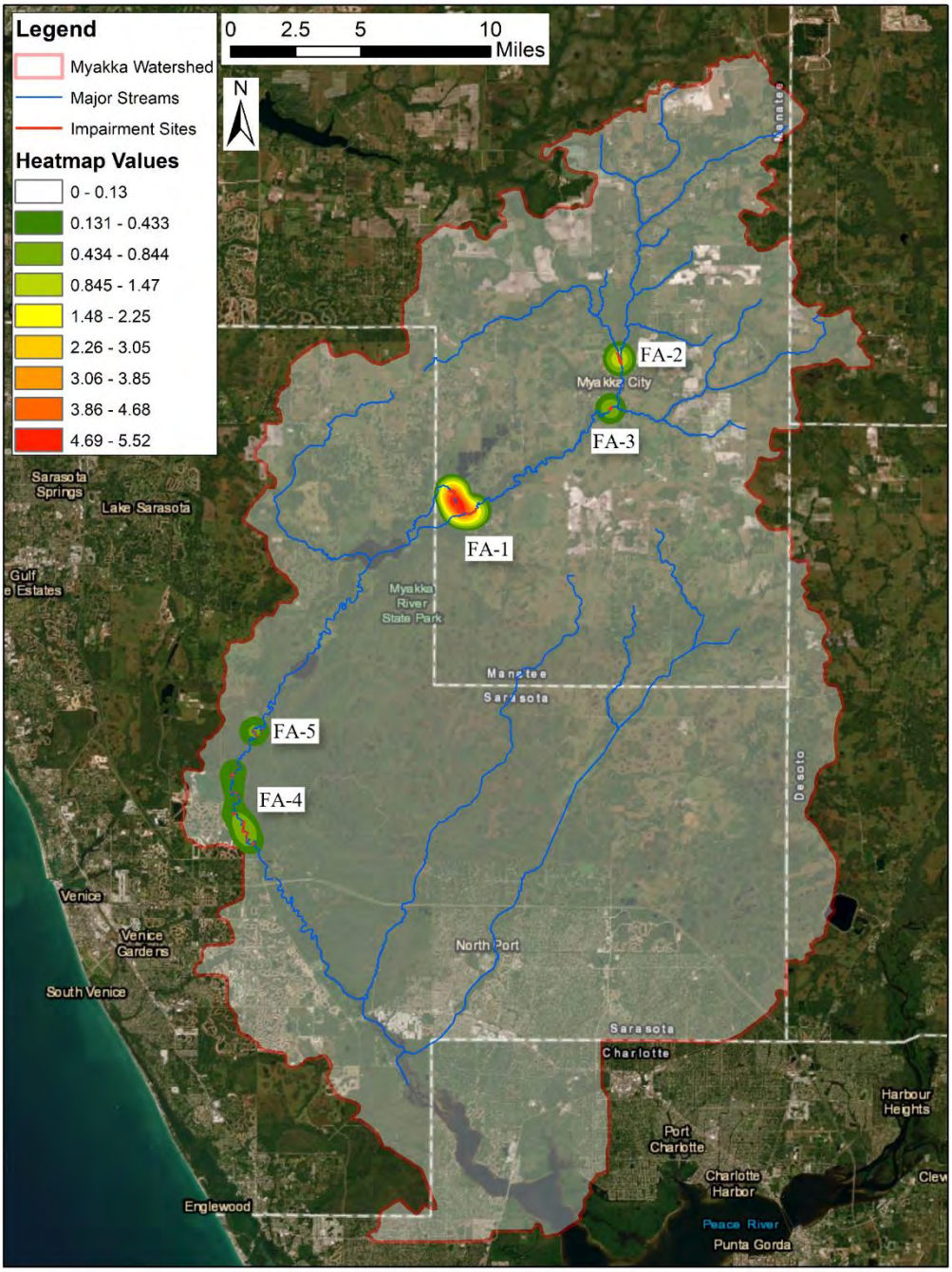


Figure 20. ArcGIS heatmap rankings and impairment site heatmap focal areas for restoration within the Myakka River Watershed. FA-1 = Myakka River focal area 1, FA-2 = Myakka River focal area 2, etc.

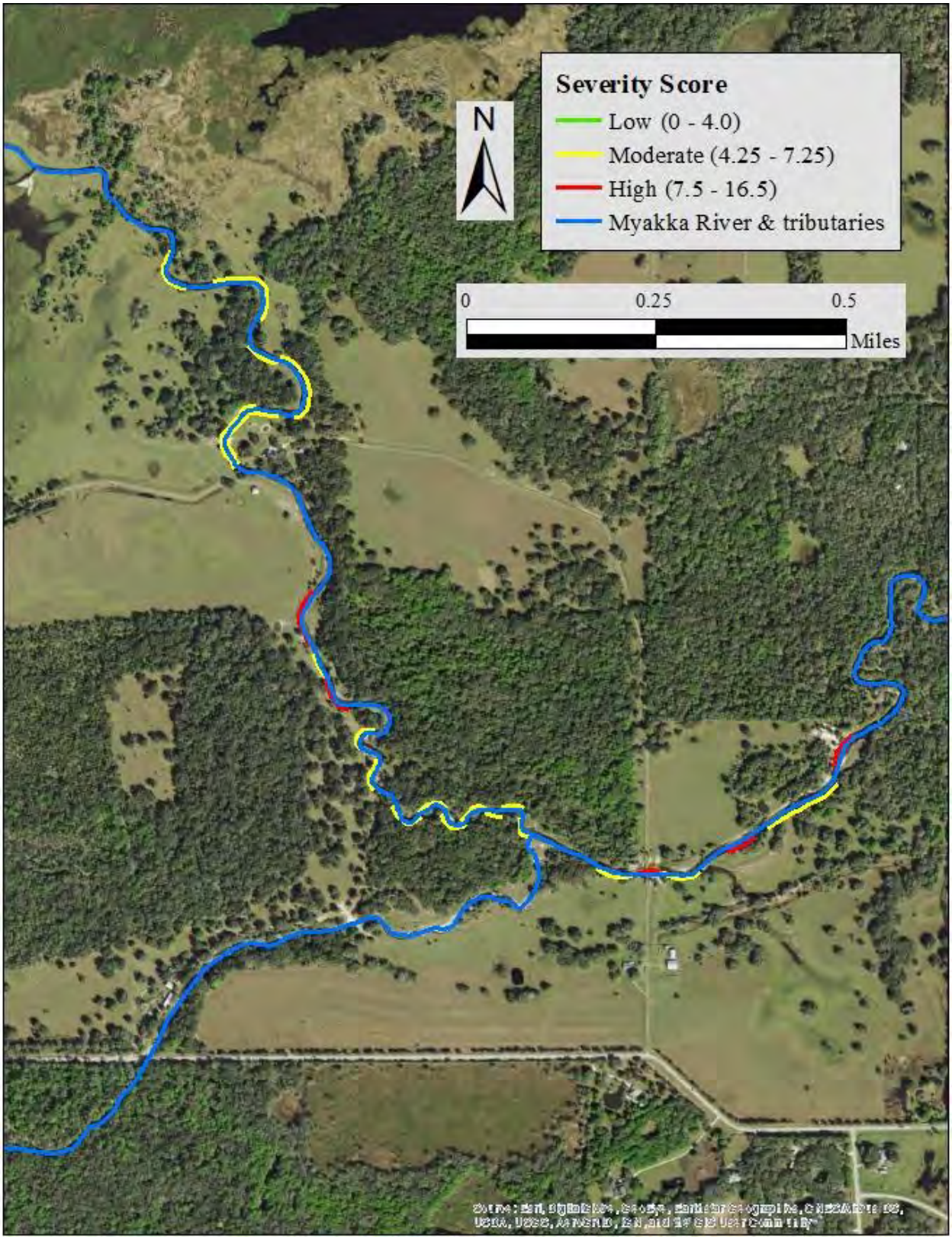


Figure 21. Location and ranking of impairment sites identified in the Myakka River 1 focal area during 2019 to 2022.

Table 18. Number of impairment sites and length of impairments, per severity category (low, moderate, and high), identified and assessed within impairment site heat map focal areas on the Myakka River during 2020 to 2022.

	Length of	Number of impairment sites				Length of impairment (ft)			
Focal Area	reach (mi)	Low	Moderate	High	Total	Low	Moderate	High	TOTAL
Myakka River 1	1.90		19	5	24		6,035	1,387	7,422
Myakka River 2	0.49	15			15	2,189			2,189
Myakka River 3	0.14		1		1		700		700
Myakka River 4	4.96	21			21	4,995			4,995
Myakka River 5	1.78	5		1	6	875		150	1,025
Total	9.27	41	20	6	67	8,059	6,735	1,537	16,331

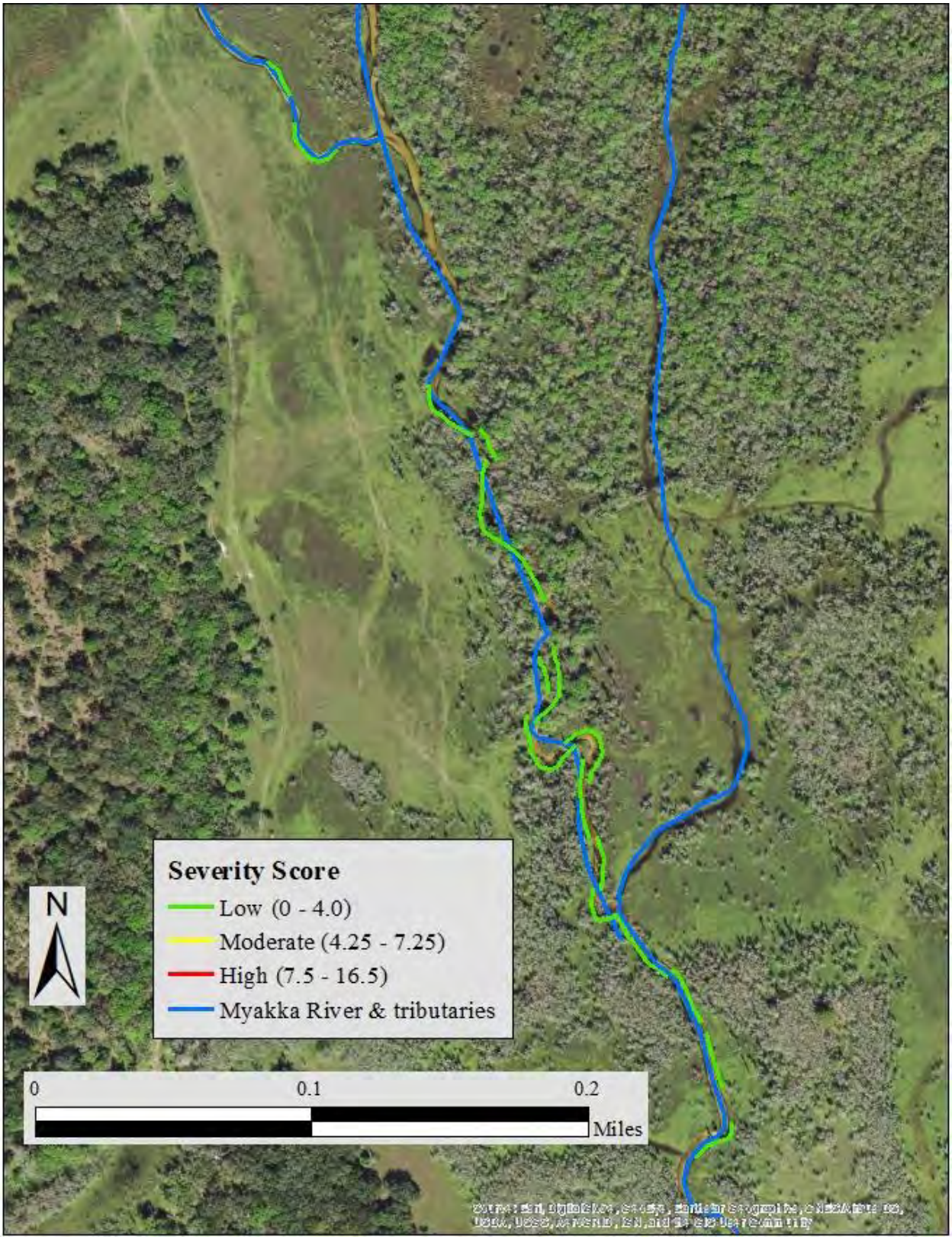


Figure 22. Location and ranking of impairment sites identified in the Myakka River 2 focal area during 2019 to 2022.

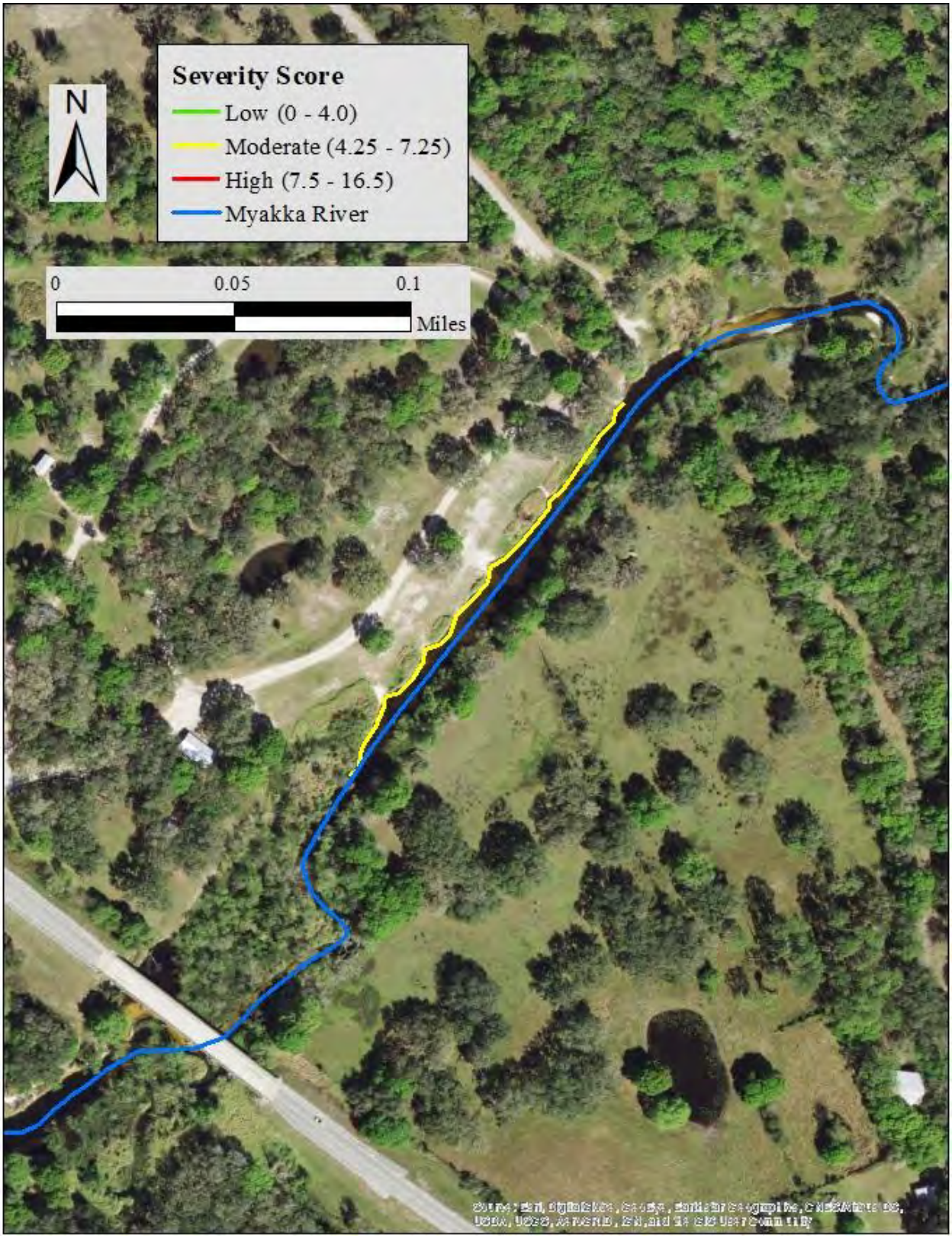


Figure 23. Location and ranking of impairment sites identified in the Myakka River 3 focal area during 2019 to 2022.

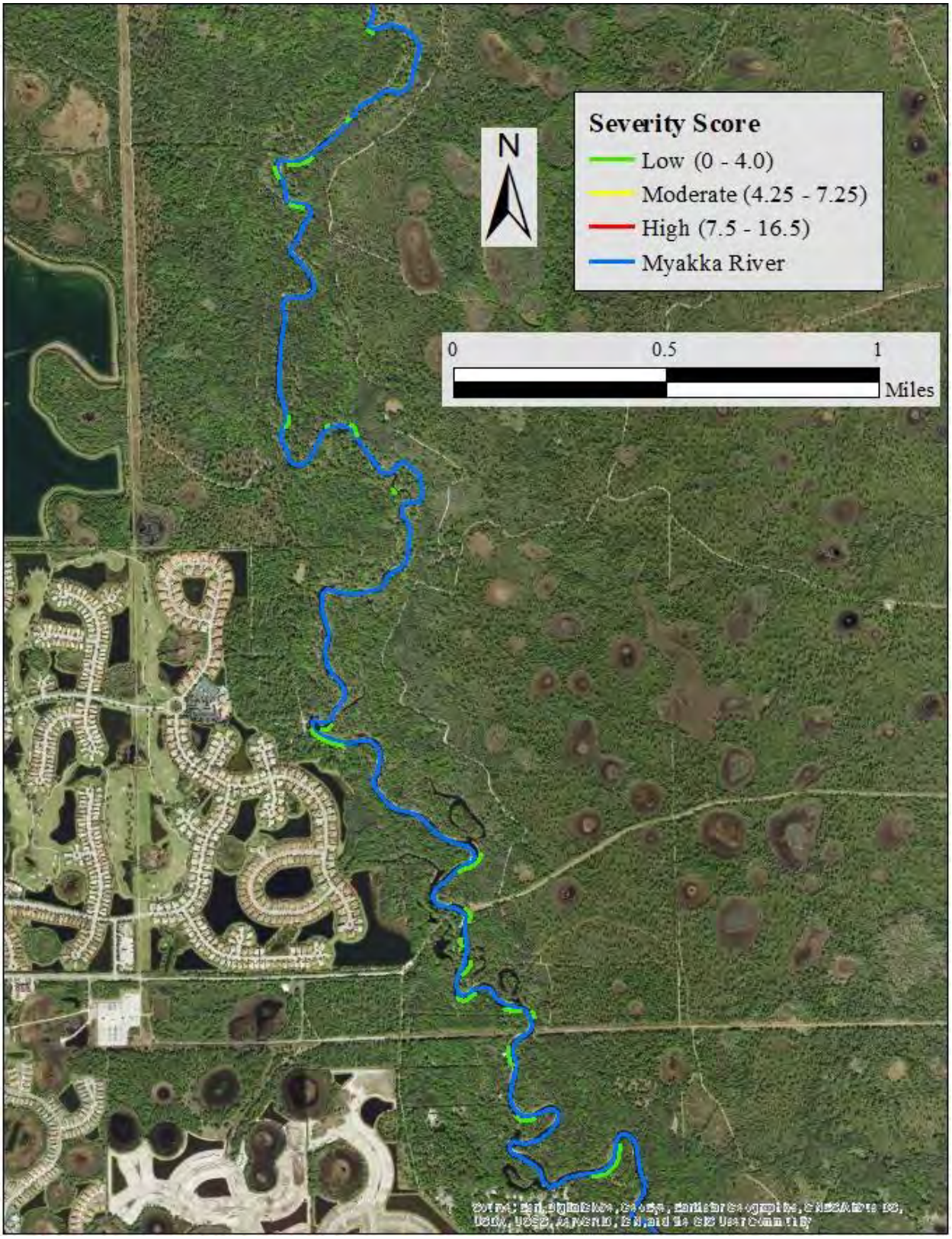


Figure 24. Location and ranking of impairment sites identified in the Myakka River 4 focal area during 2019 to 2022.

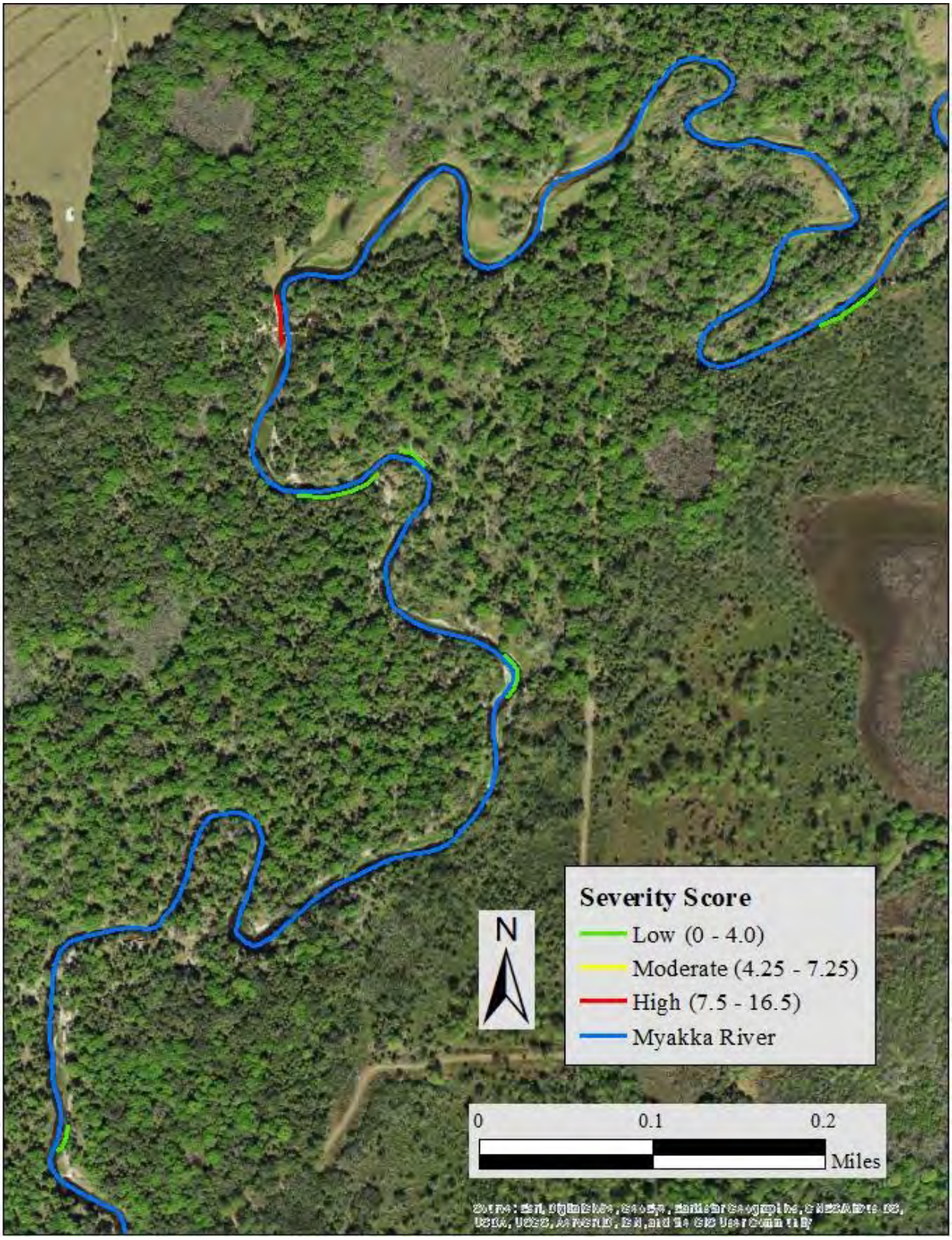


Figure 25. Location and ranking of impairment sites identified in the Myakka River 5 focal area during 2019 to 2022.

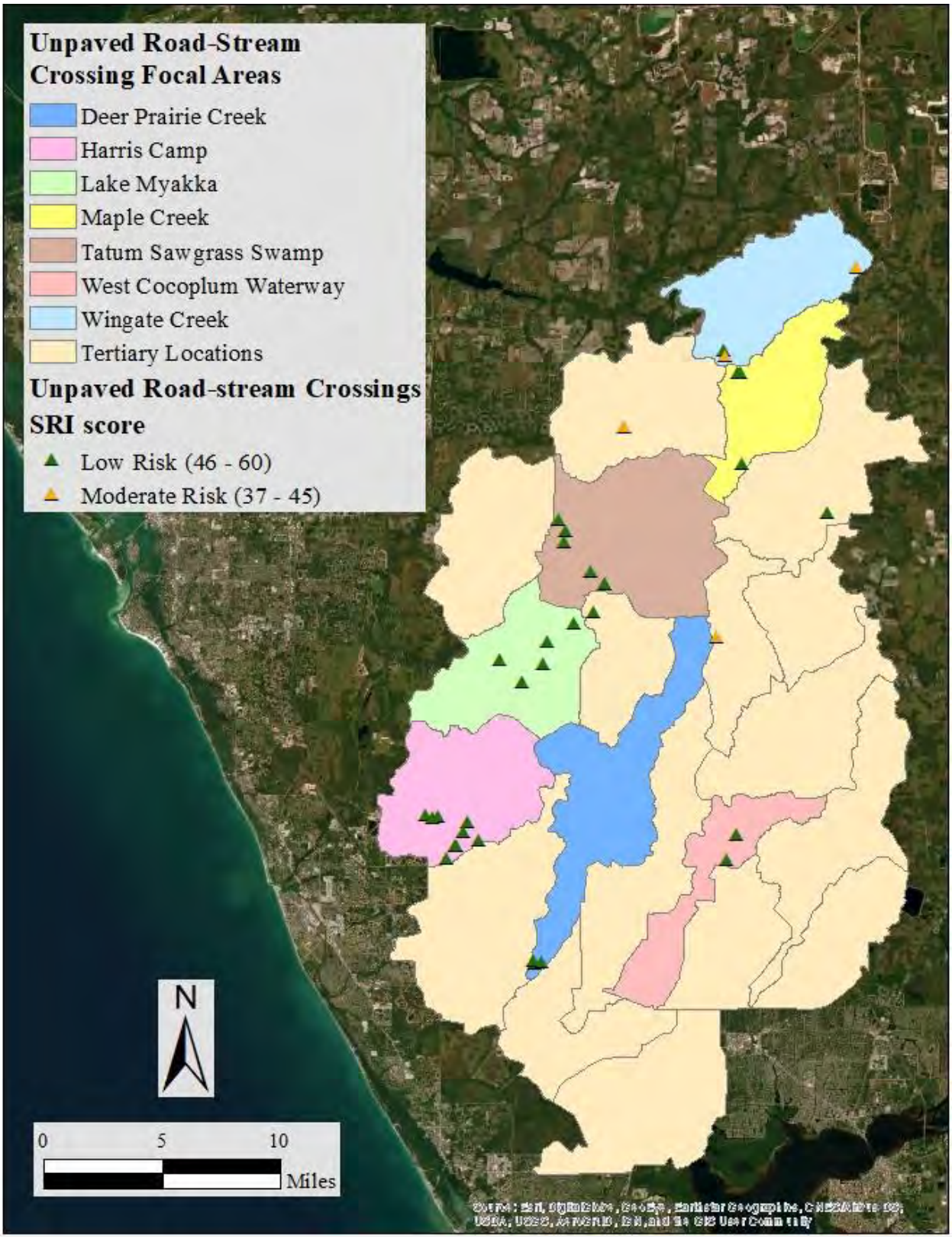


Figure 26. Location and ranking of all scored unpaved road-stream crossings, per focal area (sub-watersheds), within the Myakka River Watershed.

Table 19. Number of unpaved road-stream crossings (crossings) per Sediment-Risk-Index category (low, moderate, and high risk) and number of fish passage barriers (barriers) assessed within unpaved road-stream crossing site focal areas and tertiary locations on the Myakka River during 2019 to 2022. * = sandbars were present which may prevent fish passage during low-water periods.

	Number of crossings				
Focal Area	Low	Moderate	High	Total	Barriers
Harris Camp	9			9	3
Tatum Sawgrass Swamp	6			6	*
Lake Myakka	5			5	
Deer Prairie Creek	3			3	1
Maple Creek	3			3	
Wingate Creek	1	2		3	2
West Cocoplum Waterway	2			2	
Tertiary Locations	2	2		4	
Total	31	4	0	35	6

Table 20. Total number (N), catch per unit distance (CPUD, N/km), and percent composition by number and weight for fish collected during 2020 to 2022 along the Myakka River. SE = standard error, [1] = non-native, [2] = euryhaline, and [3] = marine.

Common name	Scientific name	N	Fish/km CPUD (SE)	W (g)	% composition N	% composition W
African Jewelfish [1]	*Hemichromis bimaculatus*	73	8.1 (1.9)	181	0.6%	0.1%
American Eel [2]	*Anguilla rostrata*	1	0.1 (0.1)	444	0.0%	0.1%
Asian Swamp Eel [1, 2]	*Monopterus albus*	36	4.0 (0.8)	3,315	0.3%	0.9%
Bay Anchovy [3]	*Anchoa mitchilli*	40	4.4 (1.9)	14	0.3%	0.0%
Blue Tilapia [1, 2]	*Oreochromis aureus*	46	5.1 (1.1)	12,729	0.4%	3.6%
Bluefin Killifish	*Lucania goodei*	3	0.3 (0.2)	2	0.0%	0.0%
Bluegill	*Lepomis macrochirus*	675	75.0 (9.9)	8,477	5.3%	2.4%
Brook Silverside	*Labidesthes sicculus*	277	30.8 (7.6)	155	2.2%	0.0%
Brown Hoplo [1]	*Hoplosternum littorale*	1	0.1 (0.1)	318	0.0%	0.1%
Channel Catfish	*Ictalurus punctatus*	4	0.4 (0.2)	35	0.0%	0.0%
Coastal Shiner	*Notropis petersoni*	270	30.0 (7.5)	166	2.1%	0.0%
Dollar Sunfish	*Lepomis marginatus*	74	8.2 (2.2)	91	0.6%	0.0%
Eastern Mosquitofish	*Gambusia holbrooki*	8,985	998.3 (177.2)	1,938	70.1%	0.5%
Everglades Pygmy Sunfish	*Elassoma evergladei*	2	0.2 (0.2)	2	0.0%	0.0%
Flagfish	*Jordanella floridae*	9	1.0 (0.5)	6	0.1%	0.0%
Florida Gar	*Lepisosteus platyrhincus*	172	19.1 (2.6)	110,350	1.3%	30.9%
Golden Topminnow	*Fundulus chrysotus*	19	2.1 (0.9)	15	0.1%	0.0%
Gray Snapper [3]	*Lutjanus griseus*	3	0.3 (0.2)	394	0.0%	0.1%
Hogchoker [3]	*Trinectes maculatus*	274	30.4 (5.0)	90	2.1%	0.0%
Inland Silverside	*Menidia beryllina*	11	1.2 (0.4)	12	0.1%	0.0%
Ladyfish [3]	*Elops saurus*	1	0.1 (0.1)	58	0.0%	0.0%
Largemouth Bass	*Micropterus salmoides*	72	8.0 (1.1)	22,179	0.6%	6.2%
Least Killifish	*Heterandria formosa*	34	3.8 (1.0)	18	0.3%	0.0%
Lined Topminnow	*Fundulus lineolatus*	1	0.1 (0.1)	1	0.0%	0.0%
Longnose Gar	*Lepisosteus osseus*	9	1.0 (0.3)	2,540	0.1%	0.7%
Marsh Killifish [2]	*Fundulus confluentus*	3	0.3 (0.3)	4	0.0%	0.0%
Mayan Cichlid [1, 2]	*Cichlasoma urophthalmus*	130	14.4 (3.1)	3,177	1.0%	0.9%
Naked Goby [3]	*Gobiosoma bosc*	2	0.2 (0.2)	2	0.0%	0.0%
Rainwater Killifish [2]	*Lucania parva*	9	1.0 (0.7)	2	0.1%	0.0%
Redear Sunfish	*Lepomis microlophus*	178	19.8 (5.4)	1,182	1.4%	0.3%
Sailfin Catfish [1]	*Pterygoplichthys sp.*	233	25.9 (3.3)	43,730	1.8%	12.3%
Sailfin Molly	*Poecilia latipinna*	354	39.3 (16.5)	414	2.8%	0.1%
Seminole Killifish	*Fundulus seminolis*	193	21.4 (4.2)	309	1.5%	0.1%
Sheepshead [3]	*Archosargus probatocephalus*	1	0.1 (0.1)	721	0.0%	0.2%
Snook [3]	*Centropomus undecimalis*	117	13.0 (2.0)	109,264	0.9%	30.6%
Spotted Sunfish	*Lepomis punctatus*	64	7.1 (1.6)	1,228	0.5%	0.3%
Striped Mojarra [3]	*Eugerres plumieri*	156	17.3 (3.3)	17,636	1.2%	4.9%
Striped Mullet [3]	*Mugil cephalus*	6	0.7 (0.3)	2,676	0.0%	0.7%
sunfish species	*Lepomis sp.*	3	0.3 (0.3)	1	0.0%	0.0%
Swamp Darter	*Etheostoma fusiforme*	1	0.1 (0.1)	1	0.0%	0.0%
Taillight Shiner	*Notropis maculatus*	8	0.9 (0.4)	8	0.1%	0.0%
Tarpon [3]	*Megalops atlanticus*	2	0.2 (0.2)	3,252	0.0%	0.9%
Tidewater Mojarra [3]	*Eucinostomus harengulus*	166	18.4 (5.1)	922	1.3%	0.3%
Walking Catfish [1]	*Clarias batrachus*	16	1.8 (0.6)	2,862	0.1%	0.8%
Warmouth	*Lepomis gulosus*	36	4.0 (1.1)	100	0.3%	0.0%
White Catfish	*Ameiurus catus*	46	5.1 (1.7)	5,842	0.4%	1.6%
Total		12,816	1,424.0 (197.7)	356,863		

APPENDIX A. Restoration design for the 450-ft streambank near Zolfo Springs along the Peace River.

Permitting Plans For:

PEACE RIVER RANCH
STREAMBANK STABILIZATION PROJECT

ZOLFO SPRINGS, FL

Prepared For:

FLORIDA FISH & WILDLIFE CONSERVATION COMMISSION
3900 DRANE FIELD ROAD
LAKELAND, FL 33811

VICINITY MAP

INDEX

Prepared by:

US FISH & WILDLIFE SERVICE
1601 BALBOA AVE
PANAMA CITY, FL 32405

Date: June 2019
Project Number: xx-xxxx

GENERAL NOTES:

1. ANY DAMAGE TO THE EXISTING TURF ESTABLISHMENT IN AREAS OUTSIDE THE LIMITS OF CONSTRUCTION FOR THIS PROJECT WILL BE REPAIRED BY THE CONTRACTOR AT HIS EXPENSE AS DIRECTED BY THE OWNER.
2. GRADES SHOWN ARE FINISHED GRADES.
3. CONTRACTOR SHOULD PREVENT DAMAGE TO TREES OUTSIDE OF, BUT WITHIN CLOSE PROXIMITY TO, THE PROPERTY BOUNDARY.
4. CONTRACTOR IS RESPONSIBLE FOR ALL CONSTRUCTION ALIGNMENT AND GRADE LAYOUT
5. THE CONTRACTOR SHALL NOTIFY THE OWNER 48 HOURS PRIOR TO CONSTRUCTION.
6. THE CONTRACTOR SHALL TAKE STEPS NECESSARY TO PREVENT EROSION AND ANY OFF SITE SEDIMENT TRANSPORT RESULTING FROM INCREASED RUNOFF DURING CONSTRUCTION BY PROVIDING SILT FENCE AND/OR STAKED HAY BALES AS PART OF BEST MANAGEMENT PRACTICES OR AS INDICATE ON THE PLANS. EROSION CONTROL DEVICES SHALL CONFORM TO FLDOT.
7. ANY PUBLIC LAND CORNER WITHIN THE LIMITS OF CONSTRUCTION IS TO BE PROTECTED. IF A CORNER MONUMENT IS IN DANGER OF BEING DESTROYED AND HAS NOT BEEN PROPERLY REFERENCES, THE CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY.
8. THE CONTRACTOR SHALL MATCH EXISTING CONDITIONS AT PROJECT BEGINNING AND END AS DIRECTED BY THE PROJECT OWNER.
9. EXISTING ROADS AND TRAILS SHALL BE MAINTAINED TO LOCAL TRAFFIC AND PROPERTY OWNERS AT ALL TIMES. ALL ROADS DAMAGED BY CONSTRUCTION OPERATIONS ARE TO BE PATCHED OR RECONSTRUCTED AS DIRECTED BY THE OWNER AT THE CONTRACTOR'S EXPENSE.
10. ALL MATERIAL, TESTING AND CONSTRUCTION METHODS SHALL CONFORM TO THE FLORIDA DEPARTMENT OF TRANSPORTATION "STANDARDS SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION" LATEST EDITION, AND ASTM.
11. THE CONTRACTOR SHALL COMPLY WITH ALL FEDERAL, STATE, AND LOCAL REGULATORY AGENCY REQUIREMENTS.
12. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PRESERVE OR RELOCATED ALL BENCHMARKS AS NEEDED DURING CONSTRUCTION.
13. ALL DISTURBED AREAS WILL BE SEEDED WITH A PERMANENT VEGETATION COVER OF BLUESTEM, INDIAN GRASS AND SWITCHGRASS AND A NURSE CROP OF BROWN TOP MILLET OR RYE GRASS IMMEDIATELY AFTER CONSTRUCTION. COVER CROP SEEDING WILL BE USED IF NEEDED.
14. ALL EXCESS MATERIALS SHOULD BE DISTRIBUTED EVENLY OVER WORK AREA, OR STOCKPILED FOR USE ON FUTURE PROJECTS, AS DIRECTED BY THE OWNER.
15. IF ADDITIONAL FILL MATERIAL IS NEEDED DURING CONSTRUCTION, SOIL CAN BE TAKEN FROM THE SURROUNDING AREA WITHIN THE PROJECT AREA, AS DIRECTED BY THE OWNER.
16. ALL EXPOSED STREAMBANKS SHALL BE COVERED WITH SOD MATS WHERE POSSIBLE CUT FROM THE SURROUNDING PROJECT AREA.
17. ALL TREE SPECIES USED FOR INSTALLATION OF WOODY STRUCTURES SHALL COME FROM PROJECT SITE, OR IN NEARBY AREA.

CONSTRUCTION METHODOLOGY:

1. TYPICAL CONSTRUCTION EQUIPMENT WILL BE UTILIZED ON SITE (BULLDOZER, BACKHOE, EXCAVATOR, RUBBER TRACKED DUMP TRUCKS, ETC.). ALL EQUIPMENT AND MATERIALS WILL BE STORED ON ADJACENT UPLANDS DURING CONSTRUCTION OR WHEN NOT IN USE.

2. BEST MANAGEMENT PRACTICES (BMPS) WILL BE IMPLEMENTED TO PREVENT IMPACT TO ADJACENT WETLAND AREAS; THE BMPS WILL BE IN SITU PRIOR TO PERMITTED CONSTRUCTION ACTIVITIES AND REMAIN THOUGHT THE DURATION. SHORT-TERM EROSION CONTROL MEASURES WILL CONSIST OF STAKED HAY BALES, FLOATING TURBIDITY BARRIERS, AND ENTRENCHED SILT FENCING PLACED AROUND THE WORK AREA WHEN RAIN IS IMMINENT. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE PLACEMENT, INTEGRITY, AND UPKEEP OF ALL EROSION CONTROL AND STABILIZATION DEVISES/MATERIALS.

3. THE CONTRACTOR WILL WORK AROUND THE EXISTING STREAM FLOW AS MUCH AS POSSIBLE TO REDUCE DOWNSTREAM TURBIDITY. THE CONTRACTOR WILL EMPLOY EXCAVATION METHODS THAT WILL REDUCE THE DAMAGE TO THE SITE DURING EXCAVATION.

4. MECHANIZED REMOVAL WILL OCCUR WITHIN THE AREAS THAT CAN BE ACCESSED BY MACHINERY.

5. EXCAVATION WILL BE ACCOMPLISHED USING A SMALL TRACK EXCAVATOR WITH A 2-3 FOOT BUCKET. THE BANKS SHALL BE RE-GRADED TO THE PROPOSED ELEVATIONS WITHIN THE PERMIT DRAWINGS.

6. AFTER EXCAVATION/REMOVAL, THE TEMPORARY IMPACT AREA WILL BE REGRADED TO ELEVATIONS CONSISTENT WITH ADJACENT GRADE; THE SIDE SLOPES AND BANK CHANNEL WILL BE GRADED TO THE SPECIFIED ELEVATIONS AND DIMENSIONS WITHIN THE DRAWINGS. EXPOSED BANK SOIL AND/OR FILL SLOPES WILL BE GRADED WITH A MINIMUM SLOPE OF 1:1.5 OR CONSISTENT WITH EXISTING NATURAL ELEVATIONS.

7. AS REMOVAL IS COMPLETED, GRADED SLOPES WILL BE IMMEDIATELY SEEDED OR SODDED WITH AN APPLICABLE STABILIZATION METHOD. FURTHER STABILIZATION OF THE SITE WILL BE COMPLETED AS SOON AS POSSIBLE OR AS SOON AS CONSTRUCTION IS COMPLETE IN THAT AREA. STABILIZATION WILL INCLUDE A COMBINATION OF LIVE STAKES, GRASS SEEDING, MULCHING, NATIVE PLANTINGS, COLONIZE QUICKLY AND FACILITATE SOIL STABILIZATION (I.E. SPECIES SUCH AS *ACER RUBRUM* AND *QUERCUS SPP.* AS WELL AS VARIOUS FERNS, SEDGES, AND RUSHES ENDEMIC TO THE HABITAT).

PEACE RIVER RANCH STREAMBANK STABILIZATION PROJECT ZOLFO SPRINGS, FL	CONSTRUCTION SHEET	DATE: 5/2019	
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS	
		DRAWN: GH	SHEET CS-1
		CHECKED: CM	

PROJECT DESIGN ANALYSIS:

ALL DESIGN CRITERIA ARE SHOWN IN THE TABLE BELOW, WHICH INCLUDES PARAMETERS FOR CHANNEL DIMENSION, PATTERN, PROFILE, AND MATERIAL. BED GRAIN ANALYSIS WAS NOT CONDUCTED BUT WAS ASSUMED TO BE SANDBED. DUNE HEIGHTS WERE SURVEYED BUT ONLY USED IN DISCHARGE CALCULATIONS.

Parameter	Design		Existing		Reference Riffle		Reference Pool	
	Min	Max	Min	Max	Min	Max	Min	Max
Reach Name	PEACE RIVER		PEACE RIVER		PEACE RIVER		PEACE RIVER	
Drainage Area, DA (sq mi)	792.6		792.6		789.5		792.6	
Stream Type	C5		C5		C5		C5	
Bankfull Discharge, Q_{bkf} (cfs)	1000		1000		1000		1000	
Bankfull XS/C Area, A_{bkf} (sq ft)	680.0		715.0		681.3		745.0	
Bankfull Mean Velocity, V_{bkf} (ft/s)	1.4		1.4		1.5		1.4	
Width to Depth Ratio, [W/D]	22.6		25.5		20.6		27.3	
Bankfull Width, W_{bkf} (ft)	125.0		135.0		118.4		142.5	
Bankfull Mean Depth, D_{bkf} (ft)	5.5		5.3		5.8		5.2	
Valley Slope, S_{val} (ft/ft)	0.0008		0.0008		0.0008		0.0008	
Sinuosity, K (ft/ft)	1.70		1.70		1.70		1.70	
Average Channel Slope, $S_{avg}=S_{val}/K$	0.0005		0.0005		0.0005		0.0005	
Bankfull Wetted Perimeter, P (ft)	136.0		145.6		121.1		151.6	
Bankfull Hydraulic Radius, R (ft)	5.1		4.9		5.6		4.9	
Bankfull Mannings n	0.055		0.055		0.055		0.055	
Manning Bkf Discharge, Q_{bkf} (cfs)	956.3		960.8		1008.7		1000.0	
Bkf Max Depth Ratio, [D_{max}/D_{bkf}]	1.8	2.2	1.3	1.5	1.2	1.3	1.9	1.9
Bkf Max Depth, D_{max} (ft)	10.0	12.0	7.0	8.0	6.9	7.2	9.8	10.0
Bank Height Ratio, [D_{bkf}/D_{min}]	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Max Depth Top of Bank, D_{bkf} (ft)	10.0	12.0	7.0	8.0	6.9	7.5	9.8	10.0
Entrenchment Ratio, [W_{fpa}/W_{bkf}]	3.6	4.4	3.3	4.1	3.8	4.6	3.2	3.9
Width Flood Prone Area, W_{fpa} (ft)	450.0	550.0	450.0	550.0	450	550	450	550
Rc Ratio, [R_c/W_{bkf}]	1.4	1.6	1.3	1.5	1.4	1.7	1.2	1.4
Radius of Curvature, R_c (ft)	170.0	200.0	170.0	200.0	170.0	200.0	170.0	200.0
Pool Area Ratio, [A_{pool}/A_{bkf}]	1.3	1.3	1.2	1.3	NA	NA	1.0	1.2
Pool Area, A_{pool} (sq ft)	890.0	900.0	890.0	900.0	NA	NA	745.0	900.0
Pool Depth Ratio, [D_{pool}/D_{bkf}]	1.8	2.5	1.9	2.6	NA	NA	2.2	2.5
Pool Depth, D_{pool} (ft)	10.0	14.0	10.0	14.0	NA	NA	11.5	13.0
Pool Width Ratio, [W_{pool}/W_{bkf}]	1.1	1.1	1.1	1.1	NA	NA	1.2	1.3
Pool Width, W_{pool} (ft)	125.0	125.0	135.0	135.0	NA	NA	142.5	148.0

SURVEYOR'S NOTES:

1. ELEVATIONS BASED ON FLORIDA STATE PLANE COORDINATE SYSTEM.
2. NO UNDERGROUND UTILITIES, FOUNDATIONS OR OTHER UNDERGROUND STRUCTURES WERE LOCATED.
3. OWNER WILL CONTACT APPROPRIATE UTILITY COMPANY FOR LOCATION OF UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.
4. MEASUREMENTS WERE MADE IN ACCORDANCE WITH U.S. STANDARD FOOT.
5. LOCATION OF IMPROVEMENTS ARE AS THEY EXIST ON DATE OF SURVEY.

APPROXIMATE EARTHWORK VOLUMES:

CUT / FILL	
TYPE	CUBIC YARDS
FILL	449
CUT	1,390
TOTAL	CUT 941

LEGEND:

W/L = WATER LINE

C/L = CENTER LINE

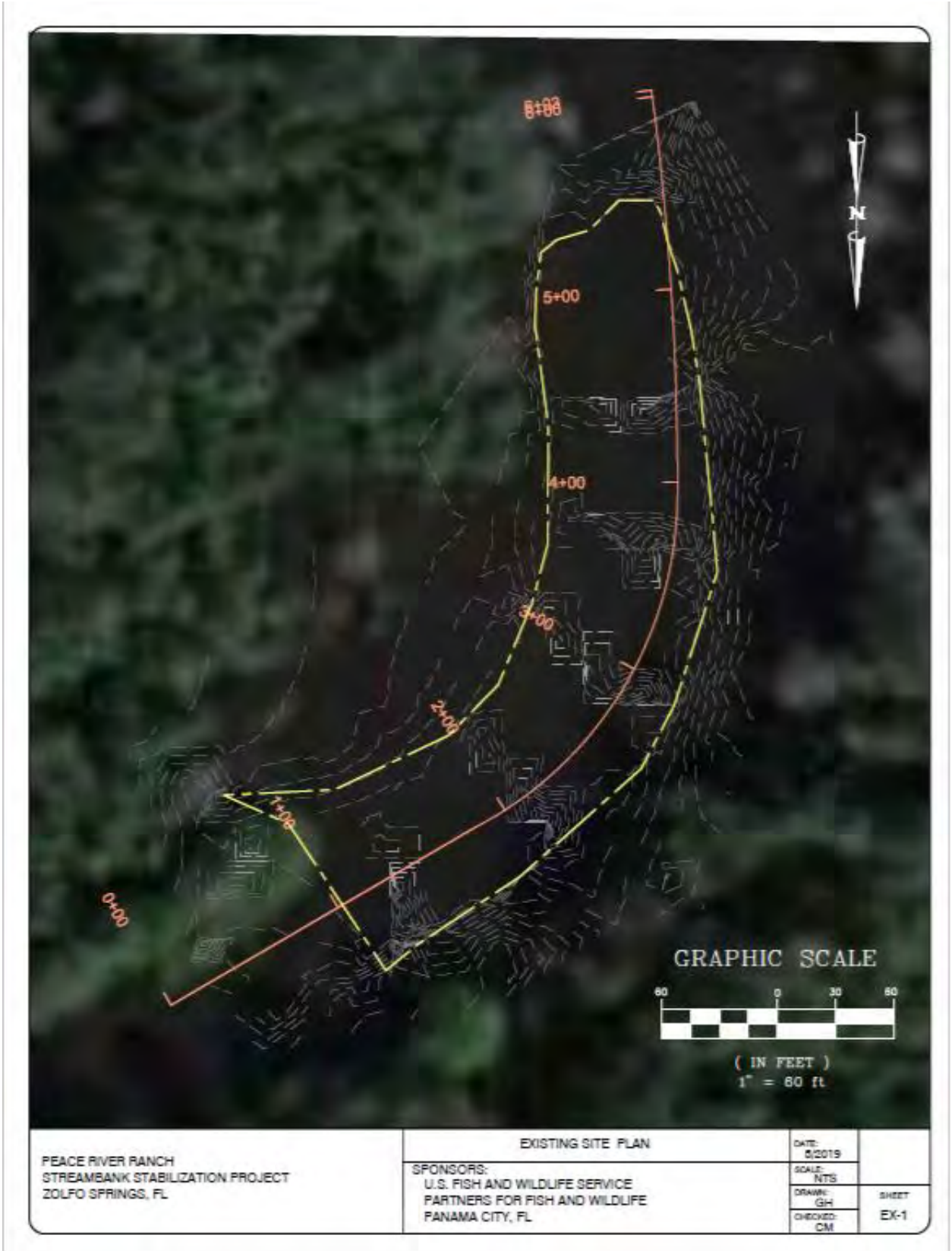
SF = SILT FENCE

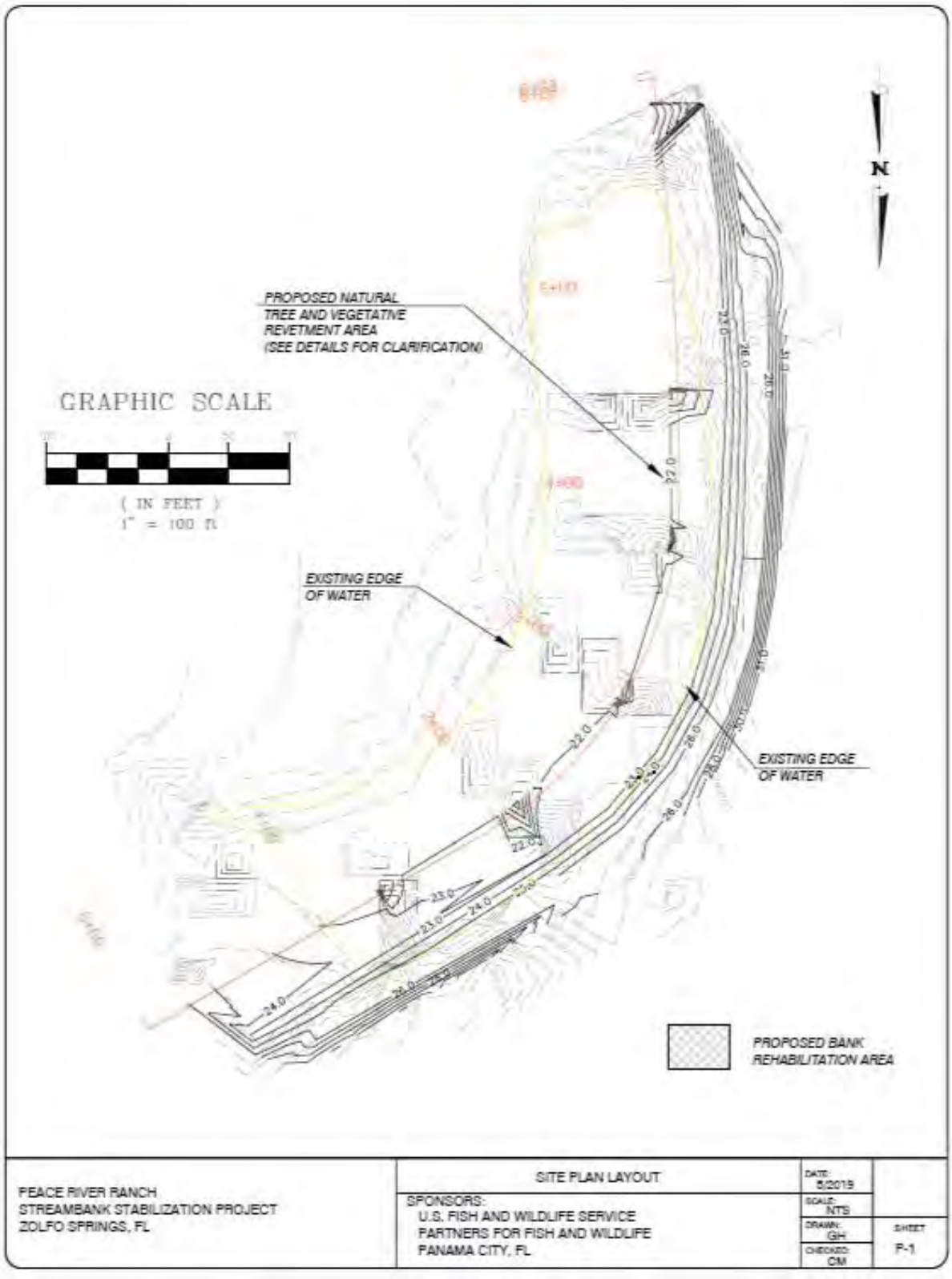
PEACE RIVER RANCH
STREAMBANK STABILIZATION PROJECT
ZOLFO SPRINGS, FL

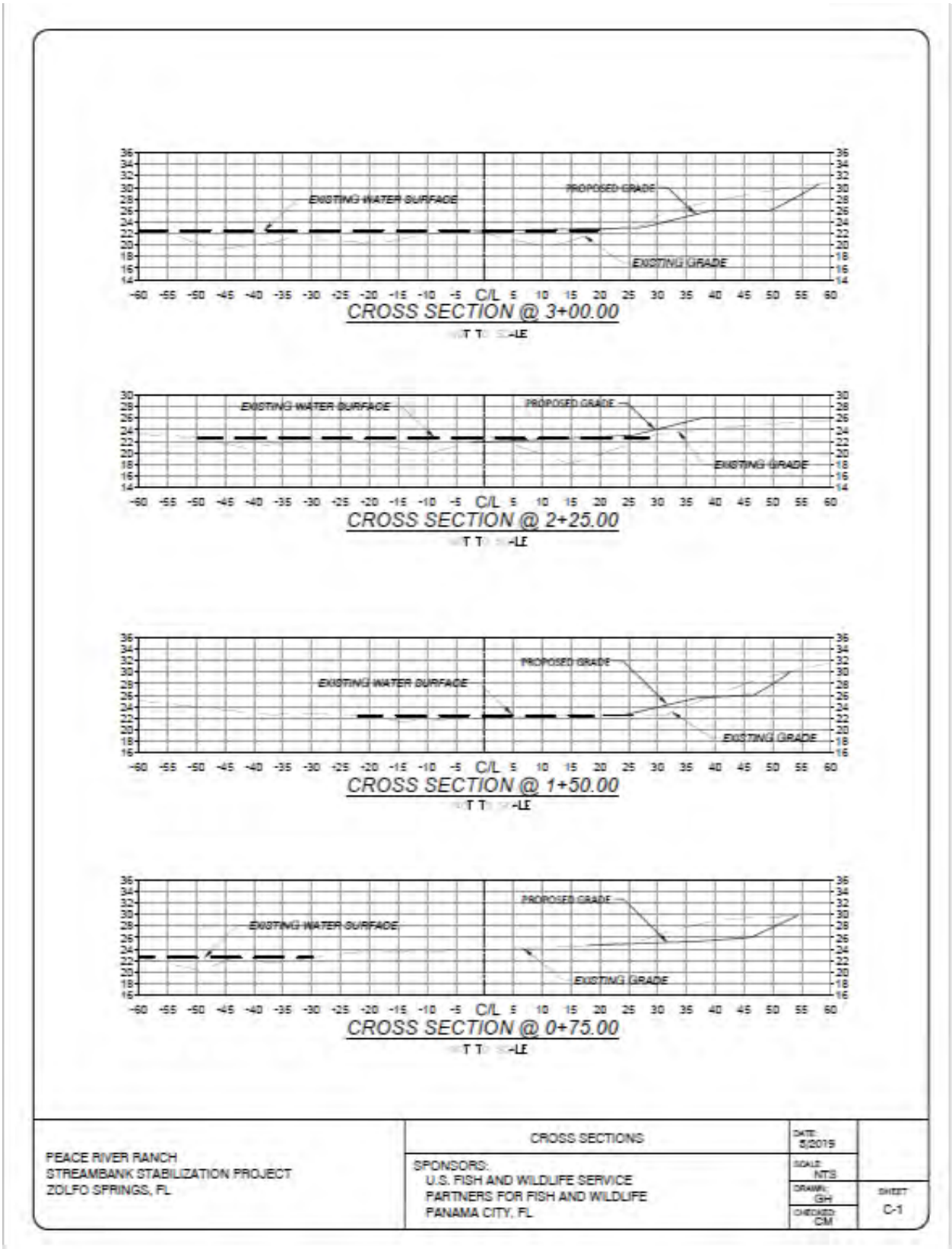
CONSTRUCTION SHEET

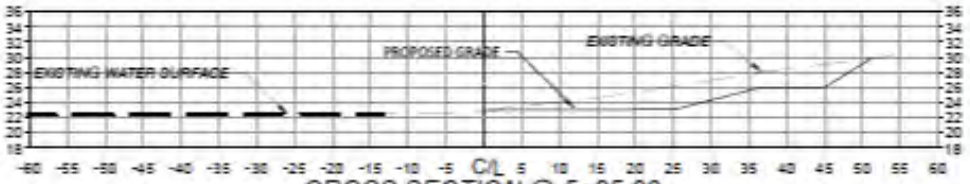
SPONSORS:
U.S. FISH AND WILDLIFE SERVICE
PARTNERS FOR FISH AND WILDLIFE
PANAMA CITY, FL

DATE: 5/2019
SCALE: NTS
DRAWN: GH
CHECKED: CM
SHEET: CS-2

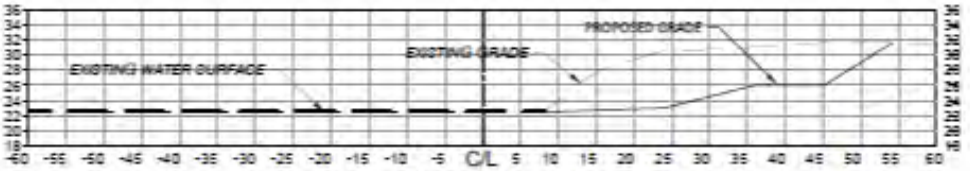

6+00
5+00
4+00
3+00
2+00
1+00
0+00
N
GRAPHIC SCALE
60
0
30
60
(IN FEET)
1" = 60 ft
PEACE RIVER RANCH
STREAMBANK STABILIZATION PROJECT
ZOLFO SPRINGS, FL
EXISTING SITE PLAN
SPONSORS:
U.S. FISH AND WILDLIFE SERVICE
PARTNERS FOR FISH AND WILDLIFE
PANAMA CITY, FL
DATE: 6/2019
SCALE: NTS
DRAWN: GH
CHECKED: CM
SHEET EX-1


N
PROPOSED NATURAL
TREE AND VEGETATIVE
REVETMENT AREA
(SEE DETAILS FOR CLARIFICATION)
GRAPHIC SCALE
(IN FEET)
1" = 100 ft
EXISTING EDGE
OF WATER
EXISTING EDGE
OF WATER
PROPOSED BANK
REHABILITATION AREA
PEACE RIVER RANCH
STREAMBANK STABILIZATION PROJECT
ZOLFO SPRINGS, FL
SITE PLAN LAYOUT
SPONSORS:
U.S. FISH AND WILDLIFE SERVICE
PARTNERS FOR FISH AND WILDLIFE
PANAMA CITY, FL
DATE: 5/2019
SCALE: NTS
DRAWN: GH
CHECKED: CM
SHEET P-1

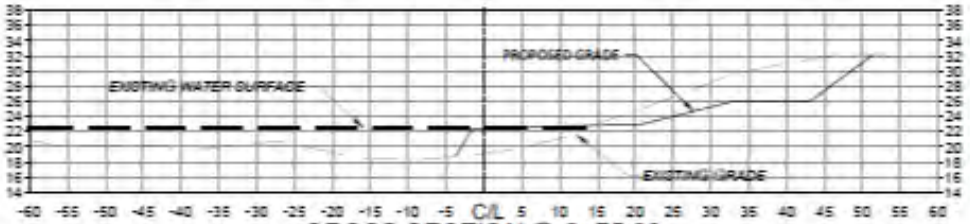

EXISTING WATER SURFACE
PROPOSED GRADE
EXISTING GRADE
C/L
CROSS SECTION @ 3+00.00
EXISTING WATER SURFACE
PROPOSED GRADE
EXISTING GRADE
C/L
CROSS SECTION @ 2+25.00
EXISTING WATER SURFACE
PROPOSED GRADE
EXISTING GRADE
C/L
CROSS SECTION @ 1+50.00
EXISTING WATER SURFACE
PROPOSED GRADE
EXISTING GRADE
C/L
CROSS SECTION @ 0+75.00
PEACE RIVER RANCH
STREAMBANK STABILIZATION PROJECT
ZOLFO SPRINGS, FL
CROSS SECTIONS
SPONSORS:
U.S. FISH AND WILDLIFE SERVICE
PARTNERS FOR FISH AND WILDLIFE
PANAMA CITY, FL
DATE: 5/2019
SCALE: NTS
DRAWN: GH
CHECKED: CM
SHEET C-1



CROSS SECTION @ 5+25.00

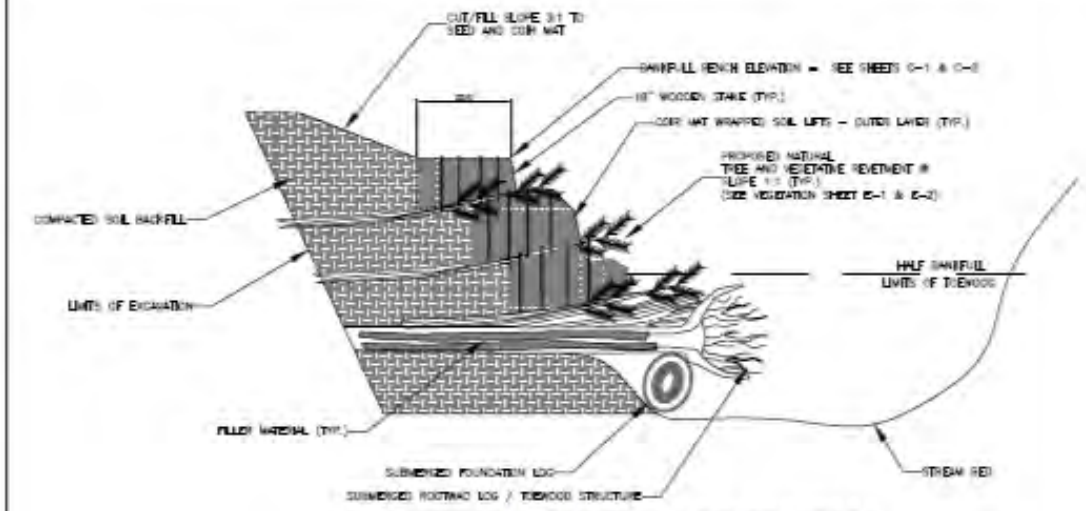


CROSS SECTION @ 4+50.00



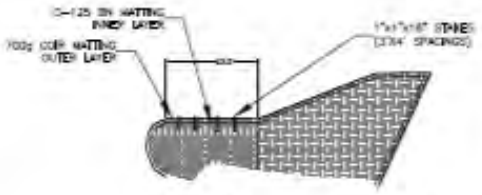
CROSS SECTION @ 3+75.00

PEACE RIVER RANCH STREAMBANK STABILIZATION PROJECT ZOLFO SPRINGS, FL	CROSS SECTIONS	DATE: 5/2019	
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS	
		DRAWN: GH	SHEET C-2
		CHECKED: CM	



TYPICAL CROSS SECTION

NOT TO SCALE



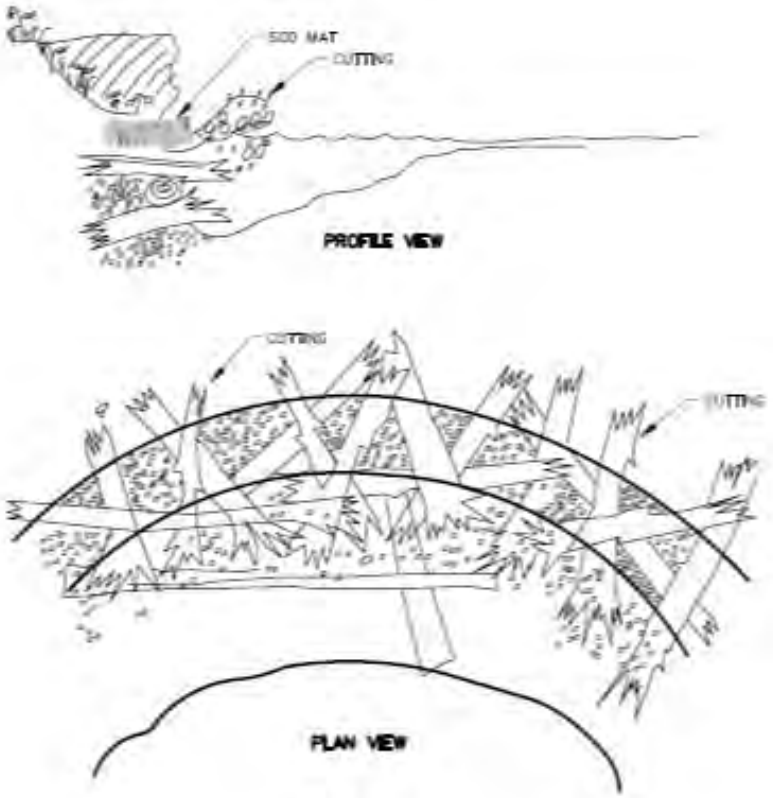
EROSION CONTROL MATTING DETAIL

NOT TO SCALE

NOTES:

1. BUILD EACH SECTION OF UPPER BANKFULL BENCH IN 1.5' GEOLIFTS COMPACTED EVERY 6" WITH RANDOM BACKFILL SOIL.
2. UPPER STREAMBANKS TO BE CONSTRUCTED OF VEGETATED SOIL SLOPES, COMPRISED OF STACKED GEOLIFTS WITH SOIL ENCAPSULATED BY EROSION CONTROL BLANKETS (SEE DETAIL), AND PLANTINGS BETWEEN EACH GEOLIFT LAYER (SEE VEGETATION PLAN).
3. GEOLIFTS CONSIST OF 2-3 LAYERS ALONG THE ENTIRETY OF THE STREAMBANK. EACH GEOGRID IS 1.5' THICK, EXCEPT TOP LAYER WHICH WILL VARY TO ACHIEVE DESIGN TOP OF BANKFULL BENCH GRADE.
4. STARTING AT TOE OF SLOPE, CONTRACTOR SHALL USE 8" DBH OR GREATER HARDWOOD (E.G., OAK, MAPLE AND/OR SYCAMORE) STACKED IN ALTERNATING DIRECTIONS W/ RANDOM TREE TOPS PLACED IN-BETWEEN TO FILL VOIDS. EACH TOEWOOD STRUCTURE SHALL BE CONSTRUCTED WITH A COMBINATION OF WOODY MATERIAL LAYERS EVERY 1.5', COMPACTED WITH RANDOM BACKFILL SOIL TO AN ELEVATION OF HALF BANKFULL.

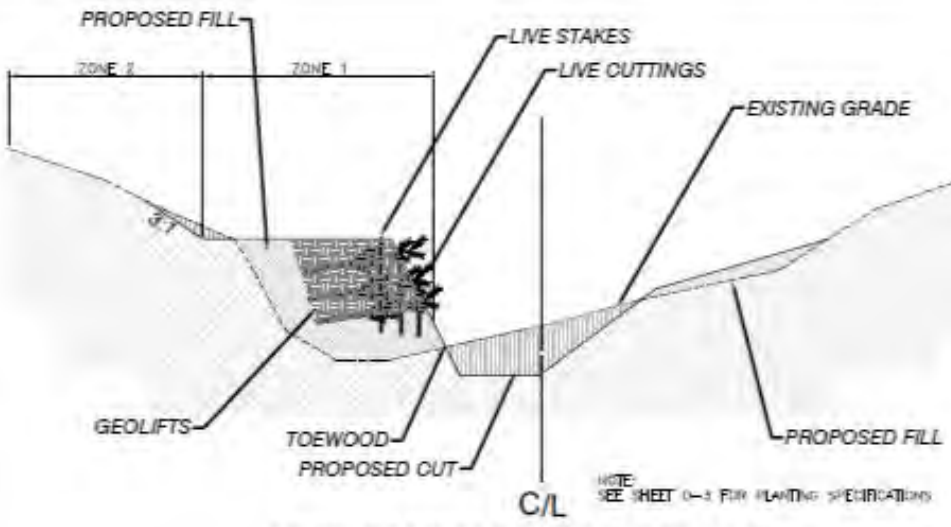
PEACE RIVER RANCH STREAMBANK STABILIZATION PROJECT ZOLFO SPRINGS, FL	TYPICAL CROSS SECTION & DETAILS	DATE: 6/2019	
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS	
		DRAWN: GH	SHEET D-1
		CHECKED: CM	



TOEWOOD/SOD MAT/DOGWOOD CUTTING

NOT TO SCALE

PEACE RIVER RANCH STREAMBANK STABILIZATION PROJECT ZOLFO SPRINGS, FL	TYPICAL CROSS SECTION & DETAILS	DATE: 5/2019	
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS	
		DRAWN: GH	SHEET: D-2
		CHECKED: CM	



VEGETATION CROSS SECTION

NOT TO SCALE

NOTES:

1. RIPARIAN HABITAT SEEDING TO PRECEDE INSTALLATION OF EROSION CONTROL BLANKETS.
2. RIPARIAN HABITAT SEEDING AND EROSION CONTROL INSTALLATION TO COVER ALL PLANTING AREAS.
3. LIVE PLANT CUTTINGS TO BE INSTALLED INBETWEEN GEOLIFTS WITH A MINIMUM LENGTH OF 6'. CUTTINGS SHOULD BE PLACED IN WATER FOR UP TO 2 DAYS PRIOR TO INSTALLING. LIVE STAKES SHOULD BE INSTALLED VERTICALLY THROUGH THE GEOLIFTS STARTING AT THE LOWER EDGE OF ZONE 1, AND WORKING UP THE SLOPE. LIVE STAKES SHOULD BE 18"-24" LONG AND NOT BE LESS THAN 3/8" IN DIAMETER. A SPACING OF 4 FEET SHOULD BE USED HORIZONTALLY ALONG THE BANK EDGE THEN OFF SET UP THE SLOPE BY 2 FEET UNTIL BANKFULL ELEVATION. LIVE CUTTING SPECIMENS SHOULD CONSIST OF COTTONWOOD, BLACK WILLOW, RED OSIER DOGWOOD, AND/OR ELDERBERRY, WHICH EVER ARE AVAILABLE.
4. ALL EXPOSED AREAS WILL BE PLANTED WITH A TEMPORARY COVER CROP CONSISTING OF REDTOP GRASS, JAPANESE MILLET, OATS, AND/OR ANNUAL RYE GRASS DEPENDING ON GROWING SEASON PREFERENCES AT 20 LBS/ACRE. FERTILIZE WITH A 10-10-10 MIX.
5. ALL TREES AND SHRUBS SHOULD BE PLANTED WITH A SUPERGEL TO AID IN WATER RETENTION DURING DROUGHT CONDITIONS. IN ADDITION, A SUPER SPORE SOIL AMENDMENT PRODUCT SHOULD BE ADDED FOR QUICK DEVELOPMENT OF MYCORRHIZAE.
6. INSTALLATION OF NATURAL SOD MAT MATERIAL WHERE POSSIBLE, TO ZONE 1 OF GEOLIFTS IS RECOMMENDED FOR ESTABLISHMENT OF NATIVE VEGETATION. SOD MATS SHOULD PRECEDE INSTALLATION OF EROSION CONTROL BLANKETS, WHERE POSSIBLE.

PEACE RIVER RANCH STREAMBANK STABILIZATION PROJECT ZOLFO SPRINGS, FL	VEGETATION PLAN	DATE: 5/2019	
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS	
		DRAWN: GH	SHEET: E-1
		CHECKED: DM	

Zone 1 (waters surface to bankfull)

Common Name	Scientific Name	Type	Wetland Indicator	Quantitiy	Size
water hickory	*Carya aquatica*	Tree	OBL	50	Bare Root
button bush	*Cephalanthus occidentalis*	Shrub	OBL	100	1 gal
swamp dogwood	*Cornus foemina*	Shrub	FACW	100	1 gal
pop-ash	*Fraxinus caroliniana*	Shrub	OBL	40	Bare Root
water locust	*Gleditsia aquatica*	Shrub	OBL	35	Bare Root
soft rush	*Juncus effusus*	Sedge	OBL	200	1 gal
sweet gum	*Liquidambar styraciflua*	Shrub	FAC	35	Bare Root
wax myrtle	*Morella cerifera*	Shrub	FAC	100	1 gal
carolina willow	*Salix caroliniana*	Shrub	OBL	50	Bare Root
common elderberry	*Sambucus nigra canadensis*	Shrub	FACW	100	1 gal
bald cypress	*Taxodium distichum*	Tree	OBL	100	Bare Root

Zone 2 (above bankfull)

Common Name	Scientific Name	Type	Wetland Indicator	Quantitiy	Size
red maple	*Acer rubra*	Tree	FAC	20	3 gal
american beautyberry	*Callicarpa americana*	Shrub	FACU	25	3 gal
water hickory	*Carya aquatica*	Tree	OBL	25	3 gal
button bush	*Cephalanthus occidentalis*	Shrub	OBL	25	3 gal
swamp dogwood	*Cornus foemina*	Shrub	FACW	35	1 gal
pop-ash	*Fraxinus caroliniana*	Shrub	OBL	20	3 gal
water locust	*Gleditsia aquatica*	Shrub	OBL	20	3 gal
Virginia sweetspire	*Itea virginica*	Shrub	FACW	30	1 gal
sweet gum	*Liquidambar styraciflua*	Shrub	FAC	20	1 gal
wax myrtle	*Morella cerifera*	Shrub	FAC	30	1 gal
laurel oak	*Quercus laurifolia*	Tree	FACW	20	3 gal
water oak	*Quercus nigra*	Tree	FAC	20	3 gal
live Oak	*Quercus virginiana*	Tree	FACU	20	3 gal
sabal palm	*Sabal palmetto*	Tree	FAC	25	7'-10'
common elderberry	*Sambucus nigra canadensis*	Shrub	FACW	40	1 gal
saw palmetto	*Serenoa repens*	Shrub	FACU	25	1 gal
bald cypress	*Taxodium distichum*	Tree	OBL	30	3 gal
possumhaw	*Viburnum nudum*	Shrub	FACW	20	1 gal
walter's viburnum	*Viburnum obovatum*	Shrub	FACW	20	3 gal

Riparian Habitat Seed Mixture (LBS Total)

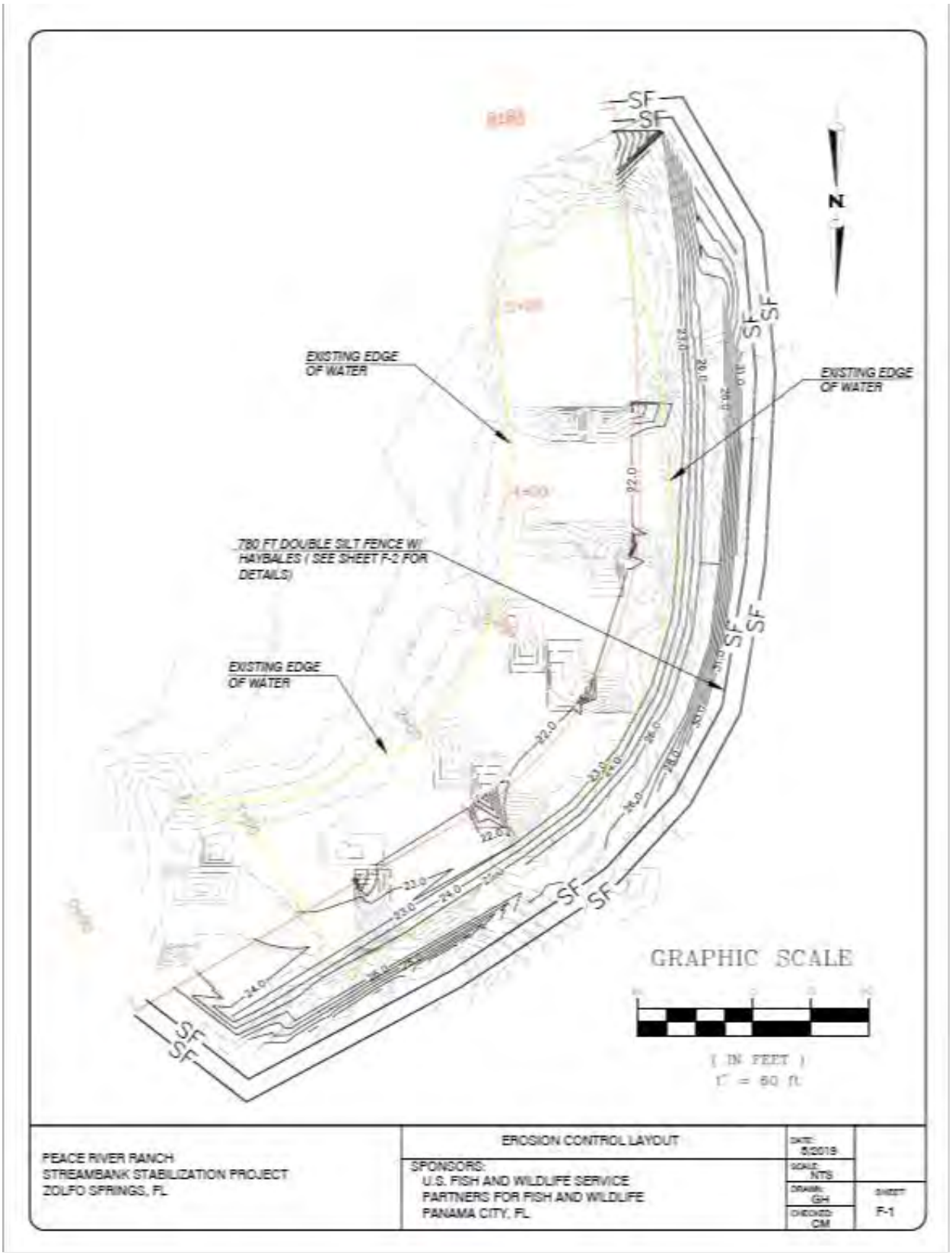
Common Name	Scientific Name	Type	Wetland Indicator	Percent of Total	Quantity (LBS)
partridge-pea	*Chamaecrista fasciculata*	Legume	FACU	10	10
leavenworth's tickseed	*Coreopsis leavenworthii*	Flower	FACW	5	5
swamp sunflower	*Helianthus angustifolia*	Flower	FACW	5	5
maidencane	*Hymenachne hemitomo*	Grass	OBL	20	20
switchgrass	*Panicum virgatum*	Grass	FAC	5	5
blackeyed susan	*Rudbeckia hirta*	Flower	FACU	5	5
creeping bluestem	*Schizachyrium scoparium var. stoloniferum*	Grass	FACU	25	25
Indiangrass	*Sorghastrum nutans*	Sedge	FACU	25	25

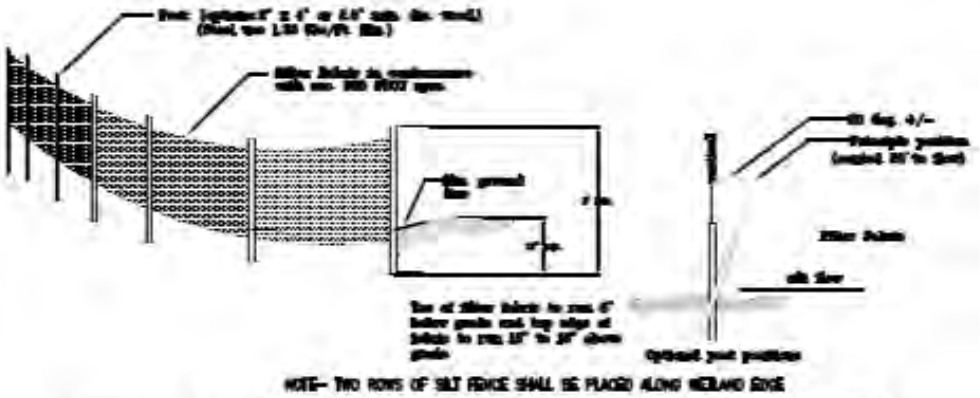
PEACE RIVER RANCH
STREAMBANK STABILIZATION PROJECT
ZOLFO SPRINGS, FL

VEGETATION PLAN

SPONSORS:
U.S. FISH AND WILDLIFE SERVICE
PARTNERS FOR FISH AND WILDLIFE
PANAMA CITY, FL

DATE: 5/2019
SCALE: NTS
DRAWN: GH
CHECKED: CM
SHEET: E-2


SF
N
EXISTING EDGE OF WATER
EXISTING EDGE OF WATER
780 FT DOUBLE SILT FENCE W/ HAYBALES (SEE SHEET F-2 FOR DETAILS)
EXISTING EDGE OF WATER
GRAPHIC SCALE
(IN FEET)
1" = 60 ft
PEACE RIVER RANCH
STREAMBANK STABILIZATION PROJECT
ZOLFO SPRINGS, FL
EROSION CONTROL LAYOUT
SPONSORS:
U.S. FISH AND WILDLIFE SERVICE
PARTNERS FOR FISH AND WILDLIFE
PANAMA CITY, FL
DATE: 5/2019
SCALE: NTS
DRAWN: GH
CHECKED: CM
SHEET F-1



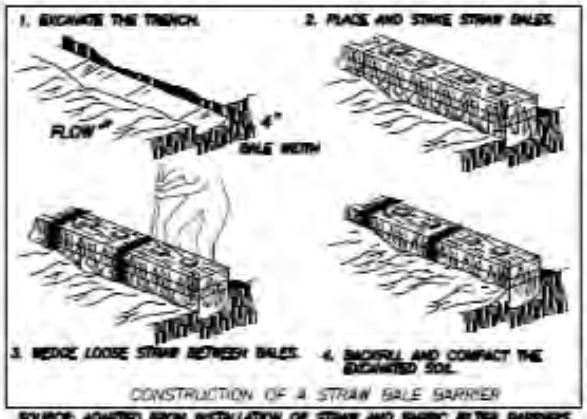
NOTE- TWO ROWS OF SILT FENCE SHALL BE PLACED ALONG WETLAND SIDE

TYPE III SILT FENCE DETAIL

N.T.S.

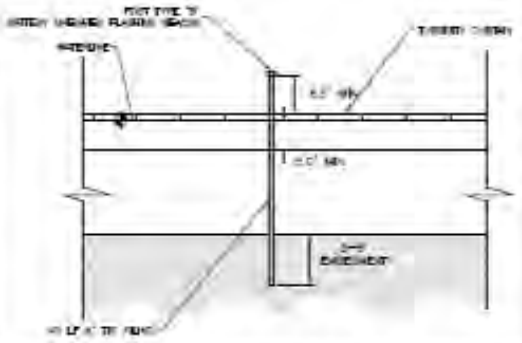
CROSS SECTION

N.T.S.



CONSTRUCTION OF A STRAW BALE BARRIER

SOURCE: ADAPTED FROM INSTALLATION OF STRAW AND FABRIC FILTER BARRIERS FOR SEDIMENT CONTROL SHERWOOD AND WYANT



TYPICAL TURBIDITY CURTAIN ELEVATION

NOT TO SCALE

PROPER PLACEMENT OF STRAW BALE BARRIER IN DRAINAGE WAY

HAY BALE DETAIL

PEACE RIVER RANCH STREAMBANK STABILIZATION PROJECT ZOLFO SPRINGS, FL	EROSION CONTROL DETAILS	DATE: 5/2019	
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS	
		DRAWN: GH	SHEET: F-2
		CHECKED: DM	

APPENDIX B. Restoration design for the 1,000-ft streambank near Arcadia along the Peace River.

Permitting Plans For:

PEACE RIVER CAMP
STREAMBANK STABILIZATION PROJECT

ARCADIA, FL

Prepared For:

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
3900 DRANE FIELD RD., LAKELAND, FL 33811

VICINITY MAP

SHEETS:	
CS-1 - CS-2	CONSTRUCTION SHEETS
EX-1	EXISTING SITE
P-1	SITE PLAN & LAYOUT
C-1 - C-5	CROSS SECTIONS
D-1 - D-2	TYPICAL CROSS SECTION & DETAILS
E1	TYPICAL VEGETATION PLAN
E2	VEGETATION SPECIFICATIONS
P-1	EROSION CONTROL LAYOUT
P-2	SILT FENCE, TURBIDITY BARRIER, & HAYBALE DETAILS

INDEX

Prepared by:

U.S. FISH AND WILDLIFE SERVICES
1601 BALBOA AVE., PANAMA CITY, FL 32405

Date: FEB 2020
Project Number: PFW-2020-03100101-02

GENERAL NOTES:

1. ANY DAMAGE TO THE EXISTING TURF ESTABLISHMENT IN AREAS OUTSIDE THE LIMITS OF CONSTRUCTION FOR THIS PROJECT WILL BE REPAIRED BY THE CONTRACTOR AT HIS EXPENSE AS DIRECTED BY THE OWNER.
2. GRADES SHOWN ARE FINISHED GRADES.
3. CONTRACTOR SHOULD PREVENT DAMAGE TO TREES OUTSIDE OF, BUT WITHIN CLOSE PROXIMITY TO, THE PROPERTY BOUNDARY.
4. CONTRACTOR IS RESPONSIBLE FOR ALL CONSTRUCTION ALIGNMENT AND GRADE LAYOUT
5. THE CONTRACTOR SHALL NOTIFY THE OWNER 48 HOURS PRIOR TO CONSTRUCTION.
6. THE CONTRACTOR SHALL TAKE STEPS NECESSARY TO PREVENT EROSION AND ANY OFF SITE SEDIMENT TRANSPORT RESULTING FROM INCREASED RUNOFF DURING CONSTRUCTION BY PROVIDING SILT FENCE AND/OR STAKED HAY BALES AS PART OF BEST MANAGEMENT PRACTICES OR AS INDICATE ON THE PLANS. EROSION CONTROL DEVICES SHALL CONFORM TO FLDOT.
7. ANY PUBLIC LAND CORNER WITHIN THE LIMITS OF CONSTRUCTION IS TO BE PROTECTED. IF A CORNER MONUMENT IS IN DANGER OF BEING DESTROYED AND HAS NOT BEEN PROPERLY REFERENCES, THE CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY.
8. THE CONTRACTOR SHALL MATCH EXISTING CONDITIONS AT PROJECT BEGINNING AND END AS DIRECTED BY THE PROJECT OWNER.
9. EXISTING ROADS AND TRAILS SHALL BE MAINTAINED TO LOCAL TRAFFIC AND PROPERTY OWNERS AT ALL TIMES. ALL ROADS DAMAGED BY CONSTRUCTION OPERATIONS ARE TO BE PATCHED OR RECONSTRUCTED AS DIRECTED BY THE OWNER AT THE CONTRACTOR'S EXPENSE.
10. ALL MATERIAL, TESTING AND CONSTRUCTION METHODS SHALL CONFORM TO THE FLORIDA DEPARTMENT OF TRANSPORTATION "STANDARDS SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION" LATEST EDITION, AND ASTM.
11. THE CONTRACTOR SHALL COMPLY WITH ALL FEDERAL, STATE, AND LOCAL REGULATORY AGENCY REQUIREMENTS.
12. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PRESERVE OR RELOCATED ALL BENCHMARKS AS NEEDED DURING CONSTRUCTION.
13. ALL DISTURBED AREAS WILL BE SEEDED WITH A PERMANENT VEGETATION COVER OF BLUESTEM, INDIAN GRASS AND SWITCHGRASS AND A NURSE CROP OF BROWN TOP MILLET OR RYE GRASS IMMEDIATELY AFTER CONSTRUCTION. COVER CROP SEEDING WILL BE USED IF NEEDED.
14. ALL EXCESS MATERIALS SHOULD BE DISTRIBUTED EVENLY OVER WORK AREA, OR STOCKPILED FOR USE ON FUTURE PROJECTS, AS DIRECTED BY THE OWNER.
15. IF ADDITIONAL FILL MATERIAL IS NEEDED DURING CONSTRUCTION, SOIL CAN BE TAKEN FROM THE SURROUNDING AREA WITHIN THE PROJECT AREA, AS DIRECTED BY THE OWNER.
16. ALL EXPOSED STREAMBANKS SHALL BE COVERED WITH SOD MATS WHERE POSSIBLE CUT FROM THE SURROUNDING PROJECT AREA.
17. ALL TREE SPECIES USED FOR INSTALLATION OF WOODY STRUCTURES SHALL COME FROM PROJECT SITE, OR IN NEARBY AREA.

CONSTRUCTION METHODOLOGY:

1. TYPICAL CONSTRUCTION EQUIPMENT WILL BE UTILIZED ON SITE (BULLDOZER, BACKHOE, EXCAVATOR, RUBBER TRACKED DUMP TRUCKS, ETC.). ALL EQUIPMENT AND MATERIALS WILL BE STORED ON ADJACENT UPLANDS DURING CONSTRUCTION OR WHEN NOT IN USE.

2. BEST MANAGEMENT PRACTICES (BMPS) WILL BE IMPLEMENTED TO PREVENT IMPACT TO ADJACENT WETLAND AREAS; THE BMPS WILL BE IN SITU PRIOR TO PERMITTED CONSTRUCTION ACTIVITIES AND REMAIN THOUGHT THE DURATION. SHORT-TERM EROSION CONTROL MEASURES WILL CONSIST OF STAKED HAY BALES, FLOATING TURBIDITY BARRIERS, AND ENTRENCHED SILT FENCING PLACED AROUND THE WORK AREA WHEN RAIN IS IMMINENT. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE PLACEMENT, INTEGRITY, AND UPKEEP OF ALL EROSION CONTROL AND STABILIZATION DEVISES/MATERIALS.

3. THE CONTRACTOR WILL WORK AROUND THE EXISTING STREAM FLOW AS MUCH AS POSSIBLE TO REDUCE DOWNSTREAM TURBIDITY. THE CONTRACTOR WILL EMPLOY EXCAVATION METHODS THAT WILL REDUCE THE DAMAGE TO THE SITE DURING EXCAVATION.

4. MECHANIZED REMOVAL WILL OCCUR WITHIN THE AREAS THAT CAN BE ACCESSED BY MACHINERY.

5. EXCAVATION WILL BE ACCOMPLISHED USING A SMALL TRACK EXCAVATOR WITH A 2-3 FOOT BUCKET. THE BANKS SHALL BE RE-GRADED TO THE PROPOSED ELEVATIONS WITHIN THE PERMIT DRAWINGS.

6. AFTER EXCAVATION/REMOVAL, THE TEMPORARY IMPACT AREA WILL BE REGRADED TO ELEVATIONS CONSISTENT WITH ADJACENT GRADE; THE SIDE SLOPES AND BANK CHANNEL WILL BE GRADED TO THE SPECIFIED ELEVATIONS AND DIMENSIONS WITHIN THE DRAWINGS. EXPOSED BANK SOIL AND/OR FILL SLOPES WILL BE GRADED WITH A MINIMUM SLOPE OF 1:1.5 OR CONSISTENT WITH EXISTING NATURAL ELEVATIONS.

7. AS REMOVAL IS COMPLETED, GRADED SLOPES WILL BE IMMEDIATELY SEEDED OR SODDED WITH AN APPLICABLE STABILIZATION METHOD. FURTHER STABILIZATION OF THE SITE WILL BE COMPLETED AS SOON AS POSSIBLE OR AS SOON AS CONSTRUCTION IS COMPLETE IN THAT AREA. STABILIZATION WILL INCLUDE A COMBINATION OF LIVE STAKES, GRASS SEEDING, MULCHING, NATIVE PLANTINGS, COLONIZE QUICKLY AND FACILITATE SOIL STABILIZATION (I.E. SPECIES SUCH AS *ACER RUBRUM* AND *QUERCUS SPP.* AS WELL AS VARIOUS FERNS, SEDGES, AND RUSHES ENDEMIC TO THE HABITAT).

	CONSTRUCTION SHEET	DATE: 03/2020	
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS	
		DRAWN: GH	SHEET: CS-1
		CHECKED: CM	

PROJECT DESIGN ANALYSIS:

ALL DESIGN CRITERIA ARE SHOWN IN THE TABLE BELOW, WHICH INCLUDES PARAMETERS FOR CHANNEL DIMENSION, PATTERN, PROFILE, AND MATERIAL. BED GRAIN ANALYSIS WAS NOT CONDUCTED BUT WAS ASSUMED TO BE SANDBED. DUNE HEIGHTS WERE SURVEYED BUT ONLY USED IN DISCHARGE CALCULATIONS.

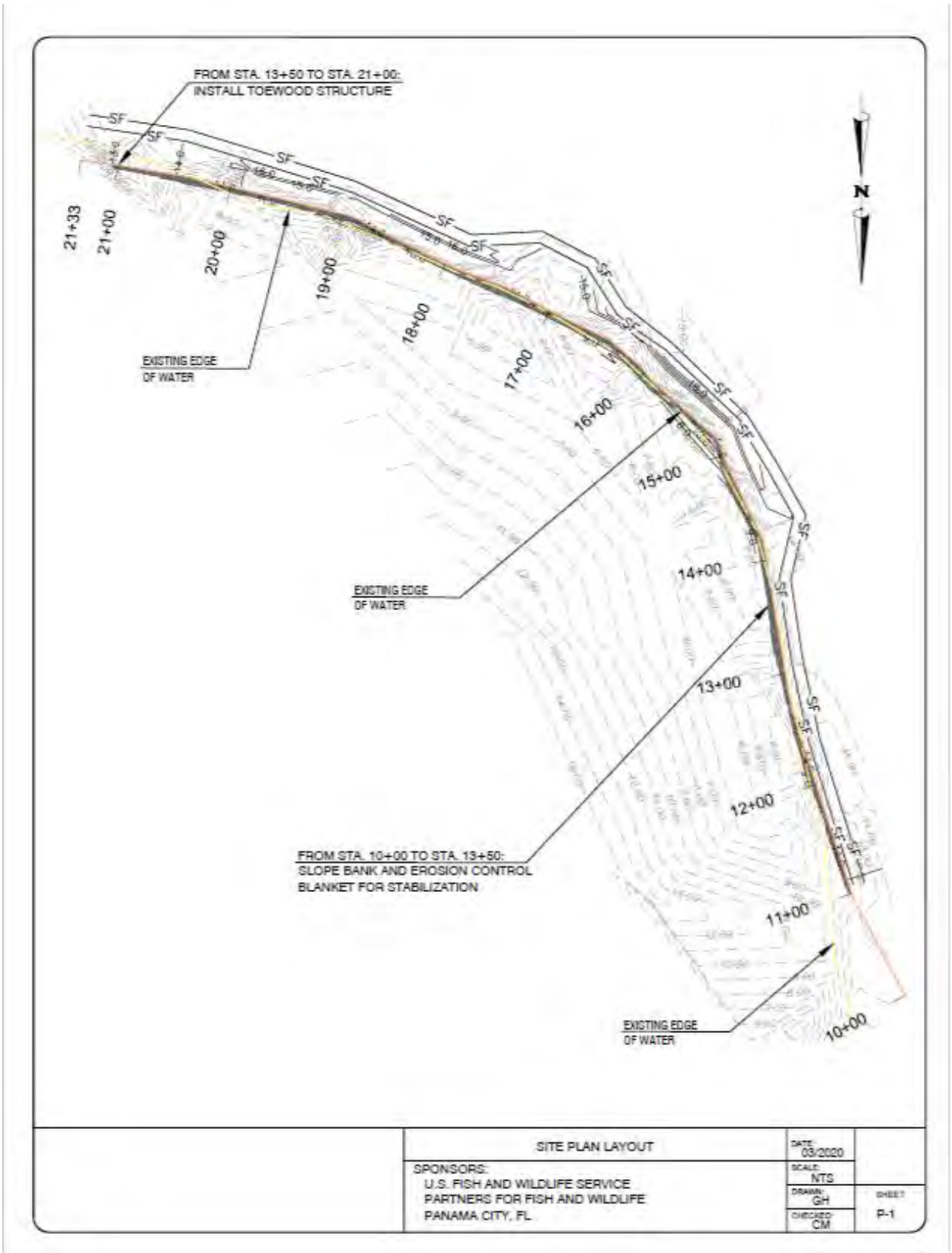
Parameter	Design		Existing		Reference Riffle		Reference Pool	
	Min	Max	Min	Max	Min	Max	Min	Max
Reach Name	PEACE RIVER		PEACE RIVER		PEACE RIVER		PEACE RIVER	
Drainage Area, DA (sq mi)	1370.0		1370.0		1370.0		1370.0	
Stream Type	C5		C5		C5		C5	
Bankfull Discharge, Q_{bkf} (cfs)	2000		2000		2000		2000	
Bankfull XSEC Area, A_{bkf} (sq ft)	1200.0		1200.0		1109.0		1133.0	
Bankfull Mean Velocity, V_{bkf} (ft/s)	1.7		1.7		1.8		1.8	
Width to Depth Ratio, [W/D]	33.3		48.4		30.5		20.7	
Bankfull Width, W_{bkf} (ft)	200.0		241.0		184.0		153.0	
Bankfull Mean Depth, D_{bkf} (ft)	6.0		5.0		6.0		7.4	
Valley Slope, S_{val} (ft/ft)	0.0008		0.0008		0.0008		0.0008	
Sinuosity, K (ft/ft)	1.70		1.70		1.70		1.70	
Average Channel Slope, S_{ave}=S_{val}/K	0.0003		0.0003		0.0003		0.0003	
Bankfull Wetted Perimeter, P (ft)	212.0		251.0		196.1		167.8	
Bankfull Hydraulic Radius, R (ft)	5.7		4.8		5.7		6.8	
Bankfull Mannings n	0.045		0.045		0.045		0.045	
Manning Bkf Discharge, Q_{bkf} (cfs)	2187.1		1954.3		2020.3		2322.6	
Bkf Max Depth Ratio, [D_{max}/D_{bkf}]	1.5	2.0	1.4	1.8	1.2	1.7	1.1	1.8
Bkf Max Depth, D_{max} (ft)	9.0	12.0	7.0	9.0	7.0	10.0	8.0	13.0
Bank Height Ratio, [D_{trob}/D_{tmax}]	1.0	1.0	1.0	1.0	1.1	1.0	1.1	1.0
Max Depth Top of Bank, D_{trob} (ft)	9.0	12.0	7.0	9.0	8.0	10.0	9.0	13.0
Entrenchment Ratio, [W_{fpa}/W_{bkf}]	4.3	5.0	3.5	4.1	4.6	5.4	5.6	6.5
Width Flood Prone Area, W_{fpa} (ft)	850.0	1000.0	850.0	1000.0	850.0	1000.0	850.0	1000.0
Rc Ratio, [R_c/W_{bkf}]	2.2	2.3	1.8	1.8	NA	NA	2.0	3.3
Radius of Curvature, R_c (ft)	440.0	450.0	430.0	435.0	NA	NA	300.0	500.0
Pool Area Ratio, [A_{pool}/A_{bkf}]	1.0	1.0	1.0	1.0	NA	NA	1.0	1.1
Pool Area, A_{pool} (sq ft)	1150.0	1200.0	1150.0	1200.0	NA	NA	1100.0	1300.0
Pool Depth Ratio, [D_{pool}/D_{bkf}]	1.2	1.5	1.4	1.8	NA	NA	0.9	1.4
Pool Depth, D_{pool} (ft)	7.0	9.0	7.0	9.0	NA	NA	7.0	10.0
Pool Width Ratio, [W_{pool}/W_{bkf}]	1.3	1.3	1.3	1.3	NA	NA	0.8	0.9
Pool Width, W_{pool} (ft)	240.0	241.0	240.0	241.0	NA	NA	150.0	160.0

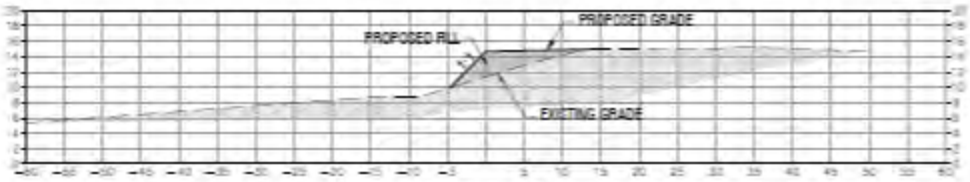
SURVEYOR'S NOTES:

1. ELEVATIONS BASED ON FLORIDA STATE PLANE COORDINATE SYSTEM.
2. NO UNDERGROUND UTILITIES, FOUNDATIONS OR OTHER UNDERGROUND STRUCTURES WERE LOCATED.
3. OWNER WILL CONTACT APPROPRIATE UTILITY COMPANY FOR LOCATION OF UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.
4. MEASUREMENTS WERE MADE IN ACCORDANCE WITH U.S. STANDARD FOOT.
5. LOCATION OF IMPROVEMENTS ARE AS THEY EXIST ON DATE OF SURVEY.

	CONSTRUCTION SHEET	DATE: 03/2020	
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS	
		DRAWN: GH	SHEET: CS-2
		CHECKED: CM	


N
21+33
21+00
20+00
19+00
18+00
17+00
16+00
15+00
14+00
13+00
12+00
11+00
10+00
GRAPHIC SCALE
150
0
75
150
(IN FEET)
1" = 150 ft
EXISTING SITE PLAN
DATE: 03/2020
SCALE: NTS
DRAWN: GH
CHECKED: CM
SHEET EX-1
SPONSORS:
U.S. FISH AND WILDLIFE SERVICE
PARTNERS FOR FISH AND WILDLIFE
PANAMA CITY, FL


FROM STA. 13+50 TO STA. 21+00:
INSTALL TOEWOOD STRUCTURE
SF
N
21+33
21+00
20+00
19+00
18+00
17+00
16+00
15+00
14+00
13+00
12+00
11+00
10+00
EXISTING EDGE
OF WATER
EXISTING EDGE
OF WATER
FROM STA. 10+00 TO STA. 13+50:
SLOPE BANK AND EROSION CONTROL
BLANKET FOR STABILIZATION
EXISTING EDGE
OF WATER
SITE PLAN LAYOUT
DATE: 03/2020
SCALE: NTS
DRAWN: GH
CHECKED: CM
SHEET: P-1
SPONSORS:
U.S. FISH AND WILDLIFE SERVICE
PARTNERS FOR FISH AND WILDLIFE
PANAMA CITY, FL



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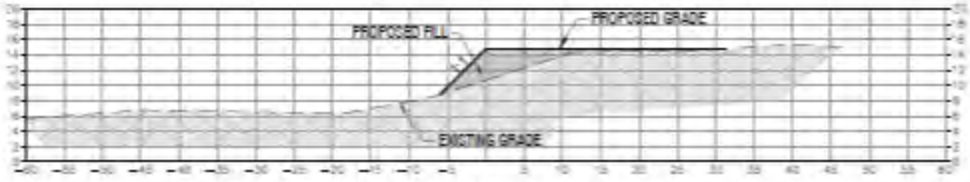
NOT TO SCALE



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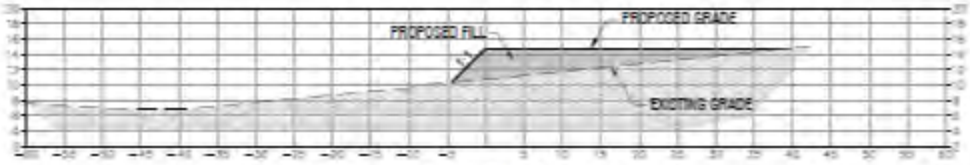

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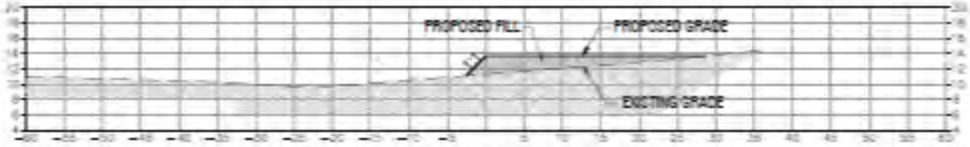

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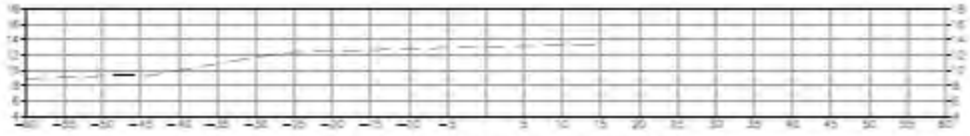

CROSS SECTION @ 10+50.00

NOT TO SCALE

	CROSS SECTIONS	DATE: 09/2020	
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS	
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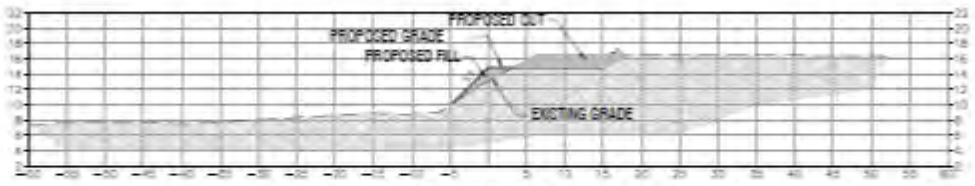
		CHECKED: CM	



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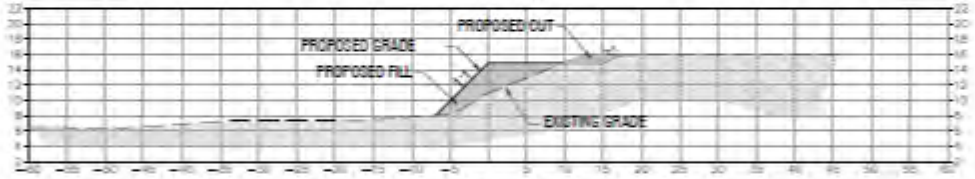

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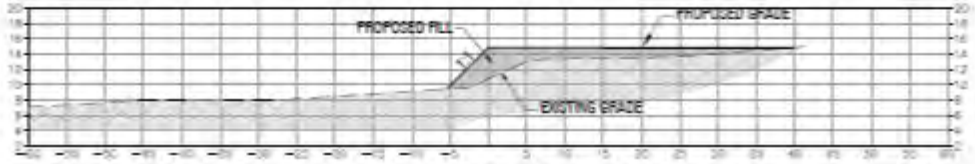

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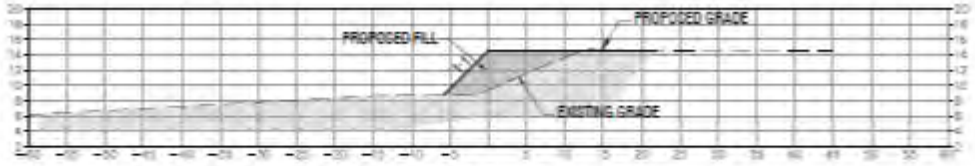

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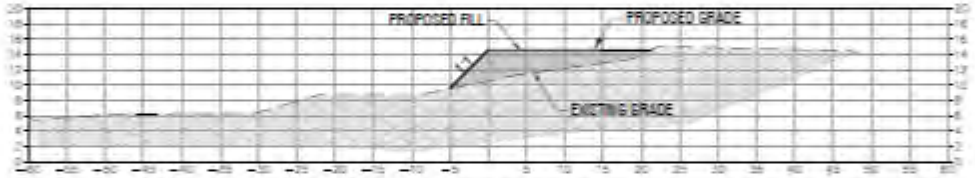

CROSS SECTION @ 13+00.00

NOT TO SCALE

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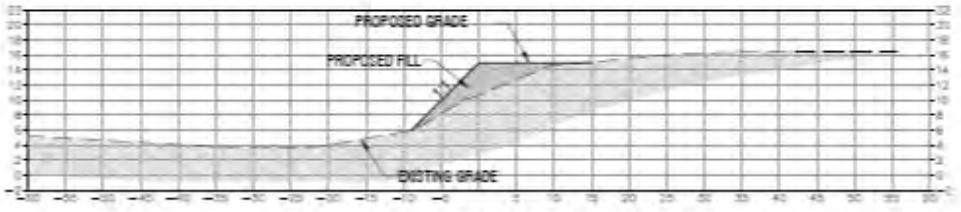

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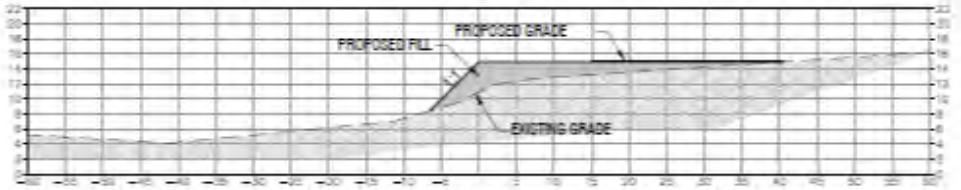
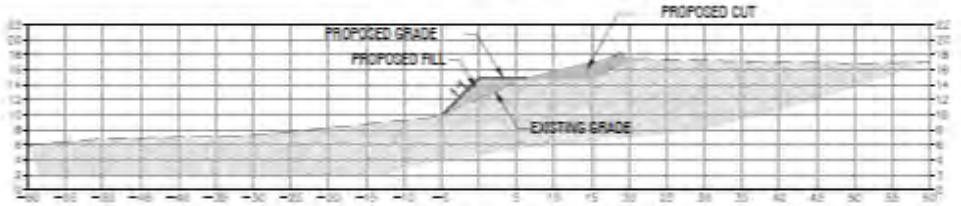


CROSS SECTION @ 17+00.00

NOT TO SCALE



CROSS SECTION @ 16+50.00

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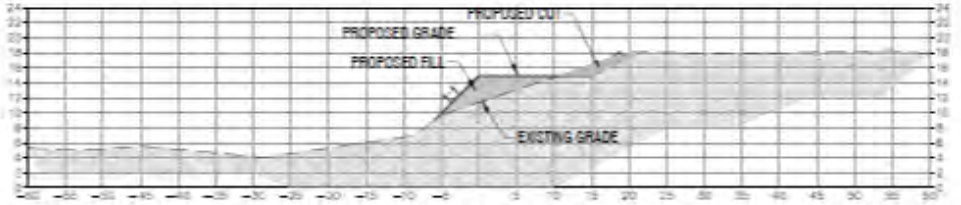

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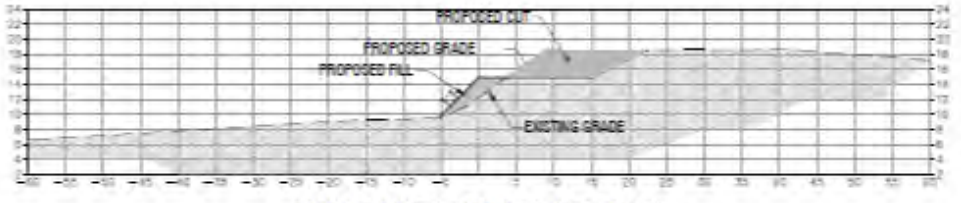
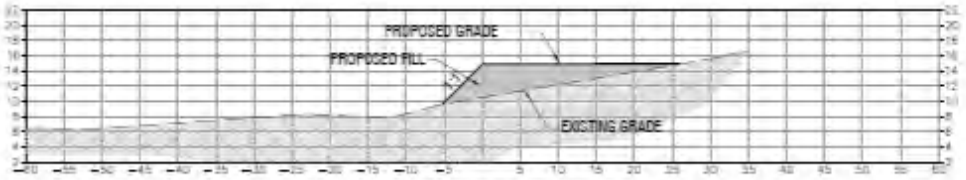


CROSS SECTION @ 15+50.00

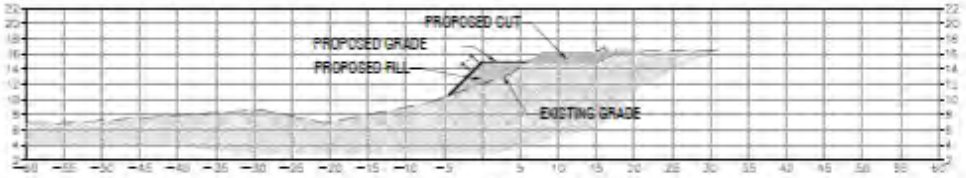
NOT TO SCALE

	CROSS SECTIONS	DATE: 03/2020
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS DRAWN: GH CHECKED: CM SHEET: C-3



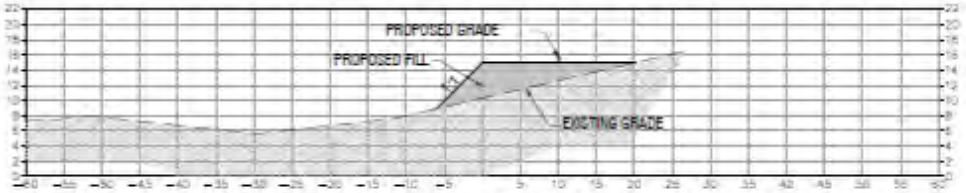
CROSS SECTION @ 20+00.00

NOT TO SCALE



CROSS SECTION @ 19+50.00

NOT TO SCALE



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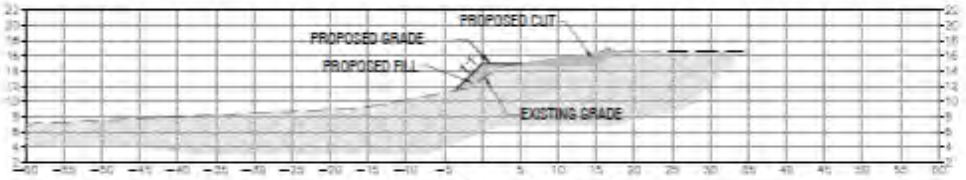

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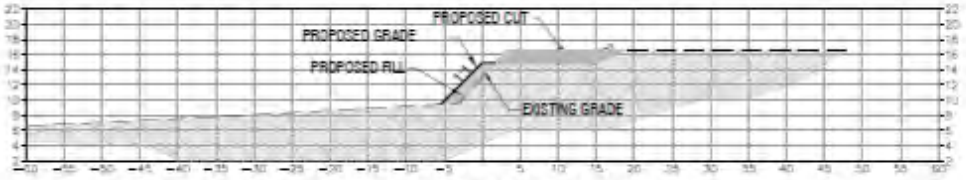
NOT TO SCALE

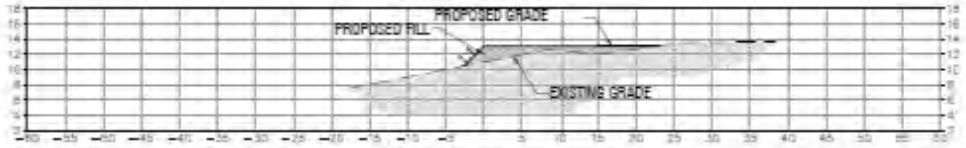


CROSS SECTION @ 18+00.00

NOT TO SCALE

	CROSS SECTIONS	DATE: 03/2020
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS DRAWN: GH CHECKED: CM SHEET: C-4

STA. 21+00.00



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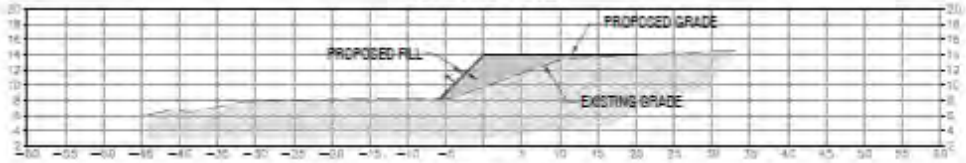
NOT TO SCALE

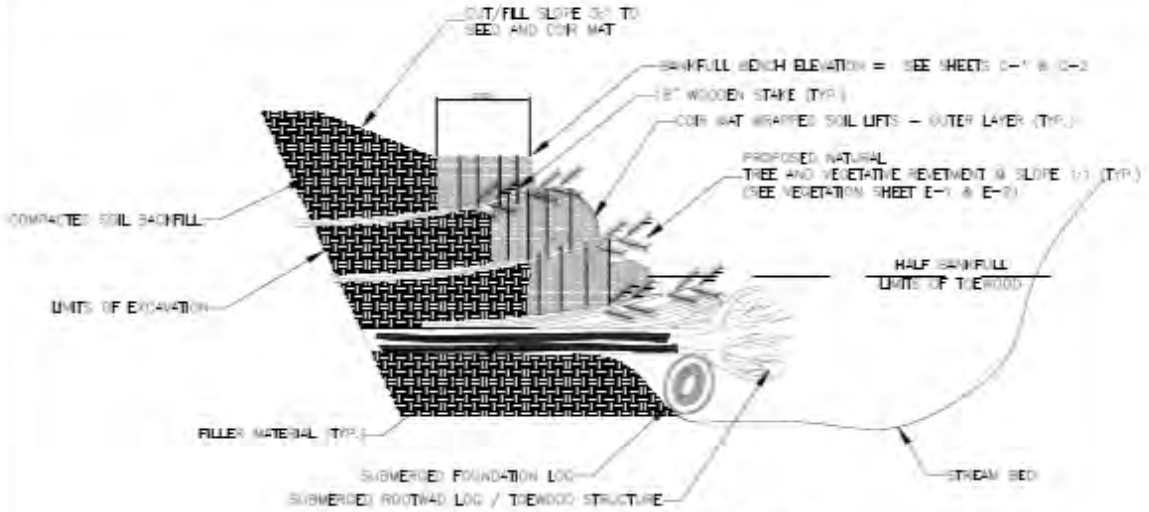
STA. 20+50.00



CROSS SECTION @ 18+00.00

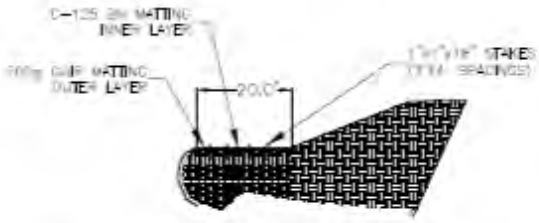
NOT TO SCALE

	CROSS SECTIONS	DATE: 03/2020
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS DRAWN: GH CHECKED: CM SHEET: C-5



TYPICAL CROSS SECTION

NOT TO SCALE



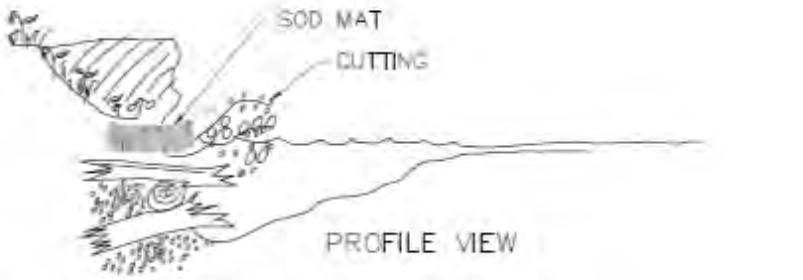
EROSION CONTROL MATTING DETAIL

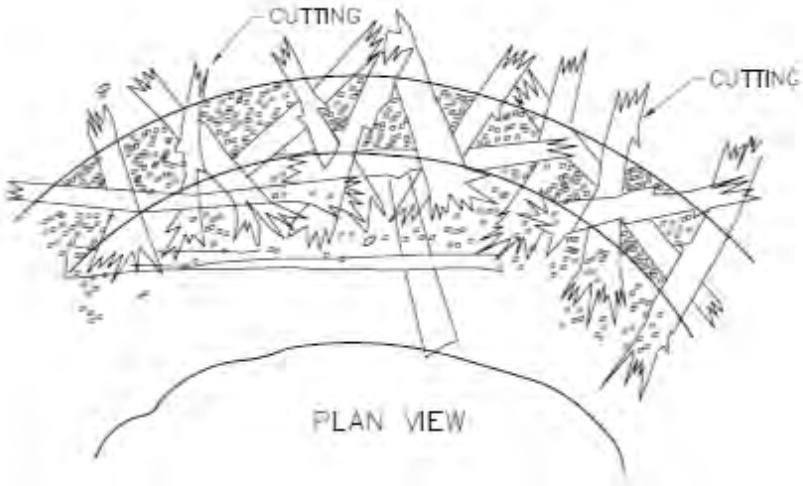
NOT TO SCALE

NOTES:

1. BUILD EACH SECTION OF UPPER BANKFULL BENCH IN 1.5' GEOLIFTS COMPACTED EVERY 6" WITH RANDOM BACKFILL SOIL.
2. UPPER STREAMBANKS TO BE CONSTRUCTED OF VEGETATED SOIL SLOPES, COMPRISED OF STACKED GEOLIFTS WITH SOIL ENCAPSULATED BY EROSION CONTROL BLANKETS (SEE DETAIL), AND PLANTINGS BETWEEN EACH GEOLIFT LAYER (SEE VEGETATION PLAN).
3. GEOLIFTS CONSIST OF 2-3 LAYERS ALONG THE ENTIRETY OF THE STREAMBANK. EACH GEOGRID IS 1.5' THICK, EXCEPT TOP LAYER WHICH WILL VARY TO ACHIEVE DESIGN TOP OF BANKFULL BENCH GRADE.
4. STARTING AT TOE OF SLOPE, CONTRACTOR SHALL USE 8" DBH OR GREATER HARDWOOD (E.G., OAK, MAPLE AND/OR SYCAMORE) STACKED IN ALTERNATING DIRECTIONS W/ RANDOM TREE TOPS PLACED IN-BETWEEN TO FILL VOIDS. EACH TOEWOOD STRUCTURE SHALL BE CONSTRUCTED WITH A COMBINATION OF WOODY MATERIAL LAYERS EVERY 1.5', COMPACTED WITH RANDOM BACKFILL SOIL TO AN ELEVATION OF HALF BANKFULL.

	TYPICAL CROSS SECTION & DETAILS	DATE: 03/2020	
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS	
		DRAWN: GH	SHEET D-1
		CHECKED: CM	





TOEWOOD/SOD MAT/DOGWOOD CUTTING

NOT TO SCALE

	TYPICAL CROSS SECTION & DETAILS	DATE: 03/2020
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS
		DRAWN: GH
		CHECKED: CM
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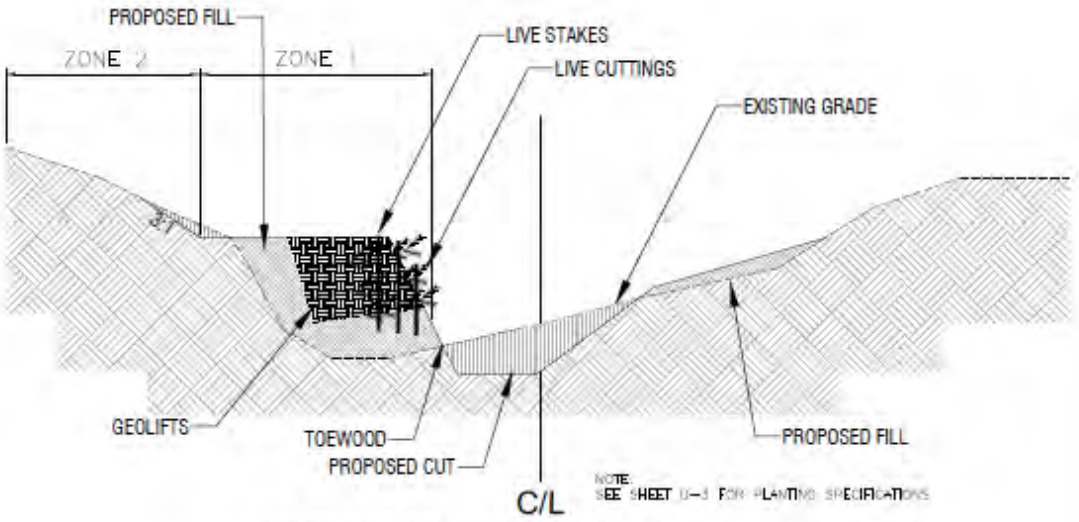


VEGETATION CROSS SECTION

NOT TO SCALE

NOTES:

1. RIPARIAN HABITAT SEEDING TO PRECEDE INSTALLATION OF EROSION CONTROL BLANKETS.
2. RIPARIAN HABITAT SEEDING AND EROSION CONTROL INSTALLATION TO COVER ALL PLANTING AREAS.
3. LIVE PLANT CUTTINGS TO BE INSTALLED INBETWEEN GEOLIFTS WITH A MININUM LENGTH OF 6'. CUTTINGS SHOULD BE PLACED IN WATER FOR UP TO 2 DAYS PRIOR TO INSTALLING. LIVE STAKES SHOULD BE INSTALLED VERTICALLY THROUGH THE GEOLIFTS STARTING AT THE LOWER EDGE OF ZONE 1, AND WORKING UP THE SLOPE. LIVE STAKES SHOULD BE 18"-24" LONG AND NOT BE LESS THAN 3/8" IN DIAMETER. A SPACING OF 4 FEET SHOULD BE USED HORIZONTALLY ALONG THE BANK EDGE THEN OFF SET UP THE SLOPE BY 2 FEET UNTIL BANKFULL ELEVATION. LIVE CUTTING SPECIMENS SHOULD CONSIST OF NATIVES OF SOUTHWEST FLORIDA (I.E., CAROLINA WILLOW, SWAMP DOGWOOD, AND/OR ELDERBERRY).
4. ALL EXPOSED AREAS WILL BE PLANTED WITH A TEMPORARY COVER CROP CONSISTING OF REDTOP GRASS, JAPANESE MILLET, OATS, AND/OR ANNUAL RYE GRASS DEPENDING ON GROWING SEASON PREFERENCES AT 20 LBS/ACRE. FERTILIZE WITH A 10-10-10 MIX.
5. ALL TREES AND SHRUBS SHOULD BE PLANTED WITH A SUPERGEL TO AID IN WATER RETENTION DURING DROUGHT CONDITIONS. IN ADDITION, A SUPER SPORE SOIL AMENDMENT PRODUCT SHOULD BE ADDED FOR QUICK DEVELOPMENT OF MYCORRHIZAE.
6. INSTALLATION OF NATURAL SOD MAT MATERIAL WHERE POSSIBLE, TO ZONE 1 OF GEOLIFTS IS RECOMMENDED FOR ESTABLISHMENT OF NATIVE VEGETATION. SOD MATS SHOULD PRECEDE INSTALLATION OF EROSION CONTROL BLANKETS, WHERE POSSIBLE.

	VEGETATION PLAN	DATE: 03/2020	
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS	
		DRAWN: GH	SHEET E-1
		CHECKED: CM	

Zone 1 (waters surfoce to bankfull)

Common Name	Scientific Name	Type	Wetland Indicator	Quantitiy	Size
water hickory	*Carya aquatica*	Tree	OBL	100	Bare Root
button bush	*Cephalanthus occidentalis*	Shrub	OBL	150	1 gal
swamp dogwood	*Cornus foemina*	Shrub	FACW	150	1 gal
pop-ash	*Fraxinus caroliniana*	Shrub	OBL	40	Bare Root
water locust	*Gleditsia aquatica*	Shrub	OBL	35	Bare Root
soft rush	*Juncus effusus*	Sedge	OBL	200	1 gal
sweet gum	*Liquidambar styraciflua*	Shrub	FAC	35	Bare Root
wax myrtle	*Morella cerifera*	Shrub	FAC	100	1 gal
carolina willow	*Salix caroliniana*	Shrub	OBL	100	Bare Root
common elderberry	*Sambucus nigra canadensis*	Shrub	FACW	150	1 gal
bald cypress	*Taxodium distichum*	Tree	OBL	150	Bare Root

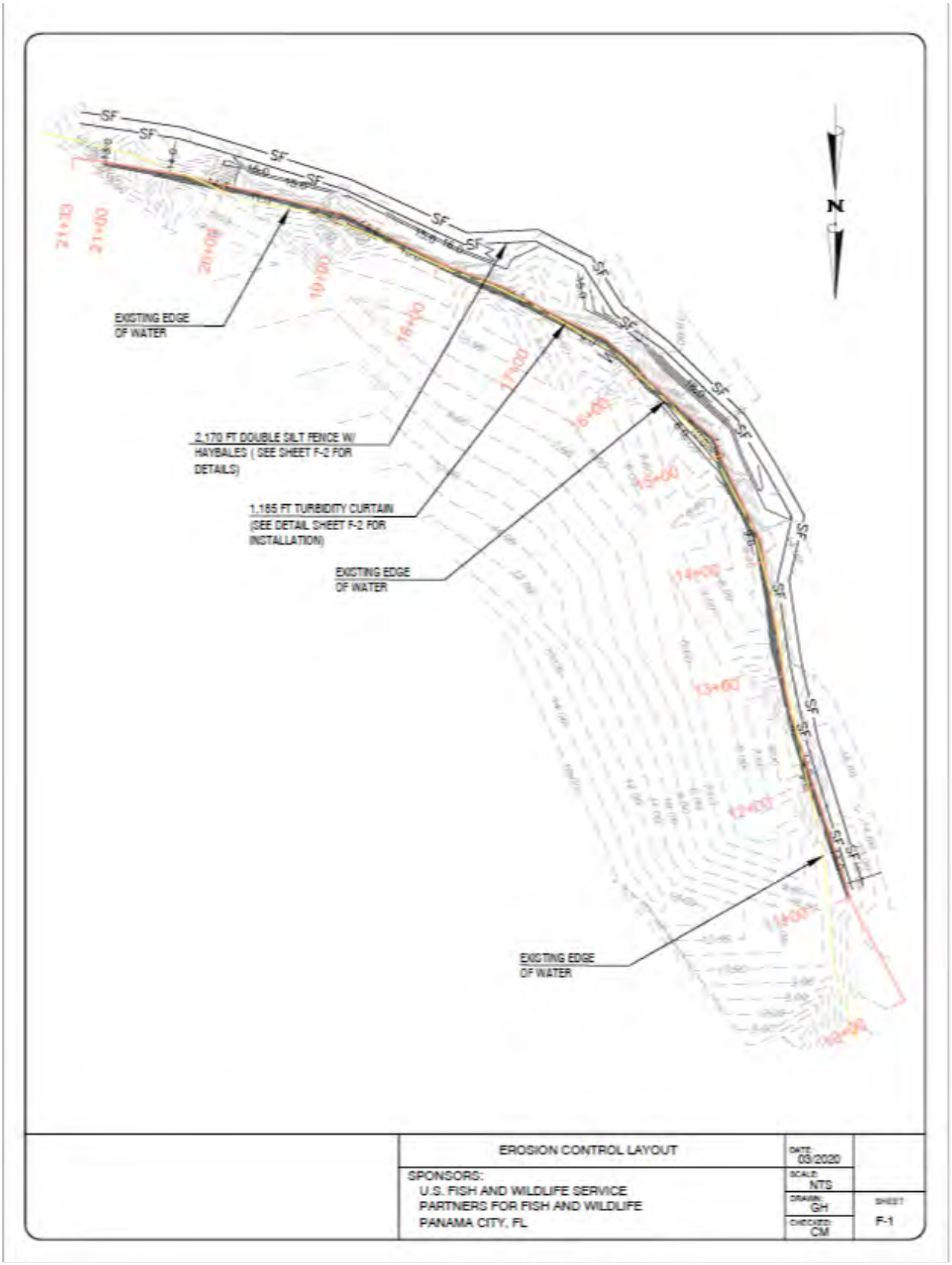
Zone 2 (above bankfull)

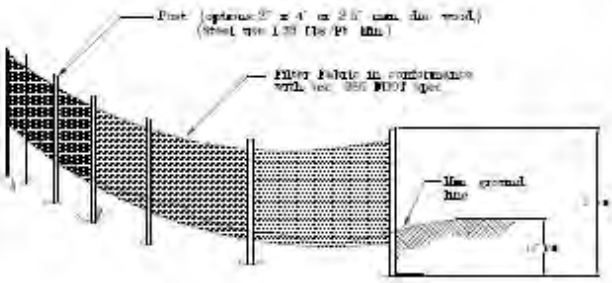
Common Name	Scientific Name	Type	Wetland Indicator	Quantitiy	Size
red maple	*Acer rubra*	Tree	FAC	30	3 gal
american beautyberry	*Callicarpa americana*	Shrub	FACU	30	3 gal
water hickory	*Carya aquatica*	Tree	OBL	30	3 gal
button bush	*Cephalanthus occidentalis*	Shrub	OBL	30	3 gal
swamp dogwood	*Cornus foemina*	Shrub	FACW	40	1 gal
pop-ash	*Fraxinus caroliniana*	Shrub	OBL	25	3 gal
water locust	*Gleditsia aquatica*	Shrub	OBL	25	3 gal
Virginia sweetspire	*Itea virginica*	Shrub	FACW	40	1 gal
sweet gum	*Liquidambar styraciflua*	Shrub	FAC	25	1 gal
wax myrtle	*Morella cerifera*	Shrub	FAC	35	1 gal
laurel oak	*Quercus laurifolia*	Tree	FACW	20	3 gal
water oak	*Quercus nigra*	Tree	FAC	20	3 gal
live Oak	*Quercus virginiana*	Tree	FACU	20	3 gal
sabal palm	*Sabal palmetto*	Tree	FAC	30	7'-10'
common elderberry	*Sambucus nigra canadensis*	Shrub	FACW	50	1 gal
saw palmetto	*Serenoa repens*	Shrub	FACU	30	1 gal
bald cypress	*Taxodium distichum*	Tree	OBL	35	3 gal
possumhaw	*Viburnum nudum*	Shrub	FACW	30	1 gal
walter's viburnum	*Viburnum obovatum*	Shrub	FACW	25	3 gal

Riparian Habitat Seed Mixture (LBS Total)

Common Name	Scientific Name	Type	Wetland Indicator	Percent of Total	Quantity (LBS)
partridge-pea	*Chamaecrista fasciculata*	Legume	FACU	10	20
leavenworth's tickseed	*Coreopsis leavenworthii*	Flower	FACW	5	10
swamp sunflower	*Helianthus angustifolia*	Flower	FACW	5	10
maidencane	*Flymenachne hemitomo*	Grass	OBL	20	10
switchgrass	*Panicum virgatum*	Grass	FAC	5	40
blackeyed susan	*Rudbeckia hirta*	Flower	FACU	5	10
creeping bluestem	Schizachyrium scoparium var. stoloniferum	Grass	FACU	25	50
Indiangrass	*Sorghastrum nutans*	Sedge	FACU	25	50

	VEGETATION PLAN	DATE: 03/2020	
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS	
		DRAWN: GH	SHEET: E-2
		CHECKED: CM	

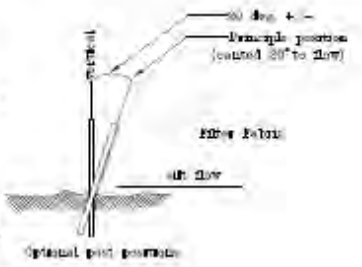

SF
N
EXISTING EDGE OF WATER
2,170 FT DOUBLE SILT FENCE W/ HAYBALES (SEE SHEET F-2 FOR DETAILS)
1,185 FT TURBIDITY CURTAIN (SEE DETAIL SHEET F-2 FOR INSTALLATION)
EXISTING EDGE OF WATER
EXISTING EDGE OF WATER
21+33
21+00
20+08
19+00
18+00
17+00
16+00
15+00
14+00
13+00
12+00
11+00
10+00
EROSION CONTROL LAYOUT
DATE: 03/2020
SCALE: NTS
DRAWN: GH
CHECKED: CM
SHEET: F-1
SPONSORS:
U.S. FISH AND WILDLIFE SERVICE
PARTNERS FOR FISH AND WILDLIFE
PANAMA CITY, FL



NOTE— TWO ROWS OF SILT FENCE SHALL BE PLACED ALONG WETLAND EDGE

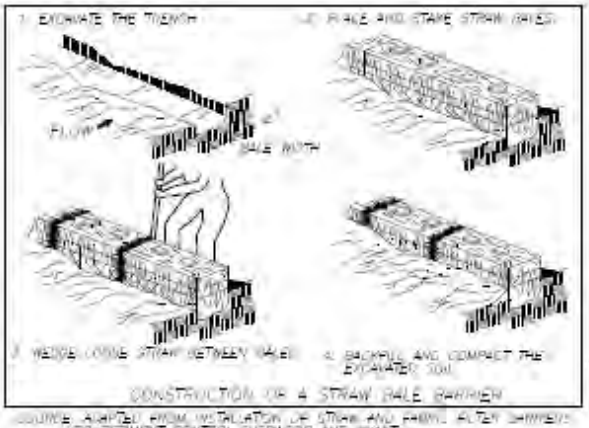
TYPE III SILT FENCE DETAIL

N.T.S.

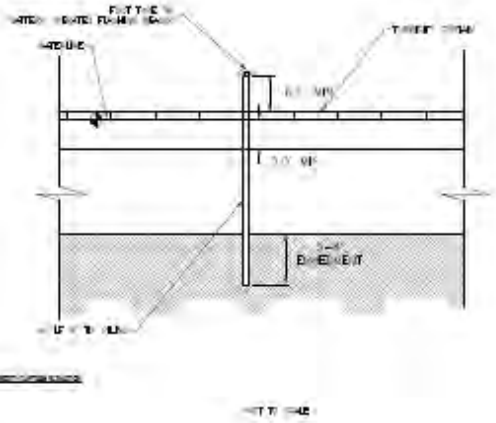


CROSS SECTION

N.T.S.



CONSTRUCTION OF A STRAW BALE BARRIER



PROPER PLACEMENT OF STRAW BALE BARRIER IN DRAINAGE WAY

HAY BALE DETAIL

	EROSION CONTROL DETAILS	DATE: 03/2020
	SPONSORS: U.S. FISH AND WILDLIFE SERVICE PARTNERS FOR FISH AND WILDLIFE PANAMA CITY, FL	SCALE: NTS
		DRAWN: GH
		CHECKED: CM
		SHEET: F-2

APPENDIX C. One-page summaries for each impairment site that was assessed on the Myakka River Watershed during 2019 to 2022.

Myakka River			Severity Scale: 1.75 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.13063 Longitude: -82.35428			County: Sarasota Site Number: MR001 Reach Length: 644 ft. Landowner: Sarasota County
			
Risk Factor	**Ranking**	**Score**	**Restoration Option 3**
Pfankuch-Channel Stability:	Good	0	
Channel Alteration:	None	0	
Bank Erosion:	Active Erosion	1	
BEHI:	Moderate (28.1)	0.5	
Local NPSP:	No Evidence	0	
Shoring Structures:	None	0	
Pipe Discharge:	Not Present	0	**Additional Site Features**
Water Odor:	Normal	0	Stream Channel Woody Material: Moderate
Fish Passage Barrier:	None	0	Impoundments: None
RB: Riparian Buffer (ft.):	60	0.25	Substrate Composition: Medium Sand
LB: Riparian Buffer (ft.):	100	0	Bank Material: Sand
RB: Floodplain Access:	Full	0	Near Bank Stress: Low
LB: Floodplain Access:	Full	0	RB Landuse: Historic Pasture, Natural Forest
	Severity Scale:	**1.75**	LB Landuse: Natural Forest
Notes:			

Myakka River	Severity Scale: 2.25 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.1322 Longitude: -82.35775	County: Sarasota Site Number: MR002 Reach Length: 280 ft. Landowner: Mark T. Pablo

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (31.7)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	60	0.25
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**2.25**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Numerous

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Moderate

RB Landuse: Historic Pasture, Natural Forest

LB Landuse: Natural Forest

Notes:

Myakka River			Severity Scale: 2.0 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.13434 Longitude: -82.35838			County: Sarasota Site Number: MR003 Reach Length: 285 ft. Landowner: *Sarasota County
			
Risk Factor	**Ranking**	**Score**	**Restoration Option 2**
Pfankuch-Channel Stability:	Good	0	
Channel Alteration:	None	0	
Bank Erosion:	Active Erosion	1	
BEHI:	Moderate (27.0)	0.5	
Local NPSP:	No Evidence	0	
Shoring Structures:	None	0	
Pipe Discharge:	Not Present	0	**Additional Site Features**
Water Odor:	Normal	0	Stream Channel Woody Material: Numerous
Fish Passage Barrier:	None	0	Impoundments: None
RB: Riparian Buffer (ft.):	40	0.5	Substrate Composition: Medium Sand
LB: Riparian Buffer (ft.):	100	0	Bank Material: Sand
RB: Floodplain Access:	Full	0	Near Bank Stress: Low
LB: Floodplain Access:	Full	0	RB Landuse: Residential, Natural Forest
	Severity Scale:	**2.0**	LB Landuse: Natural Forest
Notes:			
*Additional landowners: Michael G./Jennifer A. Tarvin			

Myakka River	Severity Scale: 1.75 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.13579 Longitude: -82.35738	County: Sarasota Site Number: MR004 Reach Length: 102 ft. Landowner: Sarasota County

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	Moderate (24.2)	0.5
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Partial	0.25
	Severity Scale:	**1.75**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sandy Clay

Near Bank Stress: High

RB Landuse: Natural Forest

LB Landuse: Natural Forest

Notes:

Myakka River	Severity Scale: 2.75 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.13595 Longitude: -82.35822	County: Sarasota Site Number: MR005 Reach Length: 223 ft. Landowner: Fourtoads LLC

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (34.0)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	0	0.75
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**2.75**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Very Low

RB Landuse: Residential, Natural Forest

LB Landuse: Natural Forest

Notes:

Myakka River	Severity Scale: 1.75 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.13633 Longitude: -82.35992	County: Sarasota Site Number: MR006 Reach Length: 271 ft. Landowner: David B. Shroyer

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	Moderate (27.8)	0.5
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	70	0.25
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**1.75**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Extensive

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sandy Stone

Near Bank Stress: Low

RB Landuse: Natural Forest, Historic Pasture

LB Landuse: Natural Forest

Notes:

Myakka River	Severity Scale: 2.0 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.13738 Longitude: -82.35988	County: Sarasota Site Number: MR007 Reach Length: 230 ft. Landowner: Sarasota County

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (32.9)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**2.0**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Low

RB Landuse: Natural Forest

LB Landuse: Natural Forest

Notes:

Myakka River			Severity Scale: 2.75 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.13825 Longitude: -82.36015			County: Sarasota Site Number: MR008 Reach Length: 105 ft. Landowner: City of Venice
			
Risk Factor	**Ranking**	**Score**	**Restoration Option 2**
Pfankuch-Channel Stability:	Good	0	
Channel Alteration:	None	0	
Bank Erosion:	Active Erosion	1	
BEHI:	High (35.0)	1	
Local NPSP:	No Evidence	0	
Shoring Structures:	None	0	
Pipe Discharge:	Not Present	0	**Additional Site Features**
Water Odor:	Normal	0	Stream Channel Woody Material: Moderate
Fish Passage Barrier:	None	0	Impoundments: None
RB: Riparian Buffer (ft.):	0	0.75	Substrate Composition: Medium Sand
LB: Riparian Buffer (ft.):	100	0	Bank Material: Sand
RB: Floodplain Access:	Full	0	Near Bank Stress: Low
LB: Floodplain Access:	Full	0	RB Landuse: Recreational, Natural Forest
	Severity Scale:	**2.75**	LB Landuse: Natural Forest
Notes:			

Myakka River	Severity Scale: 2.25 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.13920 Longitude: -82.35979	County: Sarasota Site Number: MR009 Reach Length: 225 ft. Landowner: Sarasota County

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	Moderate (23.4)	0.5
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	40	0.5
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Partial	0.25
	Severity Scale:	**2.25**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sandy Clay

Near Bank Stress: Low

RB Landuse: Natural Forest

LB Landuse: Utility, Natural Forest

Notes:

Myakka River			Severity Scale: 2.25 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.14094 Longitude: -82.35960			County: Sarasota Site Number: MR010 Reach Length: 400 ft. Landowner: Sarasota County
			
Risk Factor	**Ranking**	**Score**	**Restoration Option 1**
Pfankuch-Channel Stability:	Good	0	
Channel Alteration:	None	0	
Bank Erosion:	Active Erosion	1	
BEHI:	High (32.2)	1	
Local NPSP:	No Evidence	0	
Shoring Structures:	None	0	
Pipe Discharge:	Not Present	0	**Additional Site Features**
Water Odor:	Normal	0	Stream Channel Woody Material: Moderate
Fish Passage Barrier:	None	0	Impoundments: None
RB: Riparian Buffer (ft.):	100	0	Substrate Composition: Medium Sand
LB: Riparian Buffer (ft.):	100	0	Bank Material: Sandy Clay
RB: Floodplain Access:	Full	0	Near Bank Stress: Low
LB: Floodplain Access:	Partial	0.25	RB Landuse: Natural Forest
	Severity Scale:	**2.25**	LB Landuse: Natural Forest
Notes:			

Myakka River	Severity Scale: 2.5 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.14523 Longitude: -82.36528	County: Sarasota Site Number: MR011 Reach Length: 500 ft. Landowner: Property owner assn. inc.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (35.6)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	70	0.25
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Partial	0.25
LB: Floodplain Access:	Full	0
	Severity Scale:	**2.5**

Restoration Option 1

Additional Site Features

Stream Channel Woody Material: Numerous

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sandy Stone

Near Bank Stress: High

RB Landuse: Natural Forest, Residential

LB Landuse: Natural Forest

Notes: Landuse- Venetian Golf and River Club

Myakka River	Severity Scale: 2.0 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.14561 Longitude: -82.36510	County: Sarasota Site Number: MR012 Reach Length: 175 ft. Landowner: Sarasota County

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (31.2)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**2**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Infrequent

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Low

RB Landuse: Natural Forest

LB Landuse: Natural Forest

Notes:

Myakka River	Severity Scale: 1.5 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.15365 Longitude: -82.36247	County: Sarasota Site Number: MR013 Reach Length: 95 ft. Landowner: Sarasota County

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	Moderate (25.3)	0.5
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**1.5**

Restoration Option 3

Additional Site Features

Stream Channel Woody Material: Numerous

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Low

RB Landuse: Natural Forest

LB Landuse: Natural Forest

Notes:

Myakka River	Severity Scale: 1.75 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.15572 Longitude: -82.36391	County: Sarasota Site Number: MR014 Reach Length: 200 ft. Landowner: Sarasota County

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	Moderate (28.3)	0.5
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Partial	0.25
	Severity Scale:	**1.75**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate
Impoundments: None
Substrate Composition: Medium Sand
Bank Material: Sandy Clay
Near Bank Stress: Very Low
RB Landuse: Natural Forest
LB Landuse: Natural Forest

Notes:

Myakka River			Severity Scale: 2.25 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.15588 Longitude: -82.36497			County: Sarasota Site Number: MR015 Reach Length: 100 ft. Landowner: Sarasota County
			
Risk Factor	**Ranking**	**Score**	**Restoration Option 2**
Pfankuch-Channel Stability:	Good	0	
Channel Alteration:	None	0	
Bank Erosion:	Active Erosion	1	
BEHI:	High (35.8)	1	
Local NPSP:	No Evidence	0	
Shoring Structures:	None	0	
Pipe Discharge:	Not Present	0	**Additional Site Features**
Water Odor:	Normal	0	Stream Channel Woody Material: Numerous
Fish Passage Barrier:	None	0	Impoundments: None
RB: Riparian Buffer (ft.):	100	0	Substrate Composition: Medium Sand
LB: Riparian Buffer (ft.):	100	0	Bank Material: Sand
RB: Floodplain Access:	Full	0	Near Bank Stress: Low
LB: Floodplain Access:	Partial	0.25	RB Landuse: Natural Forest
	Severity Scale:	**2.25**	LB Landuse: Natural Forest
Notes:			

Myakka River	Severity Scale: 2.75 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.15601 Longitude: -82.36649	County: Sarasota Site Number: MR016 Reach Length: 180 ft. Landowner: Sarasota County

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	Very High (41)	1.5
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Partial	0.25
	Severity Scale:	**2.75**

Restoration Option 1

Additional Site Features

Stream Channel Woody Material: Numerous

Impoundments: None

Substrate Composition: Medium Sand

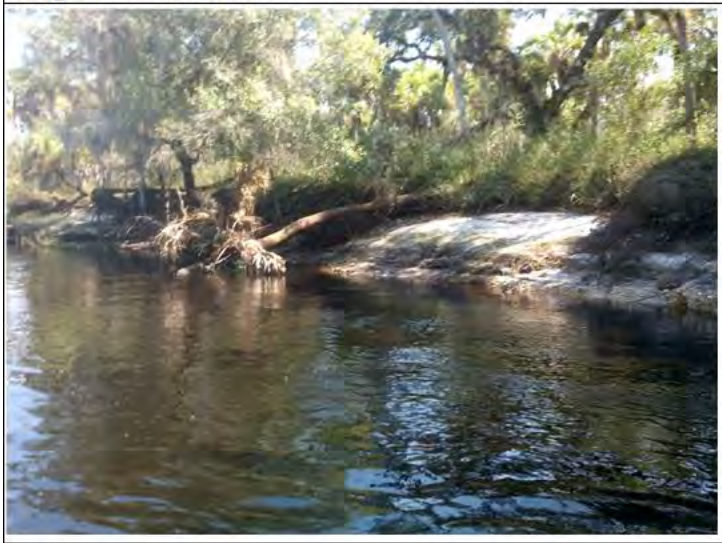
Bank Material: Sand

Near Bank Stress: Moderate

RB Landuse: Natural Forest

LB Landuse: Natural Forest

Notes:

Myakka River			Severity Scale: 2.25 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.16336 Longitude: -82.36609			County: Sarasota Site Number: MR017 Reach Length: 225 ft. Landowner: Terry G. Green*
			
Risk Factor	**Ranking**	**Score**	**Restoration Option 2**
Pfankuch-Channel Stability:	Good	0	
Channel Alteration:	None	0	
Bank Erosion:	Active Erosion	1	
BEHI:	High	1	
Local NPSP:	No Evidence	0	
Shoring Structures:	None	0	
Pipe Discharge:	Not Present	0	**Additional Site Features**
Water Odor:	Normal	0	Stream Channel Woody Material: Moderate
Fish Passage Barrier:	None	0	Impoundments: None
RB: Riparian Buffer (ft.):	100	0	Substrate Composition: Medium Sand
LB: Riparian Buffer (ft.):	100	0	Bank Material: Sand
RB: Floodplain Access:	Partial	0.25	Near Bank Stress: Moderate
LB: Floodplain Access:	Full	0	RB Landuse: Natural Forest
	Severity Scale:	**2.25**	LB Landuse: Natural Forest
Notes:			
*Additional Landowners: Jill M. Green			
Rapid Assessment			

Myakka River	Severity Scale: 2.0 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.16451 Longitude: -82.36680	County: Sarasota Site Number: MR018 Reach Length: 180 ft. Landowner: Terry G. Green*

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (31.0)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**2**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Moderate

RB Landuse: Natural Forest

LB Landuse: Natural Forest

Notes:

*Additional Landowners: Jill M. Green

Myakka River	Severity Scale: 2.0 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.16484 Longitude: -82.36583	County: Sarasota Site Number: MR019 Reach Length: 360 ft. Landowner: Sarasota County

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (34.7)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**2**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate
Impoundments: None
Substrate Composition: Medium Sand
Bank Material: Sand
Near Bank Stress: Low
RB Landuse: Natural Forest
LB Landuse: Natural Forest

Notes:

Myakka River			Severity Scale: 2.25 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.16628 Longitude: -82.36404			County: Sarasota Site Number: MR020 Reach Length: 80 ft. Landowner: Sarasota County
			
Risk Factor	**Ranking**	**Score**	**Restoration Option 2**
Pfankuch-Channel Stability:	Good	0	
Channel Alteration:	None	0	
Bank Erosion:	Active Erosion	1	
BEHI:	High (36.83)	1	
Local NPSP:	No Evidence	0	
Shoring Structures:	None	0	
Pipe Discharge:	Not Present	0	**Additional Site Features**
Water Odor:	Normal	0	Stream Channel Woody Material: Numerous
Fish Passage Barrier:	None	0	Impoundments: None
RB: Riparian Buffer (ft.):	80	0.25	Substrate Composition: Medium Sand
LB: Riparian Buffer (ft.):	100	0	Bank Material: Sand
RB: Floodplain Access:	Full	0	Near Bank Stress: High
LB: Floodplain Access:	Full	0	RB Landuse: Natural Forest
	Severity Scale:	**2.25**	LB Landuse: Natural Forest
Notes:			

Myakka River	Severity Scale: 3.25 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.16927 Longitude: -82.36315	County: Sarasota Site Number: MR021 Reach Length: 135 ft. Landowner: Sarasota County

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Mass-wasting	1.5
BEHI:	Very High (43.67)	1.5
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	60	0.25
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**3.25**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Numerous

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand/Silt

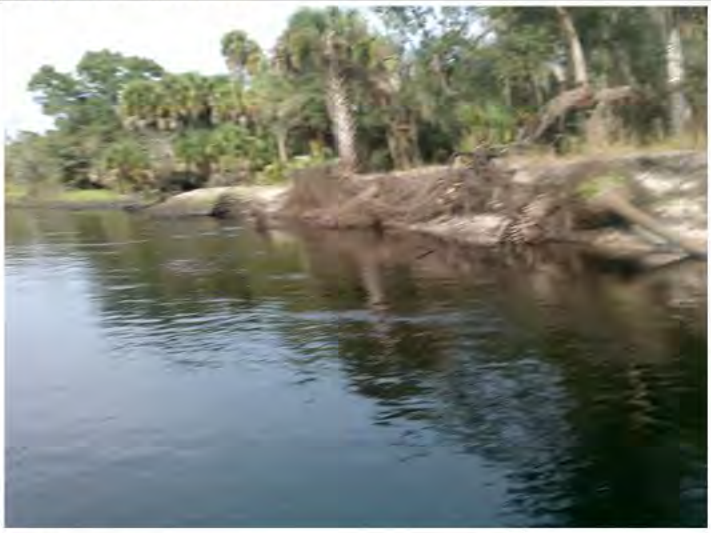
Near Bank Stress: High

RB Landuse: Historic, Natural Forest

LB Landuse: Natural Forest

Notes:

Myakka River	Severity Scale: 1.5 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.18011 Longitude: -82.35672	County: Sarasota Site Number: MR022 Reach Length: 100 ft. Landowner: Sarasota County



Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	Moderate (29.68)	0.5
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**1.5**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Moderate

RB Landuse: Natural Forest

LB Landuse: Natural Forest

Notes:

Myakka River	Severity Scale: 1.5 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.18394 Longitude: -82.35239	County: Sarasota Site Number: MR023 Reach Length: 165 ft. Landowner: TIITF*

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	Moderate (29.88)	0.5
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**1.5**

Restoration Option 3

Additional Site Features

Stream Channel Woody Material: Infrequent

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: High

RB Landuse: Natural Forest

LB Landuse: Natural Forest

Notes:

*Additional Landowners: DEP - Rec & Park Myakka River State Park

*TIITF (Trustees of the Internal Improvement Trust Fund)

Myakka River	Severity Scale: 2.5 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.1858 Longitude: -82.35334	County: Sarasota Site Number: MR024 Reach Length: 105 ft. Landowner: TIITF*

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (33.51)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	80	0.25
LB: Riparian Buffer (ft.):	80	0.25
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**2.5**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Moderate

RB Landuse: Historic, Natural Forest

LB Landuse: Historic, Natural Forest

Notes:

*Additional Landowners: DEP - Rec & Park Myakka River State Park

*TIITF (Trustees of the Internal Improvement Trust Fund)

Myakka River			Severity Scale: 2.5 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.18551 Longitude: -82.35403			County: Sarasota Site Number: MR025 Reach Length: 290 ft. Landowner: D Bar F Ranch LLC
			
Risk Factor	**Ranking**	**Score**	**Restoration Option 2**
Pfankuch-Channel Stability:	Good	0	
Channel Alteration:	None	0	
Bank Erosion:	Active Erosion	1	
BEHI:	High (31.08)	1	
Local NPSP:	No Evidence	0	
Shoring Structures:	None	0	
Pipe Discharge:	Not Present	0	**Additional Site Features**
Water Odor:	Normal	0	Stream Channel Woody Material: Numerous
Fish Passage Barrier:	None	0	Impoundments: None
RB: Riparian Buffer (ft.):	80	0.25	Substrate Composition: Medium Sand
LB: Riparian Buffer (ft.):	80	0.25	Bank Material: Sand
RB: Floodplain Access:	Full	0	Near Bank Stress: Moderate
LB: Floodplain Access:	Full	0	RB Landuse: Historic, Natural Forest
	Severity Scale:	**2.5**	LB Landuse: Historic, Natural Forest
Notes:			

Myakka River	Severity Scale: 7.5 (High)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.18697 Longitude: -82.35458	County: Sarasota Site Number: MR026 Reach Length: 150 ft. Landowner: D Bar F Franch LLC

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	No Recovery	1.5
Bank Erosion:	Active Erosion	1
BEHI:	High (33.80)	1
Local NPSP:	Slight	0.5
Shoring Structures:	Present	1.5
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Present	1.5
RB: Riparian Buffer (ft.):	40	0.5
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**7.5**

Restoration Option 1

Additional Site Features

Stream Channel Woody Material: Infrequent

Impoundments: Manmade Impoundment*

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Moderate

RB Landuse: Recreational, Natural Forest

LB Landuse: Natural Forest

Notes:

*Locally known as Down's Dam, currently a feasibilty study is being conducted for dam removal

Myakka River	Severity Scale: 1.5 (Low)
Watershed: Myakka River Subwatershed: Harris Camp Latitude: 27.18699 Longitude: -82.34920	County: Sarasota Site Number: MR027 Reach Length: 215 ft. Landowner: TIITF*

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Good	0
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	Moderate (25.07)	0.5
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	None	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**1.5**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand / Clay

Near Bank Stress: Moderate

RB Landuse: Natural Forest

LB Landuse: Natural Forest

Notes:

*Additional Landowners: DEP - Rec & Park Myakka River State Park

*TIITF (Trustees of the Internal Improvement Trust Fund)

Myakka River			Severity Scale: 6.5 (Moderate)
Watershed: Myakka River Subwatershed: Tatum Sawgrass Swamp Latitude: 27.30536 Longitude: -82.24487			County: Manatee Site Number: MR028 Reach Length: 377 ft. Landowner: Triangle Ranch LLC.
			
Risk Factor	**Ranking**	**Score**	**Restoration Option 2**
Pfankuch-Channel Stability:	Poor	1.5	
Channel Alteration:	None	0	
Bank Erosion:	Active Erosion	1	
BEHI:	High (37.37)	1	
Local NPSP:	Obvious Sources	1.5	
Shoring Structures:	None	0	**Additional Site Features**
Pipe Discharge:	Not Present	0	Stream Channel Woody Material: Infrequent
Water Odor:	Normal	0	Impoundments: None
Fish Passage Barrier:	Not Present	0	Substrate Composition: Fine sand
RB: Riparian Buffer (ft.):	25	0.75	Bank Material: Sand
LB: Riparian Buffer (ft.):	0	0.75	Near Bank Stress: Moderate
RB: Floodplain Access:	Full	0	Livestock Access: Yes
LB: Floodplain Access:	Full	0	RB Landuse: Pasture and Natural Forest
	Severity Scale:	**6.5**	LB Landuse: Pasture and Natural Forest
Notes:			

Myakka River	Severity Scale: 6.0 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR029
Latitude: 27.30522	Reach Length: 590 ft.
Longitude: -82.24293	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (37.63)	1
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	0	0.75
LB: Riparian Buffer (ft.):	75	0.25
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**6**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Infrequent

Impoundments: None

Substrate Composition: Fine sand / Clay

Bank Material: Sand / Clay

Near Bank Stress: Low

Livestock Access: Yes

RB Landuse: Pasture and Natural Forest

LB Landuse: Pasture and Natural Forest

Notes:

Potential fish passage barrier at low water.

Myakka River			Severity Scale: 6.5 (Moderate)
Watershed: Myakka River			County: Manatee
Subwatershed: Tatum Sawgrass Swamp			Site Number: MR030
Latitude: 27.30391			Reach Length: 237 ft.
Longitude: -82.24295			Landowner: Triangle Ranch LLC.
			
Risk Factor	**Ranking**	**Score**	**Restoration Option 2**
Pfankuch-Channel Stability:	Poor	1.5	
Channel Alteration:	None	0	
Bank Erosion:	Active Erosion	1	
BEHI:	High (35.56)	1	
Local NPSP:	Obvious Sources	1.5	
Shoring Structures:	None	0	**Additional Site Features**
Pipe Discharge:	Not Present	0	Stream Channel Woody Material: Infrequent
Water Odor:	Normal	0	Impoundments: None
Fish Passage Barrier:	Not Present	0	Substrate Composition: Fine sand
RB: Riparian Buffer (ft.):	0	0.75	Bank Material: Sand
LB: Riparian Buffer (ft.):	25	0.75	Near Bank Stress: High
RB: Floodplain Access:	Full	0	Livestock Access: Yes
LB: Floodplain Access:	Full	0	RB Landuse: Pasture and Natural Forest
	Severity Scale:	**6.5**	LB Landuse: Pasture and Natural Forest
Notes:			

Myakka River			Severity Scale: 5.75 (Moderate)
Watershed: Myakka River			County: Manatee
Subwatershed: Tatum Sawgrass Swamp			Site Number: MR031
Latitude: 27.30315			Reach Length: 520 ft.
Longitude: -82.24197			Landowner: Triangle Ranch LLC.
			
Risk Factor	**Ranking**	**Score**	**Restoration Option 2**
Pfankuch-Channel Stability:	Poor	1.5	
Channel Alteration:	None	0	
Bank Erosion:	Active Erosion	1	
BEHI:	High (31.43)	1	
Local NPSP:	Obvious Sources	1.5	
Shoring Structures:	None	0	**Additional Site Features**
Pipe Discharge:	Not Present	0	Stream Channel Woody Material: Infrequent
Water Odor:	Normal	0	Impoundments: None
Fish Passage Barrier:	Not Present	0	Substrate Composition: Fine sand
RB: Riparian Buffer (ft.):	100	0	Bank Material: Sand
LB: Riparian Buffer (ft.):	0	0.75	Near Bank Stress: Moderate
RB: Floodplain Access:	Full	0	Livestock Access: Yes
LB: Floodplain Access:	Full	0	RB Landuse: Pasture and Natural Forest
	Severity Scale:	**5.75**	LB Landuse: Pasture and Natural Forest
Notes:			
Potential fish passage barrier at low water.			

Myakka River	Severity Scale: 6.75 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR032
Latitude: 27.30242	Reach Length: 680 ft.
Longitude: -82.24351	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Mass-Wasting	1.5
BEHI:	High (38.27)	1
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	0	0.75
LB: Riparian Buffer (ft.):	50	0.5
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**6.75**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Infrequent

Impoundments: Manmade (Ford)

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: Moderate

Livestock Access: Yes

RB Landuse: Pasture, Natural Forest, Residential

LB Landuse: Pasture and Natural Forest

Notes:

Unpaved ford in fair condition present on site.

Potential fish passage barrier at low water.

Myakka River	Severity Scale: 6.5 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR033
Latitude: 27.30236	Reach Length: 553 ft.
Longitude: -82.24372	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (37.89)	1
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	0	0.75
LB: Riparian Buffer (ft.):	25	0.75
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**6.5**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Infrequent

Impoundments: Manmade (Ford)

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: Moderate

Livestock Access: Yes

RB Landuse: Pasture, Natural Forest, Residential

LB Landuse: Pasture and Natural Forest

Notes:

Unpaved ford in fair condition present on site.

Potential fish passage barrier at low water.

Myakka River	Severity Scale: 7.5 (High)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR034
Latitude: 27.29885	Reach Length: 409 ft.
Longitude: -82.2421	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Mass-Wasting	1.5
BEHI:	Extreme (50.65)	1.5
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	0	0.75
LB: Riparian Buffer (ft.):	0	0.75
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**7.5**

Restoration Option 1

Additional Site Features

Stream Channel Woody Material: Infrequent

Impoundments: None

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: Moderate

Livestock Access: Yes

RB Landuse: Pasture and Natural Forest

LB Landuse: Pasture and Natural Forest

Notes:

Myakka River	Severity Scale: 7.0 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR035
Latitude: 27.29788	Reach Length: 190 ft.
Longitude: -82.24174	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Mass-Wasting	1.5
BEHI:	High (39.5)	1
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	25	0.75
LB: Riparian Buffer (ft.):	0	0.75
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**7**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Infrequent

Impoundments: None

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: Low

Livestock Access: Yes

RB Landuse: Pasture and Natural Forest

LB Landuse: Pasture and Natural Forest

Notes:

Myakka River	Severity Scale: 7.5 (High)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR036
Latitude: 27.29721	Reach Length: 300 ft.
Longitude: -82.24139	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Mass-Wasting	1.5
BEHI:	Very High (43.53)	1.5
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	25	0.75
LB: Riparian Buffer (ft.):	25	0.75
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**7.5**

Restoration Option 1

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: Moderate

Livestock Access: Yes

RB Landuse: Pasture and Natural Forest

LB Landuse: Pasture and Natural Forest

Notes:

Myakka River			Severity Scale: 7.25 (Moderate)
Watershed: Myakka River			County: Manatee
Subwatershed: Tatum Sawgrass Swamp			Site Number: MR037
Latitude: 27.29654			Reach Length: 200 ft.
Longitude: -82.24088			Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Mass-Wasting	1.5
BEHI:	Very High (40.28)	1.5
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	50	0.5
LB: Riparian Buffer (ft.):	0	0.75
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**7.25**

Restoration Option 1

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: Low

Livestock Access: Yes

RB Landuse: Pasture and Natural Forest

LB Landuse: Pasture and Natural Forest

Notes:

Myakka River	Severity Scale: 6.75 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR038
Latitude: 27.29583	Reach Length: 220 ft.
Longitude: -82.24064	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	Very High (43.56)	1.5
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	25	0.75
LB: Riparian Buffer (ft.):	50	0.5
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**6.75**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: Low

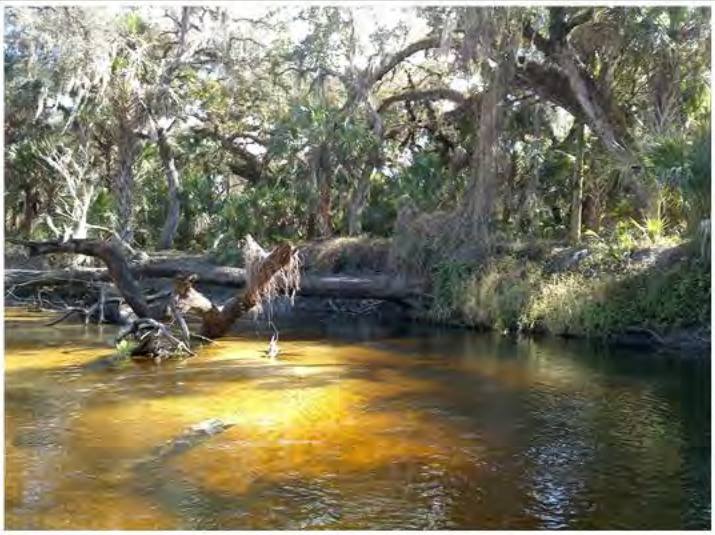
Livestock Access: Yes

RB Landuse: Pasture and Natural Forest

LB Landuse: Pasture and Natural Forest

Notes:

Myakka River	Severity Scale: 6.25 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR039
Latitude: 27.29489	Reach Length: 264 ft.
Longitude: -82.23995	Landowner: Triangle Ranch LLC.



Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	Very High (41.16)	1.5
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	25	0.75
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**6.25**

Restoration Option 1

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: High

Livestock Access: Yes

RB Landuse: Pasture and Natural Forest

LB Landuse: Pasture and Natural Forest

Notes:

Myakka River	Severity Scale: 5.5 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR040
Latitude: 27.2952	Reach Length: 215 ft.
Longitude: -82.23931	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (37.45)	1
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	50	0.5
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**5.5**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: High

Livestock Access: Yes

RB Landuse: Pasture and Natural Forest

LB Landuse: Pasture and Natural Forest

Notes:

Myakka River	Severity Scale: 5.75 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR041
Latitude: 27.29481	Reach Length: 195 ft.
Longitude: -82.2389	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (36.94)	1
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	25	0.75
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**5.75**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: High

Livestock Access: Yes

RB Landuse: Pasture and Natural Forest

LB Landuse: Pasture and Natural Forest

Notes:

Myakka River	Severity Scale: 6.0 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR042
Latitude: 27.29505	Reach Length: 230 ft.
Longitude: -82.23841	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	Very High (40.62)	1.5
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	50	0.5
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**6**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: High

Livestock Access: Yes

RB Landuse: Pasture and Natural Forest

LB Landuse: Pasture and Natural Forest

Notes:

Myakka River	Severity Scale: 5.0 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR043
Latitude: 27.29504	Reach Length: 134 ft.
Longitude: -82.23803	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (39.22)	1
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**5**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate
Impoundments: None
Substrate Composition: Fine sand
Bank Material: Sand
Near Bank Stress: High
Livestock Access: Yes
RB Landuse: Pasture and Natural Forest
LB Landuse: Pasture and Natural Forest

Notes:

Myakka River	Severity Scale: 5.0 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR044
Latitude: 27.29511	Reach Length: 157 ft.
Longitude: -82.23761	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (39.07)	1
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**5**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: Low-Moderate

Livestock Access: Yes

RB Landuse: Pasture and Natural Forest

LB Landuse: Pasture and Natural Forest

Notes:

Myakka River	Severity Scale: 5.75 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR045
Latitude: 27.29475	Reach Length: 145 ft.
Longitude: -82.23739	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (37.54)	1
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	0	0.75
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**5.75**

Restoration Option 1

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: High

Livestock Access: Yes

RB Landuse: Pasture and Natural Forest

LB Landuse: Pasture and Natural Forest

Notes:

Myakka River	Severity Scale: 6.0 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR046
Latitude: 27.29385	Reach Length: 268 ft.
Longitude: -82.23539	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (34.66)	1
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	75	0.25
LB: Riparian Buffer (ft.):	25	0.75
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**6**

Restoration Option 1

Additional Site Features

Stream Channel Woody Material: Numerous

Impoundments: None

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: High

Livestock Access: Yes

RB Landuse: Pasture and Natural Forest

LB Landuse: Pasture and Natural Forest

Notes:

Myakka River	Severity Scale: 8.5 (High)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR047
Latitude: 27.29393	Reach Length: 178 ft.
Longitude: -82.23475	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	Very High (40.55)	1.5
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	Present (Riprap)	1.5
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	0	0.75
LB: Riparian Buffer (ft.):	0	0.75
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**8.5**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Infrequent
Impoundments: Manmade (ford + bridge)
Substrate Composition: Fine sand, Cobble
Bank Material: Sand
Near Bank Stress: Very low
Livestock Access: Yes
RB Landuse: Pasture and Natural Forest
LB Landuse: Pasture and Natural Forest

Notes:

Unpaved ford and wooden/metal bridge in fair conditions present at site.

Potential fish passage barrier at low water.

Myakka River	Severity Scale: 7.0 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR048
Latitude: 27.29379	Reach Length: 270 ft.
Longitude: -82.23406	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	Exteme (46.01)	1.5
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	25	0.75
LB: Riparian Buffer (ft.):	25	0.75
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**7**

Restoration Option 1

Additional Site Features

Stream Channel Woody Material: Numerous

Impoundments: None

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: High

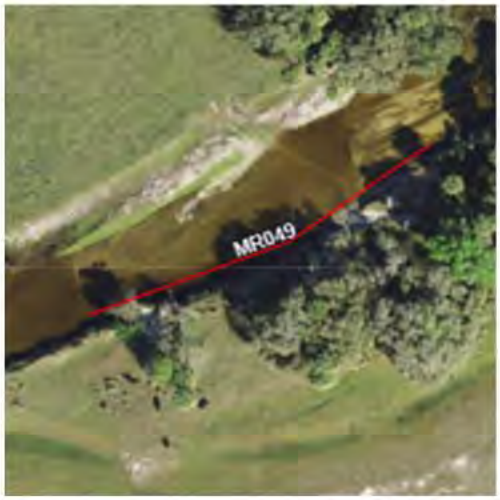
Livestock Access: Yes

RB Landuse: Pasture and Natural Forest

LB Landuse: Pasture and Natural Forest

Notes:

Myakka River	Severity Scale: 7.5 (High)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR049
Latitude: 27.29439	Reach Length: 220 ft.
Longitude: -82.23262	Landowner: Triangle Ranch LLC.



Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Mass-Wasting	1.5
BEHI:	Very High (40.57)	1.5
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	0	0.75
LB: Riparian Buffer (ft.):	25	0.75
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**7.5**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: Low-Moderate

Livestock Access: Yes

RB Landuse: Pasture and Natural Forest

LB Landuse: Pasture and Natural Forest

Notes:

Myakka River	Severity Scale: 5.5 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MR050
Latitude: 27.29515	Reach Length: 590 ft.
Longitude: -82.23131	Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Active Erosion	1
BEHI:	High (36.46)	1
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	75	0.25
LB: Riparian Buffer (ft.):	75	0.25
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**5.5**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Fine sand

Bank Material: Sand

Near Bank Stress: Moderate

Livestock Access: Yes

RB Landuse: Pasture and Natural Forest

LB Landuse: Pasture and Natural Forest

Notes:

Myakka River	Severity Scale: 7.5 (High)
Watershed: Myakka River Subwatershed: Tatum Sawgrass Swamp Latitude: 27.29609 Longitude: -82.23064	County: Manatee Site Number: MR051 Reach Length: 280 ft. Landowner: Triangle Ranch LLC.

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Poor	1.5
Channel Alteration:	None	0
Bank Erosion:	Mass-Wasting	1.5
BEHI:	Very High (42.06)	1.5
Local NPSP:	Obvious Sources	1.5
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	25	0.75
LB: Riparian Buffer (ft.):	0	0.75
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**7.5**

Restoration Option 1

Additional Site Features

Stream Channel Woody Material: Moderate
Impoundments: None
Substrate Composition: Fine sand
Bank Material: Sand
Near Bank Stress: Low-Moderate
Livestock Access: Yes
RB Landuse: Pasture and Natural Forest
LB Landuse: Pasture and Natural Forest

Notes:

Myakka River	Severity Scale: 4.75 (Moderate)
Watershed: Myakka River Subwatershed: Maple Creek Latitude: 27.34585 Longitude: -82.15548	County: Manatee Site Number: MR052 Reach Length: 700 ft. Landowner: Manatee County

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Fair	1
Channel Alteration:	None	0
Bank Erosion:	Active	1
BEHI:	High (34.12)	1
Local NPSP:	Moderate	1
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	20	0.75
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**4.75**

Restoration Option 2

Additional Site Features

Stream Channel Woody Material: Infrequent

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Very Low

RB Landuse: Other (Recreational Park)

LB Landuse: Natural Forest

Notes:

Myakka River	Severity Scale: 3.0 (Low)
Watershed: Myakka River Subwatershed: Maple Creek Latitude: 27.36814 Longitude: -82.14960	County: Manatee Site Number: MR053 Reach Length: 103 ft. Landowner: *

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Fair	1
Channel Alteration:	None	0
Bank Erosion:	Historic	0.5
BEHI:	Very High (41.27)	1.5
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**3**

Restoration Option 3

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Moderate

RB Landuse: Historic Pasture + Natural Forest

LB Landuse: Historic Pasture + Natural Forest

Notes: * Conservation Foundation of the Gulf Coast Inc.

Myakka River	Severity Scale: 2.5 (Low)
Watershed: Myakka River	County: Manatee
Subwatershed: Maple Creek	Site Number: MR054
Latitude: 27.368386	Reach Length: 111 ft.
Longitude: -82.149517	Landowner: *

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Fair	1
Channel Alteration:	None	0
Bank Erosion:	Historic	0.5
BEHI:	High (39.18)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**2.5**

Restoration Option 3

Additional Site Features

Stream Channel Woody Material: Infrequent

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Moderate

RB Landuse: Historic Pasture + Natural Forest

LB Landuse: Historic Pasture + Natural Forest

Notes: * Conservation Foundation of the Gulf Coast Inc.

Myakka River	Severity Scale: 2.5 (Low)
Watershed: Myakka River	County: Manatee
Subwatershed: Maple Creek	Site Number: MR055
Latitude: 27.36887	Reach Length: 120 ft.
Longitude: -82.14973	Landowner: *

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Fair	1
Channel Alteration:	None	0
Bank Erosion:	Historic	0.5
BEHI:	High (37.12)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**2.5**

Restoration Option 3

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

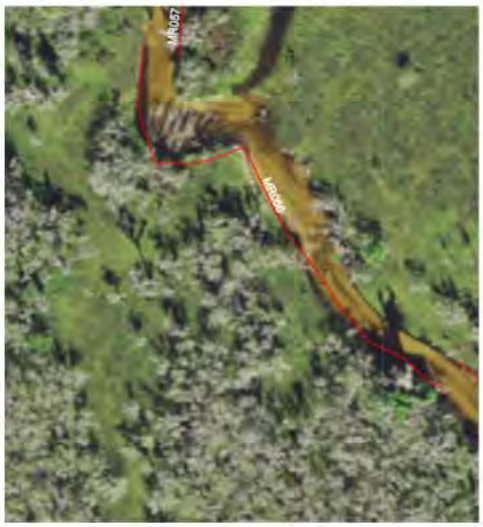
Near Bank Stress: Moderate

RB Landuse: Historic Pasture + Natural Forest

LB Landuse: Historic Pasture + Natural Forest

Notes: * Conservation Foundation of the Gulf Coast Inc.

Myakka River	Severity Scale: 3.0 (Low)
Watershed: Myakka River	County: Manatee
Subwatershed: Maple Creek	Site Number: MR056
Latitude: 27.36925	Reach Length: 250 ft.
Longitude: -82.15008	Landowner: *



Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Fair	1
Channel Alteration:	None	0
Bank Erosion:	Historic	0.5
BEHI:	Very High (40.13)	1.5
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**3**

Restoration Option 3

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Moderate

RB Landuse: Historic Pasture + Natural Forest

LB Landuse: Historic Pasture + Natural Forest

Notes: * Conservation Foundation of the Gulf Coast Inc.

From this point upstream, Ogleby Creek is a higher stream order and contributed more water than the Myakka River.

Ogleby Creek	Severity Scale: 2.5 (Low)
Watershed: Myakka River	County: Manatee
Subwatershed: Maple Creek	Site Number: MR057
Latitude: 27.36960	Reach Length: 108 ft.
Longitude: -82.15023	Landowner: *

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Fair	1
Channel Alteration:	None	0
Bank Erosion:	Historic	0.5
BEHI:	High (38.52)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**2.5**

Restoration Option 3

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Moderate

RB Landuse: Historic Pasture + Natural Forest

LB Landuse: Historic Pasture + Natural Forest

Notes: * Conservation Foundation of the Gulf Coast Inc.

Ogleby Creek			Severity Scale: 3.0 (Low)
Watershed: Myakka River Subwatershed: Ogleby Creek Latitude: 27.36995 Longitude: -82.15035			County: Manatee Site Number: MR058 Reach Length: 155 ft. Landowner: *
			
Risk Factor	**Ranking**	**Score**	**Restoration Option 3**
Pfankuch-Channel Stability:	Fair	1	
Channel Alteration:	None	0	
Bank Erosion:	Historic	0.5	
BEHI:	Very High (43.75)	1.5	
Local NPSP:	No Evidence	0	
Shoring Structures:	None	0	
Pipe Discharge:	Not Present	0	**Additional Site Features**
Water Odor:	Normal	0	Stream Channel Woody Material: Moderate
Fish Passage Barrier:	Not Present	0	Impoundments: None
RB: Riparian Buffer (ft.):	100	0	Substrate Composition: Medium Sand
LB: Riparian Buffer (ft.):	100	0	Bank Material: Sand
RB: Floodplain Access:	Full	0	Near Bank Stress: Moderate
LB: Floodplain Access:	Full	0	RB Landuse: Historic Pasture + Natural Forest
	Severity Scale:	**3**	LB Landuse: Historic Pasture + Natural Forest
Notes: * Conservation Foundation of the Gulf Coast Inc.			

Ogleby Creek	Severity Scale: 2.5 (Low)
Watershed: Myakka River Subwatershed: Ogleby Creek Latitude: 27.370023 Longitude: -82.150323	County: Manatee Site Number: MR059 Reach Length: 165 ft. Landowner: *

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Fair	1
Channel Alteration:	None	0
Bank Erosion:	Historic	0.5
BEHI:	High (38.02)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**2.5**

Restoration Option 3

Additional Site Features

Stream Channel Woody Material: Infrequent

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: High

RB Landuse: Historic Pasture + Natural Forest

LB Landuse: Historic Pasture + Natural Forest

Notes: * Conservation Foundation of the Gulf Coast Inc.

Ogleby Creek	Severity Scale: 2.5 (Low)
Watershed: Myakka River Subwatershed: Ogleby Creek Latitude: 27.370247 Longitude: -82.150379	County: Manatee Site Number: MR060 Reach Length: 180 ft. Landowner: *

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Fair	1
Channel Alteration:	None	0
Bank Erosion:	Historic	0.5
BEHI:	High (38.38)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**2.5**

Restoration Option 3

Additional Site Features

Stream Channel Woody Material: Moderate

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: High

RB Landuse: Historic Pasture + Natural Forest

LB Landuse: Historic Pasture + Natural Forest

Notes: * Conservation Foundation of the Gulf Coast Inc.

Ogleby Creek	Severity Scale: 2.5 (Low)
Watershed: Myakka River Subwatershed: Ogleby Creek Latitude: 27.370335 Longitude: -82.150594	County: Manatee Site Number: MR061 Reach Length: 174 ft. Landowner: *

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Fair	1
Channel Alteration:	None	0
Bank Erosion:	Historic	0.5
BEHI:	High (37.44)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**2.5**

Restoration Option 3

Additional Site Features

Stream Channel Woody Material: Numerous

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Moderate

RB Landuse: Historic Pasture + Natural Forest

LB Landuse: Historic Pasture + Natural Forest

Notes: * Conservation Foundation of the Gulf Coast Inc.

Ogleby Creek	Severity Scale: 3.0 (Low)
Watershed: Myakka River	County: Manatee
Subwatershed: Ogleby Creek	Site Number: MR062
Latitude: 27.370510	Reach Length: 75 ft.
Longitude: -82.150533	Landowner: *

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Fair	1
Channel Alteration:	None	0
Bank Erosion:	Historic	0.5
BEHI:	Very High (45.33)	1.5
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**3**

Restoration Option 3

Additional Site Features

Stream Channel Woody Material: Numerous

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Low

RB Landuse: Historic Pasture + Natural Forest

LB Landuse: Historic Pasture + Natural Forest

Notes: * Conservation Foundation of the Gulf Coast Inc.

Ogleby Creek	Severity Scale: 3.0 (Low)
Watershed: Myakka River	County: Manatee
Subwatershed: Ogleby Creek	Site Number: MR063
Latitude: 27.370984	Reach Length: 322 ft.
Longitude: -82.150529	Landowner: *

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Fair	1
Channel Alteration:	None	0
Bank Erosion:	Historic	0.5
BEHI:	Very High (42.19)	1.5
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**3**

Restoration Option 3

Additional Site Features

Stream Channel Woody Material: Numerous

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

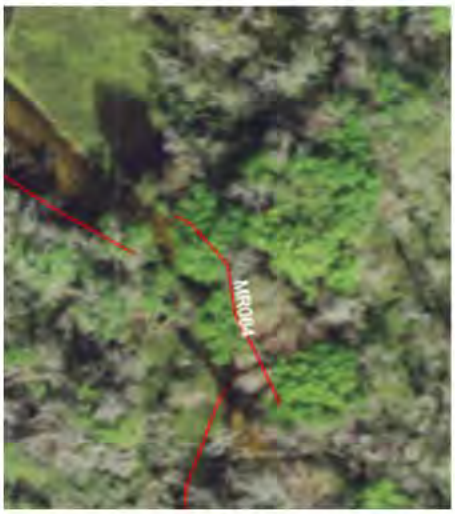
Near Bank Stress: Moderate

RB Landuse: Historic Pasture + Natural Forest

LB Landuse: Historic Pasture + Natural Forest

Notes: * Conservation Foundation of the Gulf Coast Inc.

Ogleby Creek	Severity Scale: 3.0 (Low)
Watershed: Myakka River Subwatershed: Ogleby Creek Latitude: 27.37171 Longitude: -82.150813	County: Manatee Site Number: MR064 Reach Length: 72 ft. Landowner: *



Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Fair	1
Channel Alteration:	None	0
Bank Erosion:	Historic	0.5
BEHI:	Very High (40.14)	1.5
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**3**

Restoration Option 3

Additional Site Features

Stream Channel Woody Material: Numerous

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Moderate

RB Landuse: Historic Pasture + Natural Forest

LB Landuse: Historic Pasture + Natural Forest

Notes: * Conservation Foundation of the Gulf Coast Inc.

Ogleby Creek	Severity Scale: 2.5 (Low)
Watershed: Myakka River Subwatershed: Ogleby Creek Latitude: 27.371843 Longitude: -82.150962	County: Manatee Site Number: MR065 Reach Length: 138 ft. Landowner: *

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Fair	1
Channel Alteration:	None	0
Bank Erosion:	Historic	0.5
BEHI:	High (39.69)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**2.5**

Restoration Option 3

Additional Site Features

Stream Channel Woody Material: Numerous

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Moderate

RB Landuse: Historic Pasture + Natural Forest

LB Landuse: Historic Pasture + Natural Forest

Notes: * Conservation Foundation of the Gulf Coast Inc.

Ogleby Creek	Severity Scale: 2.5 (Low)
Watershed: Myakka River Subwatershed: Ogleby Creek Latitude: 27.373359 Longitude: -82.151732	County: Manatee Site Number: MR066 Reach Length: 134 ft. Landowner: *

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Fair	1
Channel Alteration:	None	0
Bank Erosion:	Historic	0.5
BEHI:	High (39.31)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**2.5**

Restoration Option 3

Additional Site Features

Stream Channel Woody Material: None

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: High

RB Landuse: Historic Pasture + Natural Forest

LB Landuse: Historic Pasture + Natural Forest

Notes: * Conservation Foundation of the Gulf Coast Inc.

Ogleby Creek	Severity Scale: 2.5 (Low)
Watershed: Myakka River	County: Manatee
Subwatershed: Ogleby Creek	Site Number: MR067
Latitude: 27.37369	Reach Length: 82 ft.
Longitude: -82.152008	Landowner: *

Risk Factor	Ranking	Score
Pfankuch-Channel Stability:	Fair	1
Channel Alteration:	None	0
Bank Erosion:	Historic	0.5
BEHI:	High (33.96)	1
Local NPSP:	No Evidence	0
Shoring Structures:	None	0
Pipe Discharge:	Not Present	0
Water Odor:	Normal	0
Fish Passage Barrier:	Not Present	0
RB: Riparian Buffer (ft.):	100	0
LB: Riparian Buffer (ft.):	100	0
RB: Floodplain Access:	Full	0
LB: Floodplain Access:	Full	0
	Severity Scale:	**2.5**

Restoration Option 3

Additional Site Features

Stream Channel Woody Material: None

Impoundments: None

Substrate Composition: Medium Sand

Bank Material: Sand

Near Bank Stress: Moderate

RB Landuse: Historic Pasture + Natural Forest

LB Landuse: Historic Pasture + Natural Forest

Notes: * Conservation Foundation of the Gulf Coast Inc.

APPENDIX D. One-page summaries for each unpaved road-stream crossing site that was assessed on the Myakka River Watershed during 2019 to 2022.

Myakka River	Sediment Risk Index: 42 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Wingate Creek	Site Number: MU001
Latitude: 27.48591	LULC: Residential Low Density, Shrub and Brushland, Upland Hardwood
Longitude: -82.05736	
Road Name: Taylor Road	Land Owner(s): Mosaic Fertilizer LLC

Right Road Approach

Crossing Structure: Downstream

Risk Factor	Ranking	Score
US Channel Morph	Wetland	5
DS Channel Morph	G	1
DS Bank Alteration	High	1
Upstream Skew Angle	5° to 30°	3
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	Sediment/Scouring	3
Potential Eroded Vol.	>40 c.y.	1
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Materi	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Bare Soil	0
Downstream Lt Outlet	Bare Soil	0
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	2	1
Improved Ditches Tota	4	1
	SRI Total:	42

Additonal Site Features

Crossing Type and Quantity: Culvert, 2

Crossing Material: Reinforced Concrete

Culvert Outfall Drop: 0.35 in.

Fish Passage Barrier: Present

Notes: Channel was dry. Upstream crossing has hole between culverts, some damage to structure.

Myakka River	Sediment Risk Index: 52 (Low)
Watershed: Myakka River	County: Manatee
Subwatershed: Maple Creek	Site Number: MU002
Latitude: 27.42265	LULC: Bottomland, Residential Low Density, Shrub and Brushland
Longitude: -82.13895	
Road Name: Taylor Road	Land Owner(s): SWFWMD*

Right Road Approach

Crossing Structure: Downstream

Risk Factor	Ranking	Score
US Channel Morph	Wetland	5
DS Channel Morph	Wetland	5
DS Bank Alteration	High	1
Upstream Skew Angle	<5°	5
Crossing fill condition	Fair/Rip Rap	3
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	21 to 40 c.y.	3
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Rip Rap	1
Upstream Lt Outlet	Rip Rap	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Rip Rap	1
Downstream Lt Outlet	Rip Rap	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	52

Additonal Site Features

Crossing Type and Quantity: Bridge

Crossing Material: Reinforced Concrete

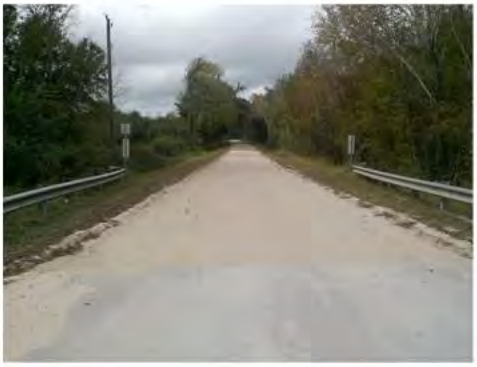
Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: *additional landowner: Marilyn A. Desenberg

Myakka River	Sediment Risk Index: 56 (Low)
Watershed: Myakka River	County: Mantee
Subwatershed: Maple Creek	Site Number: MU003
Latitude: 27.42300	LULC: Bottomland
Longitude: -82.14110	
Road Name: Taylor Road	Land Owner(s): SWFWMD*

Crossing Structure: Downstream



Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	Wetland	5
DS Channel Morph	Wetland	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	<5°	5
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	>40 c.y.	1
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	56

Additonal Site Features

Crossing Type and Quantity: Bridge

Crossing Material: Reinforced Concrete

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: *additional landowner: Marilyn A. Desenberg

Unnamed Tributary	Sediment Risk Index: 41 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Wingate Creek	Site Number: MU004
Latitude: 27.43272	LULC: Shrub and Brushland, Residential
Longitude: -82.14954	Low Density, Cropland and Pastureland
Road Name: Taylor Road	Land Owner(s): City of Bradenton*

Crossing Structure: Downstream

Right Road Approach from Crossing

Risk Factor	Ranking	Score
US Channel Morph	G	1
DS Channel Morph	F	1
DS Bank Alteration	High	1
Upstream Skew Angle	<5°	5
Crossing fill condition	Fair	3
Inlet/Outlet Condition	Scouring/Blocked	2
Potential Eroded Vol.	21 to 40 c.y.	3
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	41

Additonal Site Features

Crossing Type and Quantity: Culvert, 2

Crossing Material: Reinforced Concrete

Culvert Outfall Drop: 0.2 in.

Fish Passage Barrier: Present

Notes: additional landowner: Mom's Way LLC.

Taylor Creek	Sediment Risk Index: 46 (Low)
Watershed: Myakka River	County: Manatee
Subwatershed: Wingate Creek	Site Number: MU005
Latitude: 27.43629	LULC: Bottomland, Wetland Coniferous
Longitude: -82.15059	Forest, Shrub and Brushland**
Road Name: Taylor Road	Land Owner(s): City of Bradenton*

Upstream Channel

Crossing Structure: Downstream

Risk Factor	Ranking	Score
US Channel Morph	G	1
DS Channel Morph	Ponded	1
DS Bank Alteration	Minor/Partial	3
Upstream Skew Angle	<5°	5
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	Sediment/Scouring	3
Potential Eroded Vol.	21 to 40 c.y.	3
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Rip Rap	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	46

Additonal Site Features

Crossing Type and Quantity: Bridge

Crossing Material: Reinforced Concrete

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: wing walls present, *additional landowner: Jonathan Pages, **additional LULC: Upland Hardwood Coniferous Mix, Cropland and Pastureland

Unnamed Tributary	Sediment Risk Index: 52 (Low)
Watershed: Myakka River	County: Manatee
Subwatershed: Maple Creek	Site Number: MU006
Latitude: 27.36666	LULC: Shrub and Brushland, Bottomland,
Longitude: -82.13871	Freshwater Marshes
Road Name: Ballard Road	Land Owner(s): McClure Properties LTD*

Crossing Structure: Downstream

Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	G	1
DS Channel Morph	Wetland	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	<5°	5
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	>40 c.y.	1
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	52

Additonal Site Features

Crossing Type and Quantity: Culvert

Crossing Material: Reinforced Concrete

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: *additional landowner: Firouz Azima

Sand Branch	Sediment Risk Index: 46 (Low)
Watershed: Myakka River	County: Manatee
Subwatershed: Owen Creek	Site Number: MU007
Latitude: 27.33609	LULC: Cropland and Pastureland
Longitude: -82.08056	
Road Name: Curtis Road	Land Owner(s): P3 Real Estate Holdings LLC.*

Left Road Approach from Crossing

Crossing Structure: Downstream

Risk Factor	Ranking	Score
US Channel Morph	Wetland	5
DS Channel Morph	F	1
DS Bank Alteration	High	1
Upstream Skew Angle	<5°	5
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	Sediment/Scouring	3
Potential Eroded Vol.	>40 c.y.	1
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	46

Additonal Site Features

Crossing Type and Quantity: Culvert, 1

Crossing Material: Reinforced Concrete

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: *additional landowner: LPK LLC.

Ogelby Creek	Sediment Risk Index: 44 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Ogelby Creek	Site Number: MU008
Latitude: 27.39040	LULC: Upland Hardwood Coniferous Mix, Cropland and Pastureland
Longitude: -82.21910	
Road Name: Ogleby Creek Road	Land Owner(s): Matthew Thilbault Pallardy*

Crossing Structure: Upstream

Left Road Approach

Risk Factor	Ranking	Score
US Channel Morph	F	1
DS Channel Morph	C	5
DS Bank Alteration	High	1
Upstream Skew Angle	<5°	5
Crossing fill condition	Fair/RipRap	3
Inlet/Outlet Condition	Sediment/Scouring	3
Potential Eroded Vol.	21 to 40 c.y.	3
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Bare Soil	0
Downstream Lt Outlet	Bare Soil	0
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	2	1
Improved Ditches Total	4	1
	SRI Total:	44

Additonal Site Features

Crossing Type and Quantity: Bridge

Crossing Material: Wood

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: *additional landowners: John Falkner LLC., Kibler Agricultural Corp

Unnamed Tributary	Sediment Risk Index: 52 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Tatum Sawgrass Swamp	Site Number: MU009
Latitude: 27.33430	LULC: Bottomland, Pine Flatwoods
Longitude: -82.26552	
Road Name: Fruitville Road	Land Owner(s): Sarasota County

Crossing Structure: Upstream

Right Road Approach from Hilltop

Risk Factor	Ranking	Score
US Channel Morph	E	5
DS Channel Morph	E	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	5° to 30°	3
Crossing fill condition	Poor/Bare Soil	1
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	21 to 40 c.y.	3
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	52

Additonal Site Features

Crossing Type and Quantity: Culvert, 1

Crossing Material: Polyvinyl Chloride

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes:

Unnamed Tributary	Sediment Risk Index: 48 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Tatum Sawgrass Swamp	Site Number: MU010
Latitude: 27.32751	LULC: Bottomland, Pine Flatwoods
Longitude: -82.26142	
Road Name: Whidden Road	Land Owner(s): MAG Properties Inc.*

Crossing Structure: Downstream

Left Road Approach

Risk Factor	Ranking	Score
US Channel Morph	Ponded	1
DS Channel Morph	Ponded	1
DS Bank Alteration	Minor/Partial	3
Upstream Skew Angle	<5°	5
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	21 to 40 c.y.	3
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	48

Additonal Site Features

Crossing Type and Quantity: Culvert, 7

Crossing Material: Corrugated Metal

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: *additional landowners: Sarasota County, James M. Cain

Unnamed Tributary	Sediment Risk Index: 48 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Tatum Sawgrass Swamp	Site Number: MU011
Latitude: 27.32044	LULC: Bottomland, Pine Flatwoods, Cropland and Pastureland
Longitude: -82.26241	
Road Name: Jomar Road	Land Owner(s): VCH Citrus*

Crossing Structure: Downstream

Left Road Approach

Risk Factor	Ranking	Score
US Channel Morph	Ponded	1
DS Channel Morph	C	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	<5°	5
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	Sediment/Scouring	3
Potential Eroded Vol.	21 to 40 c.y.	3
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Bare Soil	0
Upstream Lt Ditch	Bare Soil	0
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Bare Soil	0
Downstream Lt Ditch	Bare Soil	0
Improved Outlet Total	4	1
Improved Ditches Total	0	1
	SRI Total:	48

Additonal Site Features

Crossing Type and Quantity: Bridge

Crossing Material: Reinforced Concrete

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: Fish passage blockage at low flow, *additional landowners: Sarasota County, Sandlot Boys LLC.

Bud Slough	Sediment Risk Index: 42 (Moderate)
Watershed: Myakka River	County: Manatee
Subwatershed: Mud Lake Slough	Site Number: MU012
Latitude: 27.261090	LULC: Freshwater Marshes, Cropland and Pastureland
Longitude: -82.158050	
Road Name: Coker Gully Road	Land Owner(s): Blackbeards Ranch LLC.

Crossing Structure: Upstream

Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	Ponded	1
DS Channel Morph	Ponded	1
DS Bank Alteration	High	1
Upstream Skew Angle	<5°	5
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	Sediment/Scouring	3
Potential Eroded Vol.	>40 c.y.	1
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	42

Additonal Site Features

Crossing Type and Quantity: Bridge

Crossing Material: Reinforced Concrete

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: Looks channelized downstream

Unnamed Tributary	Sediment Risk Index: 48 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: West Cocoplum Waterway	Site Number: MU013
Latitude: 27.124136	LULC: Cropland and Pastureland
Longitude: -82.153312	
Road Name: Toledo Blade Boulevard	Land Owner(s): Sarasota County

Crossing Structure: Downstream

Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	F	1
DS Channel Morph	Ponded	1
DS Bank Alteration	High	1
Upstream Skew Angle	<5°	5
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	48

Additonal Site Features

Crossing Type and Quantity: Culvert, 2

Crossing Material: Polyvinyl Chloride

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: Dry at time of survey

Deer Prarie Creek	Sediment Risk Index: 50 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Deer Prarie Creek	Site Number: MU014
Latitude: 27.06271	LULC: Bottomland, Pine Flatwoods, Other Open Land
Longitude: -82.286943	
Road Name: unnamed road	Land Owner(s): SWFWMD

Crossing Structure: Downstream

Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	C	5
DS Channel Morph	C	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	5° to 30°	3
Crossing fill condition	Fair/Rip Rap	3
Inlet/Outlet Condition	Sediment/Scouring	3
Potential Eroded Vol.	>40 c.y.	1
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	50

Additonal Site Features

Crossing Type and Quantity: Culvert, 1

Crossing Material: Corrugated Metal

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: may be tidal

Deer Prarie Creek	Sediment Risk Index: 52 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Deer Prarie Creek	Site Number: MU015
Latitude: 27.06427	LULC: Bays and Estuaries, Pine
Longitude: -82.28693	Flatwoods, Bottomland, Other Open
Road Name: unnamed road	Land Owner(s): SWFWMD

Crossing Strucutre: Downstream

Left Road Approach

Risk Factor	Ranking	Score
US Channel Morph	C	5
DS Channel Morph	C	5
DS Bank Alteration	Minor/Partial	3
Upstream Skew Angle	<5°	5
Crossing fill condition	Fair/Rip Rap	3
Inlet/Outlet Condition	Blocked	1
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	52

Additonal Site Features

Crossing Type and Quantity: Ford

Crossing Material: Reinforced Concrete

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: Dam present. Road mostly vegetated. Parking lot sediment may contribute to sedimentation.

Unnamed Tributary	Sediment Risk Index: 54 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Lake Myakka	Site Number: MU016
Latitude: 27.23511	LULC: Shrub and Brushland, Bottomland
Longitude: -82.29281	
Road Name: Myakka State Park Road	Land Owner(s):TIITF (Rec and Parks)

Crossing Structure: Downstream

Left Road Approach

Risk Factor	Ranking	Score
US Channel Morph	E	5
DS Channel Morph	E	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	>30°	1
Crossing fill condition	Fair/Riprap	3
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Rip Rap	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Rip Rap	1
Downstream Lt Outlet	Rip Rap	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	54

Additonal Site Features

Crossing Type and Quantity: Culvert, 5

Crossing Material: Corrugated Metal

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes:

Unnamed Tributary	Sediment Risk Index: 56-(Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Lake Myakka	Site Number: MU017
Latitude: 27.25939	LULC: Shrub and Brushland
Longitude: -82.27511	
Road Name: Myakka State Park Road	Land Owner(s): TIITF (Rec and Parks)

Crossing Structure: Upstream

Left Road Approach

Risk Factor	Ranking	Score
US Channel Morph	C	5
DS Channel Morph	C	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	5° to 30°	3
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Bare Soil	0
Downstream Lt Outlet	Bare Soil	0
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	2	1
Improved Ditches Total	4	1
	SRI Total:	56

Additonal Site Features

Crossing Type and Quantity: Culvert, 2

Crossing Material: Polyvinyl Chloride

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

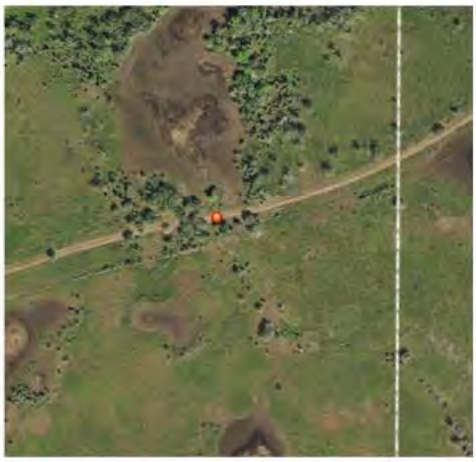
Notes:

Unnamed Tributary	Sediment Risk Index: 60 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Lake Myakka	Site Number: MU018
Latitude: 27.27053	LULC: Shrub and Brushland, Freshwater Marshes
Longitude: -82.25593	
Road Name: Myakka State Park Road	Land Owner(s): TIITF (Rec and Parks)

Crossing Structure: Downstream

Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	Wetland	5
DS Channel Morph	E	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	<5°	5
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	60



Additonal Site Features

Crossing Type and Quantity: Ford

Crossing Material: Native Soil, Rock

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes:

Unnamed Wetland	Sediment Risk Index: 56 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Lake Myakka	Site Number: MU019
Latitude: 27.24621	LULC: Freshwater Marshes, Bottomland
Longitude: -82.27788	
Road Name: Powerline Road	Land Owner(s): TIITF (Rec and Parks)

Crossing Structure: Downstream

Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	Wetland	5
DS Channel Morph	Wetland	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	<5°	5
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	>4.0%	1
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	56

Additonal Site Features

Crossing Type and Quantity: Ford

Crossing Material: Native Soil, Rock

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes:

Unnamed Tributary	Sediment Risk Index: 54 (Low)
Watershed: Myakka River	County: Manatee
Subwatershed: Mossy Island Slough	Site Number: MU020
Latitude: 27.27703	LULC: Bottomland, Shrub and Brushland
Longitude: -82.24248	
Road Name: unnamed trail	Land Owner(s): TIITF (Rec and Parks)

Crossing Structure: Downstream

Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	E	5
DS Channel Morph	Wetland	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	<5°	5
Crossing fill condition	Poor/Bare Soil	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	>4.0%	1
Road Approach Material	Aggregate/Native Soil	3
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	54

Additonal Site Features

Crossing Type and Quantity: Ford

Crossing Material: Native Soil

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes:

Unnamed Tributary	Sediment Risk Index: 50 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Lake Myakka	Site Number: MU021
Latitude: 27.24868	LULC: Freshwater Marshes, Bottomland
Longitude: -82.30792	
Road Name: unnamed trail	Land Owner(s): TIITF (Rec and Parks)

Crossing Structure: Downstream

Left Road Approach

Risk Factor	Ranking	Score
US Channel Morph	E	5
DS Channel Morph	E	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	5° to 30°	3
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	>4.0%	1
Road Approach Material	Aggregate/Sand/Clay	5
Upstream Rt Outlet	Concrete	0
Upstream Lt Outlet	Concrete	0
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Concrete	0
Downstream Lt Outlet	Concrete	0
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	0	1
Improved Ditches Total	4	1
	SRI Total:	50

Additonal Site Features

Crossing Type and Quantity: Culvert, 2

Crossing Material: Polyvinyl Chloride*

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: *culverts reinforced with concrete bags

Unnamed Tributary	Sediment Risk Index: 52 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Deer Prarie Creek	Site Number: MU022
Latitude: 27.06348	LULC: Pine Flatwoods, Bottomland
Longitude: -82.28178	
Road Name: unnamed trail	Land Owner(s): SWFWMD

Crossing Structure: Upstream

Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	E	5
DS Channel Morph	E	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	<5°	5
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y	5
Soil K Factor	<0.20	5
Approach Slope Mean	>4.0%	1
Road Approach Material	All Native Soil	1
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	52

Additonal Site Features

Crossing Type and Quantity: Ford

Crossing Material: Native Soil

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes:

Unnamed Tributary	Sediment Risk Index: 58 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: West Cocoplum Waterway	Site Number: MU023
Latitude: 27.13959	LULC: Cropland and Pastureland, Upland
Longitude: -82.14603	Hardwood Coniferous Mix
Road Name: Toledo Blade Boulevard	Land Owner(s): Sarasota County

Crossing Structure: Upstream

Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	E	5
DS Channel Morph	E	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	<5°	5
Crossing fill condition	Fair/Riprap	3
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Rip Rap	1
Upstream Lt Outlet	Rip Rap	1
Upstream Rt Ditch	Rip Rap	1
Upstream Lt Ditch	Rip Rap	1
Downstream Rt Outlet	Rip Rap	1
Downstream Lt Outlet	Rip Rap	1
Downstream Rt Ditch	Rip Rap	1
Downstream Lt Ditch	Rip Rap	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	58

Additonal Site Features

Crossing Type and Quantity: Culvert, 1

Crossing Material: Corrugated Metal

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes:

Unnamed Wetland	Sediment Risk Index: 52 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Harris Camp	Site Number: MU024
Latitude: 27.13526	LULC: Freshwater Marshes, Pine Flatwoods
Longitude: -82.34045	
Road Name: South Powerline Rd	Land Owner(s): Sarasota County

Crossing Structure: Downstream

Left Road Approach

Risk Factor	Ranking	Score
US Channel Morph	Wetland	5
DS Channel Morph	Wetland	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	>30°	1
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Native Soil	1
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	52

Additonal Site Features

Crossing Type and Quantity: Culvert, 1

Crossing Material: Polyvinyl Chloride

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: culvert connecting ditches @ 90 degree angle

Unnamed Wetland	Sediment Risk Index: 52 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Harris Camp	Site Number: MU025
Latitude: 27.13527	LULC: Freshwater Marshes
Longitude: -82.33971	
Road Name: South Powerline Rd	Land Owner(s): Sarasota County

Crossing Structure: Downstream

Left Road Approach

Risk Factor	Ranking	Score
US Channel Morph	Wetland	5
DS Channel Morph	Wetland	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	>30°	1
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Native Soil	1
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	52

Additonal Site Features

Crossing Type and Quantity: Culvert, 1

Crossing Material: Polyvinyl Chloride

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: culvert connecting ditches @ 90 degree angle

Unnamed Tributary	Sediment Risk Index: 56 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Harris Camp	Site Number: MU026
Latitude: 27.14992	LULC: Pine Flatwoods
Longitude: -82.33189	
Road Name: Well Field Road	Land Owner(s): Sarasota County

Crossing Structure: Downstream

Left Road Approach

Risk Factor	Ranking	Score
US Channel Morph	E	5
DS Channel Morph	E	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	>30°	1
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	56

Additonal Site Features

Crossing Type and Quantity: Culvert, 1

Crossing Material: Reinforced Concrete

Culvert Outfall Drop: 0.6 in.

Fish Passage Barrier: Present

Notes: dry at time of survey

Unnamed Tributary	Sediment Risk Index: 54 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Harris Camp	Site Number: MU027
Latitude: 27.12784	LULC: Shrub and Brushland, Bottomland
Longitude: -82.34646	
Road Name: unnamed trail	Land Owner(s): Sarasota County

Crossing Structure: Downstream

Left Road Approach

Risk Factor	Ranking	Score
US Channel Morph	E	5
DS Channel Morph	E	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	5° to 30°	3
Crossing fill condition	Fair/Riprap	3
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Rip Rap	1
Upstream Lt Outlet	Bare Soil	0
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Rip Rap	1
Downstream Lt Outlet	Rip Rap	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	3	0
Improved Ditches Total	4	1
	SRI Total:	54

Additonal Site Features

Crossing Type and Quantity: Culvert, 1

Crossing Material: Polyvinyl Chloride

Culvert Outfall Drop: 0.8 in.

Fish Passage Barrier: Present

Notes: Riprap falling away

Unnamed Tributary	Sediment Risk Index: 52 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Harris Camp	Site Number: MU028
Latitude: 27.15319	LULC: Pine Flatwoods
Longitude: -82.35194	
Road Name: Rocky Ford Trail	Land Owner(s): Sarasota County

Crossing Structure: Upstream

Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	E	5
DS Channel Morph	E	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	<5°	5
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Native Soil	1
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Bare Soil	0
Upstream Lt Ditch	Bare Soil	0
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Bare Soil	0
Downstream Lt Ditch	Bare Soil	0
Improved Outlet Total	4	1
Improved Ditches Total	0	1
	SRI Total:	52

Additonal Site Features

Crossing Type and Quantity: Ford

Crossing Material: Native Soil

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes:

Unnamed Tributary	Sediment Risk Index: 52 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Harris Camp	Site Number: MU029
Latitude: 27.15411	LULC: Pine Flatwoods
Longitude: -82.35980	
Road Name: unnamed trail	Land Owner(s): Sarasota County

Crossing Structure: Upstream

Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	E	5
DS Channel Morph	E	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	>30°	1
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Native Soil	1
Upstream Rt Outlet	Rip Rap	1
Upstream Lt Outlet	Rip Rap	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Rip Rap	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	52

Additonal Site Features

Crossing Type and Quantity: Culvert, 1

Crossing Material: Corrugated Metal

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes:

Unnamed Tributary	Sediment Risk Index: 52 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Harris Camp	Site Number: MU030
Latitude: 27.15253	LULC: Bottomland, Shrub and Brushland,
Longitude: -82.35580	Pine Flatwoods
Road Name: unnamed trail	Land Owner(s): Sarasota County

Crossing Structure: Downstream

Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	E	5
DS Channel Morph	E	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	5° to 30°	3
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Native Soil	1
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Other (Gravel)	0
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	3	0
Improved Ditches Total	4	1
	SRI Total:	52

Additonal Site Features

Crossing Type and Quantity: Culvert, 1

Crossing Material: Polyvinyl Chloride

Culvert Outfall Drop: 0.35 in.

Fish Passage Barrier: Present

Notes:

Unnamed Wetland	Sediment Risk Index: 58 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Harris Camp	Site Number: MU031
Latitude: 27.14332	LULC: Bottomland, Freshwater Marshes, Pine Flatwoods
Longitude: -82.33450	
Road Name: North Mabry Carlton Parkway	Land Owner(s): Sarasota County

Crossing Structure: Downstream

Left Road Approach

Risk Factor	Ranking	Score
US Channel Morph	Wetland	5
DS Channel Morph	Wetland	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	5° to 30°	3
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	58

Additonal Site Features

Crossing Type and Quantity: Culvert, 4

Crossing Material: Reinforced Concrete

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes:

Unnamed Tributary	Sediment Risk Index: 56 (Low)
Watershed: Myakka River	County: Sarasota
Subwatershed: Harris Camp	Site Number: MU032
Latitude: 27.13814	LULC: Bottomland, Shrub and Brushland,
Longitude: -82.32391	Pine Flatwoods
Road Name: North Mabry Carlton Parkway	Land Owner(s): Sarasota County

Crossing Structure: Upstream

Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	E	5
DS Channel Morph	Wetland	5
DS Bank Alteration	Natural	5
Upstream Skew Angle	<5°	5
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	Native Soil/Sand/Clay	1
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	56

Additonal Site Features

Crossing Type and Quantity: Ford

Crossing Material: Synthetic Matting/Gravel

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes:

Unnamed Tributary	Sediment Risk Index: 50 (Low)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MU033
Latitude: 27.30219	LULC: Streams and Waterways, Cropland and Pastureland, Bottomland
Longitude: -82.24369	
Road Name: unnamed road	Land Owner(s): Triangle Ranch LLC

Crossing Structure: Upstream

Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	C	5
DS Channel Morph	C	5
DS Bank Alteration	Minor/Partial	3
Upstream Skew Angle	<5°	5
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	No Impairment	5
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	>4.0%	1
Road Approach Material	Native Soil/Sand/Clay	1
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Vegetated	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	50

Additonal Site Features

Crossing Type and Quantity: Ford

Crossing Material: Native Soil/Sand

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes:

Unnamed Tributary	Sediment Risk Index: 56 (Low)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MU034
Latitude: 27.29397	LULC: Streams and Waterways, Cropland
Longitude: -82.23476	and Pastureland, Wet Prairies,**
Road Name: unnamed road	Land Owner(s): Triangle Ranch LLC

Crossing Structure: Upstream

Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	C	5
DS Channel Morph	C	5
DS Bank Alteration	Minor/Partial	3
Upstream Skew Angle	<5°	5
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	Sediment Scouring	3
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	<2.0%	5
Road Approach Material	All Aggregate	5
Upstream Rt Outlet	Riprap	1
Upstream Lt Outlet	Riprap	1
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	4	1
Improved Ditches Total	4	1
	SRI Total:	56

Additonal Site Features

Crossing Type and Quantity: Bridge

Crossing Material: Iron/Steel, Wood

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: **Upland Hardwood-Coniferous Mix

Unnamed Tributary	Sediment Risk Index: 48 (Low)
Watershed: Myakka River	County: Manatee
Subwatershed: Tatum Sawgrass Swamp	Site Number: MU035
Latitude: 27.29393	LULC: Streams and Waterways, Cropland and Pastureland, Wet Prairies, **
Longitude: -82.23451	
Road Name: unnamed road	Land Owner(s): Triangle Ranch LLC

Crossing Structure: Downstream

Right Road Approach

Risk Factor	Ranking	Score
US Channel Morph	C	5
DS Channel Morph	C	5
DS Bank Alteration	Minor/Partial	3
Upstream Skew Angle	<5°	5
Crossing fill condition	Good/Vegetated	5
Inlet/Outlet Condition	Sediment Scouring	3
Potential Eroded Vol.	<21 c.y.	5
Soil K Factor	<0.20	5
Approach Slope Mean	>4.0%	1
Road Approach Material	Aggregate/Native Soil	3
Upstream Rt Outlet	Vegetated	1
Upstream Lt Outlet	Bare Soil	0
Upstream Rt Ditch	Vegetated	1
Upstream Lt Ditch	Vegetated	1
Downstream Rt Outlet	Vegetated	1
Downstream Lt Outlet	Vegetated	1
Downstream Rt Ditch	Vegetated	1
Downstream Lt Ditch	Vegetated	1
Improved Outlet Total	3	0
Improved Ditches Total	4	1
	SRI Total:	48

Additonal Site Features

Crossing Type and Quantity: Ford

Crossing Material: Rock

Culvert Outfall Drop: 0 in.

Fish Passage Barrier: Not Present

Notes: **Freshwater Marshes