**EM-15 PROTECTION OF PLANTS AND ANIMALS**

The Barataria and Terrebonne Basins (B-T) provides habitat for a multitude of invertebrates, birds, finfish, shellfish, reptiles, amphibians, and mammals, with all contributing to the living fabric of the basins. It is estimated that the B-T ecosystems provide habitat for approximately 735 species of native birds, finfish, shellfish, reptiles, amphibians, and mammals. The following narratives are not exclusive toward the deference for the multitude of additional organisms that comprise the ecosystems of the B-T. Practicality requires that the list of action species be limited.

A discussion of living resources within the B-T basins must acknowledge the Deepwater Horizon oil spill that occurred in the Gulf of Mexico on April 20, 2010. The Barataria and Terrebonne estuaries were ground zero for the movement of oil onto the shores of the north-central Gulf of Mexico. Oil spills affect wildlife and fisheries species and their habitats in many ways. One of the most conspicuous animal casualties of the oil spill was the bottlenose dolphin population of the Barataria estuary. One of the most conspicuous vascular plant species impacted was the smooth cord grass, characteristic of the salt marsh habitat. Other species may have suffered more subtle impacts that will not be known until the future, if ever.

Discussion of plants and animals are separated into six (6) categories to describe the B-T living resources: (1) Plants, (2) Pollinators, (3) Fish and Shellfish, (4) Birds, (5) Wildlife, and (6) Threatened and Endangered Species.

**A. OBJECTIVES**

**(1) Plants -** To support conservation efforts for ecological succession patterns of plant diversity

from up-basin to down-basin within each of the habitat zones of the B-T delta ecosystem.

**(2) Pollinators** **-** To build a framework that encourages landowners to manage their land in a

way that maximizes its suitability as habitat for pollinators.

**(3) Fish and Shellfish** - To support conservation efforts to maintain the diverse recreational

and commercial invertebrate and vertebrate species harvested for pleasure and profit.

(**4) Birds** - To support conservation measures that maximize available natural habitats that maintain healthy populations of migratory and resident birds across the B-T system.

**(5) Wildlife** - To support conservation efforts to maintain the diverse amphibian, reptile, and mammal populations.

**(6) Threatened and Endangered Species** - To support recovery and conservation efforts for threatened and endangered species.

**B. BACKGROUND**

**(1) Plants** - A delta’s ecosystem is composed of specific habitats found in succession from up-basin to down-basin, and defined largely by the vegetative species found within each, which is dependent on three primary interacting environmental parameters: (1) elevation above sea level, (2) soil moisture content, and (3) salinity.

**(2) Pollinators** - Pollinators and pollinated plants are critical to our Nation’s economy and food security, ecological diversity, wildlife, and environmental health (National Strategy to Promote the Health of Honey Bees and Other Pollinators, Pollinator Health Task Force, The White House, 2015). Pollinators are a keystone species group and include honeybees, native bees, other insect pollinators, birds, and bats. About 75% of flowering plants on the earth rely on pollinators to set seed and about 1/3 of human food depends on pollinators. Honeybee pollination alone is worth $15 billion to our agricultural crops each year. Pollinator insects provide many other ecosystem services as well; 90% of birds depend on insects during at least one stage of their lives; many flower-visiting beetles are also decomposers; and many flower-visiting insects have larvae that provide pest control. Pollinator populations are struggling. In 2014, beekeepers reported that approximately 40% of their honeybee colonies were lost. With this loss of bee colonies, the essential pollination services that bees provide to agriculture is also lost, threatening our Nation’s agriculture. Monarch butterflies, another pollinator, have declined by 90% or more over the past two decades in their overwintering grounds in Mexico.

**(3) Fish and Shellfish** - Louisiana is the second largest producer of fisheries in the United States behind Alaska. In 2015, commercial landings equaled 1,070,317,980 pounds with a dockside value of $ 373,680,966. In 2015, Louisiana contributed 68% of all Gulf States’ pounds landed and 42% if its dockside value, with the Barataria-Terrebonne basins a significant contributor. A few of the dominant freshwater and estuarine species contributing to Louisiana’s production in 2015 were the Bowfin (colloquially known as Choupique, 98% of the National poundage), Black Drum Fish (65% of the National poundage), White Shrimp (63% of the National poundage), Eastern Oyster (58% of the National poundage), Menhaden (55% of the National poundage), wild-caught Channel Catfish (29% of the National poundage), Brown Shrimp (26% of the National poundage), and Blue Crab (26% of the National poundage). Those listed, along with many more commercial species, are extensively found within the Barataria and Terrebonne Basins. Some of the commercial species listed above are also important recreational species, such as blue crab, white and brown shrimp, channel catfish, bowfin, and black drum. Additional recreational species are the estuarine species, red drum (colloquially known as red fish), and spotted sea trout (colloquially known as speckled trout), and the freshwater species of the Centrarchidae (sunfish) family (largemouth bass, blue gills, red ears, crappies). These species are exceedingly popular for recreational fishers.

(**4) Birds** – *Birds, because of their significant number of migratory species as well as native species has its own separate profile and not discussed in Wildlife.* There are over 400 species of birds that are known to the B-T basins. While many are considered “residents” the majority are migratory in nature, passing through southeast Louisiana twice each year during their long migratory journeys. The Barataria-Terrebonne Basins are uniquely located along the migratory path of many species of birds. Trans-gulf migrants crossing between the Yucatan peninsula and North America use the Barataria Terrebonne Basins as a landfall for northbound migrants or the final point of departure for southbound ones. Although trans-gulf migrants reach the gulf coast from west of Houston, Texas, to Florida, a large proportion of the migrant population uses the upper Texas coast and coastal Louisiana around to Mississippi. The Barataria Terrebonne Basins are therefore important areas for the trans-gulf migrants, because they cover a significant part of this important section of gulf coast. For over one hundred years, but especially since the work of Dr. George Lowery in the 1940s and 1950s on Grand Isle (1946, for example), the area of the B-T basins has been recognized as a very heavily used stopover by Neotropical trans-gulf migrant birds. It is especially critical when foul weather in spring causes migrating birds to reach land exhausted, or in fall when bad weather forces the birds to abort their southward migration at the last moment, before leaving land.

Although habitats in the BTB are important for transient Neotropical migrant birds, the region is also important for wintering and breeding species as well, whether they are Neotropical migrants or not. Large flocks of waterfowl winter in the BTB, as well as significant portions of the populations of some passerine species such as Swamp Sparrow and Yellow-rumped Warbler. Some seabird species have major breeding populations on the barrier islands of the BTB, and a few Neotropical migrant passerines such as Prothonotary Warbler also have significant fractions of their total populations breeding in the swamps of southeast Louisiana.

Review of long term data sets and various scientific studies suggest declines for many species of birds from Neotropical migrant songbirds, to forest and marsh dependent residents, to Arctic nesting shorebirds, and prairie nesting waterfowl. The causes of these declines are, of course, various, complex, and in many cases not completely understood. However, a common theme linking these various species is that they have suffered serious loss of habitat necessary to sustain them over some stage of their life-cycle.

**(5) Wildlife** - Wildlife species are abundant and inhabit the swamps, bays, bayous and marshes of the B-T basin. Wildlife for this report are separated into four broad categories: amphibians, reptiles, birds and mammals. Amphibians found in the basins include frogs, newts and salamanders, and reptiles include snakes, turtles and lizards. Mammals consist of bats, small rodents such as mice, rats and shrews, furbearers such as muskrat, mink, otter, opossum, raccoon, bobcat, coyote and black bear, game species such as white tail deer, grey squirrels and rabbits. In a mid-1970s survey of the Barataria Basin, investigators identified at least 30 species of mammals and 70 species of amphibians and reptiles. The Louisiana Department of Wildlife and Fisheries (LDWF) identified four major influences on terrestrial wildlife: habitat destruction or conversion, habitat fragmentation, habitat disturbance, and altered habitat composition and structure. LDWF also identified similar threats to aquatic wildlife species: modification of water levels/changes in natural flow patterns, sedimentation, habitat disturbance, nutrient loading and altered composition and structure.

**(6) Threatened and Endangered Species -** Approximately 735 species of birds, finfish, shellfish, reptiles, amphibians, and mammals spend all or part of their life cycle in the Estuary. Approximately 40 animal species and approximately 50 plant species in the Estuary are threatened or endangered. Many factors contribute to declines in animal populations, particularly changes in habitat. Pollution can also have a negative impact on the health of species and their ability to reproduce, and over-harvesting can harm animal populations. Section 4 of the Endangered Species Act directs USFWS and NOAA's National Marine Fisheries Service to develop and implement recovery plans for threatened and endangered species, unless such a plan would not promote conservation of the species. BTNEP is actively engaged in projects such as the Piping Plover Survey to monitor the distribution and abundance of target T&E species.

**C DESCRIPTION OF ACTION**

**(1) Plants** - This action is implemented by protecting, conserving and creating habitats conducive to preserve the vascular vegetation associated with the 4.2 million acres of wetlands, ridges, forests and farmlands between the Mississippi and Atchafalaya Rivers that comprise the Barataria and Terrebonne delta basins.

**(2) Pollinators** - Pollinator habitat can range in size from small, residential gardens to larger plots of land and still offer cumulative benefits to nearby agriculture. This action is recommended wherever it is economically and logistically feasible to do so. In 2014, President Obama issued a Presidential Memorandum directing an interagency Task Force to create a *Strategy to Promote the Health of Honey Bees and Other Pollinators.* The U.S. Environmental Protection Agency (EPA) and U.S. Department of Agriculture (USDA) lead this Task Force with three main goals:

* Reduce honey bee colony losses to economically sustainable levels;
* Increase monarch butterfly numbers to protect the annual migration; and
* Restore or enhance millions of acres of land for pollinators through combined public and private action.

Increasing the quantity and quality of habitat for pollinators is a major part of the Task Force’s Strategy and Action Plan to better understand pollinator losses and improve pollinator health.

**(3) Fish and Shellfish –** This action is implemented be preserving the salinity gradients that exist within the estuaries from fresh to saline.At least 80% of the coastal species landed commercially and recreationally in the northern Gulf of Mexico are estuarine-dependent for part or all their life.

(**4) Birds** - The intent is to build a framework in the Barataria Terrebonne Basins for the conservation of bird populations that use the area. This framework will include components to educate the public about bird issues, monitor bird populations, and encourage private, corporate, and government landowners to protect critical areas and manage land under their care in such a way as to maximize its suitability as habitat for migratory and resident birds. Furthermore, this framework promotes avian tourism and the infrastructure to support public access.

**(5) Wildlife** – In Louisiana 90% of the state is privately owned. Although the exact statistic is not known, the great majority of land in the B-T is privately owned. Therefore, conservation and maintenance of wildlife diversity requires that landowners be actively engaged in the process. The LDWF in its 2005 and draft 2015 wildlife action plans have recognized the following as the greatest threats to maintaining species diversity:

* Habitat destruction or conversion
* Habitat fragmentation
* Habitat disturbance
* Altered habitat composition and structure

**(6) Threatened and Endangered Species -** The Endangered Species Act requires threatened and endangered animal and plant species be identified at the federal and state level. To be considered for federal listing, the species must meet one of five criteria:

* There is the present or threatened destruction, modification, or curtailment of its habitat or range.
* An over utilization for commercial, recreational, scientific, or educational purposes.
* The species is declining due to disease or predation.
* There is an inadequacy of existing regulatory mechanisms.
* There are other natural or manmade factors affecting its continued existence.

**D. LOCATION**

**(1) Plants** - Within the B-T dominant plant species by habitat are based on their location from up-basin to down-basin as listed below:

* Bottomland Hardwoods: These areas occasionally flood, but are usually dry. Prominent are Overcup Oak, Water Hickory, Sugarberry, Swamp Dogwood, Privet, Water Elm, Water Oak, Sweet Gum, Box Elder, and Winged Elm, Hawthorns, Red Mulberry, Pecan, Hackberry, Honey Locust and Elderberry.
* Swamp: Trees and shrubs that dominate this ecosystem have evolved to tolerate prolonged flooding. Key species are Bald Cypress and Tupelo-gum; others are Swamp Red Maple, Black Willow, Pumpkin Ash, Green Ash, Water Locust, and Buttonbush.
* Freshwater Marsh: This habitat supports the greatest plant diversity of all marsh habitats. Common plants of freshwater marshes include Maidencane, Spikesedge, Bulltongue, Alligatorweed, Giant Cutgrass, Pickerelweed, Pennywort, Cattail, Southern Wildrice, Coontail, Common Duckweed, Waterlilies, irises, and bullwhip.
  + Much of Barataria-Terrebonne’s freshwater marsh is “floatant” meaning that it is buoyant during certain times of the year.
* Intermediate Marsh: This is a unique habitat zone characteristic of delta regions that are influence by freshwater and slight oceanic processes that produce a mixture of plants that can tolerate some osmotic tolerance to salinity. The two dominant plant that can tolerate salinity is Wiregrass and Widgeongrass, alongside freshwater species such as Cattails, Bulltongue, Giant Bulrush, Common Threesquare, Deer Pea, Switch Grass, Walter’s Millet, Alligator Weed, and Southern Naiad.
* Brackish Marsh: Mostly Wiregrass, with few other plant species. Other species in this habitat are Olney Bulrush, Leafy Threesquare and Widgeongrass.
* Salt Marsh: Relatively few species can tolerate the salinity stress and dominated by Smooth Cordgrass (Oystergrass) and Black Mangroves. Other species are Saltgrass, Black Needlerush, and Saltwort.
* Beach Dunes: The dunes of Louisiana's barrier islands are exposed to moderate to high amounts of salt spray. In addition, limited nutrient availability and substrate instability also affect coastal dune vegetation. A few of the species are wiregrass, sea oats, beach panic, saltwort, morningglory and seaside goldenrod. If dunes remain stable, allowing natural succession to progress, then Coastal Dune Shrub Thickets are formed.
* Maritime Ridges: Can be natural stranded beach ridges (“Cheniere” - French for "place of oaks") or anthropogenic to create elevation above the surrounding marsh. These ridges are mostly 4 to 5 feet above sea level. Live oak and Hackberry are the dominant canopy species.

**(2) Pollinators -** Pollinator habitat can range in size from small, residential gardens to larger plots of land and still offer cumulative benefits to nearby agriculture. This action is recommended wherever it is economically and logistically feasible to do so.

**(3) Fish and Shellfish -** An estuary is defined by its prevailing, and changing, salinity patterns that occur yearly, seasonally and daily, producing habitats that require fish and shellfish to adapt or perish. This dependence is manifested in the important balance of freshwater and ocean waters mixing within the estuaries producing salinity gradients that create the ideal habitat for each respective species. The major habitat influence of salinity is certainly not as a static gradient from up-estuary to down-estuary, but changes often due to river and bayou discharges, precipitation, or prevailing winds and tidal currents bringing in Gulf ocean waters. This dynamic salinity flux creates the ideal habitats for those species that can physiologically cope with this changing condition.

A few species are profiled based on their habitat location within the delta, their value as indicators of habitat requirements, and public interest. The importance of a balance between freshwater and salinity within the B-T delta is used as the habitat criteria for estuarine-dependent species. For reference, salinity is measured in parts-per-thousand (ppt), with freshwater at < 1 ppt and Gulf ocean water at 32-34 ppt.

* Brown Shrimp: Brown shrimp spawn in the Gulf primarily in the fall on deep continental shelf waters with post-larvae immigrating into the estuary in great numbers through tidal passes of barrier islands in February-April and needing an ideal salinity of 10 ppt or greater to survive and grow to a size for commercial and recreational harvest. This is known as the “spring shrimp fishery” and usually opens in mid-May for about 60 days, or until white shrimp larvae begin to show up in large numbers. The brown shrimp in May-June migrate in large numbers back to the Gulf to mature, mate and spawn. Life span is 1-2 years. This is a fishery with the species contributing a new exploitable population annually. The species is not considered to be in decline.
* White Shrimp: White shrimp spawn in the Gulf of Mexico primarily in shallow continental shelf waters from March to November, with post-larvae migrating to the estuaries in large numbers usually in June and again in October-November. White shrimp migrate farther into the estuaries than brown shrimp and can do well at 5 ppt salinity. Cold fronts usually force mass migrations in the fall and early winter months. This is known as the “fall shrimp season.” Life span is 1-2 years. This is a fishery with the species contributing a new exploitable population annually. The species is not considered to be in decline.

*Note: coastal wetland acreage (habitat) in estuaries is historically correlated to long-term carrying capacity for white and brown shrimp, and this hydrological connection between marsh and water is considered an important aspect of shrimp production*.

* Eastern Oyster: This is an immobile species, except as a larva for 2-3 weeks after fertilization, which requires a minimum salinity of 8-10 ppt for competent development and eventual setting onto a substrate where it will exist for the rest of its life. Once the larva has settled, it takes on the typical shape and appearance of an oyster, and becomes physiologically tolerant to a wide range of salinity, depending on water temperature. From December to March, with relatively low water temperatures, the oyster can tolerate salinities a low as 0-1 ppt for weeks, but in warm to hot waters by late spring/summer will succumb to physiological stress and potential death in days if the salinity drops below 5 ppt. Oysters exhibit some low spawning throughout the year except in the coldest months of December-January, with major spawns occurring typically in April-May and in September-October, again needing a salinity minimum of 8-10 ppt for adequate reproductive development. Oysters inhabit a narrow habitat zone within the estuaries because of its immobility and the prevalence of predators. Subtidal oysters are found in estuarine habitats that range from about 5-15 ppt; the low end of the salinity range because of physiological needs and the high end because of the abundance of predators. Intertidal oysters are in higher salinities out to the barrier islands because they are protected from major predation because of daily low-tide exposure. Life span is usually 6-8 years. This species can mature and spawn within a few months after setting, and contributes a new exploitable population within about 15-18 months. The species is not considered to be in decline.
* Blue Crab: This mobile species is one of the most salinity tolerant within the estuary, and can be found in great numbers from freshwater to ocean habitats. However, there are two periods within its life cycle where salinity becomes extremely important. It is not known precisely what salinity is needed for mating pairs during March to May, but it is generally recognized that brackish water conditions are necessary. Mating occurs usually in the mid to lower regions of the estuary. Once mating has occurred the female must migrate further down the estuary to spawn from May-August in salinities of at least 20 ppt, ideally, for its larvae to hatch and develop properly. This is a species that matures within 10-12 months and essentially can contribute an annual crop for exploitation. Life span is usually 2-3 years. The species is presently considered to be in decline, with no conclusive reasons why, although commercial and recreational fishing pressure is significantly high.
* Speckled Trout: This highly popular recreational species is found along the coast from barrier islands to inland brackish ponds and lakes. Although there can be substantial migration up and down an estuary, the species does not move much between estuaries, thereby creating estuary-specific populations. They are carnivores feeding on shrimp, crabs, and forage fish such as bay anchovy and Gulf menhaden, and even on smaller juvenile spotted seatrout and red drum. Adults spawn primarily from May-August in a wide variety of habitats from sandy beaches to shallow vegetated ponds. This is often governed by water temperature and light, but the underlying habitat need is the proper salinity. The species can live and spawn in salinities from 10-40 ppt, but optimal spawning habitat is 17-35 ppt for best egg viability. Individuals mature and are capable of spawning by the beginning of their second year of life, with males usually mature at a total length of 210-230 mm (8-9 in) and females at a total length of about 300 mm (12 in). Life span is usually 5-9 years. This is a fishery with the species contributing a new exploitable population annually. The species is not considered to be in decline.

* Gulf Menhaden: This is the most abundant, by poundage, industrial species harvested in Louisiana and the northern Gulf of Mexico. The adults are harvested in great schools upon the shallow waters of the continental shelf off the barrier islands. This species can be found in a wide salinity range from ocean strength to as low as 2-5 ppt. Adults and juveniles are also found in large schools in all salinities of the estuaries. All life stages are most abundant in salinities ranging from 5 to 10 ppt. Menhaden mature and spawn offshore in their second year of life and have a protracted spawning period from September to April with a peak generally between December and February. This is a filter-feeding animal eating on microscopic animals and plants that constitute plankton.

*Note: Menhaden is not only a commercial species, but also a forage species providing a source of food as a prey animal for many important fish species. It provides a key ecological niche within the food web of the estuary. Other extremely important forage species include bay anchovies, killifish, mud crabs, and grass shrimp.*

(**4) Birds** – All living creatures are directly tied to the habitats that sustain them. In general, birds need three things: places to nest, shelter from predators and inclement weather, and adequate food and water. Essentially each of these needs are themselves provided by different habitats.

Barataria–Terrebonne is a patchwork of many different habitat types. Each of these different habitat types is used by different birds for different reasons. While much of this region consists of water, there are large expanses of wetland areas including saltwater marsh, freshwater marsh, and forested wetlands. These marsh and forested wetland habitats are lower in elevation than the surrounding natural ridges, causing them to remain wet throughout much of the year. Small remnants of upland forests still remain along the natural ridges of bayous and streams, however, many of these upland forests and some forested wetlands have been cleared for agriculture and residential/urban development.

* Barrier and Headland Beaches- Along the coast are the barrier islands and headland beaches, many of which are accessible only by boat. The beaches, mudflats, and adjacent gulf and bay waters form a ribbon of habitats that are extremely important to many species of birds that pass through on their long migratory journey, including shorebirds such as threatened Piping Plovers, Wilson’s and Snowy plovers, Willets, Sanderlings, and Red Knots. These areas are also important to colonial water birds including Brown Pelicans, Laughing Gulls, Least and Foster’s terns, and Black Skimmers. These habitats are not only used as staging and refueling areas for migrants but they are also important for many species that breed in Barataria-Terrebonne. Common birds that nest along barrier islands include the Royal Tern, Caspian Terns, Black-necked Stilts, Roseate Spoonbills, Great Egrets, Snowy Egrets, and Tricolored Herons.
* Marshes - There are many places in southeast Louisiana where vast freshwater, intermediate, brackish, and saltwater marshes stretch as far as one can see. These seemingly endless lush green fields with their intermittent ponds, lakes, and bays are important habitat for millions of birds. Freshwater marsh gives way to intermediate, brackish, and finally saltwater marsh, representing an increase in salinity and decrease in plant diversity as one progresses southward toward the Gulf of Mexico. Migratory songbirds that spend part of their journey in marsh habitats include Northern Waterthrush, Yellow Warblers, Common Yellow-Throats, and Indigo Buntings. These birds can typically be found in the floating marsh habitats that support shrub species of plants. Resident marsh birds that nest and make their home here include Mottled Ducks, Common Moorhens, Glossy and White-faced ibis, and Marsh Wrens. Common Loons, Horned Grebes, Lesser Scaup, and Red-breasted Mergansers are usually found on the open lakes and bays that fringe many of these marsh habitats.

Distribution of many species of birds is influenced by salinity, with species such as Clapper Rails and Seaside Sparrows restricted to salt marsh, while Least Bitterns, King Rails, and Purple Gallinules are found in fresher marshes. Some species tolerate a wide range of salinities and can be found throughout all marsh habitats, including Red-winged Blackbirds, Great Blue Herons, and White Ibis.

* Forested Wetlands - Inland from the marshes are the seemingly impenetrable forested wetlands of Barataria-Terrebonne that include both swamp and bottomland hardwoods. Swamp forests with their cathedral bald cypress, moss draped water tupelo, and tea-stained water are a hallmark of Louisiana. These majestic cypress/tupelo forests are important not only to migrants such as Yellow-crowned Night Herons, Acadian Flycatchers, Northern Parulas, and Hooded, Prothonotary, and Yellow-throated warblers but are equally important to resident Great Blue Herons, Wood Ducks, Red-shouldered Hawks, Barred Owls, and Pileated Woodpeckers. In the winter, the swamps play host to Yellow-bellied Sapsuckers, Eastern Phoebes, and hordes of Yellow-rumped Warblers.

Flanking many of these cypress/tupelo swamp forests are the bottomland hardwoods of Barataria-Terrebonne. Here, plant diversity is at its greatest. Like cypress/tupelo swamp, bottomland hardwoods are also very important for migratory songbirds, including Yellow-billed Cuckoos, Summer Tanagers, Red-eyed Vireos, and Great-crested Flycatchers. Resident birds such as Eastern Screech Owls, Northern Cardinals, Blue Jays, and Carolina Chickadees are common inhabitants of bottomland hardwood forests. In winter, forested wetlands shelter Sharp-shinned Hawks, American Woodcock, Hermit Thrushes, Ruby-crowned Kinglets, Blue-headed Vireos, and White-throated Sparrows.

* Upland Forests - Found along the natural ridges of relict distributaries (bayous) and on cheniers (live oak forests) near the coast are the upland forests of Barataria–Terrebonne. Historically, upland forests also dominated many of the barrier islands that still exist today. Much of these once vast forests were cleared for agricultural and urban development long ago as they represented the highest ground available. This “highest ground” was the last place to flood during periods of high rainfall and strong southerly winds.

Cheniers (live oak ridges) and upland forests on barrier islands are of particular importance to migratory songbirds just before or after their gulf crossing, including Swainson’s Thrushes, Yellow-throated Vireos, Scarlet Tanagers, Painted Buntings, Rose-breasted Grosbeaks, Baltimore Orioles, Tennessee, Cerulean, Blackburnian, Kentucky, Wilson’s, Black-throated Green warblers, and many others. These upland plant communities produce seeds, fruit, and insects important to songbirds that spend part of their migratory journey in these barrier islands habitats.

**(5) Wildlife** - A few species are profiled based on their location within the delta, their value as indicators of habitat requirements, and public interest:

* American Bullfrog – the bullfrog is a very popular commercial and recreational species. A freshwater fishing license is all that is required for collection of individuals. It is the largest frog in North America reaching a length of 200 mm (8 in). Males are usually territorial, and when they mate, the female lays a film of 10,000 to 20,000 eggs on the surface of the water around vegetation. Mating occurs from early March to June. Bullfrogs occur in any freshwater habitat throughout the delta. There has been a general decline in amphibian populations throughout the southern states. The status of the bullfrog in the B-T is not known; however, it is considered one of the hardiest amphibian species for survival.

* American Alligator – The alligator is managed effectively as a ranched (farmed) animal using wild-harvested eggs from nesting females collected from private lands, with 12% of successful hatchlings returned to wild within two years and when an adequate size for better survival. Additionally, the state allows wild harvest for skin and meat in September of each year. As of January 2015, there were 56 licensed farmers in Louisiana with 32 having stock with an on-farm inventory totaling 799,047 alligators. During the 2014 tag year (January 2014 through December 2014), an estimated 341,888 farm-raised alligators were harvested with an estimated value of $81.7 million. Eight (8) of the 32 farms with stock are located in the B-T estuaries.

During the 2014 wild season, a total of 36,277 alligators were harvested by 3,279 licensed alligator hunters. Alligators harvested averaged 7.6 feet in length, with an estimated value of $13.8 million. Wild harvest for skin and meat is managed by the LDWF allowing one alligator per prescribed acreage. To understand the importance of habitat acreage for alligator population management, the state allowed in 2014 for Lafourche parish an alligator acreage ratio of 1:160 for cypress-tupelo swamp, 1:90 for freshwater marsh (< 1 ppt salinity), 1:55 for intermediate marsh (1-3 ppt salinity), and 1:140 for brackish marsh (3-15 ppt salinity). The acreage ratio varies from parish to parish, but the importance of freshwater and intermediate marsh is evident for nesting populations. The success of state management has removed the species from the threatened and endangered species list. The population is healthy, but very dependent on adequate nesting habitat.

* Bottlenose Dolphin- There may not be an estuarine species that brings more delight to the public than the dolphin. Besides its fame, it has an integral position within the estuarine ecosystem as a top predator. Bottlenose dolphins inhabiting the bays, sounds, and other estuaries adjacent to the Gulf of Mexico form discrete communities. Therefore, the Barataria population, as well as the Terrebonne population, are unique to their respective estuary. A 1995 NMFS study indicated a best estimate population of 209 dolphins in Barataria Bay and 100 in Terrebonne Bay. A dolphin can weight 135-635 Kg (300-1400 lbs.) and reach a length of 2-4 m(6.0-12.5 ft.). Their life span is 40-50 years, and sexual maturity varies by population and ranges from 5-13 years for females and 9-14 years for males. Calves are born after a 12-month gestation period and wean at 18 to 20 months. On average, calving occurs every 3 to 6 years.

*Note: NOAA found, after nearly four years of monitoring after the Deepwater Horizon oil spill, that only 86.8% of the Barataria bay dolphins survived each year, as compared to other populations where roughly 95% of the dolphins survived. The reduced reproductive potential, along with decreased survival, will have long-term consequences for the Barataria Bay dolphin population. Dolphins were noted with disease conditions, including lung disease and impaired stress response.*

* American Black Bear – This species was recently removed from the threatened list in Louisiana. Home populations are known to exist in the coastal wetlands of the Atchafalaya basin as well as the central and northern habitats of the basin and in the northern region of the B-T basin in Point Coupee Parish near False River. There have been numerous sightings of black bears throughout the northern and central regions of the B-T basins.

**(6) Threatened and Endangered Species -** Threatened and endangered plant and animal species exist in all 16 parishes comprising the Barataria-Terrebonne National Estuary. Louisiana has identified 20 rare natural communities in the Estuary.

**E. LEAD AGENCIES OR ENTITIES RESPONSIBLE FOR IMPLEMENTING ACTION**

* **Louisiana Department of Wildlife and Fisheries (LDWF) -** The lead state agency for fish and wildlife in the state is the Louisiana Department of Wildlife and Fisheries**.** Major management divisions within the LDWF are Office of Fisheries, Office of Wildlife, Office of Management and Finance, Law Enforcement and Legal, all working together to assure conservation and stewardship of living resources.
  + LDWF factors in pollinators as a keystone species in largescale land acquisition and restoration
  + LDWF has developed Management Plans for alligators, shrimp, oysters, speckled trout, red drum and many more species.
  + Birds
  + LDWF is presently revising its 2005 Wildlife Action Plan and has a draft 2015 plan on its website.
  + The Louisiana Natural Heritage Program, within LDWF, develops and maintains a database on rare, threatened and endangered species of plants and animals and natural communities for Louisiana.
  + Boards and Commissions within LDWF that meet to discuss issues of importance specific to the management of a species
    - Alligator Advisory Council
    - Fur Advisory Council
    - Hunting and Fishing Advisory Education Council
    - Artificial Reef Council
    - Oyster Task Force
    - Shrimp Task Force
    - Crab Task Force
    - Crawfish Task Force
* **Louisiana Department of Natural Resources (LDNR)** – LDNR is primarily a regulatory agency with coastal wetlands responsibilities housed within the Office of Coastal Management. The office is comprised of two divisions:
  + Permits/Mitigation Division – an important activity within the division is the Coastal Use Permit (CUP) process. The purpose of the CUP is to document and regulate coastal zone activities that may increase the loss of wetlands and aquatic resources, as well as to reduce conflicts between coastal resources users. A second activity within the office is Mitigation Banking. Mitigation must offset any activity that creates a net loss of wetlands.
  + Interagency Affairs & Field Services Division. This division is responsible for implementing the Louisiana Coastal Resources Program (LCRP); 1980 LRCP Final Environmental Impact Statement.
* **Louisiana Coastal Protection and Restoration Authority (CPRA)** – A principal function of CPRA is to develop and revise every five (5) years the “Louisiana Coastal Master Plan for a Sustainable Coast.” Reports have been published in 2007, 2012, and the draft pan for 2017 was released in January 2017 for public comment. This document is the state’s blueprint for coastal restoration and protection activities and has potential significant influence on living resources. Report development has public and agency inputs.
* **Louisiana Department of Agriculture and Forestry** – The Department has a pollinator education program, the “Louisiana Pollinator Cooperative Conservation Program” (LPCCP), in cooperation with the LSU Agriculture Center.
* **Federal Agencies: U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), U.S. Fish and Wildlife Service (USFWS), U.S. Geological Survey's (USGS), and the National Oceanic and Atmospheric Association’s (NOAA) National Marine Fisheries Service (NMFS).**
  + The USFWS Wildlife and Sport Fish Restoration Program (WSFR), collaborating with the Association of Fish and Wildlife Agencies (AFWA), encourages States to address pollinator conservation in projects that use Federal financial assistance funds.
  + USFWS and NOAA administer the Endangered Species Act.
  + NRCS includes pollinator habitat as part of its Environmental Quality Incentives Program (EQIP). As of 2016, there are no pollinator habitat projects in the BTNEP parishes.
  + NOAA’s (National Marine Fisheries Service (NMFS) administers the Marine Mammal Protection Act (MMPA), houses the Office of Sustainable Fisheries, and provides technical advice to government agencies and the public on proposed actions that could have a negative effect on living marine resources, including coastal wetlands.
  + NOAA established the Coastal and Estuarine Land Conservation Program (CELCP) in 2002 to protect coastal and estuarine lands considered important for their ecological, conservation, recreational, historical, or aesthetic values.
  + USGS administers the Amphibian Research and Monitoring Initiative (ARMI). The south-central region of AMRI includes the States of Texas, Oklahoma, Arkansas, Mississippi, and Louisiana.

*Note: Support implementers should include the Barataria-Terrebonne National Estuary Program, other state agencies including the Department of Culture, Recreation, and Tourism, the Department of Transportation and Development, and others including NGOs. In particular, the BTNEP program has collaborated with a number of agencies and NGO’s to advance aspects of the CCMP for 25 years. Over the past two decades, the BTNEP program has joined agencies including the LDWF, FWS, and NWRC to collect data and synthesize information regarding colonial nesting birds. BTNEP, in collaboration with a number of other entities, has developed an extensive database regarding nesting shorebirds along the Louisiana coast. More recently, the BTNEP program through partnerships with CPRA, LDWF, and FWS has developed an extensive dataset regarding wintering birds along the Caminada Headland including the threatened and endangered Piping Plover and Red Knot. Efforts to advance our knowledge regarding the life history requirements of these birds should continue through efforts similar to these. Furthermore, the BTNEP program has worked with a number of partners including the Greater Lafourche Port Commission to restore habitat for Neotropical migrants in the Port Fourchon area, with oil and gas companies to manage their properties for nesting shorebirds and with CPRA to enhance habitat for birds in lower Plaquemines Parish. With the increased scope of this new action plan, BTNEP seems poised to work with many different partners to conduct similar work to support other wildlife and fish projects that benefits people and the natural habitats these species require.*

**F. TIMELINES AND/OR MILESTONES**

In part, as referenced here, the CCMP supports the implementation of the various plans developed by other agencies/entities. Each of those individual plans has their own specific timelines and milestones. Implementation of actions through the BTNEP Management Conference and financed through Section 320 funding are typically developed annually by various Action Plan Teams. These concepts typically involve partnerships/collaboration with various agencies/institutions; as such, many are considered opportunistic, not following specific timelines. Annual work plans developed through this process define timelines and milestones.

* **Pollinators**: The National Strategy to Promote the Health of Honey Bees and Other Pollinators outlines the following goals:
  + Reduce honeybee colony losses during winter (overwintering mortality) to no more than 15% by 2025.
* Increase the Eastern population of the monarch butterfly to 225 million butterflies occupying an area of approximately 15 acres (6 hectares) in the overwintering grounds in Mexico, through domestic/international actions and public-private partnerships, by 2020.
* Restore or enhance 7 million acres of land for pollinators by 2020 through Federal actions and public/private partnerships.

Pollinator habitat projects should be implemented within the estuary as suitable project sites and funding are identified.

* **Threatened and Endangered Species**: For threatened and endangered species, Federal recovery plans set timelines specific to each species varying from 3 to 6 years to completion after listing. Recovery plans will vary for each species and must include the following information:
  + a description of "site-specific" management actions to make the plan as explicit as possible;
  + the "objective, measurable criteria" to serve as a baseline for judging when and how well a species is recovering; and
  + an estimate of money and resources needed to achieve the goal of recovery and delisting.

**G. POSSIBLE RANGE OF COSTS AND SOURCES OF FUNDING**

* As defined above, Lead Agencies/Entities are legislatively mandated to manage issues related to EM-15. Furthermore, each agency/entity develops annual budgets and programmatic budgets internally to address those legislatively mandated requirements. These budgets or discussion thereof are not presented here.

BTNEP as a co-lead implementor works with other lead agencies/entities on an annual basis to define datagaps and develop partnerships with these organizations to address those datagaps. This includes an annual tiered process, first convening meetings of various action plan teams to discuss needs for a particular action plan Projects are defined during this phase along with appropriate costs/budgets. These **c**osts vary according to the size and scope of the individual projects. As the process moves further, these project concepts and associated budgets are presented to the Management Conference where they are discussed and approved and included as part of individual BTNEP work plans. Funding sources vary, including CWA Section 320 funding. Other funding sources include but are not limited to the State Wildlife Grant Program administered through LDWF, section 6 Program administered through the FWS, various funding sources through CPRA, and the RESTORE Act. Since the process of selecting projects to address datagaps is used annually, no reasonable expectation of costs can be presented beforehand.

**H. PERFORMANCE MEASURES**

**a. Possible Data Gathered:**

* **Plants**
* **Pollinators:** All organizations maintain a list of acres/square feet of pollinator habitat created.
* **Fish and Shellfish**
* **Birds**
* **Wildlife**
* **Threatened and Endangered Species:** Populations are assessed by variables such as presence/absence, reproductive success, breeding, survival, abundance, density, etc.

**b. Monitoring**

**i. Parties responsible**

* **Plants**
* **Pollinators:** USFWS, NRCS, LDWF
* **Fish and Shellfish**
* **Birds**
* **Wildlife**
* **Threatened and Endangered Species**: The Endangered Species Act (ESA) requires USFWS and NOAA to monitor species recovered and removed from the endangered species list "...in cooperation with States..." and "...for not less than five years."

**ii. Timetable for gathering data**

* **Plants**
* **Pollinators:** Annual Report
* **Fish and Shellfish**
* **Birds**
* **Wildlife**
* **Threatened and Endangered Species:** Annual Report

**iii. How data is shared**

* **Plants**
* **Pollinators:** Via Agency Websites
* **Fish and Shellfish**
* **Birds**
* **Wildlife**
* **Threatened and Endangered Species:** Annual Report

**iv. Possible data gaps**

* **Plants**
* **Pollinators:** None Identified
* **Fish and Shellfish**
* **Birds**
* **Wildlife**
* **Threatened and Endangered Species:** None Identified

**v. If additional funding is needed**

* **Plants**
* **Pollinators:** Yes, as available
* **Fish and Shellfish**
* **Birds**
* **Wildlife**
* **Threatened and Endangered Species:** Yes, as available