Full Name [redacted]

10/13/2018

id. 11350217

Original submission

10/13/2018

Email Address	[redacted]
Professional Title	[redacted]
Organization	[redacted]
Do you meet all of the requirements for the Biological Science category?	**Yes**
Enter your courses that fulfill the 9 credits in Ecology	**1. Forestry 2061: Forest Ecology- 3 credits, Louisiana State University** **2. Wildlife 4013: Ecology and Management of Wetland Wildlife- 3 credits, Louisiana State University** **3. Botany 4020: Taxonomy and Ecology of Aquatic Plants- 3 credits, Louisiana State University**

Enter your courses that fulfill the remaining 6 credits in Biological Science	**4. Biology 1201: Biology for Science Majors- 3 credits, Louisiana State University** **5. Botany 1202: Botany for Science Majors- 3 credits, Louisiana State University** **6. Zoology 1202: Intro Zoology- 3 credits, Louisiana State University** **7. Wildlife 3016: Wildlife Biology of Mammals, Amphibians and Reptiles- 3 credits, Louisiana State University** **8. Zoology 4142: Ornithology- 4 credits, Louisiana State University** **9. Zoology 4141: Mammology- 4 credits, Louisiana State University** **10. Fisheries 4039: Biology of Fishes- 3 credits, Louisiana State University** **11. Forestry 2001: Dendrology- 3 credits, Louisiana State University** **12. Botany 3060: Introduction to Plant Physiology- 4 credits, Louisiana State University** **13. Botany 4041: Plant Taxonomy- 4 credits, Louisiana State University** **14. Entomology 4018: Forest Insects and Diseases- 4 credits, Louisiana State University**
If any of your courses in this category do not have titles that appropriately indicate the course content, please provide additional explanation.	n/a
Do you meet all of the requirements for the Physical Science category?	**Yes**
Enter your courses that fulfill the 6 credits in soils, hydrology, and/or climate science	**1. Agronomy 2051: Soil Science- 4 credits-Louisiana State University** **2. Oceanography and Coastal Science 4164: Deltaic Processes- 3 credits-Louisiana State University** **3. Oceanography and Coastal Science 4166: Wetland Delineation- 3 credits-Louisiana State University**
Enter your courses that fulfill the 9 remaining credits in the Physical Science category	**4. Chemistry 1201: Basic Chemistry I- 3 credits-Louisiana State University** **5. Chemistry 1202: Basic Chemistry II- 3 credits-Louisiana State University** **6. Chemistry 2261: Organic Chemistry- 3 credits-Louisiana State University**

If any of your courses in this category do not have titles that appropriately indicate the course content, please provide additional explanation.	n/a
Do you meet all of the requirements for the Resource Management and Conservation Category?	**Yes**
Enter your courses that fulfill the 3 credits in ecological dimensions	**1. Forestry 4036: Forest Management- 4 credits-Louisiana State University** **2. Forestry 4032: Forest Fire Protection and Use- 3 credits-Louisiana State University** **3. Forestry 4035: Forest Game / Range Management- 3 credits-Louisiana State University**
Enter your courses that fulfill the 3 credits in human dimensions	**4. Wildlife 4050: Wildlife Policy and Law Enforcement- 3 credits-Louisiana State University** **5. Forestry 4039: Renewable Natural Resources Policy- 3 credits-Louisiana State University** **6. Forestry 4021: Recreation- 3 credits-Louisiana State University** **7. Forestry 4038: Forest Economics- 3 credits-Louisiana State University** **8. Environmental Science 7043: Environmental Law and Regulation- 3 credits-Louisiana State University**
Enter the courses that fulfill the remaining 6 credits in the Resource Conservation and Management category.	**9. Wildlife 1001: Intro Wildlife Management- 2 credits, Louisiana State University** **10. Forestry 1001: Conservation of Forest Resources- 2 credits, Louisiana State University** **11. Wildlife 2031: Principles of Wildlife Management- 3 credits, Louisiana State University** **12. Fisheries 2001: Introduction to Fisheries and Aquaculture- 2 credits, Louisiana State University**
If any of your courses in this category do not have titles that appropriately indicate the course content, please provide additional explanation.	n/a

Do you meet all of the requirements for the Quantitative Science Category?	**Yes**
Enter your courses that fulfill the 6 credits in inventory, monitoring, and/or assessment	**1. Forestry 3003: Forest Biometrics- 4 credits, Louisiana State University** **2. Forestry 3036: Field Studies in Mensuration- 2 credits, Louisiana State University** **3. Geography 4045: Environmental Remote Sensing- 3 credits, Louisiana State University** **4. Experimental Statistics 4001: Statistical Methods- 4 credits, Louisiana State University**
Enter your courses that fulfill the remaining 3 credits in the Quantitative Science category	**5. Forestry 2011: Forest Measurements- 2 credits, Louisiana State University** **6. Civil Engineering: Elementary Surveying and Measurements-3 credits, Louisiana State University** **7. Civil Engineering: Elementary Surveying Lab- 1 credit, Louisiana State University** **8. Wildlife 4011: Wildlife Management Techniques- 3 credits, Louisiana State University** **9. Forestry 4061: Acquisition and Analysis of Geographical Data- 3 credits, Louisiana State University** **10. Geography 4047: Geographic Information Systems** **11. Geography 4998: Vector GIS- 3 credits, Louisiana State University** **12. Geography 4998: Remote Sensing/ GIS- 3 credits, Louisiana State University** **13. Geography 7975: Advanced Remote Sensing Seminar- 3 credits, Louisiana State University**
If any of your courses in this category do not have titles that appropriately indicate the course content, please provide additional explanation.	n/a
Do you meet all of the requirements for the Ecological Restoration Category?	**Yes**

Enter your courses that fulfill the 6 credits in Ecological Restoration.	**1. Oceanography and Coastal Science 7124: Applied Coastal Plant Ecology- 3 credits, Louisiana State University** **2. Oceanography and Coastal Science 4560: Wetland Loss, Restoration and Management- 3 credits, Louisiana State University** **3. Forestry 3002: Silviculture- 4 credits, Louisiana State University** **4. Forestry 3037: Field Studies in Silviculture- 2 credits, Louisiana State University** **5. Forestry 3040: Field Studies in Silvicultural Prescription- 1 credit, Louisiana State University** **6. Forestry 4033: Silviculture and Management of Hardwoods- 3 credits, Louisiana State University**
f any of your courses in this category do not have titles that appropriately indicate the course content, please provide additional explanation.	n/a
Upload Transcripts	[redacted]
Provide a brief description of your professional-level experience that satisfies the 5-year full time equivalent.	[redacted]
Upload CV/Resume	[redacted]
Check Project #1 to enter project details.	**Project #1**
Project #1: Name	**Danza del Rio Mitigation Bank**
Project #1: Location	**Brazoria County, Texas**
Project #1: Stage of Project	**Post-Implementation Maintenance**

Project #1: Objectives	**The purpose of the project was to establish a wetland mitigation bank under Section 404 of the Clean Water Act. The site restoration objective of the project was to re-establish and rehabilitate 795.8 acres of forested wetlands and 33.2 acres of upland forested wetlands with native species assemblage resembling that of the Columbia Bottomlands. The ecological objective of the project regarding the landscape and region was to restore and protect a forested wetland within the Columbia Bottomlands region of southwest of Houston, Texas. The Columbia Bottomlands is an ecologically, important area in the region which prior to settlement, comprised of 700,000 acres that formed a broad forested landscape from the Gulf Coast to approximately 100 miles inland. The area has historic significance in that is also known as Austin's woods as it was the first area that Stephen F. Austin chose for his first colony of 300 settlers in 1828. By the end of the 20th Century, only 178,000 acres remained as highly fragmented forested stands. The remaining areas remain threatened by residential and commercial development, agricultural conversion, timber removal and invasive species. The significance of the Columbia Bottomlands is that they serve as a major resting area for potentially 237 species of Nearctic-neotropical migratory birds. The US Fish and Wildlife Service estimates that approximately 239 million birds migrate through the Columbia Bottomlands every year. These forests provide the final opportunity to feed and rest prior to crossing the Gulf of Mexico. The US Fish and Wildlife Service has a goal to use perpetual-term conservation easements to protect 2,880 acres of wetlands with the region.**
Project #1: Project Description	**The project site is 935.9 acres which was historically forested as part of the larger Columbia Bottomlands forested complex. The site had been cleared and ditched for agricultural purposes and was being used for cattle grazing and pasture. Several utility rights-of-way had traversed the site as well. The project site was located next to a larger forested block which had never been cleared and was owned by the US Fish and Wildlife Service as part of the San Bernard National Wildlife Refuge. Specifically, this was the Dance Bayou Unit of the refuge. Since it had never been cleared it served as a good reference site for the historic conditions of the property. The restoration team conducted a baseline survey of the project site Based on the reference data evaluated and on-site data considered, a restoration design was implemented to provide a maximum benefit with efficient and low-cost solution. Based on the evaluation of the Dance Bayou Unit, the afforestation plan called for the planting of over 500,000 bare root, native tree species. Half of this number were 12 species consisting of native hardwood species and were based upon the floral inventories conducted on the Dance Bayou Unit. Of this, most of the species were hard-seeded species such as oaks, hickories and pecans. The minority of the species were light seeded species such as ash, elm, and maple. This was done as we expected more natural regeneration from the lighter-seeded species given the proximity of the site to the extant forest tracts. The other half of the planting was cottonwood tree cuttings so as every other tree species planted was a cottonwood. The purpose of this planting scheme was**

based on several considerations. There were two non-native species of concern on the project. One was Chinese tallowtree and the other was deep-rooted sedge. As cottonwood is a very fast-growing tree, it would quickly provide vertical and horizontal structure which would shelter the more shade tolerant desirable species by providing the optimal amount of sunlight. Additionally, the shade would prevent rapid colonization by the two invasive species thereby reducing potential labor and costs in controlling these species. This rapidly developing vertical structure would provide structural habitat to many silvicolous bird species. Once the cottonwood reached a certain height, they would be systematically deadened to release the more desirable hardwood species. The effect of deadening the cottonwood would also provide habitat for various fauna in the form of snags from standing dead stems and large woody debris from fallen stems. Given the project was mitigation bank, the restoration plan and project information were subject to public review and comment providing an opportunity for resource agencies, the public and other stakeholders to provide input and comment on the project. To insure protection of the site, the team engaged with a local non-profit land trust, Bayou Lands Conservancy, to negotiate a conservation easement for the property. Monitoring plots were established for future monitoring of vegetation and piezometers were installed to document that wetland hydrology was being achieved. Restoration was implemented in 2014 and an as-built report was completed for documentation. Monitoring is conducted yearly to determine the adequacy of the restoration in terms of planted stem survival, natural recruitment, effectiveness of invasive species control efforts, herbivory damage, and effectiveness of hydrology restoration. To date five monitoring reports have been completed for this project.

Describe how your project aligns with SER standards and principles of ecological restoration.

The project site was selected as it was non-forested and used for cattle production but was historically a forested tract. This was evidenced by aerial photography acquired in the 1940s. We conducted on-site baseline investigation which included an analysis of the soils, vegetative communities and hydrology of the site. This information coupled with an analysis of the climate history, aerial photographs, and information from the rancher who had managed the property allowed us to get a full understanding of this site. The site was adjacent to an existing forested site which is the 650-acre Dance Bayou Unit of the San Bernard National Wildlife Refuge complex. This site would serve as a reference for the restoration project as it consisted of an old-growth forest which had species rich flora of approximately 301 species. We visited with personnel of the San Bernard Wildlife Refuge and academic professionals who conducted research on the Dance Bayou Unit regarding to get a perspective on the floral history of the Unit. Additionally, the Natural Resources Conservation Service had conducted studies on the soil and hydrologic relationships of the Dance Bayou Unit. This information allowed us to establish measurable goals and restoration milestones. The goals were to provide a net increase in ecosystem services in the form of the physical, biological and chemical functionality of forested wetlands. The increase in physical

functionality was to provide for temporary storage of water during high rainfall events and lessen the impact of downstream flooding. The increase in biological function of restored forested wetlands would serve as habitat for local native wildlife species, specifically those that depend on wetlands for some portion of their lifecycle such as amphibians. The project would also provide additional forested habitat for Nearctic-Neotropical birds. The increase in chemical functionality would provide for processes that remove sediment, heavy metals, manufactured chemicals and other pollutants washed into the system during high rainfall events and thereby improve downstream water quality in Dance Bayou and the San Bernard Rivers. These benefits would then extent to Matagorda Bay and the Upper Texas Coast. The project soils were hydric indicating they formed under hydric conditions and were structurally intact. Once the agricultural ditches were removed, the frequency and duration of ponding would increase. An interm Hydrogeomorphic Model (iHGM) for riverine forested wetlands was utilized to predict physical, biological and chemical functional lift, measured as functional capacity units (FCUs) within nine defined wetland assessment areas (WAAs). The FCUs represent the functional capacity index (FCI) multiplied by the total number of acres. The FCI for each of the three functions are calculated utilizing 15 metrics which are measured. These are flood/ponding duration, flood/pond frequency, topographic roughness, course woody debris presence, percent woody vegetation coverage, percent mast producing species, species richness, basal area, tree density, tree density, midstory cover, herbaceous cover, soil detritus in A horizon, degree of redoximorphic features, absorptive properties of the soil, and connectivity of adjacent habitat. The models is run on future without restoration and a future with restoration. The difference in FCUs represent the net increase in function. Our projection for the project was a net increase of 562.1 Physical Functions; 794.1 Biological Functions; and 605.3 Chemical Functions over a 10-year period following implementation. After five years of monitoring, our results show an increase of 462.6 Physical Functions (82.3% of projected lift), 394.9 Biological Functions (49.7% of projected lift) and 509.9 Chemical Functions (84.2% of projected lift). Therefore, the project is on an adequate trajectory to meet or exceed its targets by year 10. The project was subsequently scaled up as five more restoration projects totaling 47.5 acres were added to it in the form of permittee-responsible mitigation projects. The result of the added projects was the restoration and protection of 935.9 acres of Columbia Bottomlands.

Project #1: Describe your role in the project.	**I served as the project manager and project designer on the project. As such I conducted a desktop analysis of the sites utilizing GIS. I commissioned a professional land surveyor to obtain accurate boundary information and worked with a title firm and legal counsel to review the title history to evaluate encumbrances which could affect the long-term protection of the property. I conducted the wetland delineation and collected data for the baseline information and served as the lead project designer. I coordinated with the various federal and state resource agencies regarding the permitting, development of the mitigation banking instrument. Specifically, these agencies included the Galveston District of the US Army Corps of Engineers, the US Fish and Wildlife Service, the Environmental Protection Agency, the Natural Resources Conservation Service, Texas Parks and Wildlife Department, Texas Commission on Environmental Quality and the Texas General Land Office. I commissioned an archaeologist who conduct a cultural resources survey to satisfy the Section 106 of the National Historic Preservation Act requirements related to the Section 404 Clean Water Act process. I worked with a licensed nursery to acquire localized seed sources and propagate these into 1-0 seedlings. I worked with our internal construction crew insure the site was adequately prepared. We utilized pre-emergent herbicides to abate the preponderance of pasture grass species and sub-soiled the site to a depth of 18 inches to abate the effect of years of cattle grazing and subsequent compaction. Once seedlings were procured, I worked with our staff to set up a mixing facility where the seedlings were received, inspected, mixed to insure species were not planted in mono-cultures of single species; and subsequently repackaged and shipped to the site. I contracted a planting contractor to install the seedlings to specification. I coordinated with our internal staff to monitor the project during and post-implementation and to provide monitoring reports on the projects. I selected Bayou Lands Conservancy, an accredited local land trust, to be the holder of the conservation easement. I worked with them to review the title information, develop the easement language, execute the easement and file it in the real-estate records of Brazoria County. I worked with our staff in developing project costs for implementing a casualty insurance policy to insure funds would be available to implement adaptive management and potentially restore another site should deficiencies be detected in the project. I worked with the National Fish and Wildlife Foundation to establish a long-term endowment to insure the availability of funds to pay for long-term protection and maintenance of the project.**

Upload Project #1 Supporting Information (Optional)

Danza_del_Rio_Supporting_Documents.pdf

Check Project #2 to enter project details.	**Project #2**
Project #2: Name	**Ponderosa Ranch of Pointe Coupee Mitigation Bank**

Project #2: Location	**Pointe Coupee Parish, Louisiana**
Project #2: Stage of Project	**Monitoring, Documentation, Evaluation, and Reporting**

Project #2: Objectives	**The purpose of the project was to establish a wetland mitigation bank under Section 404 of the Clean Water Act. The site restoration objective of the project was to re-establish, rehabilitate, restore and enhance 304.0 acres of forested wetlands and 1.7 acres of upland forested wetlands with native species assemblage resembling that of a Mississippi River alluvial floodplain forested wetland habitat consisting of bottomland hardwoods and baldcypress swamp habitat. The ecological objective of the project regarding the landscape and region was to restore and protect a forested wetland with the Terrebonne Basin of the Mississippi River alluvial valley with an emphasis on the contributing watershed of False River in Pointe Coupee Parish, Louisiana. The Mississippi River Alluvial Valley is an approximately 24 million-acre area which in pre-Columbian times consisted mostly of continuous bottomland hardwoods and swamps. Today, only about 20% of the original forested landscape remains and much of it is in fragmented blocks which average about 158 acres in size. Much of the deforestation was the result of clearing for agricultural use which accelerated in the 20th Century due to major flood control projects, advancements in land-clearing technology and spikes in soybean prices through the 1960s and 1970s. Within the Terrebonne Basin, it is estimated that over 200,000 acres of wetlands were lost from 1932 through 1990. False River is an approximate 3,200-acre oxbow lake in Pointe Coupee Parish which has ecological and economic significance to the region. False River has undergone a decline in water quality over the past 50 years as large amounts of forestland in the watershed was converted to agricultural uses with over 50 miles of drainage ditches were constructed in the contributing watershed. The results were siltation, nutrient loading and pollution entering False River from these agricultural areas. The Louisiana legislature established the False River Watershed Council to implement a watershed strategy, establish best management practices, develop a watershed conservation plan and investigate the acquisition of conservation easements. The afforestation of the project site, elimination of drainage ditches, and the protection of the site through a conservation easement fits the objectives as set forth for the restoration and protection of False River. The project also fits with the goals of the comprehensive conservation and management plan developed by the Barataria-Terrebonne National Estuaries Program (BTNEP) which are to preserve and restore wetlands, support diverse, natural biological communities, develop and meet water quality standards to protect estuary resources, and to work in conjunction with natural processes. The afforestation of this tract given its proximity to extant forests would provide benefits to various species of wildlife such as Neoarctic-Neotropical migrant birds, three of which are species of high conservation priority (Swainson's warbler, Cerulean warbler and swallow-tailed kites) and the Louisiana black bear, a species that was once a federally-listed threatened species but is now in recovery.**
Project #2: Project Description	**The total project site is 323.8 acres which was historically forested as part of the larger Mississippi River Alluvial Valley complex. The site had been mostly cleared of trees and ditched for agricultural**

purposes and was being used for cattle grazing and pasture. Even though it was cleared, it topography was not manipulated so its geomorphic landform remained which was that of a ridge and swale topography (i.e. meander scrolls) which was the result of various changes in the Mississippi River over time given the site was located between the current Mississippi River and Falser River, an oxbow lake and former channel of the Mississippi. The project site was located next to a larger forested block which had never been cleared for agriculture. Since it had never been cleared it served as a good reference site for the historic conditions of the property. Additionally, individual trees of baldcypress and bottomland hardwood species existed with the pasture as shade trees and therefore provided a good indication as to historic species-geomorphic relationship. The restoration team conducted a baseline survey of the project site and the adjacent forested area. Data collected in the reference area included species composition, landscape position, elevation, soil types, and hydrology. Based on the reference data evaluated and on-site data considered, a restoration design was implemented to provide a maximum benefit with efficient and low-cost solution. The afforestation plan called for the planting of over 167,000 native tree species. This consisted of 25 species consisting of native hardwood species and were based upon the floral inventories conducted in the reference site as well as existing information such as the USDA Plants Database, published soil surveys, Louisiana natural plant community publications, and various plant guides. The species consisted of approximately 50% hard-seeded species and 50% soft seeded species and was mixture of slow-growing and fast-growing species such as cottonwood, green ash and sycamore. The incorporation of fast-growing, light-seeded species results in a rapidly developing vertical structure would provide structural habitat to many silvicolous bird species. Approximately 98% of the seedlings were bare-root seedlings (BRS). However, given the anticipated water depths in some of the lower areas following hydrologic restoration, 2% of the total plants were containerized seedlings which were grown utilizing the root-production method (RPM). This technique results in an extensive root system and higher stem growth which would insure that the species heights would be well above the water depth. The trade off to utilizing RPM seedlings vs. BRS is that the RPM trees cost approximately 40x more therefore careful planning went into where the RPMs would go and how they were installed. To restore hydrology, over 41,000 linear feet of drainage ditches were backfilled with over 17,000 cubic yards of earthen material. A 2.1-acre area within the pasture was dominated by Chinese tallow-tree. This area was treated with herbicide to prevent stump sprouts, the trees were mechanically removed, and the area planted with native baldcypress swamp species. Given the project was mitigation bank, the restoration plan and project information were subject to public review and comment providing an opportunity for resource agencies, the public and other stakeholders to provide input and comment on the project. To insure protection of the site, the team engaged with a local non-profit land trust, the Mississippi River Trust, to negotiate a conservation easement for the property. Seventeen monitoring plots and 13 transects were established for future monitoring of vegetation

	and piezometers were installed to document that wetland hydrology was being achieved. Restoration was implemented in 2013 and an as-built report was completed for documentation. Monitoring is conducted to determine the adequacy of the restoration in terms of planted stem survival, stem growth, natural recruitment, effectiveness of invasive species control efforts, herbivory damage, and effectiveness of hydrology restoration. To date two post-implementation monitoring reports have been completed for this project.
Describe how your project aligns with SER standards and principles of ecological restoration.	**The project site was selected as it was non-forested and used for cattle production but was historically a forested tract. This was evidenced by aerial photography acquired dating back to the 1940s. We conducted on-site baseline investigation which included an analysis of the soils, vegetative communities and hydrology of the site as well as on a nearby reference area. This information coupled with an analysis of the climate history, aerial photographs, and information from the rancher who had managed the property allowed us to get a full understanding of this site. The site was adjacent to existing forested sites. This site would serve as a reference for the restoration project as it consisted of native species and had the same topography and geomorphic features of the project side which was a ridge and swale complex (meander scroll formations). Additionally, the Natural Resources Conservation Service had conducted an on-site investigation of the project area to determine the hydric nature of the soils. This information allowed us to establish measurable goals and restoration milestones. The goals were to provide a net increase in ecosystem services in the form of the physical, biological and chemical functionality of forested wetlands. The increase in physical functionality was to provide for temporary storage of water during high rainfall events and lessen the impact of downstream flooding. The increase in biological function of restored forested wetlands would serve as habitat for local native wildlife species, specifically those that depend on wetlands for some portion of their lifecycle such as amphibians. The project would also provide additional forested habitat for Nearctic-Neotropical birds. The increase in chemical functionality would provide for processes that remove sediment, heavy metals, manufactured chemicals and other pollutants washed into the system during high rainfall events and thereby improve downstream water quality in False River. These benefits would ultimately extend to estuaries within the lower portion of the Terrebonne watershed. The project soils were hydric indicating they formed under hydric conditions and were structurally intact. Once the agricultural ditches were removed, the retention of water would increase. The performance criteria for afforested areas was a minimum of 250 stems per acre and that Chinese tallowtree would be less than 1% by the time the long-term success criteria is met, which is defined as an 80% canopy coverage and expected no sooner than 8 years following implementation. In the four years since implementation, monitoring has showed that while Chinese tallowtree are present, they are at controllable numbers. Positive hydrology indicators are present in the form of surface water, saturation, crawfish burrows and oxidized rhizospheres around living roots. The**

bottomland hardwood areas have stem densities ranging from 316 to 409 stems per acre and 280 to 293 stems per acre in baldcypress swamp areas. In terms of growth, the average bottomland hardwood stem biomass, as measured in cubic inches, has increased by a factor of 77 and the baldcypress swamp biomass has increased by a factor of 76. The mitigation project was built of a 248.5-acre restoration project that our team design, permitted, implemented, and protected as a permittee-responsible mitigation (PRM) project. With the addition of this mitigation bank project, that result was 572.3 acres of restored and protected property. After the mitigation bank was implemented, we subsequently scaled up the restoration and protection with a 27.6-acre PRM and a 384.0-acre addition to the mitigation bank bringing to the overall total to 983.9 acres of restored and protected bottomland hardwoods and baldcypress swamp. 39 species of forbs, grasses, sedges, shrubs and trees have been observed in and around the monitoring plots of which 35 species have a wetland indicator status.

Project #2: Describe your role in the project.	**I served as the lead project manager and project designer for the project. As such I conducted a desktop analysis of the sites utilizing GIS. I commissioned a professional land surveyor to obtain accurate boundary information and worked with the title company and legal counsel to review the title history to evaluate encumbrances which could affect the long-term protection of the property. My team and I conducted the wetland delineation and collected data for the baseline information and served as the lead project designer. I coordinated with the various federal and state resource agencies regarding the permitting, development of the mitigation banking instrument. Specifically, these agencies included the New Orleans District of the US Army Corps of Engineers, the US Fish and Wildlife Service, the Environmental Protection Agency, the Natural Resources Conservation Service, and the Louisiana Department of Wildlife and Fisheries. I worked with a licensed nursery to acquire localized seed sources and propagate these into 1-0 bare-root seedlings and RPM containerized. I worked with our internal construction crew insure the site was adequately prepared. We utilized pre-emergent herbicides to abate the preponderance of pasture grass species and sub-soiled the site to a depth of 18 inches to abate the effect of years of cattle grazing and subsequent compaction. Once seedlings were procured, I worked with our staff to set up a mixing facility where the seedlings were received, inspected, mixed to insure species were not planted in monocultures of single species; and subsequently repackaged and shipped to the site. I contracted a planting contractor to install the seedlings to specification. I coordinated with our internal staff to monitor the project during and post-implementation and to provide monitoring reports on the projects. I selected Mississippi River Trust to be the holder of the conservation easement. I worked with our staff in developing project costs to fund an escrow account to insure funds would be available to implement adaptive management and potentially restore another site should deficiencies be detected in the project. I also worked on calculating budgets to fund a long-term account to insure the availability of funds to pay for long-term protection and maintenance of the project. For community engagement, I participated in public events regarding the restoration of the False River ecosystem emphasizing the role that these projects play in the ecosystem restoration effort.**

Upload Project #2 Supporting Information (Optional)

Ponderosa_Ranch_of_PC_Supporting_Documents.pdf

Check Project #3 to enter project details	**Project #3**
Project #3: Name	**South Fork Coastal Mitigation Bank**
Project #3: Location	**Calcasieu and Cameron Parishes, Louisiana**
Project #3: Stage of Project	**Monitoring, Documentation, Evaluation, and Reporting**

Project #3: Objectives	**The purpose of the project was to establish a compensatory mitigation bank under Section 404 of the Clean Water Act and the Louisiana Coastal Zone Management Program. The site restoration objective of the project was to re-establish and rehabilitate 595.9 acres of bottomland hardwood (BLH), 508.9 acres of coastal prairie (CP) and 458.3 acres of fresh-intermediate marsh (FIM) within a 1609-acre project site with native species assemblage resembling that of a coastal prairie-tidal marsh interface having gallery forests. The ecological objective of the project regarding the landscape and region was to restore and protect a wet prairie, marsh and gallery forest complex within an area historically known as the Calcasieu Prairie. The coastal prairies of Louisiana once covered approximately 2.5 million acres at the time of European settlement. Today, less than 100 acres of remnant prairie exists, and this habitat is a critically imperiled habitat. Much of this habitat occurs in small strips of land along railroad rights-of-way which were burned frequently to keep them clear of debris. Many prairie restoration projects are very small scale and while these are important, larger scale projects need to be done in order benefit insects and pollinators. The pre-settlement estimate for fresh marsh acreage in south Louisiana was 1 to 2 million acres while intermediate marsh was 100,000 to 500,000 acres. The post-settlement agricultural expansion resulted in a 25% to 50% loss of freshwater marsh and 50% to 70% of intermediate marsh. Grassland birds are a group of birds which have experienced more decline than other groups of birds. The restoration of grasslands is important to species such as northern bobwhite, loggerhead shrike, Le Conte's sparrow, seaside sparrows, Cerulean warblers, golden-winged warblers and Swainson's warblers. The inclusion of shrub species and gallery forests into the landscape would benefit migratory and resident species such as gray catbirds, indigo buntings, ruby-throated hummingbirds, hooded warblers, yellow-breasted chats, painted buntings, orchard orioles, and eastern towhees. Coastal prairie is important to nectar-feeding and pollinating species such as various butterflies and insects. The CP and FIM complex provide important habitat for numerous species of waterfowl, wading birds, Nearctic-Neotropical songbirds. These areas are also known to harbor a greater number of red-tailed hawks, northern harriers, and white-faced ibis than any other ecological region in the US. These marshes are the preferred habitat of whooping cranes therefore the restoration of this habitat supports the on-going effort to re-introduce the whooping crane to southwest Louisiana. Given the proximity of the restored fresh-intermediate marsh to the Calcasieu estuary, this would provide habitat to various marine and estuarine organisms such as brown shrimp, blue crab, killifish, menhaden, mullet, flounder, and red drum. Only 6% of the pre-settlement forests within the Chenier plan remain. Restoration of gallery forests would benefit various wildlife, nesting bird species and Nearctic-Neotropical migrant birds given the proximity of this site to the Gulf of Mexico. Additionally, re-established and protected forests would provide a link from coastal area inland which would facilitate species migration as a response to anticipated climate shifts.**
Project Description	**The total project site is 1609.0 acres which was historically a coastal**

prairie and tidal emergent marsh system within the Calcasieu Prairie and the Chenier Plain of southwest Louisiana. The site had been utilized for agricultural and livestock production and much of the site had been leveled. The project site did have areas in which the geomorphic features, the mima mounds, were never cleared and had some remnant prairie species. Although it had been grazed by cattle, the fact that it had never been cleared made it a good candidate for a reference site for the historic conditions of the property. The restoration team conducted a baseline survey of the project site and the reference area. Data collected in the reference area included species composition, landscape position, elevation, soil types, and hydrology. Based on the reference data evaluated and on-site data considered, a restoration design was implemented to provide a maximum benefit with efficient and low-cost solution. The afforestation plan within the bottomland gallery forest area called for the planting of over 320,000 bare-root seedlings comprised of 26 native tree species. Species selection was based upon the floral inventories conducted in the reference site as well as existing information such as the USDA Plants Database, published soil surveys, Louisiana natural plant community publications, and various plant guides. The species consisted of approximately 60% hard-seeded species and 40% soft seeded species and was mixture of slow-growing and fast-growing species such as cottonwood, green ash and sycamore. The incorporation of fast-growing, light-seeded species results in a rapidly developing vertical structure would provide structural habitat to many thamnic and silvicolous bird species. All seedlings were mixed prior planting to ensure spatial diversity of species (i.e. no monocultures). The coastal prairie and fresh-intermediate marsh areas were planted with marshhay cordgrass trade gallon containers at 19 per acre and 49 per acre. The purpose of planting the marshhay cordgrass was that it was a natural component of the species and this species will provide the fuel necessary to carry a prescribed fire. Given the prairie site had remnant species, the site required only assisted regeneration to supplement natural regeneration. Prairie seed species were planted over 51 systematically distributed one-acre sites throughout the coastal prairie restoration area. These distributions were done at a rate of 4 pounds per acre. The seed was a mixture of 102 lbs of wild seed collected from various prairie sites within the ecoregion. This mix consisted of 128 different species of coastal prairie grasses and forbs. The remaining 102 lbs of seed was purchased from the University of Louisiana at Lafayette (ULL) Ecology Center which consisted of native seeds propagated within their nursery facility. The mixture of seeds was infused into clay balls and distributed by hand at the 51 sites. The clay ball-method was used to ensure that the seed remained in place for germination and would not be carried away by floodwaters or eaten by birds or rodents. All planting was completed in the winter and spring of 2016. To restore hydrology, over 34,000 linear feet of drainage ditches were backfilled with over 115,000 cubic yards of earthen material. All old spoil and rice levees were degraded to natural grade. Gaps were created in a spoil bank separating the project area from a tidally-influence waterway and 3,200 linear feet of natural channel was restored to facilitate the

	natural ebb and flow of tidal waters into the fresh-intermediate marsh area. All interior fencing was removed so as not to impede wildlife movement. Given the project was mitigation bank, the restoration plan and project information were subject to public review and comment providing an opportunity for resource agencies, the public and other stakeholders to provide input and comment on the project. To insure protection of the site, the team engaged with US Land Conservancy, a non-profit land trust to negotiate and implement a conservation easement on the property. 129 monitoring plots and 27 transects were established for vegetation monitoring. Restoration was implemented in 2016 and an as-built report was completed for documentation. A prescribed burn schedule was established on the coastal prairie area to prevent woody encroachment and control diminish the amount of invasive herbaceous species over time. Monitoring is conducted to determine the adequacy of the restoration in terms of planted stem survival, stem growth, natural recruitment, herbivory damage, and effectiveness of hydrology restoration, invasive species control and controlled burning efforts. To date one post-implementation monitoring report has been completed for this project.
Describe how your project aligns with SER standards and principles of ecological restoration.	**The project site was selected as it was used for crop and cattle production but was historically a prairie-marsh system which included forests in the form of gallery forests. This was evidenced by aerial photography acquired dating back to the 1940s. We conducted on-site baseline investigation which included an analysis of the soils, vegetative communities and hydrology of the site as well as on an internal reference area. This information coupled with an analysis of the climate history, aerial photographs, and information from the farmer who had managed the property and coastal prairie experts with the USGS, NRCS, and the Louisiana Department of Wildlife and Fisheries allowed us to get a full understanding of this site. This internal reference site would serve as a reference for the restoration project as it consisted of unaltered landforms (mima mound complex). Although this site had some disturbance from cattle grazing and had been fire suppressed, it contained a large amount of remnant coastal prairie species. This information allowed us to establish measurable goals and restoration milestones. The goals were to provide a net increase in ecosystem services in the form of the physical, biological and chemical functionality of forested and emergent wetlands. The increase in physical functionality was to provide for temporary storage of water during high rainfall events and lessen the impact of downstream flooding. The increase in biological function of restored emergent and forested wetlands would serve as habitat for local native wildlife species, specifically those that depend on wetlands for some portion of their lifecycle such as various amphibian and fish species. The project would also provide additional habitat for several different species of birds, both migratory and sedentary. The increase in chemical functionality would provide for processes that remove sediment, heavy metals, manufactured chemicals and other pollutants washed into the system during high rainfall events and thereby benefit downstream water quality in the Calcasieu estuary. The project soils were hydric**

indicating they formed under hydric conditions and were for the most part structurally intact. The retention time of water would increase with the removal of agricultural drainages and the removal of levees and gapping of berms would allow for better water movement across the project site as well as allow for ingress and egress of tidally-influenced waters. The performance criteria for forested restoration area was a minimum of 250 stems per acre and that Chinese tallowtree would be less than 1% by the time the long-term success criteria is met, which is defined as an 80% canopy coverage and expected no sooner than 8 years following implementation. In the year since implementation, monitoring has showed that while Chinese tallowtree are present, they are at controllable numbers. The coastal prairie and fresh-intermediate marsh success criteria at one year after implementation was for the area to have been seeded and trees, saplings, or shrubs would represent < 35% of the area and invasive species would be <25%. The success criteria three years after implementation was for >80% herbaceous strata with >14 forb, herbaceous or graminoid species being present. Trees, saplings, or shrubs would represent <20% of the area and invasive species would be <5%. In the fifth year following implementation, the success criteria three years after implementation was for >90% herbaceous strata with >50 forb, herbaceous or graminoid species being present. Trees, saplings, or shrubs would represent <10% of the area and invasive species would be <3%. The hydrology requirements are that the site meet the indicators as defined in the Atlantic and Gulf Coastal Plain Regional Supplement to the Corps of Engineers Wetland Delineation Manual. Positive hydrology indicators are present in the form of surface water, high water table, saturation, aquatic fauna, oxidized rhizospheres around living roots, surface soil cracks, and crawfish burrows. The bottomland hardwood areas have stem densities ranging from 417 to 432 stems per acre. In terms of growth, the average stem biomass, as measured in cubic inches, has increased by a factor of 3.4 in one year. The species richness was 17 species tallied between the monitoring plots and the transects. The mitigation project was built of a 1,990.9-acre restoration project that our team designed, permitted, implemented, and protected as a permittee-responsible mitigation (PRM) project as well as an approved 515.4-acre mitigation bank which I had previously designed and implemented which subsequently was expanded with a second phase of 361.1 acres. With the addition of this mitigation bank project, the result was 4,476.4 acres of restored and protected property. After the mitigation bank was implemented, we are in the process of designing and seeking regulatory approval for a 241.8-acre phase to the bank which, if approved and implemented, would bring the restoration and protection to 4,718.2 acres of restored and protected forested, prairie and marsh habitat area.

Describe your role in the project.	**I served as the lead project manager and project designer for the project. As such I conducted a desktop analysis of the sites utilizing GIS. I commissioned a professional land surveyor to obtain accurate boundary information and worked with the title company and legal counsel to review the title history to evaluate encumbrances which could affect the long-term protection of the property. My team and I conducted the wetland delineation and collected data for the baseline information. Me and my assistant project manager, Dr. Bill Delany served as the co-lead project designers. We coordinated with the various federal and state resource agencies regarding the permitting, development of the mitigation banking instrument. Specifically, these agencies included the New Orleans District of the US Army Corps of Engineers, the US Fish and Wildlife Service, the Environmental Protection Agency, the Natural Resources Conservation Service, the Louisiana Department of Natural Resources, and the Louisiana Department of Wildlife and Fisheries. We worked with licensed nurseries to acquire localized seed sources and propagate these into 1-0 bare-root seedlings and smooth cordgrass plugs. We acquired seeds from various prairie grass and forb species either through collection from local habitats for through commercially available sources. I worked with our internal construction crew insure the site was adequately prepared. We utilized pre-emergent herbicides to abate the preponderance of pasture grass species and sub-soiled the site to a depth of 18 inches to abate the effect of years of cattle grazing and subsequent compaction. Once seedlings were procured, I worked with our staff to set up a mixing facility where the seedlings were received, inspected, mixed to insure species were not planted in monocultures of single species; and subsequently repackaged and shipped to the site. I contracted a planting contractor to install the seedlings to specification. We developed a system to encapsulate prairie and grass seeds into clay balls for distribution at the site. I coordinated with our internal staff to monitor the project during and post-implementation and to provide monitoring reports on the projects. I selected US Land Conservancy to be the holder of the conservation easement. Dr. Delany and I also coordinated with our field staff on controlled burn schedules as well as evaluate potential burn contractors to conduct regularly scheduled prescribed burns. I worked with our staff in developing project costs to fund an escrow account to insure funds would be available to implement adaptive management and potentially restore another site should deficiencies be detected in the project. I also worked on calculating budgets to fund a long-term account to insure the availability of funds to pay for long-term protection and maintenance of the project. For community engagement, I served on a panel at an open-house public forum to answer any questions regarding the mitigation plan. Dr. Delany and I also worked on a white paper for the Corps to address how certain wetland impacts could utilize coastal prairie habitat for compensatory mitigation in accordance with the federal mitigation rule. I also worked with our land staff to resolve potential conflicts regarding potential drainage issues as they related to neighboring properties.**

Upload Project #3 Supporting Information (Optional)