RPI

Hal Fravel, M.S., PWS **Research Planning, Inc.**

Environmental Scientist / Ecologist

Mr. Fravel is an environmental scientist with 14 years of professional experience in marine, coastal, aquatic, and terrestrial natural resource management and policy. His regional expertise includes the Gulf of Mexico and the Southeastern U.S.; however, he also has experience throughout the U.S., including the Caribbean region, and international experience in the Middle East. Mr. Fravel's specialty areas include wetland science (restoration, assessment, and delineation), ecological restoration, endangered species consultation (including migratory birds), GIS (spatial data analyses and data management), NEPA, scientific peer review, and environmental permitting (federal, state, and local). He has led environmental monitoring and assessment projects involving wetland vegetation analysis, multi-year water quality and sediment sampling, species specific biological surveying, monitoring, and relocation, and conducted shoreline assessments for pollution threats.

EDUCATION

M.S., Ecological Restoration, University of Florida, Gainesville, FL (2012)

B.S., Environmental Studies, Florida State University, Tallahassee, FL (2003)

CERTIFICATIONS

Professional Wetland Scientist
SCAT Shoreline Assessment
24-Hour HAZWOPER
Department of Interior Oil Spill Response and Damage Assessment
Florida Fish and Wildlife Conservation Commission (FFWCC) Gopher Tortoise Authorized Agent
Qualified Stormwater Management Inspector
Certified Arborist (2006-2017)

PROFESSIONAL EXPERIENCE

Senior Scientist, Research Planning, Inc., Tallahassee, FL (2015 to present)

Scientist to Senior Scientist, Atkins, Tallahassee, FL (2006 - 2015)

Adjunct Professor (Wetland Resources), Tallahassee Community College, Tallahassee, FL (2013 - 2014)

Wildland Firefighter/EMT, USFS & Flagstaff/Summit Fire Departments, Flagstaff, AZ (2004 - 2006)

GIS Intern, Florida Division of Emergency Management, Tallahassee, FL (2003)

PROJECT EXPERIENCE

Mr. Fravel has experience with ecological sampling, ecological restoration, wetland assessments, mitigation area management and environmental permitting.

NOAA Scientific Support Team Emergency Support Function (ESF) – 10, Hurricane Irma and Maria response, Florida, Puerto Rico, and U.S. Virgin Islands (2017-2018). Mr. Fravel supported NOAA's Emergency Restoration Division Scientific Support Team during the ESF-10 responses for Hurricanes Irma and Maria. Served as the Environmental Unit Leader (Puerto Rico) coordinating the identification

of potential pollution threats in the maritime environment including sunken, sinking, or damaged vessels and developing salvage plans to minimize additional impacts to sensitive habitats (i.e. mangroves, seagrass, coral reefs) during the removal process. Emergency consultations involved USACE Section 404/10; ESA Section 7 with USFWS and NMFS Protected Species Division; NMFS Essential Fish Habitat; National Historic Preservation Act Section 106 consultation with PR SHPO and USVI SHPO; and facilitated local consultations with Puerto Rico Department of Nature and Environmental Resources. He also worked in the Environmental Unit for operations in Florida focusing on developing salvage plans for vessels displaced in mangrove forests in the Keys.

Al Zour Oil Spill, Kuwait (2017). Conducted SCAT surveys along an oiled shoreline in Kuwait and collected oiled sediment samples that were sent to labs in England for fingerprinting analysis. The Responsible Party had not been identified at the time of sampling, therefore the oil samples were necessary to help identify the origin of the oil. Economic damages were assessed by conducting interviews with impacted parties including a power plant, desalination plant, multiple industrial facilities, and a million dollar a day port construction project. Data from the shoreline assessments were used to assist Kuwait Environmental Public Authority determine the trajectory of the oil spill and to give recommendations on cleanup methodology.

Restoration Planning following the *Deepwater Horizon* Oil Spill, Gulf of Mexico-wide including Texas, Louisiana, Mississippi, Alabama, and Florida (2015-2017). Mr. Fravel was a senior scientist contributing to the development of restoration planning and NEPA documents in support of the *Deepwater Horizon* Oil Spill NRDA. Tasks within the coastal wetland, sea turtle, and oyster sub-teams focused on screening potential restoration techniques currently utilized in the Gulf States that could offset impacts caused by the *Deepwater Horizon* oil spill. Work assignments included developing Phase IV Early Restoration Plans, contributions to the overall PDARP/PEIS, and support for the Programmatic Biological Assessment (BA) addressing potential impacts or restoration activities to 114 threatened and endangered species across the Gulf Region.

Scientific Peer Review for the Department of Treasury, Gulf of Mexico-wide including Texas, Louisiana, Mississippi, Alabama, and Florida (2016-present). Mr. Fravel conducts best available science reviews initiated by the Office of Gulf Coast Restoration, U.S. Department of Treasury for all Direct Component RESTORE projects involving restoration and protection of natural resources. Project reviews have included proposed large-scale coastal wetland and riverine restoration projects in Louisiana and Mississippi, beach/dune protection in Florida, bay scallop restoration and protection in Florida, as well as a variety of other restoration projects across several Gulf States. Each project review is conducted independently from other reviewers and comments are submitted to the Department of Treasury to help facilitate the decision on the scientific merit of each proposed project.

Minimum flows and levels development of the Wakulla and St. Marks Rivers, Wakulla County, Florida (2015-2017). The minimum flow and level (MFL) study will facilitate future management decisions on water withdrawal from these two river systems with the consideration of how different flow conditions can affect coastal wetlands, tidal freshwater swamp floodplain habitats, and protected species of the Wakulla and St. Marks rivers. This included instream habitat assessments, habitat mapping (i.e. GIS), and vegetation sampling within the floodplain of each river and downloading data from five (5) continuous data loggers stationed in the rivers and monthly water quality sampling at 29 vertical profile stations utilizing YSI water quality instruments to collect temperature, salinity, conductivity, pH, and depth.

Minimum flows and levels development for Jackson Blue Spring, Jackson County, Florida (2016-2017). The MFL study will facilitate future management decisions on water withdrawal from the Jackson Blue Spring system which includes Merritts Mill Pond and Spring Creek near Marianna, Florida. Completed work includes instream habitat assessments, habitat mapping (GIS), and vegetation sampling within the floodplain of the upper section, Merritts Mill Pond, and lower section, Spring Creek. These data will facilitate a model to determine how different flow conditions can affect the freshwater swamp floodplain habitats and water resources in the Jackson Blue Spring system.

Carrabelle Rock Mine Wetland Delineation, Franklin County, FL (2016). Field team lead for this wetland delineation on a private inholding within Tate's Hell State Forest / Wildlife Management Area in the Florida panhandle. Approximately 400 acres were assessed and surveyed for wetland features such as hydric pine plantation, emergent wetlands, and surface waters. Preliminary GIS desktop analyses included aggregating data from sources such as Natural Resources Conservation Service soil (NRCS), National Wetland Inventory (NWI) habitats, NWFWMD Florida Land Use, Cover and Forms Classification System (FLUCCS), and topographic data layers. State protected species, such as parrot pitcher plants, were surveyed for and identified in the field for future permitting requirements.

Egan's Creek Greenway Restoration, Fernandina Beach, FL (2012-2015)**.** Mr. Fravel served as the lead field biologist for this wetland restoration project involving the restoration of a forested freshwater wetland that had been impacted by a saltwater intrusion event. GIS mapping included current and historic aerial imagery, national wetland inventory (NWI) data, topographic data, natural resource conservation survey (NRCS) soil data, and Florida land use and forms classification system (FLUCCS) data. For three years, Mr. Fravel led field crews for biannual soil electrical conductivity (EC) sampling, vegetation sampling, and invasive species surveys. Measuring the EC at depths of 3, 9, and 15 inches provided data to evaluate trends via GIS and assist with the final restoration plan by identifying which areas have seen a decrease in saline conditions conducive to vegetative planting. The final restoration plan included a planting plan, invasive species eradication, infrastructure improvements, and snag management (i.e. removal or left in place for wildlife).

Natural Gas Pipeline Environmental Permitting and Wetland Assessment, Florida Gas Transmission (FGT), Florida (2006-2014). Mr. Fravel provided ongoing environmental services for FGT including wetland permitting, vegetation monitoring and invasive species identification/eradication, and listed species surveys and consultations during a large expansion that extending from the Alabama to south Florida via the west coast of Florida. Additional permitting for several smaller FGT linear utility corridor projects required site assessments, wetland delineations, threatened and endangered species habitat evaluations, and associated local permit applications. Bald eagle nest monitoring was required during the construction phase of a pipeline near Chiefland, FL requiring close coordination with USFWS.

Natural Gas Pipeline easement assessment and wetland delineation, Louisiana and Texas (2008-2012). Mr. Fravel conducted initial environmental assessments for several pre- and post-construction linear pipeline easements in both Lousiana and Texas for several private clients over this time frame. Assessments included wetland and/or stream classification, delineation, and assessments that included identifying vegetation, hydrologic indicators, and hydric soil indicators. Habitat assessments included identification of potential habitat for federally listed species in that given area.

Wetland Identification and Mitigation Assessment, Fairchild AFB, Washington (2014)**.** Lead biologist tasked with using existing GIS data and limited field surveys to determine the location of wetlands within the airfield of Fairchild Air Force Base. Existing infrastructure causes flooding to occur and water to pond

near and on the runway. The goal is to alter the flow of water to reduce the likelihood of ponding to occur within the airfield and direct the flow offsite. This will reduce the chance for ponding and also reduce the chance for wildlife to utilize existing water features. Further analyses were conducted to identify areas for potential wetland mitigation to offset any impacts that would occur as a result of modifying existing wetlands.

Panama City - Bay County International Airport Relocation Mitigation Management and Monitoring, Bay County, Florida (2009-2014). Part of a team of biologists responsible for performing a variety of mitigation monitoring activities associated with a 4,000 acre industrial site and related 10,000 acre mitigation site. Coordinated and led many of the field efforts associated with the mitigation site such as annual vegetation monitoring, invasive exotic species identification and eradication, hydrologic monitoring (piezometer water-level data collection), and water quality sampling within and adjacent to the project site. The quarterly water quality sampling program involved the coordination of several land owners, field crews, and two labs to analyze the samples.

Prop Scar and Seagrass Assessments, Indian River County, Florida (2008). After the Sebastian Inlet was dredged and rerouted, biological assessments were conducted to see if the rerouting was effective in keeping prop scar damage to a minimum in this highly sensitive seagrass area that included a known population of the federally threatened Johnsons' seagrass (*Halophia johnsonii*). Prop scars were categorized and assessed based on length and depth. Seagrass assessments were conducted to see if replanting activities from earlier restoration activities were effective.

Port Panama City Seagrass Permitting, Surveys, and Reporting, Bay County, Florida (2014). As senior scientist and task manager for the seagrass surveys, Mr. Fravel developed and directed seagrass surveys to meet the requirements obtained through coordination with the U.S. Army Corps of Engineers (USACE) and Florida Department of Environmental Protection as related to maintenance of the entrance channel and turning basin. This survey and the subsequent report delineated the composition, density, and extent of seagrass occurrences which aided in the design of the port expansion.

Derelict Vessel Environmental Assessments, Brevard and Volusia Counties, Florida (2008). Scientist responsible for performing biological assessments around derelict vessels slated for removal from the waterways. Assessments were conducted in the Intercoastal Waterway and the St. Johns River. The assessments involved identifying seagrasses and freshwater submerged aquatic vegetation that could potentially be impacted by the removal of the derelict vessels which was then used to determine permitting requirements.

Crane Creek Dredging Design and Construction Services, Brevard County, Florida (2007)**.** Field biologist responsible for conducting a freshwater submerged aquatic vegetation survey for several miles of Crane Creek. This task was part of an effort to attain and maintain water and sediment of sufficient quality to support a healthy seagrass-based estuarine ecosystem in the Indian River Lagoon by removing sediments that contain organic debris and fine-grained clay and silt materials (muck) from Crane Creek, improving the water and sediment quality within the creek and reducing the potential for the creation of turbid waters, which directly affect seagrass growth and recruitment.

Wetland Creation and Restoration for expansion of Okeechobee Landfill, Okeechobee County, Florida (2007-2009)**.** Lead field scientist for project overseeing the wetland restoration activities and assessments including wetland delineation, hydrologic monitoring and listed species assessments associated with the

operation and expansion of the Okeechobee Landfill and the 445-acre wetland mitigation area. This involved surveys for gopher tortoise (included relocation), Audubon's crested caracara, bald eagle, sandhill crane, woodstork, grasshopper sparrow, kestrel, and Florida scrub jays. He served as the site inspector for the 40-acre wetland creation associated with the mitigation area. As project arborist, he inspected thousands of plants and trees before their installation in the wetlands.

Large-scale Wetland Mitigation Banking Market Assessment for Hancock Forest Management (HFM), Nationwide U.S. (2013). Served as GIS analyst that estimated current and future supplies of and demand for mitigation bank credits within the study area; identifying population trends within the study area, including the assessment of population projections to determine high population and growth areas within the study area, identifying geographic markets corresponding with HFM timberlands that represent the best potential for mitigation banking; providing information on mitigation banking arrangements, and potential land-use issues. In each case, market studies have involved extensive GIS analyses using multiple publically available data, e.g., mitigation banks (location, guiding documents credit ledgers), watersheds, land cover, U.S. census, and building permits. Final deliverable included an overall ranking of potential mitigation banking opportunities at various geographic scales (USACE District, State, multi-counties, and/or watersheds) based on a customized scoring system.

Mitigation Bank Feasibility Study, Resource Management Services, Alabama and Florida (201-2014). GIS analyst responsible for conducting research for a mitigation bank feasibility study including land owned by the client across the entire United States. Research involved phone surveys to 17 USACE districts to determine their procedures for mitigation banking and particular areas of concern for each district. The USACE data were as synthesized and then merged with several factors including the clients land base, environmental, socio-economic, and population data to determine an area of potential interest to develop a wetland mitigation bank on client owned property. Areas of interested included locations where the client owned land, wetland, and/or surface water features were present, population growth is expected, and lack of existing mitigation banks in the area.

Town Creek Headwaters Mitigation Bank feasibility and permitting, North Carolina (2013-2014). Mr. Fravel assisted with the feasibility analysis and development of initial environmental permitting for a new wetland mitigation bank in North Carolina. He also managed the database for all field efforts and compiled publicly available GIS data to produce maps used in the development of the mitigation bank. He also conducted wetland delineations and habitat characterizations to determine the existing condition of the project area. These data were then taken to the conceptual level to determine if restoration activities could occur on this land and then estimate how many wetland and stream mitigation credits could be generated by those land management activities. Conceptual restoration activities included hydrologic alteration, prescribed burning, tree thinning operations, and vegetation planting.

Environmental Assessments and Mitigation Monitoring**.** The St. Joe Company. Florida (2009-2015). Senior Scientist. Mr. Fravel served as the lead biologist providing habitat restoration management recommendations regarding road removal, hydrologic restoration, vegetation planting, and prescribed burning to improve existing coastal wetlands and tidal creek habitats on St. Joe lands in Gulf, Bay, Walton, and Leon Counties, Florida. He performed the quarterly and annual coastal and marine multi-year water quality, sediment, seagrass, and wetland assessments at the Turkey Point – Alligator Harbor Mitigation Area along with coordinating the regulatory reporting required for state and federal permits at this mitigation area. At the Sacred Heart Mitigation Area in Gulf County, he conducted annual vegetation monitoring, provided management recommendations, and coordinated agency permitting.

Summer Camp Beach Community Mitigation Area Management, Franklin County, Florida (2009-2014). Biologist responsible for providing qualified mitigation supervisor (QMS) services for the Summer Camp Beach community and mitigation area. He provided management recommendations and coordination with client biologists regarding road removal, hydrologic restoration, vegetation planting, and prescribed burning. He performed the quarterly and annual coastal and marine multi-year water quality, sediment, seagrass, and wetland assessments. He also coordinated the reporting and response to state and federal agencies.

Sacred Heart Memorial Hospital Offsite Mitigation Area, Gulf County, Florida (2009-2014). Project manager and senior scientist providing monitoring and land management services for the Sacred Heart mitigation area. In this role, he provides management recommendations regarding habitat enhancement from planted silviculture to wet pine prairie and savannah (including prescribed fire recommendations). He directed and performed annual vegetation monitoring and annual protected species surveys including Telephus spurge (*Euphorbia telephioides*) and Chapmans rhododendron (*Rhododendron chapmanii*).

Herndon Swamp Restoration oversight, St. Johns River Water Management District, Brevard County, Florida (2006-2009). SJRWMD has enhanced berms and water crossings along a large canal to restore hydrologic function to Herndon Swamp. Mr. Fravel conducted monthly hydrologic monitoring for three years via staff gauges. He has conducted annual vegetation monitoring associated with the restoration activities to determine the response of vegetation to the altered hydrologic connection.

Mangrove Restoration Planning, Monroe County, Florida (2008)**.** Certified arborist tasked with the oversight of restoration activities that included replanting mangroves in areas that had been removed illegally. Impacted areas were assessed for extent of damages and to identify the survivability of affected mangrove individuals. Mr. Fravel reviewed the restoration plans that included identifying the areas that could be replanted based on the needs of mangrove species.

PROTECTED SPECIES CONSULTATION

Mr. Fravel is an authorized agent in the state of Florida for the survey, excavation, and relocation of gopher tortoises (state listed). He has experience with other federal and state protected species with many projects involving multiple species such as sea turtles, manatee, bald eagle, reticulated flatwoods salamander, and Johnsons' seagrass.

United States Marine Corps Support Facility – Blount Island Gopher Tortoise Relocation, Duval County, Florida (2013). Mr. Fravel was responsible for all aspects of this gopher tortoise relocation project involving the development and expansion of the Marine Corps Support Facility-Blount Island. He led the field surveys, environmental permitting, excavation and relocation tasks which included the excavation of over 100 gopher tortoise burrows and the relocation of 52 gopher tortoises to a recipient site on the Apalachicola National Forest. The relocated gopher tortoises were monitored on the recipient site for 12 months post-relocation thus satisfying the gopher tortoise permitting requirements for the state of Florida.

Duke Energy, Wetlands Permitting and Mitigation Planning, South Carolina (2014). Mr. Fravel conducted surveys for state and federally listed plants. Agency coordination was required to ensure proper procedures were utilized due to the sensitivity of the project. The listed plant surveys were integrated into the mitigation plan as part of the conservation efforts. Areas known to have listed plants would be enhanced to promote their growth and success.

Apalachicola National Forest (ANF) Gopher Tortoise Restoration, Relocation, and Research Project, Leon County, Florida (2013-2015). Biologist for this project involving the translocation of up to 3,000 gopher tortoises from third-party permit holders statewide to ANF as part of a large-scale restoration effort. A formal research study aimed at evaluating stocking density and enclosure size effects on the site fidelity of relocated tortoises is coupled with the restoration objectives. Project partners include the Florida Fish and Wildlife Conservation Commission (FFWCC), U.S. Department of Agriculture - Forest Service (USFS), The St. Joe Company, and the Wildlife Foundation of Florida (WFF). He is responsible for the implementation and reporting associated with the restoration and research project. These responsibilities include FWC and USFS permit acquisition, coordination with project partners, gopher tortoise acquisition from third party donors, study implementation including radio telemetry of gopher tortoises and vegetative community surveys, and statistical data analysis.

St. Sebastian River Muck Removal Services, Indian River/Brevard Counties, Florida (2006-2009). As the project biologist for this large dredge project within the St. Sebastian River, he was responsible for water quality compliance monitoring as well as monitoring for state- and federally listed wildlife species. Listed wildlife includes the bald eagle, gopher tortoise, Florida scrub jay, eastern indigo snake, sea turtles, and manatee. The bald eagle requirements for this project involved a strict monitoring plan with monthly reports sent to the U.S. Fish and Wildlife Service. He was the sole bald eagle monitor for three nesting seasons for the same bald eagle pair observing a total of four eaglets fledge.

Windmark Beach Community Ecological Services, Gulf County, Florida (2010-2014). As a team of biologists, he implemented yearly monitoring associated with management plans for several threatened and endangered species for federal and state agency requirements. His responsibilities also included habitat management recommendations, homeowner education, and environmental reporting across the development area. He also directed monitoring surveys, management activities, and reporting requirements in the gopher tortoise mitigation areas. These data were used to produce all monitoring reports and aid the client in meeting their mitigation goals and objectives. Species included in annual surveys were gopher tortoise, eastern indigo snake, Chapman's rhododendron, Godfreys butterwort, giant water dropwort, narrow leaved phoebanthus, and Chapman's crownbeard.

Jennings State Forest, FWC-Certified Gopher Tortoise Recipient Site Permitting, Clay County, Florida (2012). This is a FDOT sponsored project for the certification of a gopher tortoise recipient site within northeast Florida. With the certification of the recipient site, FDOT will have the option of using this site for future roadway projects requiring gopher tortoise relocation. Duties included gopher tortoise burrow and vegetation surveys to assess the current gopher tortoise population and habitat conditions using FFWCC approved surveys for over one thousand acres of state forest land.

Flightline Facilities Gopher Tortoise Relocation – Tallahassee Regional Airport, Leon County, Florida (2014). Project manager on this relocation project for development at the Tallahassee Regional Airport property. The project site included two facilities located approximately one mile apart and connected by a linear pipe for superconductive cable development. He led coordination and acquisition of permits with state and local agencies. He also directed all surveys, excavations, and relocations to the Apalachicola National Forest Gopher Tortoise Restoration, Relocation, and Research Site. Local permitting was satisfied via coordination with the City of Tallahassee Growth Management Department.

SR 70 Widening Reconstruction Services. Florida (2008-2009). Lead biologist responsible for conducting surveys and nest searches for Audubon's crested caracara for two nesting seasons along 15 miles of

existing roadway. Surveys were used to identify nests and/or habitat along the roadway/right-of-way to develop a monitoring plan for future construction operations. This resulted in several new nest locations and identification of additional habitat suitable for this federally threatened species.

US 441 widening, Georgia Department of Transportation, Georgia (2009). Field biologist performing eastern indigo snake surveys for GDOT along a 45 mile stretch of road that was proposed to be widened. Duties included locating all burrows within a specified distance from the existing road. Each burrow was then surveyed via a gopher camera, for any eastern indigo snakes.

NEPA AND PLANNING, DEVELOPMENT AND ENVIRONMENT (PD&E) EXPERIENCE

West Bay Parkway (CR 388) Extension Project Development and Environment (PD&E) Study, Bay County, Florida. As a biologist, he was a large part of the effort to assess the 13-mile proposed project through aerial interpretation, habitat characterization, Uniform Mitigation Assessment Method (UMAM) assessments, and threatened and endangered species surveys. The extensive desktop analyses included digitizing all habitats within the project area and collecting all data necessary for ground-truthing the digital files. Preliminary surveys have been initiated for gopher tortoise, reticulated flatwoods salamander, and many state- and federally-listed plants. Environmental assessments have been conducted at the project study area corridor and alternative alignment levels including agency coordination for protected species and essential fish habitat. He wrote and assisted with the writing of the Wetland Evaluation Report and Endangered Species Biological Assessment Report, as well as produced most of the maps for use in the field and reporting.

Wellness Way Corridor Feasibility Study, Florida (2014-2015). Environmental analysis of a proposed private toll road in the PD&E stages of development. Three alternative alignments were identified during an initial Corridor Feasibility Study conducted prior to this stage of planning. Mr. Fravel coordinated the initial desktop analyses of environmental features in and around the three 5 mile alternative alignments that is known habitat for the federally threatened sand skink (*Neoseps reynoldsi*). Mr. Fravel compiled and synthesized data in an environmental constraints report submitted to the client, detailing the potential involvement with wetlands and listed species.

Focused Environmental Assessment (EA) for Venice Municipal Airport Runway 13-31 Safety Improvement Project, Sarasota County, Florida (2014). Senior scientist responsible for authoring the affected environment section of the EA and managing the GIS data for all figure production for the EA. Mr. Fravel provided quality assurance and quality control (QA/QC) reviews of draft and final EA document submittals to the FAA. This EA evaluated impacts associated with the realignment of Runway 13-31 to conform to FAA design standards (preferred alternative) relative to a no action alternative. This evaluation was based upon environmental consequences to the affected environment including aircraft operations; noise; air quality; infrastructure and utilities; hazardous materials and waste; and earth, water, biological, cultural, and socioeconomic resources. This EA also evaluated cumulative impacts to these biophysical resources related to past, present, and future actions in the area.

Environmental Assessment (EA) for Relocation and Construction of the Panama City - Bay County International Airport VORTAC to Tyndall Air Force Base, Bay County, Florida (2012)**.** Part of a team of biologists responsible for the survey design, data collection and analysis, and EA composition on this project. This EA evaluated the preferred action alternative (of VORTAC relocation) in relation to the no action alternative, based upon environmental consequences to the affected environment including: aircraft operations; noise; air quality; infrastructure and utilities; hazardous materials and waste; and earth, water, biological, cultural, and socioeconomic resources.

Orchard Pond Greenway PD&E and ERP Permitting**,** Leon County, Florida (2010-2012). Lead biologist responsible for regulatory agency coordination and supervision of the wetland delineation and functional assessments (UMAM), natural community mapping (FLUCFCS) and listed species surveys (gopher tortoise, woodstork, bald eagle, and several listed plant species) for ERP permitting. The project required the production of a State Environmental Impact Report (SEIR) which combined components of a Wetland Evaluation Report (WER) and Endangered Species Biological Assessment Report (ESBAR) that were prepared by the same team. A Natural Features Inventory, Environmental Impact Analysis and Environmental Management Permit had to be approved from Leon County Department of Development Support and Environmental Management prior to submitting state and federal permit applications.

State Road 22 Road Widening, Bay County, Florida (2014-2015)**.** Senior scientist who authored two technical documents (WER and ESBAR) per FDOT PD&E regulations for this roadway widening project that included an alternatives analysis and field surveys. He oversaw and conducted the wetland delineations and listed species surveys within and adjacent to the proposed project area. Both documents discuss the potential involvement with the natural environment as well as changes in social, traffic, and noise impacts.

Gulf to Bay Highway (US 98 Re-Alignment) Segments 2 &3, PD&E, Gulf County, Florida (2012-2015)**.** Biologist coordinating the Joint Application for Works in the Waters of Florida (dredge and fill permit) for the re-alignment of approximately 10.5 miles of rural, two-lane roadway. He has been involved in the extensive GIS effort to use aerial photography to accurately characterize the habitat within the project area. The identification of wetland habitat and habitats that could potentially include state and federal threatened and endangered species assisted the client in preliminary discussions with agency personnel.

Route Mapping and Aerial Photography Interpretation, Alabama DOT, Alabama (2013). Senior scientist tasked with identification and documentation of routes (roads) on a county by county basis as assigned via GIS analyses. Analysts involved with mapping new and old routes for ALDOT used the updated data to accurately replace an outdated dataset. The outdated dataset served as the base layer that was checked for accuracy with current aerial photography. The updated geodatabase provided current information to ALDOT to assist with its daily and long term operational and planning goals.

SR 60 Corridor Widening Construction Management/Construction Engineering and Inspection (CEI) Services, Florida (2006-2009). Biologist responsible for performing NPDES compliance inspections and monitoring for state- and federally-listed wildlife species. Listed wildlife includes Audubon's crested caracara, Florida snail kite, woodstork, bald eagle, Florida panther, and gopher tortoise. This contract involved providing inspection services for four contracts (eight projects) involving the widening of 23 miles of SR 60 between I-95 in Vero Beach and Florida's Turnpike in Yeehaw Junction.

Additional Certifications and Skills

Software and Hardware: ArcGIS, ArcPad, Trimble, Terra Sync, Pathfinder, Win-situ
Field: PADI Certified Scuba Diver (Advanced Open Water and Nitrox), Florida Boating Safety Education, small craft and coastal boating experience, ATV Safety Institute, YSI water quality instruments.