

Appendix H. Essential Fish Habitat Report

ESSENTIAL FISH HABITAT REPORT

U.S. 90 Pearl River Bridges St. Tammany Parish, LA and Hancock County, MS

State Project Numbers: H.000284 & NO. H.000286

Federal Aid Project Numbers: H000284 & NO. H000286

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ACRONYMS AND ABBREVIATIONS

EA	Environmental Assessment
EFH	Essential Fish Habitat
FHWA	Federal Highway Administration
FMC	Fishery Management Council
GIS	Geographic Information System
GMFMC	Gulf of Mexico Fishery Management Council
GPS	Global Positioning System
GSMFC	Gulf States Marine Fisheries Commission
LADOTD	Louisiana Department of Transportation and Development
LDWF	Louisiana Department of Wildlife and Fisheries
LNHP	Louisiana Natural Heritage Program
MDOT	Mississippi Department of Transportation
MDEQ	Mississippi Department of Environmental Quality
MSA	Magnuson-Stevens Fisheries Conservation and Management Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OHWM	Ordinary High Water Mark
PPT	Parts Per Thousand
ROW	Right-Of-Way
USFWS	U.S. Fish and Wildlife Service
WMA	Wildlife Management Area

1.0 INTRODUCTION

The Louisiana Department of Transportation and Development (LADOTD) and the Mississippi Department of Transportation (MDOT) in cooperation with the Federal Highway Administration (FHWA) are proposing to replace or rehabilitate five bridge structures associated with the Pearl River system along US 90 (Figures 1 -4) in St. Tammany Parish, Louisiana and Hancock County, Mississippi as follows:

- Structure no. 62520060705291, West Pearl River Bridge, Movable Lift Span
- Structure no. 62520060706701, West Middle Pearl River Bridge
- Structure no. 62520060707111, Middle Middle Pearl River Bridge
- Structure no. 62520060707701, East Middle Pearl River Bridge
- Structure no. 62520060800001, East Pearl River Bridge, Movable Swing Span

Conceptual engineering and an Environmental Assessment (EA) are being prepared to evaluate potential rehabilitation/replacement concepts and to determine the environmental impacts associated with the proposed projects. The logical termini for the projects study area are the US 90 intersection with US 190 in St. Tammany Parish, Louisiana and the US 90 intersection with Kelly Road/7th Avenue in Pearlinton, Hancock County, Mississippi. These logical termini were identified by LADOTD and the MDOT and approved by FHWA. Most of the study area is comprised of maintained right-of-way (ROW) and rural residential development (within the Pearlinton community).



Figure 1. Proposed Project Location

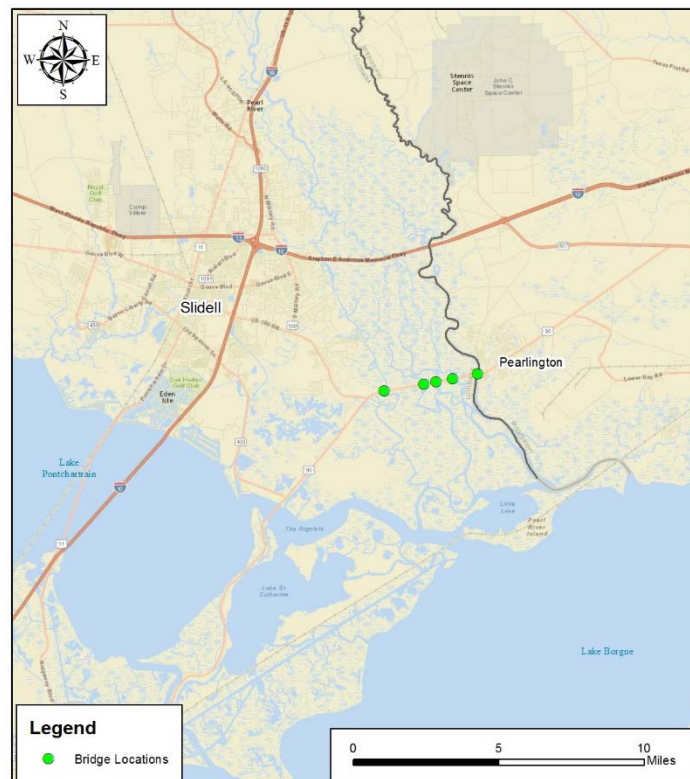
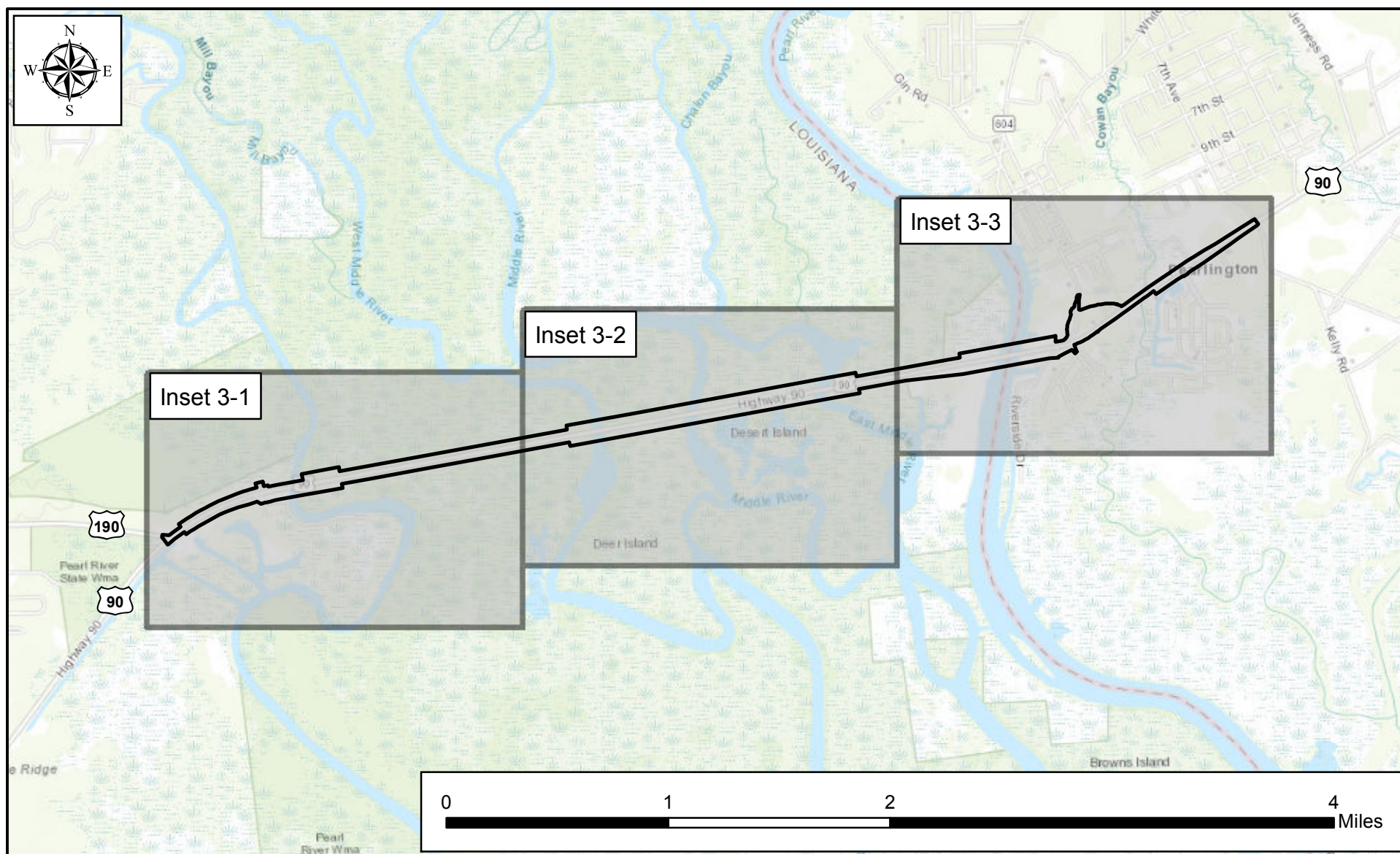
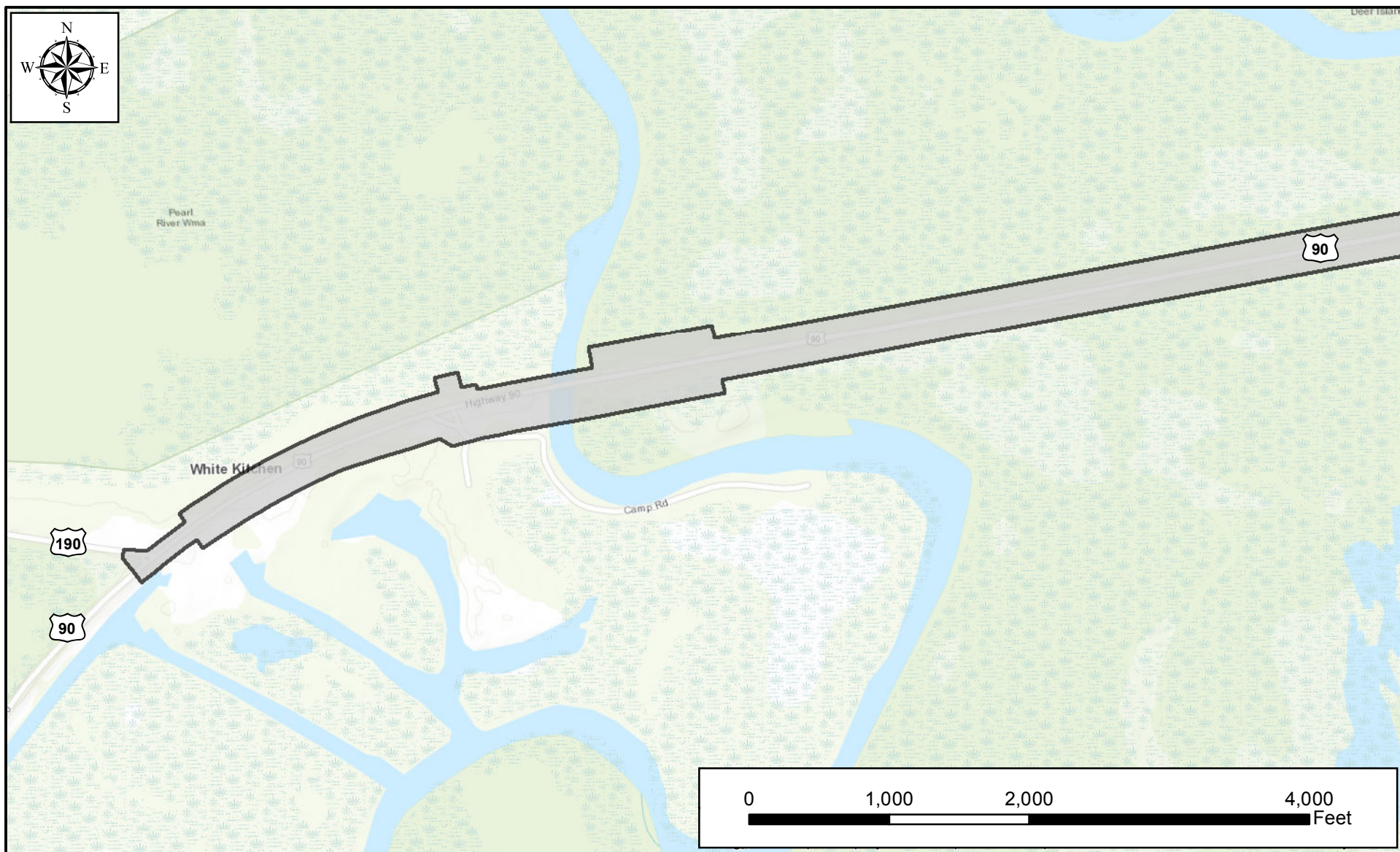


Figure 2. Bridge Locations Along US 90

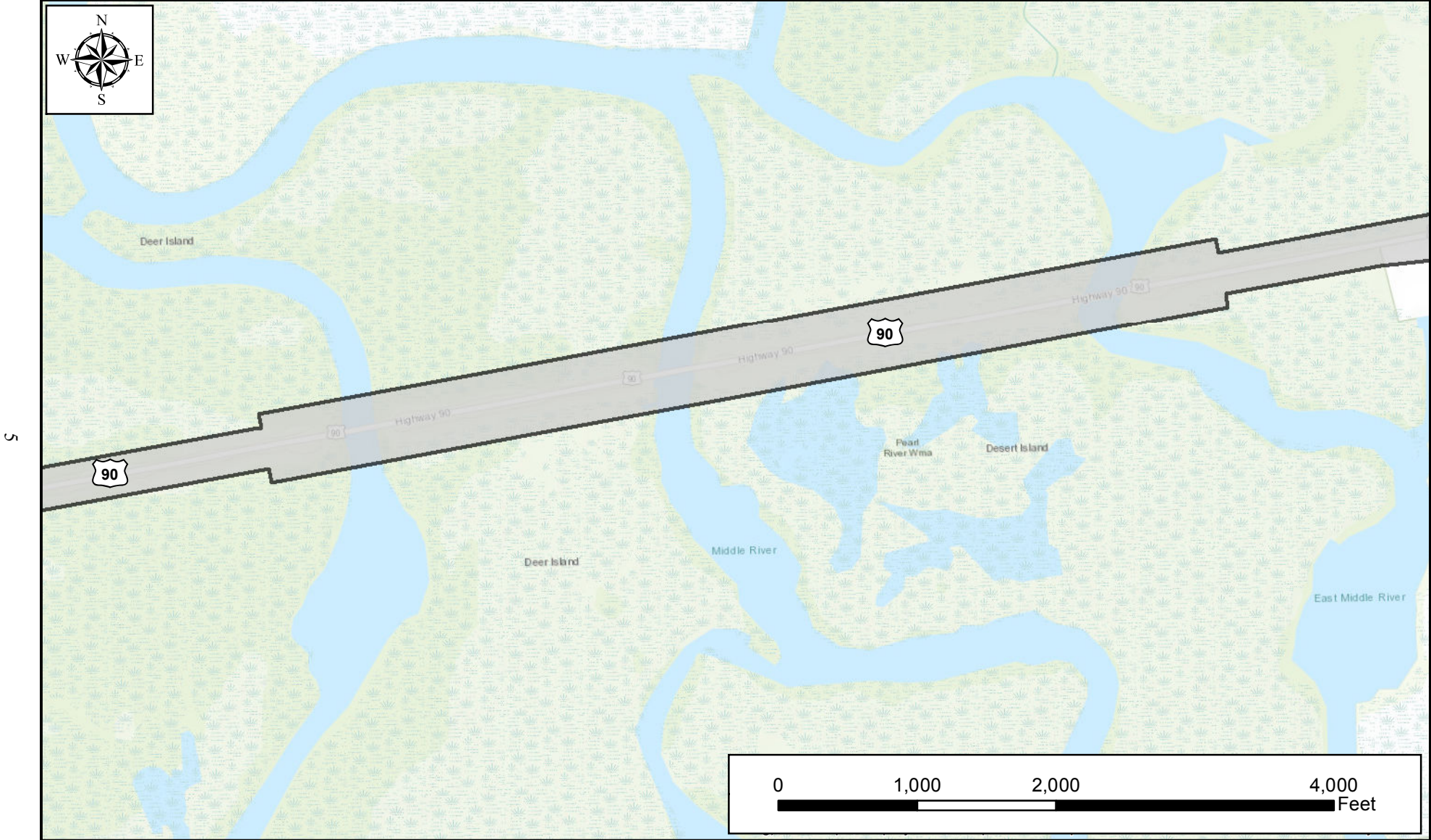
Figure 3. Topographic Map Index of the Study Area



Inset 3-1. Topographic Map of the Study Area near the West Pearl River



Inset 3-2. Topographic Map of the Study Area near the Three Middle Pearl Rivers



Inset 3-3. Topographic Map of the Study Area near the East Pearl River

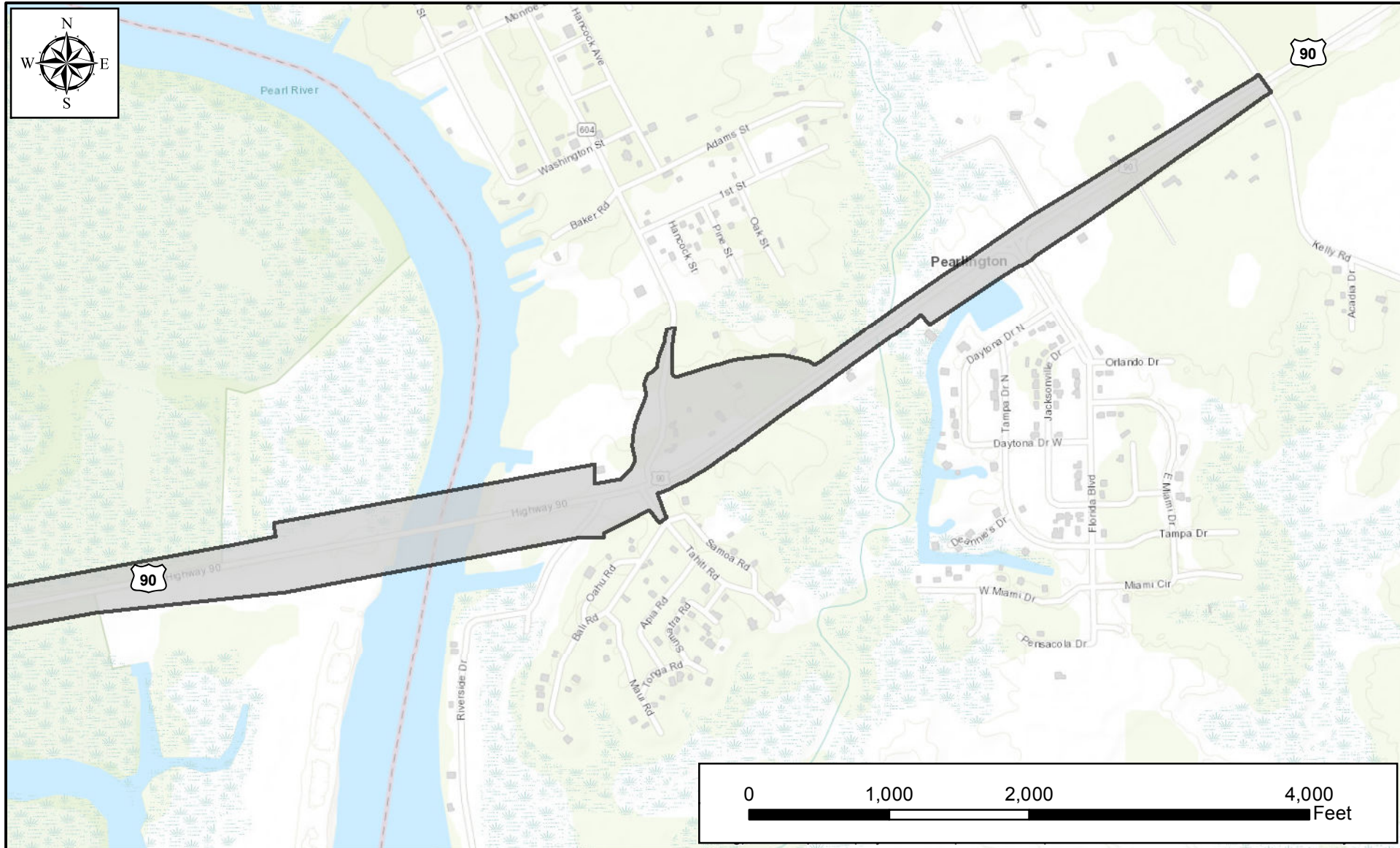


Figure 4. Aerial Photograph Index of the Study Area

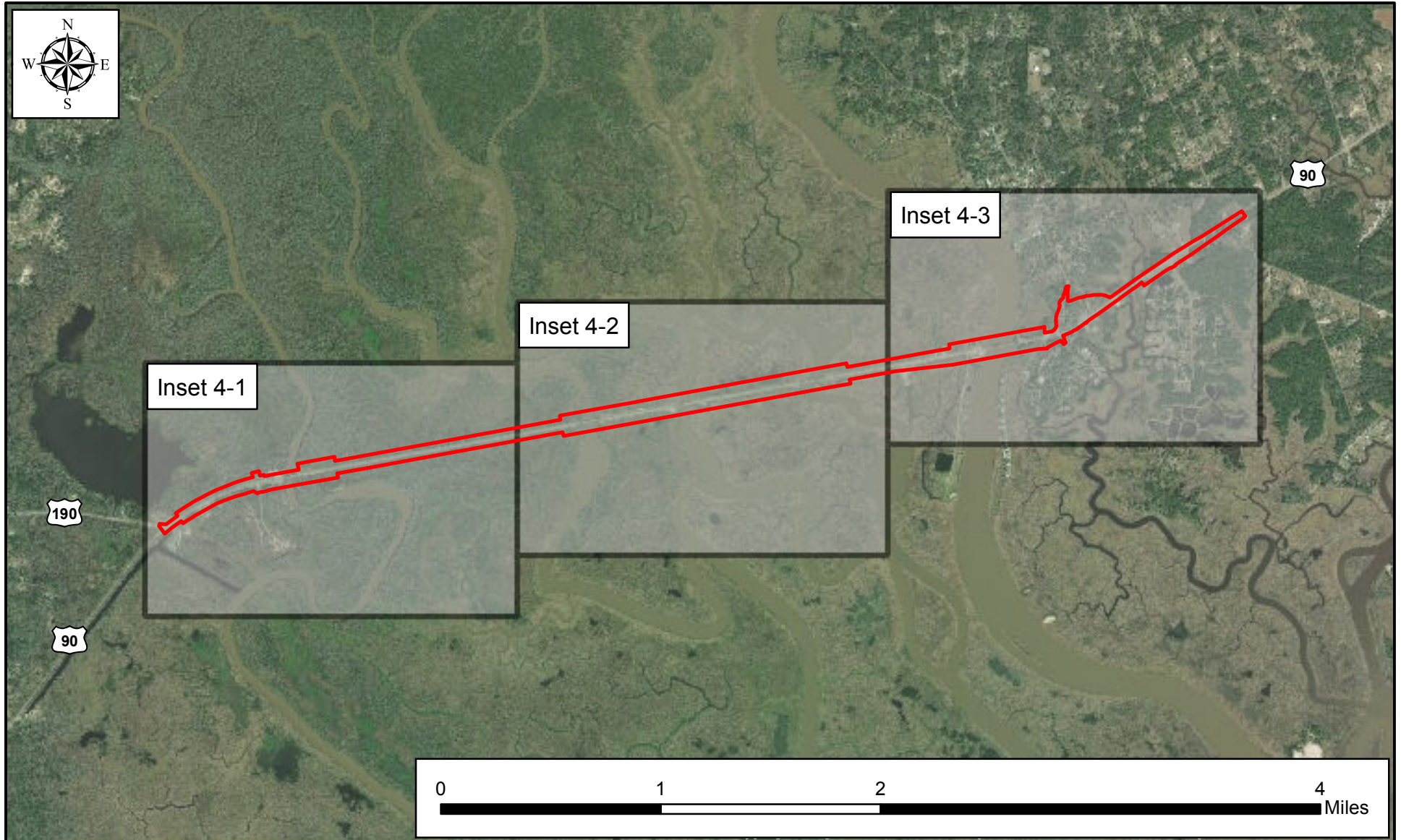


Figure 4-1. Aerial Photograph of the Study Area near the West Pearl River

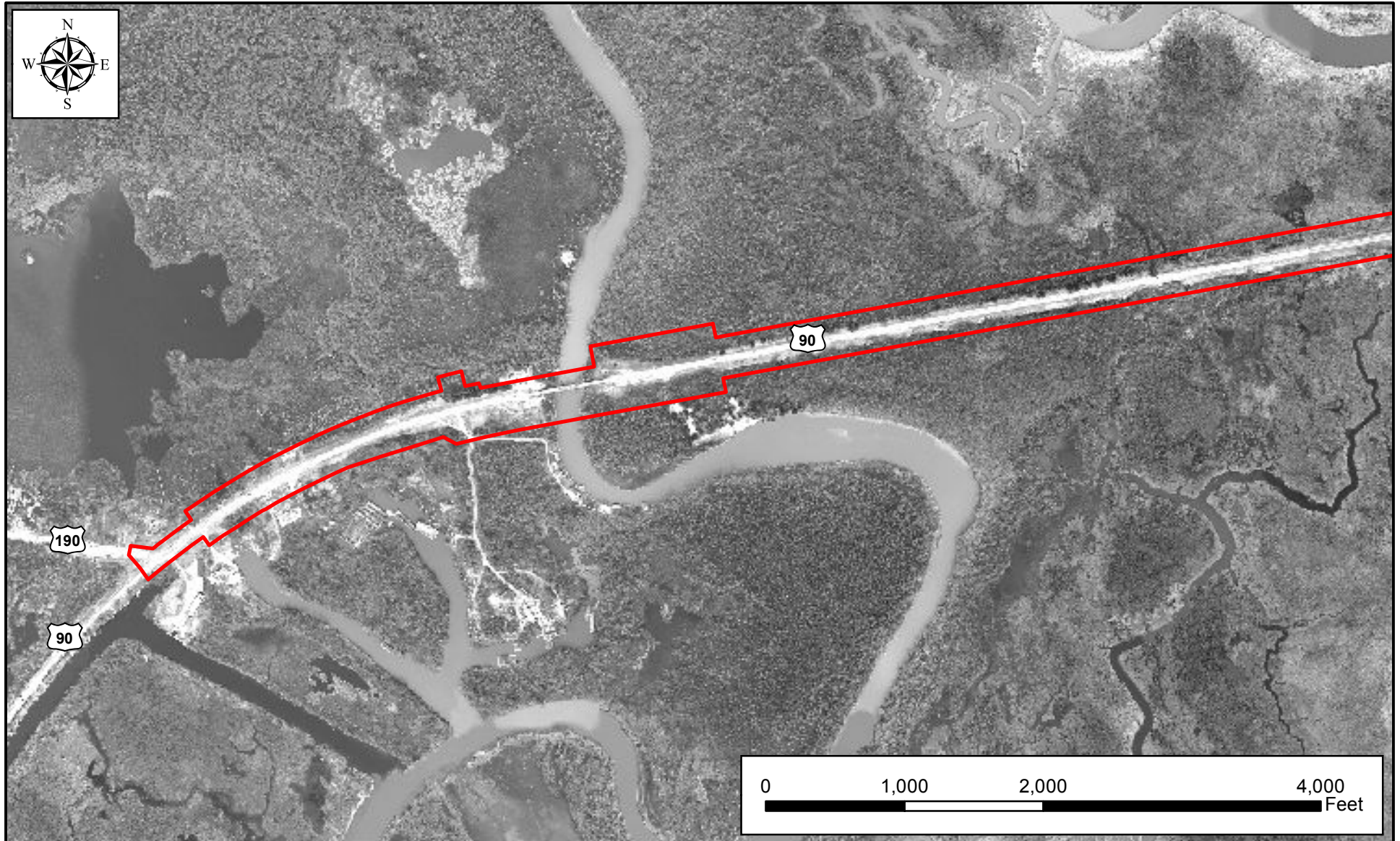


Figure 4-2. Aerial Photograph of the Study Area near the Three Middle Pearl Rivers

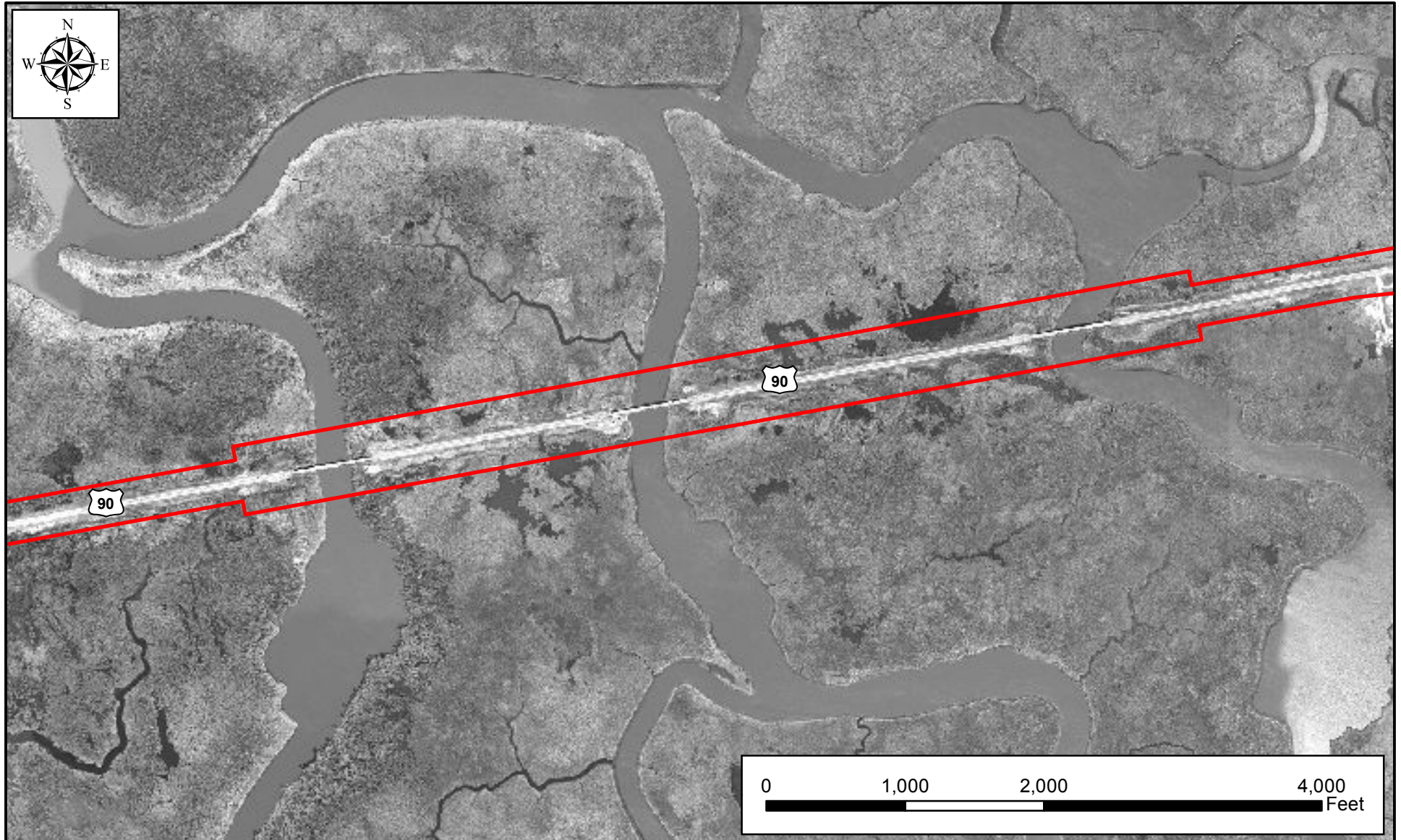
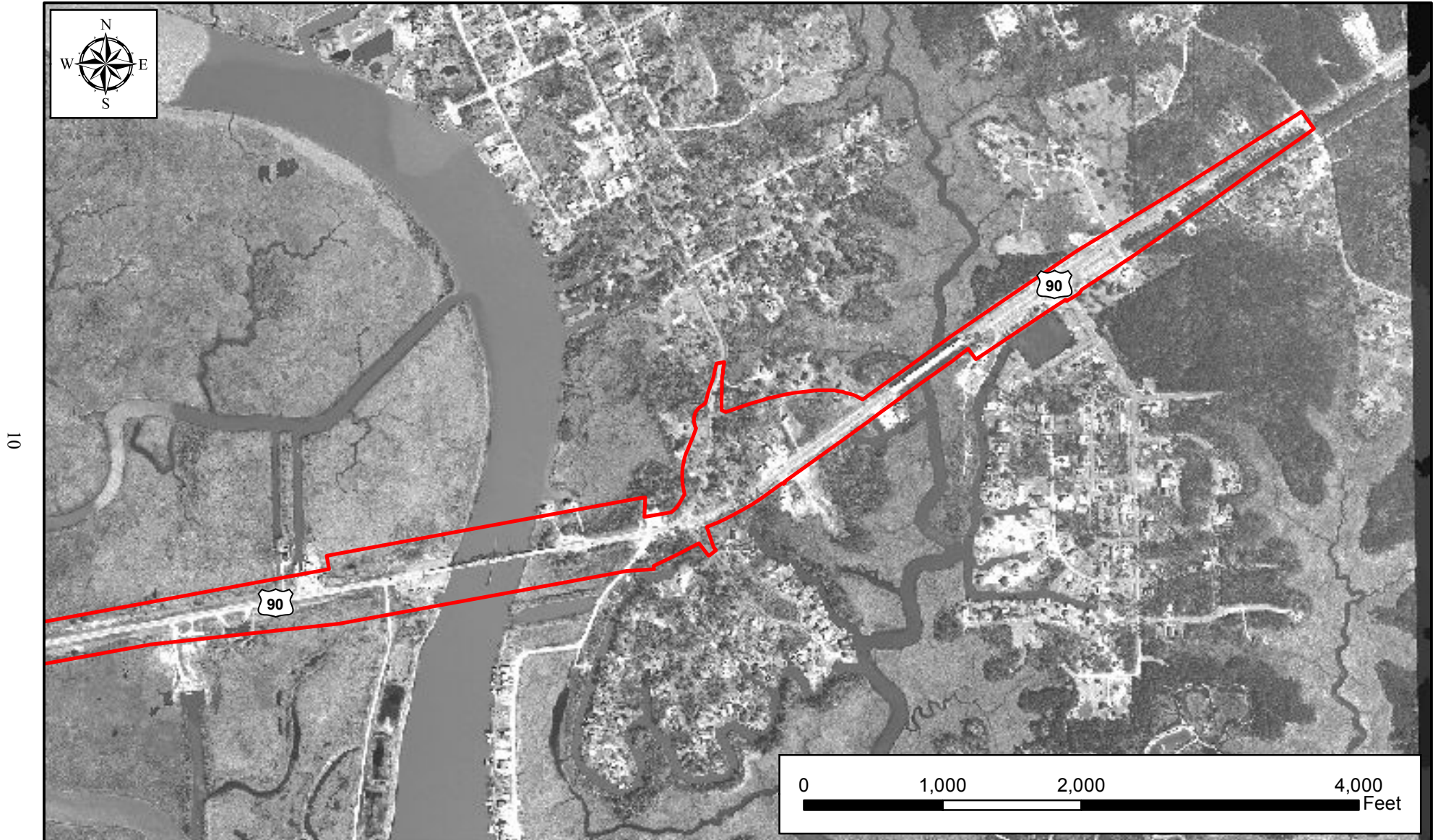


Figure 4-3. Aerial Photograph of the Study Area near the East Pearl River



2.0 BACKGROUND AND AGENCY COORDINATION

The Magnuson-Stevens Fisheries Conservation and Management Act of 1976 (MSA) (16 U.S.C. 1801 et seq.) was passed to promote sustainable fish conservation and management. Under the MSA, the National Marine Fisheries Service (NMFS) was granted legislative authority for fisheries regulation in the U.S. within a jurisdictional area located between 3 miles and 200 miles offshore, in the Exclusive Economic Zone depending on geographic location. NMFS was also granted legislative authority to establish eight regional Fishery Management Councils (FMCs) responsible for the proper management and harvest of fish and shellfish resources within these waters. Measures to ensure the proper management and harvest of fish and shellfish resources within these waters are outlined in Fisheries Management Plans prepared by the eight councils for their respective geographic regions. The Pearl River system is within the management jurisdiction of the Gulf of Mexico Fishery Management Council (GMFMC).

NMFS recognized that many marine fisheries are dependent on nearshore and estuarine environments for at least part of their life cycles. The MSA was reauthorized and changed extensively via amendments in 1996 (P.L. 104-297), stressing the importance of habitat protection to healthy fisheries. The authority of NMFS and its councils was strengthened by the reauthorization to promote more effective habitat management and protection of marine fisheries. Specific marine environments important to marine fisheries are referred to as Essential Fish Habitat (EFH) in the MSA and are defined as those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity (16 U.S. Code [U.S.C.] § 1802 (10)). The EFH regulations (at 50 C.F.R. § 600 Subpart J) provide additional interpretation of the definition of EFH waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fishes and may include areas historically used by fishes. Substrate includes sediment, hardbottom, structures underlying the waters, and any associated biological communities. “Necessary” means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem. Spawning, breeding, feeding, or growth to maturity covers all habitat types used by a species throughout its life cycle.

In addition to the regional FMCs, the Gulf States Marine Fisheries Commission (GSMFC) and NMFS also have management responsibilities for certain fisheries. The GSMFC is an organization of five states from the Gulf Coast of Florida to Texas that manages fishery resources in state waters of the Gulf of Mexico. The GSMFC provides coordination and administration for several cooperative state/federal marine fishery resources. NMFS has jurisdiction over highly migratory species in federal waters of the Gulf of Mexico. Typically, the GSMFC and NMFS work closely with regional councils in preparing and implementing fishery management strategies.

The GMFMC manages seven fishery resources in federal waters off the coasts of Texas, Louisiana, Mississippi, Alabama, and the west coast of Florida to Key West. These include 7 species of coastal migratory pelagics, over 300 species of coral and coral reefs, red drum, 43 species of reef fish, four species of shrimp, spiny lobster, and stone crab.

A letter was sent by LADOTD to the NMFS dated January 27, 2016 initiating EFH consultation. In a response dated April 4, 2016, NMFS indicated that “only Spanish mackerel should be considered to have EFH potentially impacted by bridge replacement activities. All other pelagic fishery resources identified in your letter should not be included in the EA. Additionally, only gray snapper and lane snapper should be identified as reef fish potentially impacted by project implementation. The NMFS concurs with the inclusion of red drum, white shrimp and brown shrimp as federally managed species having EFH in the project area.”

3.0 SPECIES ACCOUNTS

The following sections provide species accounts of those species identified by NMFS in their response letter. Three key sources (GMFMC 1998, 2004, 2005) were used to describe the life history and preferred habitat of managed species with EFH designated within the study area.

3.1 Spanish Mackerel

Spanish mackerel (*Scomberomorus maculatus*) occur in the Gulf of Mexico, with their center of distribution off the Florida coast. Adults are found within inshore coastal waters and may enter estuaries in pursuit of baitfish. Migrations to the northern Gulf in the spring are believed to be temperature dependent, and the species is found in waters with temperatures greater than 20°C (68°F) and out to depths of 75 meters (246') at oceanic salinities. Adults feed mostly on fishes, and less often on crustaceans and mollusks, with a diet that includes clupeids, engraulids, carangids, and squid. Adults spawn over the inner continental shelf from May to September, with the north-central and northeastern Gulf of Mexico considered important spawning areas. The pelagic eggs are found over the inner continental shelf at depths less than 50 meters (164') in spring and summer. Larvae occur over the inner continental shelf, principally in the northern Gulf, where they consume larval fishes such as carangids, clupeids, and engraulids. Juveniles occur in estuarine and coastal waters, where they feed on engraulid and clupeid fishes, gastropods, and some squid.

All life history stages of Spanish mackerel typically inhabit waters where salinity fluctuates between 32 – 36 parts per thousand (ppt) (Godcharles and Murphy 1986). Spanish mackerel tend to avoid both freshwater and low salinity waters near river mouths, though it has been documented that some juveniles inhabit waters where salinity has dropped below 18 ppt (Springer and Woodburn 1960).

Assumptions for EFH determination:

- Feeding habitat for adults and juveniles includes the Middle Middle Pearl, East Middle Pearl, East Pearl, and Cowan Bayou.
- Feeding habitat for adults and juveniles also includes estuaries immediately adjacent to those rivers.

- Estuaries within the remainder of the study area have been included as feeding habitat if they have a direct connection to those rivers, are easily accessible by an adult or juvenile Spanish mackerel and have significant water depth for adult or juvenile mackerel to travel freely. Areas with a scrub shrub designation and areas with only a few inches of standing water were eliminated.
- The West Pearl River and West Middle Pearl River and their associated wetlands within the study area were eliminated as EFH for Spanish mackerel because they are riverine systems surrounded by palustrine wetlands.

3.2 Gray Snapper

Gray snapper (*Lutjanus griseus*) occurs in estuaries and shelf waters of the Gulf and are particularly abundant off south and southwest Florida. Considered to be one of the more abundant snappers inshore, the gray snapper inhabits waters to depths of about 180 meters (590'). Adults are demersal and mid-water dwellers, occurring in marine, estuarine, and riverine habitats. They occur up to 32 kilometers (20 miles) offshore and inshore as far as Coastal Plain freshwater creeks and rivers. They are found among mangroves, sandy grassbeds, and coral reefs and over sandy, muddy, and rocky bottoms. Spawning occurs offshore around reefs and shoals from June to August. Eggs are pelagic and are present from June through September after the summer spawn, occurring in offshore shelf waters and near coral reefs. Larvae are planktonic, occurring in peak abundance from June through August in offshore shelf waters and near coral reefs from Florida through Texas. Post-larvae move into estuarine habitat and are found especially over dense grass beds of *Halodule* and *Syringodium*. Juveniles are marine, estuarine, and riverine dwellers, often found in estuaries, channels, bayous, ponds, grassbeds, marshes, mangrove swamps, and freshwater creeks. They appear to prefer *Thalassia* grass flats, marl bottoms, seagrass meadows, and mangrove roots. Juveniles utilize the estuarine bays as nursery grounds from May through September.

Assumptions for EFH determination:

- Feeding habitat for adults and juveniles includes the West Pearl, West Middle Pearl, Middle Middle Pearl, East Middle Pearl, East Pearl, and Cowan Bayou.

- Feeding habitat for adults and juveniles also includes palustrine emergent wetlands and estuaries immediately adjacent to those rivers.
- Estuaries within the remainder of the study area have been included as feeding habitat if they have a direct connection to those rivers, are easily accessible by an adult or juvenile gray snapper and have significant water depth for adult or juvenile gray snapper to travel freely. Areas with a scrub shrub designation and areas with only a few inches of standing water were eliminated.

3.3 Lane Snapper

Lane snapper (*Lutjanus synagris*) occur throughout the shelf area of the Gulf in depths ranging from 0 to 130 meters (0' to 427'). The species is demersal, occurring over all bottom types, but is most common in coral reef areas and sandy bottoms. Spawning occurs in offshore waters from March through September. Nursery areas include mangrove and grassy estuarine areas in southern Texas and Florida and shallow areas with sandy and muddy bottoms off all the Gulf States. Early and late juveniles appear to favor grass flats, reefs, and soft bottom areas to offshore depths of 20 meters (66') (NOAA 1985). Adults occur offshore at depths of 4 to 132 meters (13' to 433') on sand bottom, natural channels, banks, and man-made reefs and structures.

Assumptions for EFH determination:

- Feeding habitat for juveniles includes the Middle Middle Pearl, East Middle Pearl, East Pearl, and Cowan Bayou.
- Feeding habitat for juveniles also includes estuaries immediately adjacent to those rivers.
- Nursery habitat includes estuaries immediately adjacent to those rivers.
- Estuaries within the remainder of the study area have been included as feeding and nursery habitat if they have a direct connection to those rivers, are easily accessible by a juvenile Lane snapper, and have significant water depth for juvenile or larval Lane snapper to travel freely. Areas with a scrub shrub designation and areas with only a few inches of standing water were eliminated.
- The West Pearl River and West Middle Pearl River and their associated wetlands within the study area were eliminated as EFH for Lane snapper because they are riverine systems surrounded by palustrine wetlands.

3.4 Red Drum

The red drum (*Sciaenops ocellatus*) occurs throughout the Gulf of Mexico in a variety of habitats, ranging from depths of about 40 meters (130') offshore to very shallow estuarine waters. Red drum commonly occurs in most Gulf estuaries where they are found over a variety of substrates, including seagrass, sand, mud, and oyster reefs. Spawning occurs in deeper water near the mouths of bays and inlets, and on the Gulf side of the barrier islands (Pearson 1929; Simmons and Breuer 1962; Perret et al. 1980) from about September through November. Red drum is known to spawn in depths ranging from a minimum of 40 meters to a maximum of 70 meters (130' to 230') (NMFS 2004). The eggs hatch mainly in the Gulf, and larvae are transported into the estuary where the fish mature before moving back to the Gulf (Perret et al. 1980; Pattillo et al. 1997). Red drum is known to utilize Lake Pontchartrain and Mobile Bay as nursery areas. Estuarine wetlands are especially important to larval, juvenile, and subadult red drum. An abundance of juvenile red drum has been reported around the perimeter of marshes in estuaries (Perret et al. 1980). Young fish were found in quiet, shallow, protected waters with grassy or slightly muddy bottoms (Simmons and Breuer 1962). Adult red drum use estuaries but tend to spend more time offshore as they age.

Assumptions for EFH determination:

- Feeding habitat for adults, juveniles, and sub-adults includes the Middle Middle Pearl, East Middle Pearl, East Pearl, and Cowan Bayou.
- Feeding habitat for adults, juveniles, and sub-adults also includes estuaries immediately adjacent to those rivers.
- Nursery habitat includes estuaries immediately adjacent to those rivers.
- Estuaries within the remainder of the study area have been included as feeding and nursery habitat if they have a direct connection to those rivers, are easily accessible by an adult red drum, and have significant water depth for juvenile or larval red drum to travel freely. Areas with a scrub shrub designation and areas with only a few inches of standing water were eliminated.
- The West Pearl River and West Middle Pearl River and their associated wetlands within the study area were eliminated as EFH for red drum because they are riverine systems surrounded by palustrine wetlands.

3.5 White Shrimp and Brown Shrimp

The life histories of white shrimp (*Penaeus setiferus*) and brown shrimp (*Penaeus aztecus*) are generally similar, although the time of spawning varies among the species. Mating takes place in shallow offshore waters, while actual spawning takes place in deeper offshore waters. The eggs are released and fertilized externally in the water. Within 24 hours, fertilized eggs hatch into a microscopic larva. The larvae are capable of only limited horizontal, directional movement in response to light conditions and are unable to swim independently of the water currents. Shrimp migrate via currents from offshore waters to coastal bays during the last planktonic stage and enter estuarine nursery grounds as post-larvae. Development to the post-larval stage takes several weeks. Post-larvae have well developed swimming capabilities. Once they move into brackish waters, the post-larvae abandon their planktonic way of life and become part of the benthic community. Young shrimp remain in the estuary until they approach maturity. Adult shrimp migrate offshore to spawn, and the cycle is repeated.

Brown shrimp comprise approximately 85 percent of Mississippi's harvest. Brown shrimp are most abundant from June to October and can be found in inshore and offshore waters. White shrimp, found in shallower waters over mud bottoms, are caught mostly during daylight hours during the fall months. Water temperatures, salinity, available food, and habitat area affect the size of the shrimp harvest.

Assumptions for EFH determination:

- Feeding habitat for young shrimp includes the Middle Middle Pearl, East Middle Pearl, East Pearl, and Cowan Bayou.
- Feeding habitat for young shrimp also includes estuaries immediately adjacent to those rivers.
- Nursery habitat includes estuaries immediately adjacent to those rivers.
- Estuaries within the remainder of the study area have been included as feeding and nursery habitat if they have a direct connection to those rivers, are easily accessible by young shrimp, and have significant water depth for young shrimp to travel freely. Areas with a scrub shrub designation and areas with only a few inches of standing water were eliminated.

- The West Pearl River and West Middle Pearl River and their associated wetlands within the study area were eliminated as EFH for these shrimp species because they are riverine systems surrounded by palustrine wetlands.

4.0 EXISTING CONDITIONS

Local terrain within the study area consists primarily of palustrine and estuarine marsh of the Pearl River Basin. Portions of the study area surrounding the West Pearl and three Middle Pearl Rivers are adjacent to the Louisiana Department of Wildlife and Fisheries' (LDWF) Pearl River Wildlife Management Area (WMA). The West Pearl River, from the Louisiana state line to its entrance into Lake Borgne, is designated as a Natural and Scenic River.

The Pearl River Basin is found in southeastern Louisiana and central and southwestern Mississippi and covers over 8,700 square miles (MDEQ 2007). The Basin drains all or parts of 24 counties in Mississippi and three parishes in Louisiana. Over 16,000 miles of streams and rivers flow through this Basin. The West Pearl, West Middle, Middle Middle, East Middle, East Pearl Rivers, and Cowan Bayou are the primary waterways within or near the study area.

Waters from the West Pearl River and the West Middle Pearl River flow into The Rigolets and Little Lake, respectively, thence into Lake Borgne. Waters from the Middle Middle and East Middle Pearl Rivers flow into the East Pearl River, approximately 2.5 miles south of the East Pearl River Bridge. The East Pearl River empties into Lake Borgne, where the dredged Pearl River Channel meets the Gulf Intracoastal Waterway. The discharge flows eastward past Grand Island through St. Joe Pass and into the Mississippi Sound. Cowan Bayou empties into Mulatto Bayou which flows into the East Pearl River. All discharges eventually reach the Gulf of Mexico. These features flow south/southeast, except during times of high tide and/or a hurricane event when waters may be pushed upstream and into the surrounding marsh and swamp.

General vegetation communities within the study area were determined during field surveys and project site visits. This information, along with the current aerial photography, the Louisiana Natural Heritage Program's (LNHP) Natural Communities of Louisiana Classification System (LDWF 2009), and Vegetation Types in Coastal Louisiana in 2013 (Sasser *et. al.* 2014) was used to classify the study area into six general vegetation communities as described below:

Intermediate Marsh

Intermediate Marsh was located throughout the study area and includes most of the wetland areas from a point just east of the West Middle Pearl River to a point just east of Cowan Bayou. This community typically lies between Brackish Marsh and Freshwater Marsh. Intermediate Marsh has an irregular tidal regime, is characterized by very low salinity, and is dominated by narrow-leaved, persistent species. Small ponds are scattered throughout. This marsh type is characterized by a diversity of species, many of which are found in Freshwater Marsh and some of which are found in Brackish Marsh.

Freshwater Marsh

Freshwater Marsh is located from the West Pearl to the West Middle Pearl River. Freshwater Marsh is normally located adjacent to Intermediate Marsh along the northern most extent of the coastal marshes. Small ponds are scattered throughout. Frequency and duration of flooding which are intimately related to micro-topography seem to be the primary factors governing species distributions. Substrate, current flow, salinity, and competition are also important in determining species distribution patterns. Freshwater Marsh has the greatest plant diversity and highest soil organic matter content of any marsh type.

Baldcypress Swamp

Baldcypress Swamp occurs in small isolated areas from the US 190 intersection to the West Middle Pearl River. Baldcypress Swamps are forested, alluvial swamps growing on intermittently exposed soils. The soils are inundated or saturated by surface water or groundwater on a nearly permanent basis throughout the growing season except during periods of extreme drought. There is relatively low floristic diversity.

Scrub/Shrub Swamp

Scrub/Shrub Swamp is scattered throughout the study area and can be categorized as a fringe community between the maintained ROW and the emergent marsh. Scrub/Shrub Swamp is a low, flat wetland dominated by woody vegetation less than 20 feet tall. Soils are very poorly drained, surface water present for extended periods, sometimes drying during late summer or during drought.

Mixed Hardwood-Loblolly Forest

Mixed Hardwood-Loblolly Forests occurs in small isolated areas from the US 190 intersection to the West Middle Pearl River and in and around Pearlington. Mixed Hardwood-Loblolly Forests are found statewide in the uplands and are variable depending on elevation and consequent moisture regime. Loblolly pine comprises 20 percent or more of the overstory in a mixture with several hardwood species.

Maintained

This community consists of maintained road ROW and lawns associated with commercial and residential development. These areas are best described as areas where clearing of the natural vegetation previously occurred, and lawn grasses now dominate. These areas have not obtained a climax vegetation state because they are subject to periodic maintenance activities including mowing, leveling, clearing, or applications of herbicides to control plant growth.

5.0 METHODS AND FINDINGS

Prior to initiation of field work, geographic information system (GIS) ArcGIS® 10.3 software was used to compile relevant environmental information within the study area. Field surveys were conducted between June 6 and November 4, 2016 to record relevant data on potential wetland and stream features. Wetland boundaries, streams, ponds, and the ordinary high-water mark were collected throughout the study area using a Trimble GeoXH® Global Positioning System (GPS) device and the information was input to a GIS mapping program.

A boat survey was also performed at each of the five river crossings by environmental personnel on May 3 and 4, 2016. Data collected included hydrograph data, water clarity, sediment composition, habitat characteristics, and the wetland/upland line at the bridge crossings. The best clarity reading that was collected was 1.4' on the West Middle and Middle Middle Rivers. In terms of EFH, the survey indicates that there is open water in the channels, which transitions to a zone of emergent vegetation along each bank. No submerged aquatic vegetation was observed at any of the river crossings during the survey.

GPS data was downloaded into the GIS software after the completion of all field work. Utilizing this data and the assumptions for EFH determinations outlined in the preceding chapter, the potential EFH within the study area was mapped (Appendix A) and quantified (Table 1).

Table 1. Summary of Potential Essential Fish Habitat Within Study Area

River System	Habitats	Spanish Mackerel	Gray Snapper	Lane Snapper	Red Drum	White Shrimp	Brown Shrimp	Impacts to Potential EFH (acres)
West Pearl River	R, P		X					1.8
Middle Pearl Rivers	R, P, E	X	X	X	X	X	X	39.7
East Pearl River	E	X	X	X	X	X	X	10.5
Cowan Bayou	E	X	X	X	X	X	X	2.0
Total								54.0

Legend: R – Riverine P – Palustrine E – Estuarine

6.0 BRIDGE REPLACEMENT ALTERNATIVES

Multiple alternatives/options were considered at each proposed bridge replacement location throughout the planning process. The following paragraphs provide a brief description of each alternative/option.

6.1 West Pearl River Bridge Replacement

The Replacement Alternatives developed for the West Pearl River Bridge include:

1. **Fixed Span Alternative**. This alternative proposes the construction of a new fixed span structure downstream from the existing bridge. The existing 90' wide channel would be retained. New road sections would be constructed to connect the new bridge approaches to existing US 90. New road sections would also be constructed on the west side of the river to maintain access to Camp Road, as well as, the residential and commercial properties on both sides of the highway. Access to Camp Road, as well as, the residential and commercial properties would be maintained during construction activities.
2. **Movable Span Alternatives**. This alternative proposes the construction of a new movable span structure (Lift or Bascule) downstream from the existing bridge. The existing 90' wide channel would be retained. New road sections would be constructed to connect the new bridge approaches to existing US 90. New road sections would also be constructed on the west side of the river to maintain access to Camp Road, as well as, the residential and commercial properties on both sides of the highway. Access to Camp Road, as well as, the residential and commercial properties would be maintained during construction activities.

6.2 West Middle and Middle Middle Pearl River Bridge Replacement

The Replacement Alternatives developed for the West Middle and Middle Middle Pearl River Bridges include:

1. **Fixed Span Alternative on Offset Alignment**. This alternative proposes the construction of two new fixed span structures upstream from the existing bridges. A new road section is required between the two structures and would be constructed north of the existing highway. New road sections are also proposed to connect the new bridge approaches to existing US 90.

2. **Fixed Span Alternative on Existing Alignment.** This alternative proposes the construction of a new fixed span structure on the existing US 90 alignment. This alternative requires construction of two temporary detour bridges and a temporary roadway adjacent to, and north of, the existing highway so the US 90 corridor remains open during the construction of the replacement bridges.

6.3 East Middle Pearl River Bridge Replacement

The Replacement Alternatives developed for the East Middle Pearl River Bridge include:

1. **Fixed Span Alternative on Offset Alignment.** This alternative proposes the construction of a new fixed span structure downstream from the existing bridge centerline. New road sections are also proposed to connect the new bridge approaches to existing US 90.
2. **Fixed Span Alternative on Existing Alignment.** This alternative proposes the construction of a new fixed span structure on the existing US 90 alignment. This alternative requires construction of a temporary detour bridge and a temporary roadway adjacent to, and north of, the existing highway so the US 90 corridor remains open during the construction of the replacement bridge.

6.4 East Pearl River Bridge Replacement

The Replacement Alternatives developed for the East Pearl River Bridge include:

- 1(a). **Fixed Span Alternative – Loop Option.** This option proposes the construction of a new fixed span structure downstream from the existing bridge and a connection (Loop Road) between US 90 and MS 604. The MS 604 / US 90 intersection would be relocated east of the existing intersection and remain as a stop control intersection. A left turn lane is proposed from eastbound US 90 to northbound MS 604. Connectivity would be provided to Tahiti Road with a newly constructed frontage road located north of the new bridge, extending west from existing MS 604. The existing Riverside Drive would be routed under the new bridge to tie in with the new frontage road. The “Loop Road” would support continued east–west access between MS 604 and US 90. During construction, access can be provided from US 90 to the existing bridge with the use of the loop road or a diversion. Access would be provided to existing residences and commercial properties; however, some properties may be impacted by the loss of direct access to existing US 90. The boat launch would be impacted by the placement of support piers.

- 1(b). **Fixed Span Alternative – Gooseneck Option.** This option proposes the construction of a new fixed span structure downstream from the existing bridge and a Frontage Road connection (Gooseneck) between US 90 and MS 604. MS 604 currently terminates at US 90. In this option, MS 604 would turn through a new roundabout and continue parallel to the new bridge to connect with US 90. A new frontage road would extend west from the roundabout to provide access to developed properties. Existing Riverside Drive would be routed under the new bridge to tie in with the new frontage road. Tahiti Drive would connect directly with the roundabout. The new “Gooseneck” frontage road would support continued east–west access between MS 604 and US 90. During construction, access can be provided from US 90 to the existing bridge with the use of the “Gooseneck” frontage road or a diversion. Access would be provided to existing residences and commercial properties. Businesses located along the north side of existing US 90 will be impacted by construction of the new frontage road. Other properties may be impacted by the loss of direct access to US 90.
2. **Movable Span Alternatives.** This alternative proposes the construction of a new movable span structure (Lift or Bascule) downstream from the existing bridge. A left turn lane would be provided from eastbound US 90 to northbound MS 604 and a right turn lane would be provided from westbound US 90 to northbound MS 604. East of the river, Riverside Drive would be routed east to tie into Tahiti Road, and a new intersection would be constructed including US 90, relocated Tahiti Road and MS 604. Access would be provided to existing commercial and residential properties.

7.0 POTENTIAL IMPACTS

The limits of construction layer for each bridge replacement alternative and the potential EFH layer were then analyzed in the GIS to map (Appendix B) and quantify (Table 2) expected impacts to potential EFH associated with each river.

Table 2. Impacts to Potential Essential Fish Habitat Within Study Area

River System	Habitats	Spanish Mackerel	Gray Snapper	Lane Snapper	Red Drum	White Shrimp	Brown Shrimp	Impacts to Potential EFH (acres)
West Pearl River	R, P		X					0.8
West Middle Pearl River	R, P		X					1.2
Middle Middle Pearl River	R, P, E	X	X	X	X	X	X	1.5
East Middle Pearl River	E	X	X	X	X	X	X	1.2
East Pearl River	E	X	X	X	X	X	X	2.8
Cowan Bayou	E	X	X	X	X	X	X	0.0
Total								7.5

Legend: R – Riverine P – Palustrine E – Estuarine

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APPENDIX A

LOCATION OF POTENTIAL ESSENTIAL FISH HABITAT

Figure 1. Potential Essential Fish Habitat for Spanish Mackerel near the Three Middle Pearl Rivers

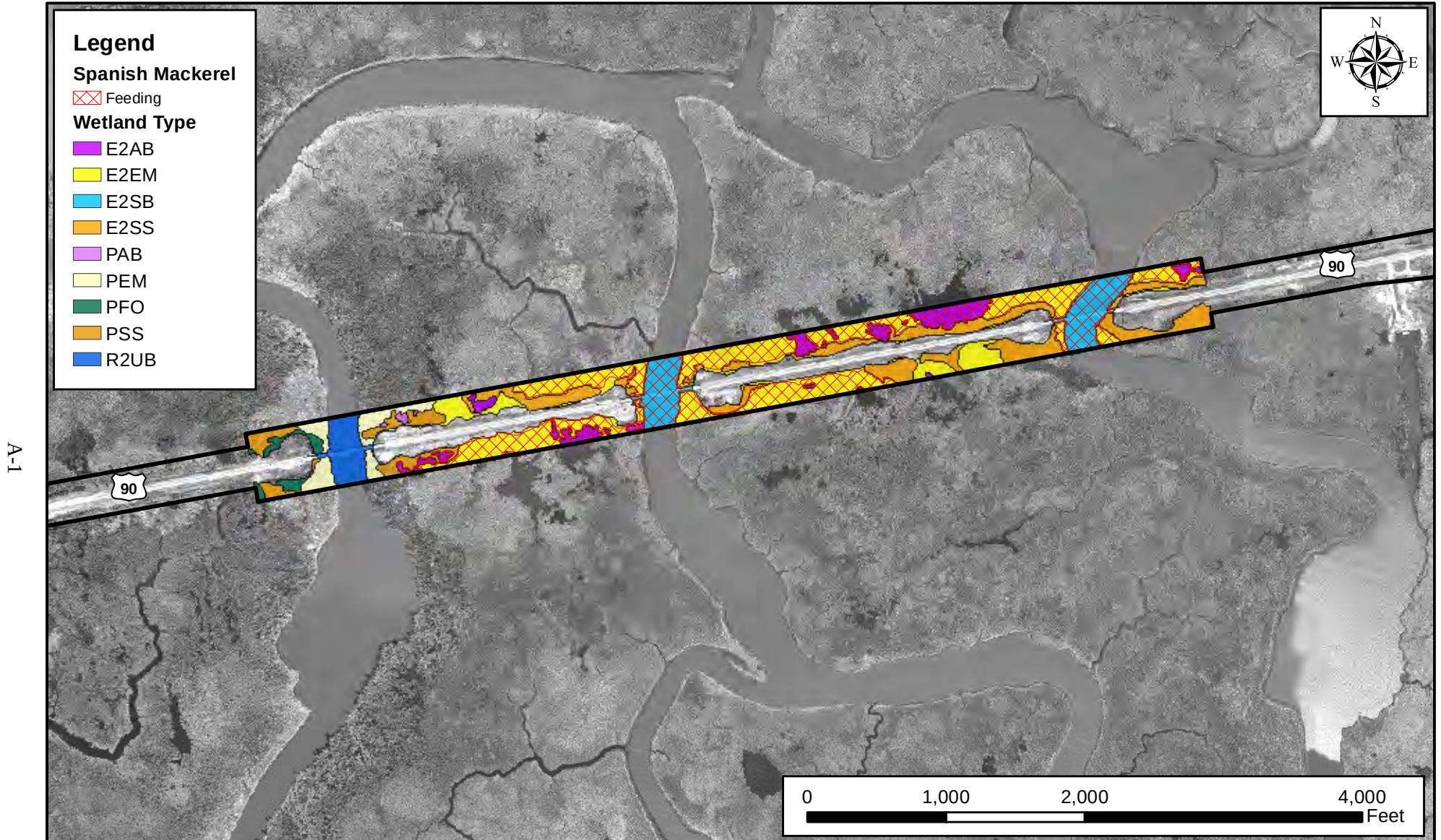


Figure 2. Potential Essential Fish Habitat for Spanish Mackerel near the East Pearl River and Cowan Bayou

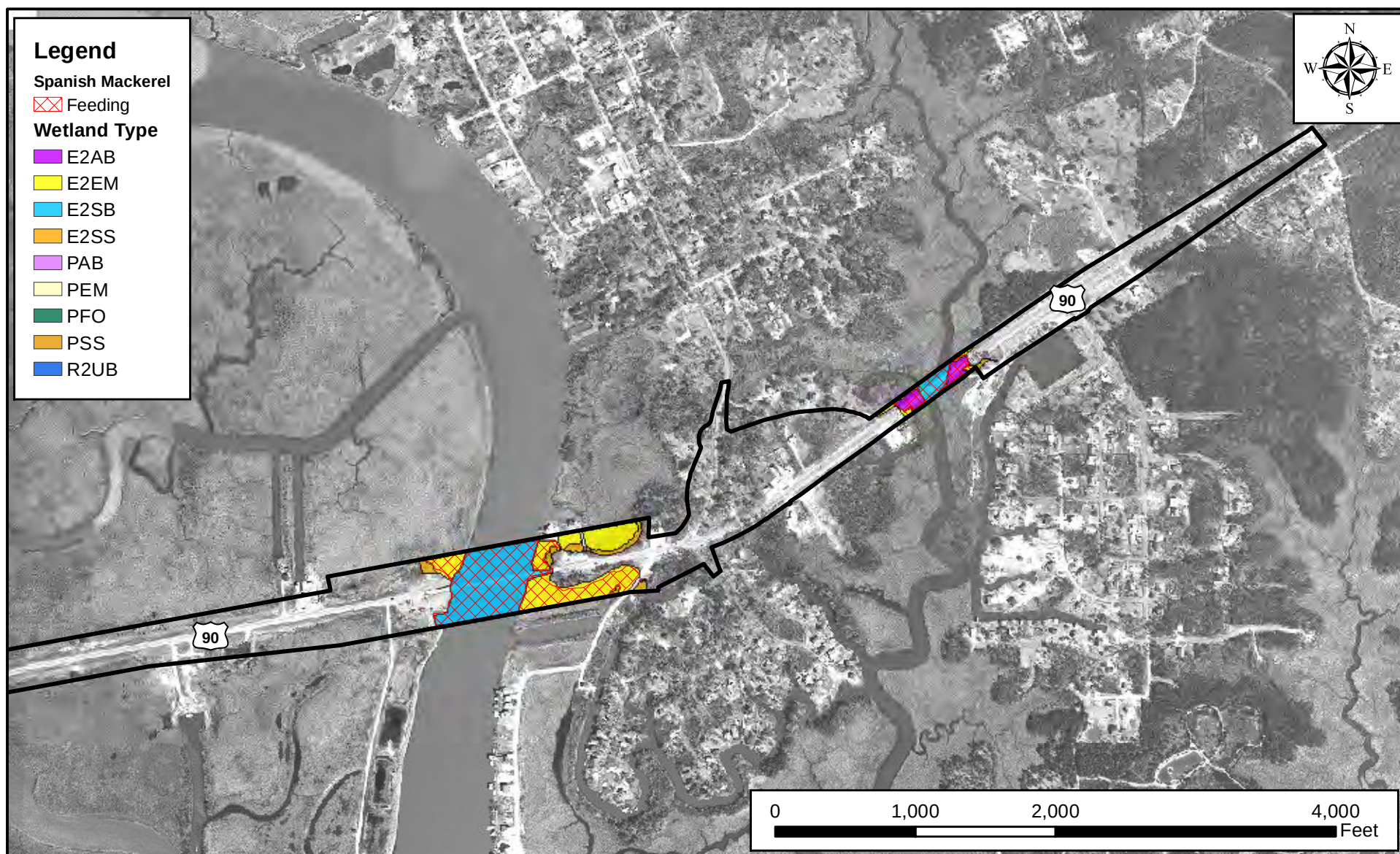


Figure 3. Potential Essential Fish Habitat for Gray Snapper near the West Pearl River

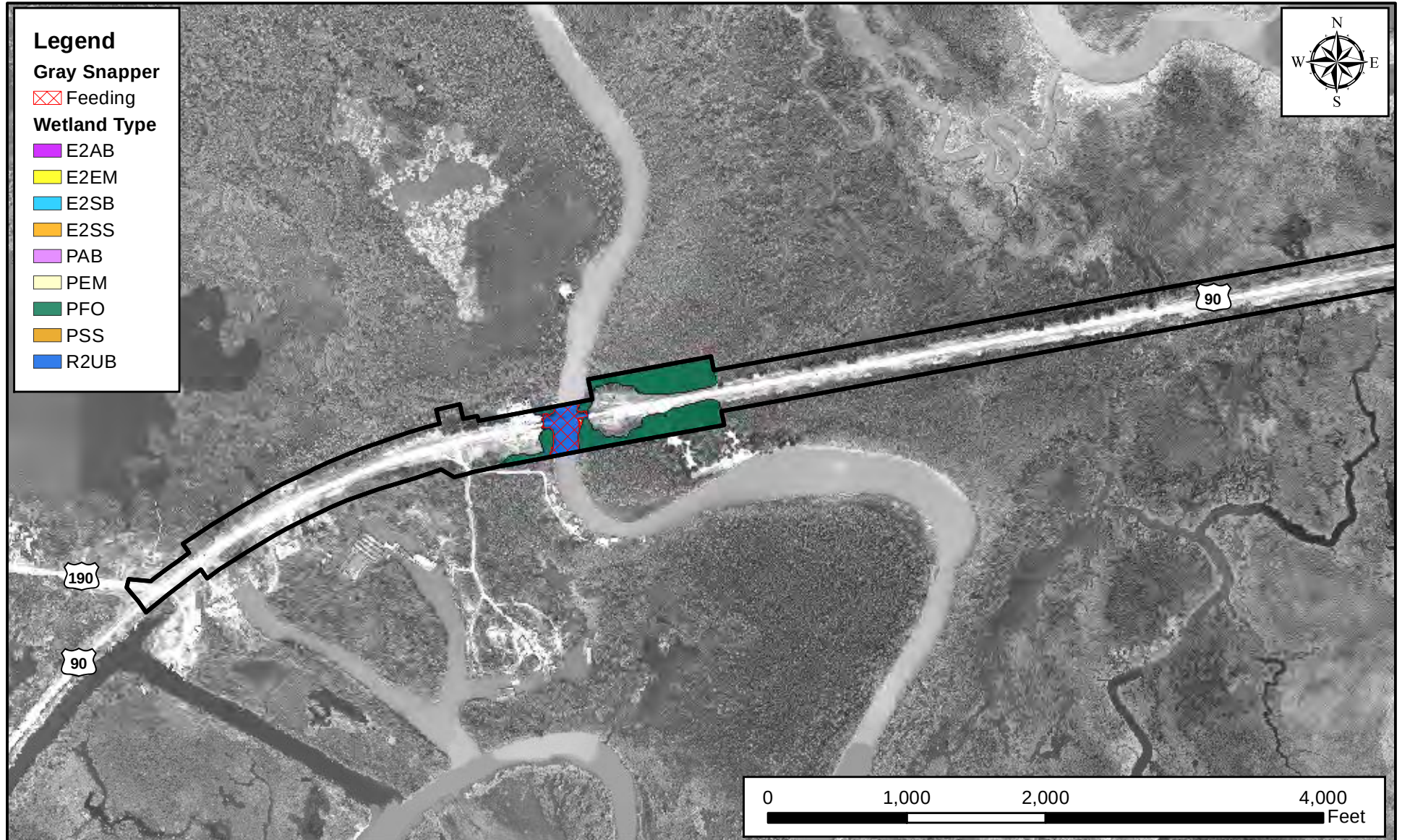


Figure 4. Potential Essential Fish Habitat for Gray Snapper near the Three Middle Pearl Rivers

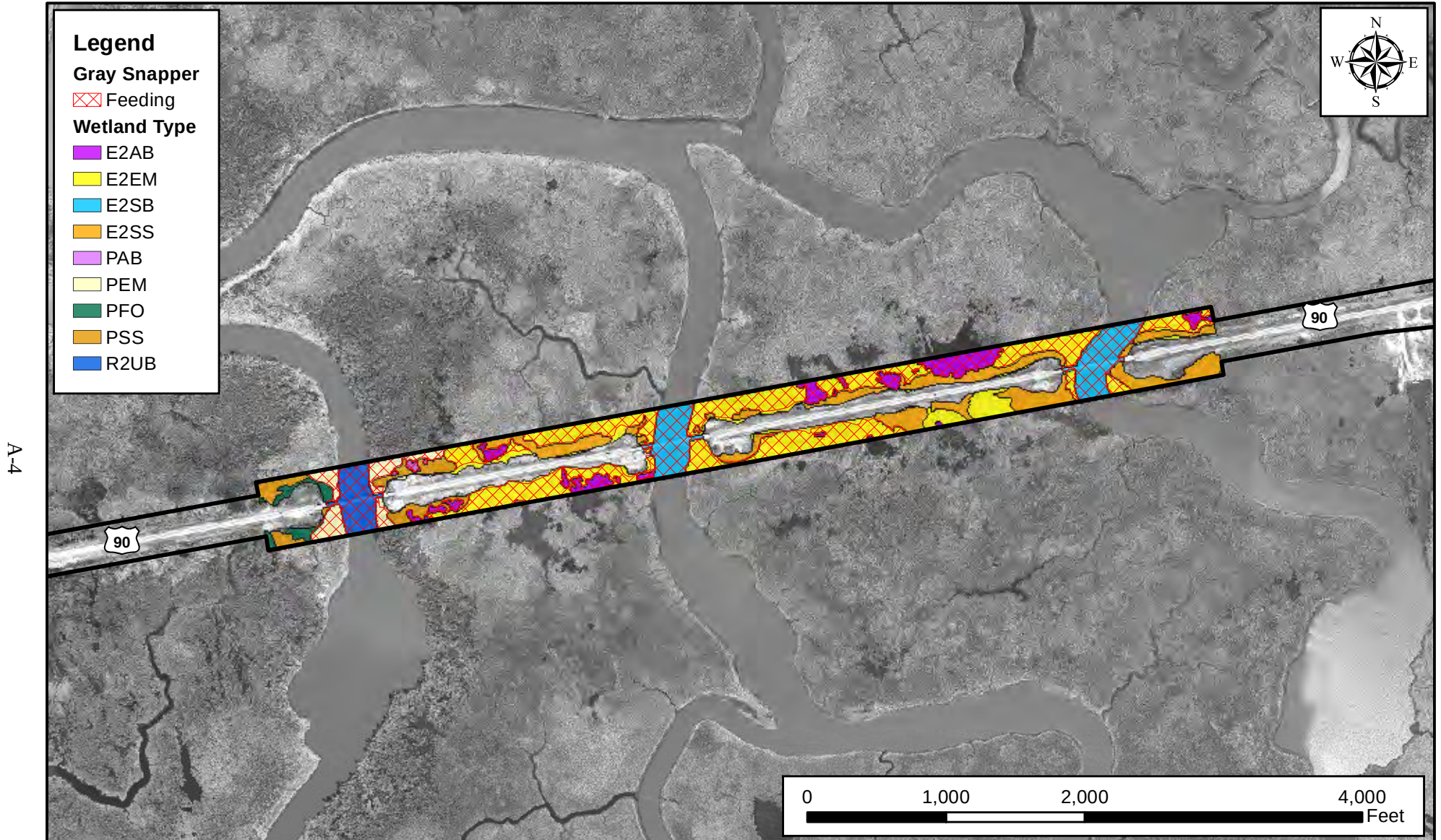


Figure 5. Potential Essential Fish Habitat for Gray Snapper near the East Pearl River and Cowan Bayou

A-5

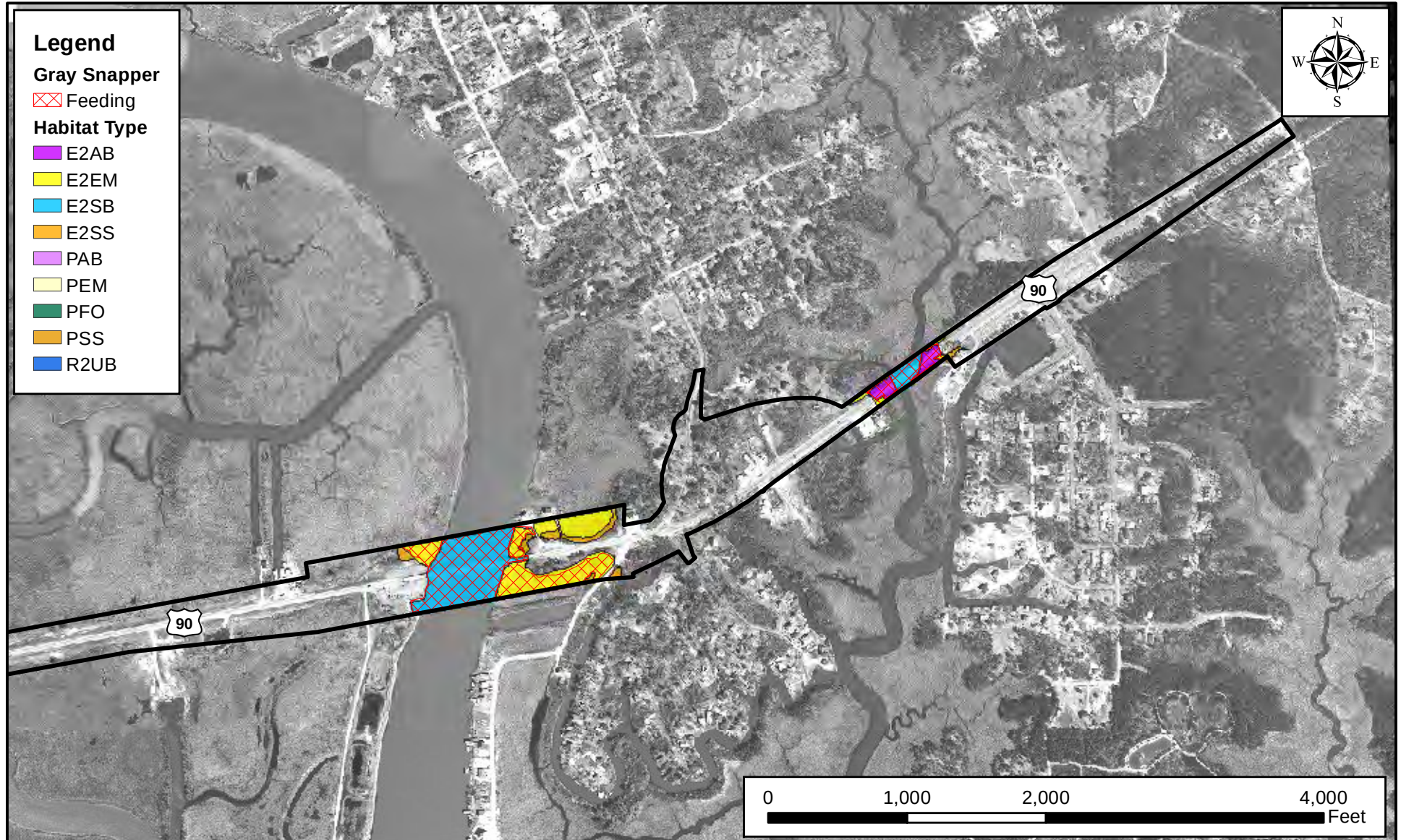


Figure 6. Potential Essential Fish Habitat for Lane Snapper, Red Drum, and White/Brown Shrimp near the Three Middle Pearl Rivers

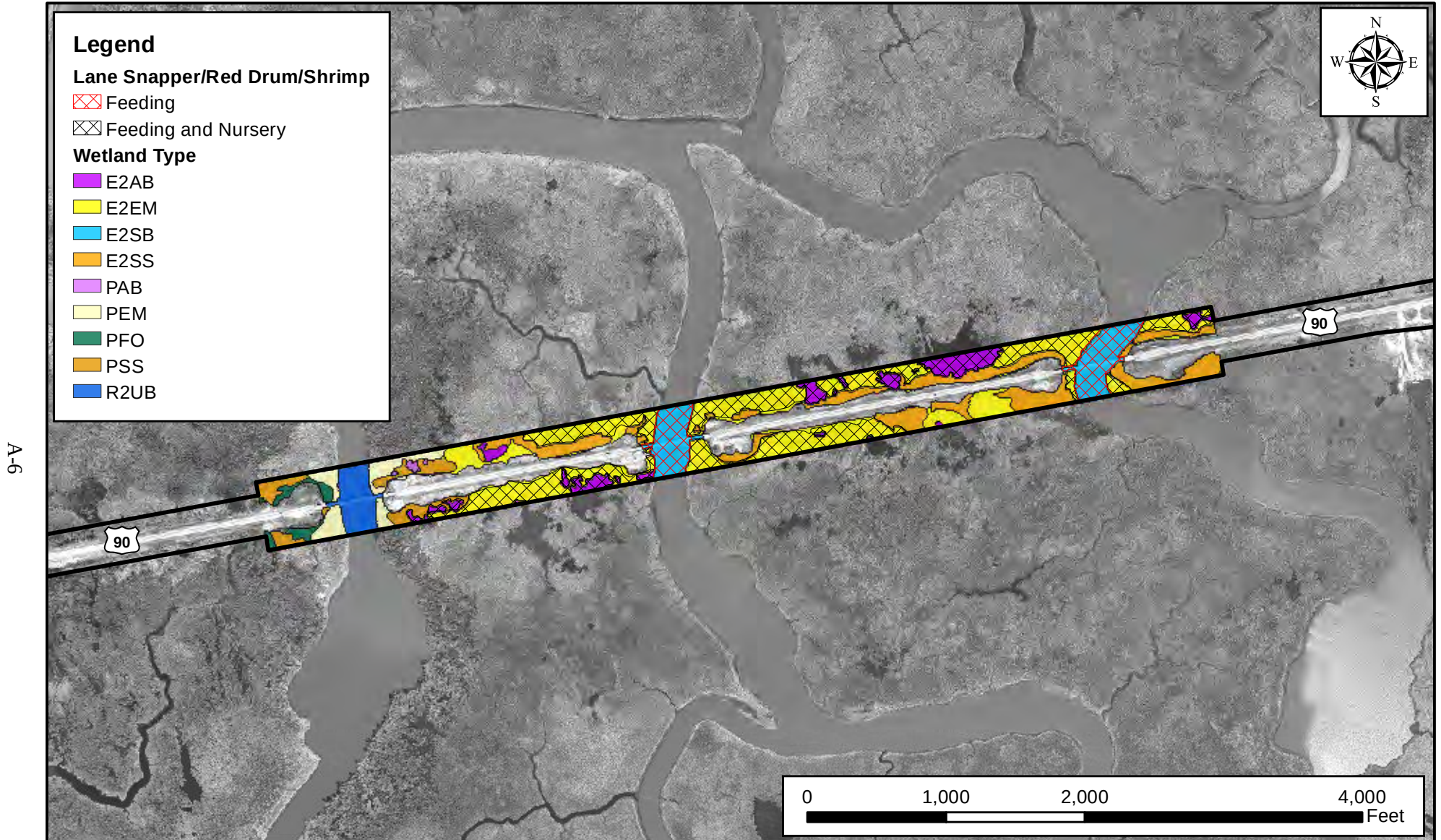
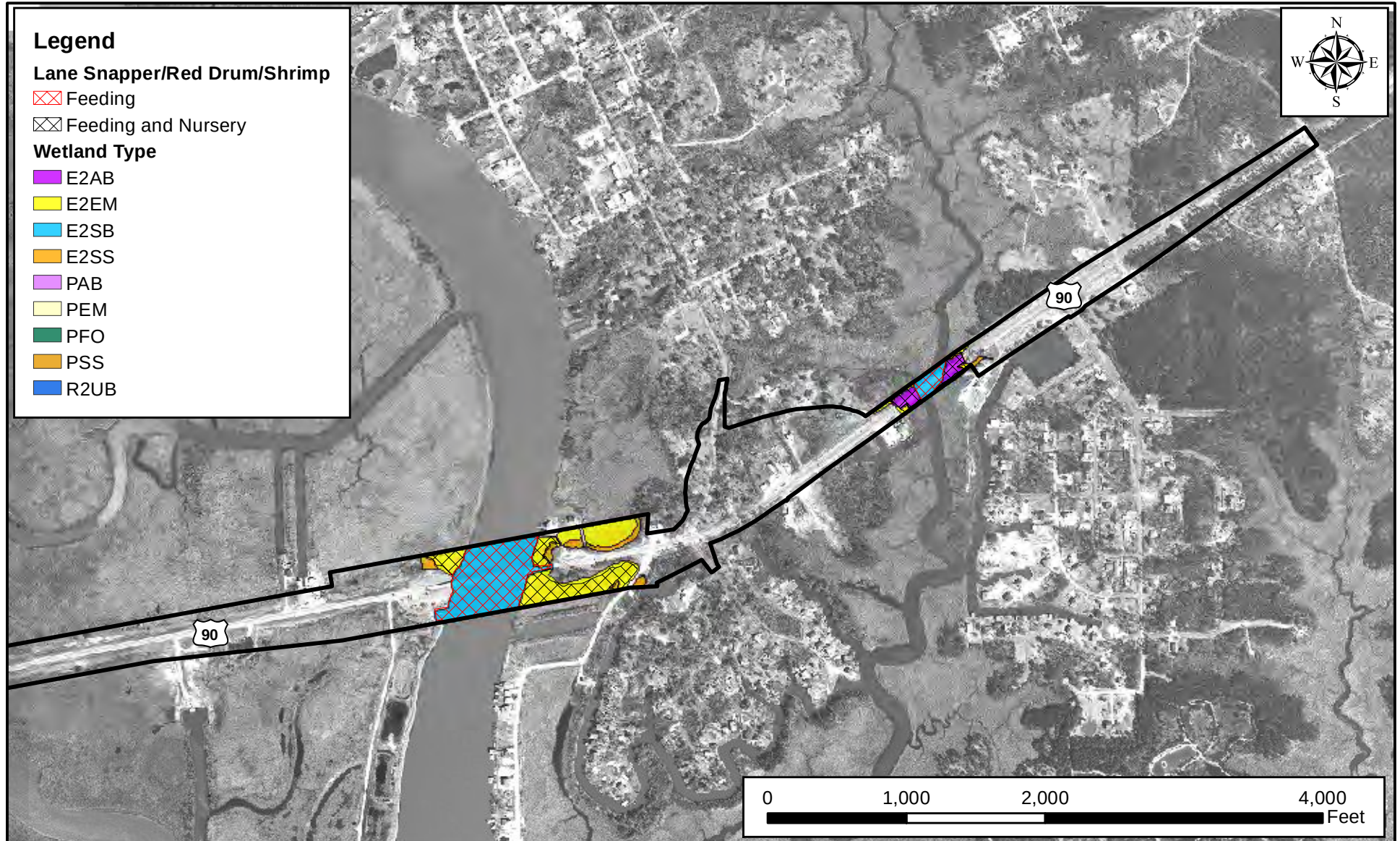


Figure 7. Potential Essential Fish Habitat for Lane Snapper, Red Drum, and White/Brown Shrimp near the East Pearl River and Cowan Bayou



APPENDIX B

LOCATION OF IMPACTS TO POTENTIAL ESSENTIAL FISH HABITAT

Figure 1. Impacts to Potential Essential Fish Habitat near the West Pearl River

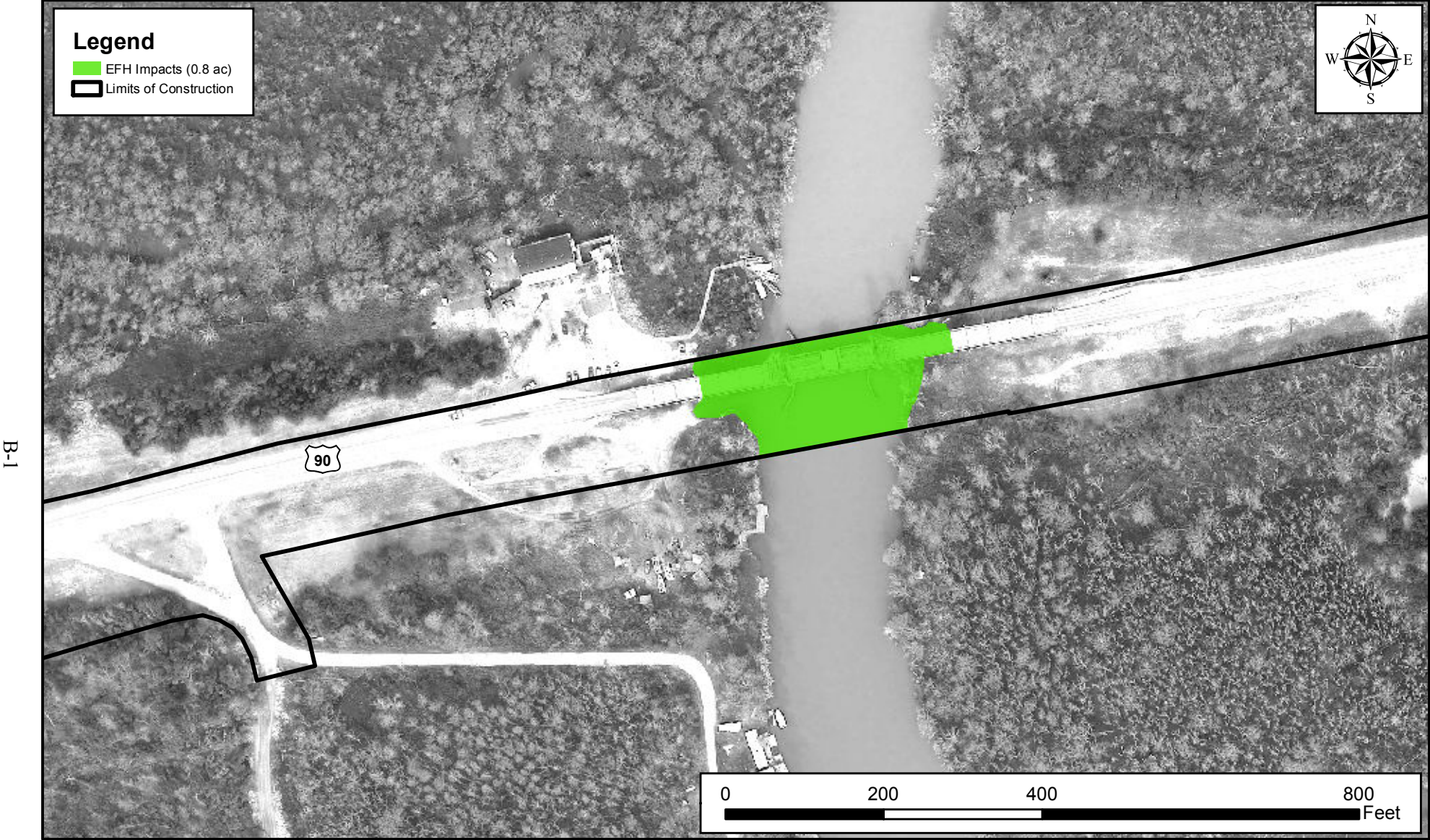


Figure 2. Impacts to Potential Essential Fish Habitat near the West Middle Pearl River

B-2

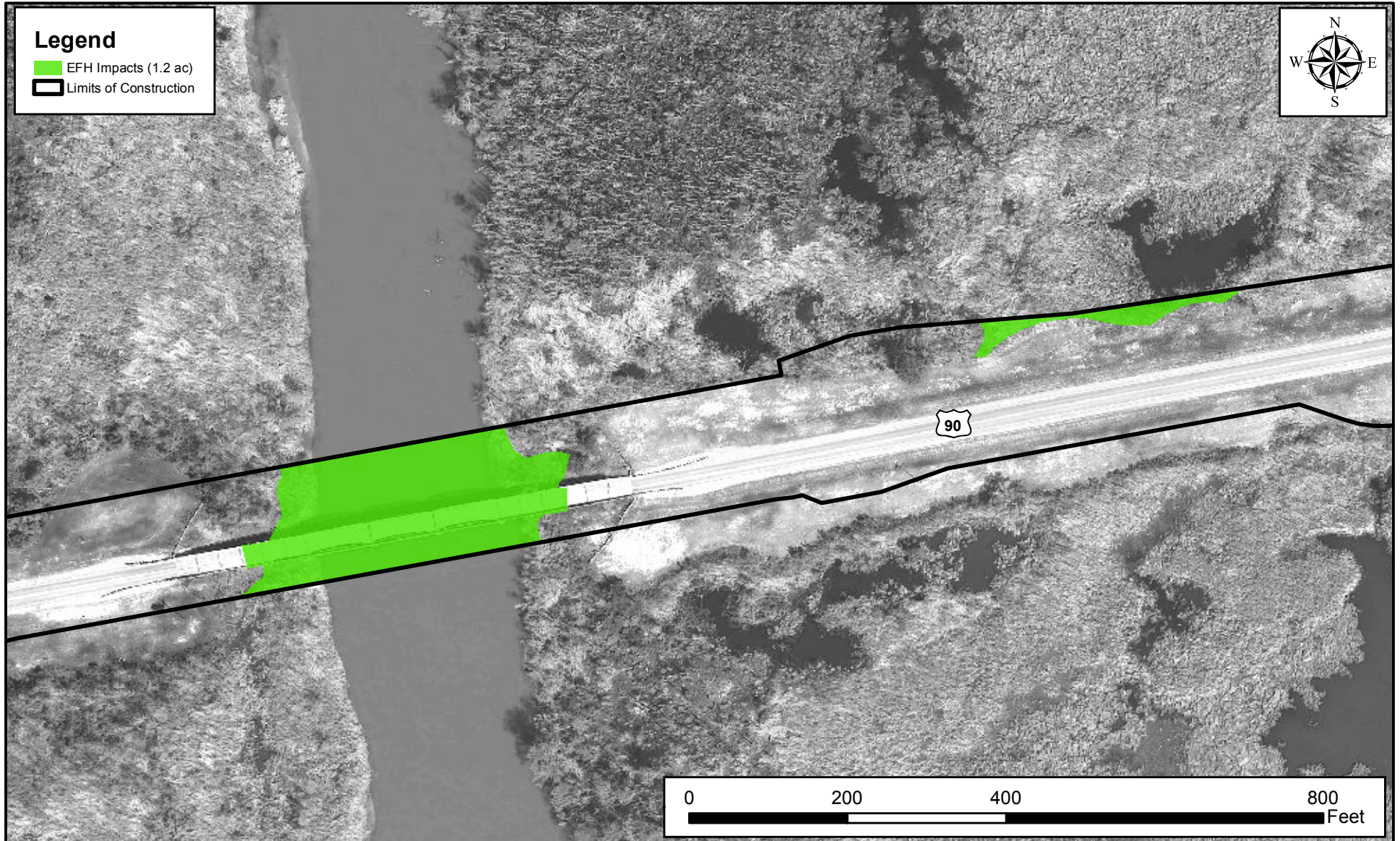


Figure 3. Impacts to Potential Essential Fish Habitat near the Middle Middle Pearl River

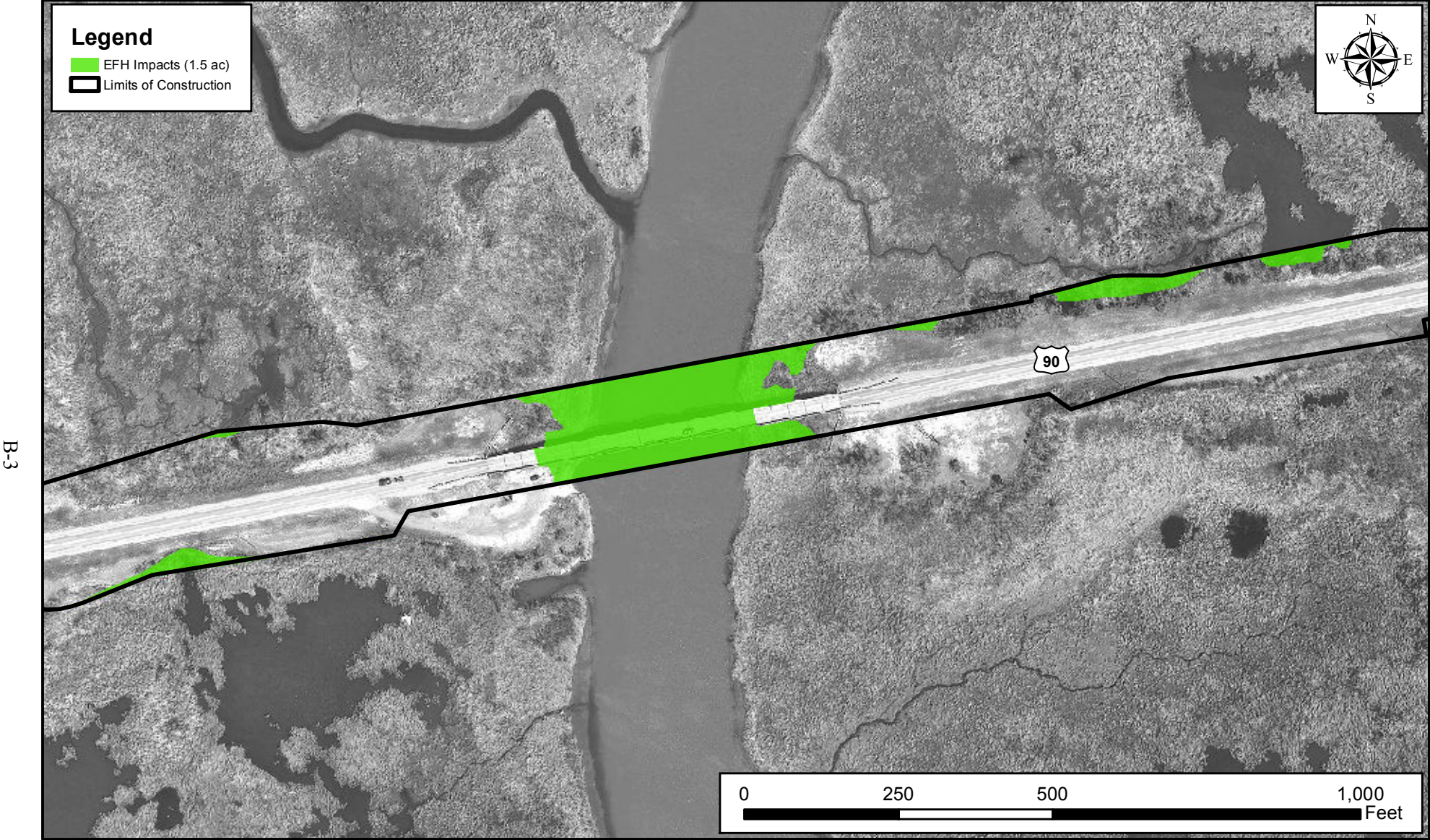


Figure 4. Impacts to Potential Essential Fish Habitat near the East Middle Pearl River

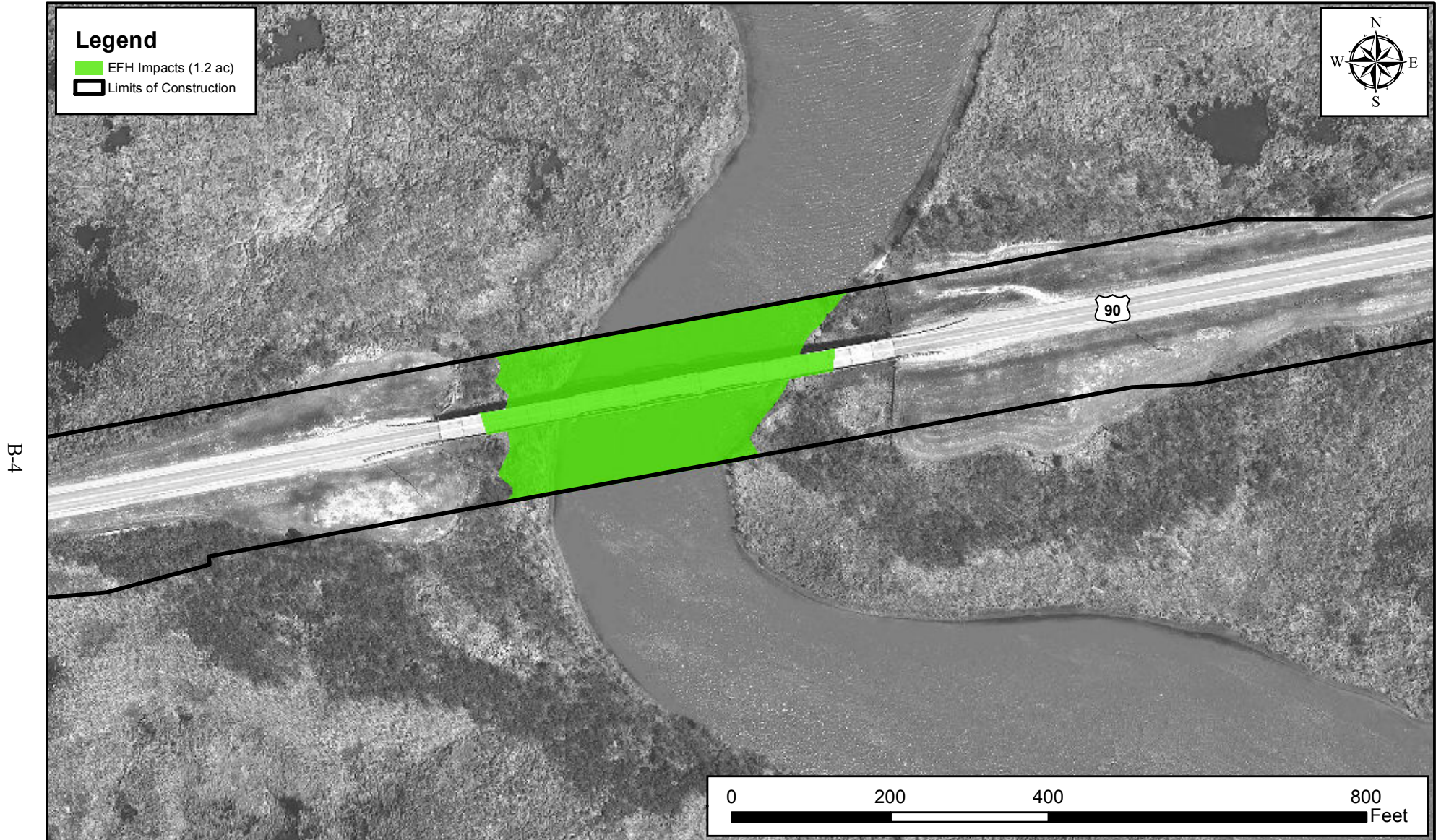


Figure 5. Impacts to Potential Essential Fish Habitat near the East Pearl River

