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June 5, 2014

Ms. Carol M. Wood
King & Spalding
1100 Louisiana Street, Suite 4000
Houston, Texas 77002

RE: Supplemental Ecological Expert Report
Vermilion Parish School Board v. Louisiana Land, et al.
Helen R. Connelly, Ph.D. and John H. Rodgers, Jr., Ph.D.

Dear Ms. Wood:

As per your request, we are providing supplemental opinions in the matter of the Vermilion Parish School Board v. The Louisiana Land and Exploration Company, et al. Our opinions in this referenced matter are regarding the health and functionality of the ecosystem in the East White Lake area, located within Section 16, Township 15 South, Range 1 East in Vermilion Parish, Louisiana.

We have arrived at our opinions concerning the health and functionality of the East White Lake ecosystem based on: 1) our crab and fish collection field studies done in the East White Lake area in 2010/2011, as reported in the *Crab and Fish Collection Report* (Connelly, 2014) that is Attachment A to this report; 2) our ecosystem assessment field study done in the East White Lake area in 2014, as reported in our *Wetlands Functions and Services Report* (Connelly and Rodgers, 2014) that is Attachment B to this report; 3) a review of the scientific literature in the field; 4) a review of litigation documents pertaining to this case; 5) our advanced education and experience in the field. The curriculum vitae for Dr. Helen Connelly and Dr. John Rodgers are provided as Attachment C.

The following is a summary of our opinions in the referenced matter:

1. The East White Lake ecosystem is a healthy and functioning ecosystem that provides services to the wildlife population, the human population, and to the watershed itself. The populations of vegetation, fish, crabs, birds, and other wildlife in the ecosystem are thriving, abundant, and diverse.

2. The blue crab (*Callinectes sapidus*) population in the East White Lake area, as assessed by us in 2010, 2011, and 2014, is healthy and performing its role in the food web of this ecosystem. The aquatic habitat in the East White Lake ecosystem supports blue crabs in abundance, as well as the natural predators and prey of blue crabs.

3. The claims made by William J. Rogers in his 2014 report that oilfield activities have contaminated site media, so that they pose unacceptable risk to ecological populations; and claims made by Gary C. Barbee in his 2010 reports that ecological populations have been adversely affected by contamination from the site are unfounded. We observe no evidence that ecological populations are being adversely affected or exposed to unacceptable risk. The ecological populations in the East White Lake ecosystem represent an intact food web, a biodiverse population of species, and provide services and functions to East White Lake human and ecological communities.

4. ICON's plan for excavation of sediment and injection of cement in the East White Lake ecosystem will destroy local thriving populations of wildlife and damage the functions and services currently provided by the ecosystem. The damage caused by ICON's proposed sediment excavation activities include and are not limited to: destruction of habitat and diet for plant and animal life in the canals; elimination of diet for wading birds and shore animals that depend on fish, reptile, crustacean, and vegetation life in the canals; loss of recreational fishing and crabbing; loss of commercial crabbing; loss of submerged plants that are a diet for birds and invertebrates; loss of aquatic plants that naturally filter water quality; destruction of biodiversity by destroying the habitat for fish, crabs and plants; removal of diet for migratory birds; loss of photosynthesis from aquatic algae on submerged plants and sediments; destruction of grasses and edge habitat; and loss of shore line habitat. The damage caused by ICON's proposed cement injection activities include and are not limited to: killing the grasses, trees, shrubs, vines, and aquatic plants at cement injection sites; destroying natural habitats and diets for birds and wildlife at cement injection sites; impeding natural water flow and disrupting the hydrologic cycle; and adding greenhouse gases to the atmosphere due to the operation of heavy equipment and barges. These excavation and injection activities proposed by ICON would be destructive and devastating to the currently healthy and functioning ecosystem.

We are qualified to make these opinions concerning the East White Lake ecosystem. Evidence and support for these opinions is fully documented in the attachments to this letter: *Crab and Fish Collection Report*, 2014 (Attachment A) and *Ecosystem Functions and Services Report*, 2104 (Attachment B).

If other pertinent information concerning this case becomes available in the future, we will add to and supplement these opinions.

Sincerely,

Helen R. Connelly, Ph.D.

John H. Rodgers Jr.

John H. Rodgers, Jr. Ph.D.

Crab and Fish Collection Report
Attachment A

Vermilion Parish School Board v.
Louisiana Land, et al

Supplemental Ecological Expert Report

Crab and Fish Collection Report

Section 16 T 15S R 01E

East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

February 27, 2014

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Executive Summary

In December 2010 and January 2011, fish and crabs were collected from 23 locations in the White Lake water shed. The project team included Dr. John Rodgers, Patrick Ritchie, and Dr. Helen Connelly. The site is located in Section 16, Township 15 South, Range 1 East in Vermilion Parish, Louisiana, about five miles southwest of Forked Island.

Crabs and fish were collected from 13 locations in the vicinity of the East White Lake Oil and Gas Field, from six reference locations in Schooner Bayou Canal, and from four reference locations in White Lake. Cast netting for fish was attempted at 15 locations and trawl netting for fish was accomplished at 17 locations. Crabs were collected by crab traps from all 23 locations. A total of 307 blue crabs (*Callinectes sapidus*) were collected from all locations and shad forage fish *(Dorosoma cepedianum)* were collected from all locations. Sufficient numbers of crabs and fish were collected from all locations to meet minimum lab requirements for tissue analysis.

All samples collected were documented and shipped under chain of custody overnight on ice each day of the collection project to Columbia Analytical Labs in Kelso, Washington for preparation and for analyses. Samples arrived at the lab in a good condition and acceptable for analysis.

Records of the sampling event such as field notes, field record forms, and photos are included and described in this report. Methods and procedures used during the sampling event were in accordance with the December 2010 sampling plan *Quality Assurance Project Plan/Sampling Analysis and Assessment Plan for Crab and Forage Fish Tissue*, which is attached as an appendix to this document. Presentation and evaluation of the laboratory results are presented in a separate report under separate cover by others.

Crab and Fish Collection Report

Section 16 T 15S R 01E

East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

1.0 Introduction

This report documents the methods and materials used to collect crabs and fish in a sampling event that occurred in December 2010/January 2011. Crabs and fish were collected during the sampling event from the White Lake water shed including the East White Lake Oil and Gas Field in Vermilion Parish, Louisiana. Collected crabs and fish were sent to an independent commercial laboratory for preparation and analyses. The analytical results of the tissue analysis are not included in this report but are presented in a separate report by others.

Crabs and fish were collected from canals in the East White Lake Oil and Gas Field, from Schooner Bayou Canal as a reference location, from White Lake as a reference location, and from retail fish markets in the Gulf Coast region for analyses. Crabs and fish were collected according to a protocol outlined in a *Quality Assurance Project Plan/Sampling Analysis and Assessment Plan for Crab and Forage Fish Tissue* dated December 6, 2010 that was prepared specifically for this sampling event (Appendix A).

1.1 Site Location

The site, located in Section 16, Township 15 South, Range 1 East in Vermilion Parish, Louisiana (Figure 1), is about five miles southwest of Forked Island. The areas of interest are the canals and waterways located on the eastern side of White Lake, including Section 16 of the East White Lake Oil and Gas Field.

1.2 Target Species

Blue crabs (*Callinectes sapidus*) and small forage fish such as shad (*Dorosoma cepedianum*) were collected as the target species for the tissue study. December 2010 and January 2011 was a good time to collect these organisms because they do not spawn at that time.

1.3 Project Team

Blue crabs and forage fish were collected by a field team that included Dr. John Rodgers (project director and project manager), Patrick Ritchie, and Dr. Helen Connelly.

1.4 Analytical Laboratory

Samples were shipped to Columbia Analytical Services, Inc., (CAS) of Kelso, Washington for sample preparation and analytical testing. Tissue analytical results are not presented in this report.

1.5 Sampling Location Plan

Crabs and fish were collected from 23 locations (Figure 2) in the White Lake water shed. Twelve sampling locations were described in the plan for Section 16 of the East White Lake Oil and Gas Field canals area and one additional location was added during field collection. These twelve locations are T-01 through T-12 (T is for “tissue”) and the additional location is T-01A (Figure 3).

Crabs and fish were collected from five reference locations described in the plan in Schooner Bayou Canal and at one additional sampling location, which was added during field collection. These sampling locations are TR-01 through TR-05 (TR is for “tissue reference”) and the additional location is TR-03A (Figure 4).

Crabs and fish were collected from four reference locations in White Lake. These locations are TR-06 through TR-09 (Figure 4).

Crabs were purchased from six retail fish markets in the Gulf Coast region:

Baton Rouge Area:
Addis Seafood
7926 6th Street
Addis, Louisiana 70710

Des Allemands Area:
Cajun Crab Connection
123 West Bayou Road
Des Allemands, Louisiana 70030

Lake Charles Area:
Dugas Landing
700 Joe Dugas Road
Hackberry, Louisiana 76045

Biloxi Area:
Desporte & Sons Seafood
1075 Division Street
Biloxi, Mississippi 39530

New Orleans Area:
Fisherman’s Cove Seafood
3201 Williams Boulevard
Kenner, Louisiana 70065

Houston Area:
Hong Kong Food Market
11205 Bellaire Boulevard
Houston, TX 77072

Purchased crabs from retail markets were packaged on ice and shipped to the analytical laboratory.

2.0 Project Goals

The purpose for collecting crabs and fish during the December 2010/January 2011 sampling event was to provide biological tissue for analyses. The four daily goals for the field team during the crab and fish collection event were as follows:

1. *Collect sufficient numbers of crabs and fish:* The field team needed to collect enough crabs and fish from each sampling location to send the laboratory the amount of biological tissue required to do the analyses.

2. *Accurately record and document the crab and fish collection event:* The field team needed to accurately record and document the events, facts, activities and details of the samples collected. This documentation record provides support for conclusions that will be made later concerning the analytical results.

3. *Deliver samples to the laboratory of acceptable quality for analysis:* The field team needed to collect, package and ship the crabs and fish according to protocol so that the samples would arrive at the laboratory in acceptable condition. This would ensure that the end result of the data collection effort is a set of analytical results that is considered of acceptable quality to the scientific and academic community.

4. *Follow the written sampling plan:* The field team needed to follow the written plan for field methods and procedures and use best professional judgment, based on education, training and experience to alter the protocol when field conditions warranted change.

Efforts, procedures, and protocols followed to accomplish these goals are presented in subsequent sections of this report.

3.0 Project Goal 1: Collect Sufficient Numbers of Crabs and Fish

It was a project goal to collect enough crabs and fish from each sampling location to send the laboratory the amount of biological tissue they required to do analytical testing. The limiting factor in every organism collection study is the ability to collect sufficient numbers of samples. The following sections describe the field team's successful collection methods for both fish and crabs.

3.1 Crab Collection Method

The field team successfully collected crabs using crab traps at all sampling locations.

At the beginning of the project, the crab traps were loaded onto the boat by seasoned local contract fisherman, Julian Gajan. Gajan drove the boat with the field team and the baited crab traps to each predetermined sample location, directed by the team with sampling maps. Once a sampling location was selected by the field team, based on the sample location map in the plan, the GPS coordinates were identified by the field team using a DeLorme Earthmate PN-40 GPS and recorded in the field logbook.

At each location, Gajan would throw the crab trap into the water, and it would remain there to be checked for crabs in the next days. A weight attached to the bottom of the crab trap anchored the trap in place. Each crab trap had an identifiable marker buoy that marked the trap as part of the project.

All traps used were constructed according to Louisiana Department of Wildlife and Fisheries (LDWF) regulations. The crab traps are wire mesh boxes approximately 30 inches by 30 inches by 15 inches with hinged lids. The wire mesh resembles chicken wire with 1.5-inch square openings. The crab trap has an entrance for crabs and a bait box inside containing catfish parts but no way for a larger crab to exit the trap. The crab trap has small exit holes to let small crabs escape.

To collect the crabs from the trap, Gajan would lift the crab trap up to the side ledge of the boat using a hooked gaffe. The crabs were removed by opening a hinged lid on top of the trap that had been secured by a bungee cord. The crabs were shaken out of the trap or removed with clean tongs.

Immediately upon being collected, the crabs were counted and recorded on the field record forms as male or female and then put into labeled clean five-gallon buckets. The buckets were labeled with the sample location ID (e.g. T-02) and each bucket had a small amount of ambient water in it with a loosely applied lid.

At each location where crabs were collected, water chemistry data was measured using an In-Situ Troll 9500 that had been calibrated that day using In-Situ Inc., Quik Cal Solution. Ambient water chemistry measurements taken at each location included: rugged dissolved oxygen (RDO), temperature, pH, conductivity, oxidation reduction potential (ORP), turbidity, depth, and time of collection. Water chemistry data was recorded in the field logbook and on the field record form. Table 1 lists the water chemistry data collected during the project.

Crab traps were checked at each location approximately every day or two until enough crabs were collected from the location to satisfy the laboratory requirement of approximately five crabs per location. Some traps had enough crabs after being checked once, other traps accumulated fewer crabs, and had to be checked and harvested more than once (Table 2). All crab traps in the White Lake reference locations only had to be checked once to collect a sufficient number of crabs. Crab traps in the site canals and in Schooner Bayou Canal had to be checked anywhere from one time to five times in order to collect a sufficient number of crabs. Once sufficient numbers of crabs were collected, the trap was removed, unless the location was utilized by Gajan for his commercial fishing.

Figure 5 and Table 2 show the numbers of crabs collected per location. The number of crabs collected per location ranged from five crabs (TR-06 and T-09) to 28 crabs (T-02). A total of 307 crabs were collected from all 23 sampling locations during the collection project.

3.2 Fish Collection Methods

Three different methods were attempted for collecting a sufficient amount of fish. The first two methods tested did not capture enough fish quickly enough; the last method tested was extremely successful. The three methods tested for collecting fish included (in order): cast net, hoop net on the bottom of the waterway, and trawling nets pulled through the water by a trawling boat.

3.2.1 Cast Net

The first fish collection method attempted, throwing a cast net, was labor intensive and only captured small numbers of fish for any one cast. The cast net used in this project was a synthetic circular net with a four foot radius and small weights around its outside edge. Gajan would stand in the boat and throw the net by hand so that it would fall in a circular pattern on the surface of the water and then sink. After the net settled, he pulled a cord attached to the net's weighted edge so that the net would form a bag. Some fish were caught as the net was pulled by hand back to the boat.

Cast netting for fish was attempted at 15 locations, and resulted in enough fish at six locations to collect and ship for analysis. The method, although somewhat successful, was unpredictable and time consuming.

3.2.2 Hoop Net

The second method attempted for capturing fish was by staking a hoop net to the bottom surface of the waterway. The hoop net, when set up, takes on the shape of a column or a tube. The net has a series of hoops spaced along the length of the net to keep it open, with a second net inside that has a narrow entrance for fish. The net is staked to the bottom of the bayou and bait is placed in the closed end of the net. Fish swim in to eat the bait but cannot exit the net. The fish can be collected when the net is lifted out of the water.

The hoop nets tested in this project were effective in capturing larger fish such as catfish but were not effective in capturing the smaller forage fish that were the target species for collection.

3.2.3 Trawling Net

The third and final method tested for collecting fish was by dragging nets through the water from a trawling boat. This method was very successful and was used for collecting fish at a total of 17 locations, including locations in the canals, the lake and in Schooner Bayou.

The field team and two local fishermen successfully used a double-rigged trawling boat to collect fish at each location attempted. The boat had rigid booms with nets extending from both sides of the boat. When the boat moved forward, the booms were lowered into the water to drag mesh trawl nets. Fish entered the wide open end of the cone shaped net, and then accumulated in the tail end of the net, which tapered to a narrow end. The tail end of the trawling net, filled with fish, was pulled onto the boat by an attached line. The full end of the net, kept closed by a rope, was released to dump fish into a collection basket or onto a sorting table in the back of the boat.

The trawling boat was navigated to each sampling location by using the GPS coordinates for each location where crabs had already been collected. The nets were lowered into the water and dragged for approximately 200 yards. The net containing fish was brought onto the boat and the field team sorted the fish by throwing back into the water all fish by-catch and shad that were smaller than seven centimeters long. The fish were collected into labeled clean five-gallon buckets with a small amount of ambient water and a loosely applied lid. Fish were immediately put on ice at the landing, and then weighed and measured or packaged for shipping to the laboratory. Field record forms that documented the location, time, and quantity of fish collected were completed for each fish sampling location. Table 3 shows a summary of the fish collection effort.

3.4 Collection Effort

The sampling team worked ten days in order to collect a sufficient number of crabs and fish to satisfy the requirements for tissue analyses. This involved checking crab traps a total of 51 times, attempting to cast net for fish at 15 locations and trawling for fish at 17 locations. Table 4 is an activity log that shows the effort required to collect fish and crabs for the project.

3.5 Collecting Sufficient Quantity of Samples for the Laboratory

The field team had a goal of providing the laboratory with sufficient crab and fish tissue to perform analyses. The guidance in the plan was that each sample composite consist of the same species, and the composite must be able to deliver 50 to 60 grams (25 to 30 grams minimum) of tissue for chemical analysis.

The analytical laboratory, Columbia Analytical Services (CAS) provided their preferred and minimum tissue mass requirement for the project.

4.0 Project Goal 2: Accurately Record and Document the Crab and Fish Collection Event

The accurate record that is generated during the sampling effort is important because it becomes the document of information that supports the analytical results. The following section describes the written documentation generated by the field team to record the events that occurred while collecting crabs and fish. The field sampling event was documented by these records generated in the field: field logbook, digital photography, field record forms, labeling of samples, and chain of custody.

4.1 Field Logbook

The field logbook was used to record the sequence and times of events that occurred each day of the sampling project. Water chemistry measurements, crab and fish counts and measurements, GPS coordinates, and field efforts are recorded in the field logbook. The field logbook has been scanned and saved in electronic format (Appendix B).

4.2 Digital Photography

Sampling efforts and events were photographed and saved in electronic format and are reproduced in a photo log at the end of this document. Photographs were made of the field team collecting, weighing, and measuring crabs and fish, and of the habitat and general appearance of the surrounding ecosystem. Notes were made in the field logbook of photos taken. The photo log is attached as Appendix C.

4.3 Field Record Forms

Field record forms were filled out for each sample location where crabs or fish were collected. The field team began filling out the field record form on the boat while the samples were being collected.

Each time crabs or fish were successfully collected a field record form was initiated. The form includes the sample location ID, time, date, collection method (such as trap or net), GPS coordinates, estimated maximum water depth, sample type (such as crabs or fish), date the trap was set, type of bait used, a count or estimate of volume of crabs or fish collected, determination of gender (crabs only), and any comments. For sampling locations being visited for the first time, water chemistry measurements were recorded on the field record form including: rugged dissolved oxygen (RDO) (mg/L), temperature (°C), pH, conductivity (µS/cm), oxygen reducing potential (ORP) (V), turbidity (NTU), and depth (ft). The field record form was initiated on the boat when the samples were collected, and completed at the landing where weights and measurements could be taken and recorded. The field record form was copied and one copy accompanied the samples to the laboratory in a sealed plastic bag. The other copy has been scanned and saved in electronic format. The information recorded on the field record form was also recorded in ink in the project field logbook. The field record forms are attached as Appendix D.

4.4 Labeling Samples and Recording Measurements

At each location where crabs or fish were collected, crabs or fish collected from that location were put into a clean five-gallon bucket dedicated to that sample location and type of sample (crab or fish). The bucket was labeled using indelible ink with the sample location ID and the time. The information recorded on the labeled bucket was also recorded on the field record form and in the field logbook (see previous Section 4.1 on Field Logbook and Section 4.3 on Field Record Forms).

4.4.1 Labeling Fish Samples and Recording Measurements

Immediately upon returning to the landing, the fish from each labeled bucket were processed one sample location bucket at a time. For the first three locations where fish were collected (TR-02, TR-03, and TR-04), 20 to 30 fish per location were measured for length (maximum body length was measured from the anterior-most part of the fish to the tip of the longest caudal fin) and width, and weighed on a tabletop digital scale by a field team member wearing clean nitrile gloves. These fish measurements were recorded in the field logbook and on the field record form that had already been prepared in the field for that sample location. The weighing and measuring process for the fish from these first three locations proved to be time consuming due to the number of forage fish collected, and the team made a judgment call to estimate volumes of forage fish rather than to weigh and measure each individual fish.

For the 20 other sampling locations from which fish were collected, the field record forms were filled out with an estimate of total volume of fish rather than a measured length and width for each individual fish. All fish from a single sample location were recorded on the field record form that had been filled out in the field for that sample ID location, as well as in the field logbook.

To package fish for shipping, all fish from one sample location were wrapped in foil with their bodies touching the non-shiny or dull side of heavy duty aluminum foil. The exterior of the foil packet of fish was labeled with indelible ink with the project name (EWL Tissue Study), the site ID number, the letter F for fish, the date of sample (month/day/year), the time of collection (military time), and the collector's initials. The labeled foil fish packet was placed inside of a heavy duty plastic zip locked freezer bag and the plastic freezer bag was also labeled in indelible ink with the same label information that was on the foil packet of fish (project name, site ID number, the letter F for fish, date, time, and collector's initials). The labeled packet of fish was placed immediately on ice in a clean ice chest along with the field record form and the chain of custody, which were sealed inside of a plastic zip lock bag to protect against getting wet. Upon arriving at the Fed Ex location to ship the fish to the laboratory, the ice was replaced with dry ice, so that the fish were shipped frozen.

4.4.2 Labeling Crab Samples and Recording Measurements

Immediately upon returning to the landing, the crabs from each labeled bucket were processed one sample location bucket at a time by field team members wearing clean nitrile gloves. One field team member would get a crab out of the bucket and call out the sample location ID and whether the crab was male or female. Another field team member would weigh the crab on a tabletop digital scale, measure the crab's length (the lateral distance across the carapace from tip of spine to tip of spine) and width, and call out these measurements. Another team member would record the measurements on the field record form that had been filled out in the field for that sample ID location, as well as in the field logbook. The crab, now recorded was placed on ice in a clean cooler dedicated to one sample location. The ice was double bagged in heavy duty zip locked baggies so that excess water would not drown the crabs, and the crabs would arrive alive at the laboratory. The field record form and the chain of custody were placed inside of a sealed Ziplock® baggie and placed in the cooler with the crabs from one location.

4.4.3 Recorded Crab Weights and Measurements

Table 2 is a summary of average crab weights and measurements documented in this collection project. The crabs collected in White Lake and in the East White Lake Oil and Gas Field canals were generally larger crabs and the crabs collected in Schooner Bayou were generally smaller crabs by comparison. Figure 6 is a map showing the average weight of crabs collected by location.

A calculation was done that combined crab weight, length and width, and is described as crab fullness. It is average crab weight divided by the length times the width of the crab [gm/(cm x cm)]. This metric showed that the crabs in all habitats were of similar fullness. The crabs collected in the Lake and in the vicinity of the East White Lake Oil and Gas Field were of the same average fullness (1.9 gm/cm^2) and the crabs from Schooner Bayou Canal had slightly lower average fullness of 1.8 gm/cm^2. Figure 7 shows the average crab fullness by location.

Table 5 shows the length, width, weight and gender of each crab collected during the project.

4.5 Chain of Custody

A completed chain of custody accompanied the crabs and fish that were shipped overnight to Columbia Analytical Services Laboratory in Kelso, Washington. The chain of custody was copied, scanned and saved electronically for each shipment that left Fed-Ex in Lafayette, Louisiana during the sampling event.

The chain of custody listed each sample location ID that was shipped on a given day for all sample locations shipped, using this format: project name (EWL), Sample ID number, and C for crab or F for fish. Also recorded on the chain of custody were the sampling date, sampling time, project manager signature (John Rodgers), date of shipping, time of shipping, analytical methods required, and any comments.

The completed chain of custody was placed along with the field record form inside of a Ziplock® baggie inside of the ice chest and the whole ice chest was wrapped many times with packing tape. Appendix E has the chain of custody forms from the project and corrections made to the chain of custody.

5.0 Project Goal 3: Deliver Samples to the Laboratory of Acceptable Quality for Analysis

Field efforts were directed towards collecting, packaging and shipping the samples in such a way that the samples would be of sufficient quantity and of acceptable quality to be analyzed and the results usable for scientific risk assessment. Steps were taken to ensure this quality of data from the time the samples were collected to the time the samples arrived at the laboratory.

5.1 Quality Assurance Project Plan/Sampling Analysis and Assessment Plan for Crab and Forage Fish Tissue

The field efforts to achieve the ultimate goal of usable analytical results were numerous and were directed by the *Quality Assurance Project Plan/Sampling Analysis and Assessment Plan for Crab and Forage Fish Tissue* dated December 6, 2010 and prepared specifically for this sampling event. The plan for achieving quality in sampling and analysis is attached to this document as Appendix A.

The attached plan document (Appendix A) describes the quality assurance (QA) and quality control (QC) procedures to be used to determine COC concentrations in blue crab and/or forage fish tissue from the site, reference locations, and retail fish markets in the region. The QAPP was prepared consistent with the following documents: *EPA Requirements for Quality Assurance Project Plans*, EPA QA/R-5 (USEPA 2001) and *EPA Guidance for Quality Assurance Project Plans*, EPA QA/G-5 (USEPA 2002b), and *Protocol for Issuing Public Health Advisories for Chemical Contaminants in Recreationally Caught Fish and Shellfish* (LDHH et al. 2011). The collection methods, procedures and protocols follow the guidelines and recommendations of *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume1: Fish Sampling and Analysis*, Third Edition (USEPA 2000a).

5.1.1 Contamination

Protecting against contamination is part of any protocol for generating acceptable data. Steps were taken during the sampling event to avoid introducing contaminants to the samples during handling. Some of the steps taken to prevent contamination included:

- Rinsing the fish and crabs collected in a small amount of ambient water.
- Placing samples in clean holding buckets, one dedicated bucket per location, to prevent contamination.
- Sealing the shipping container to prevent introduction of contaminants during travel from the field to the laboratory.
- Placing lids on the samples after collection.

- Cleaning ice chests and five gallon buckets with detergent and rinsing with clean water prior to use.

- Placing samples in foil and plastic bags, prior to placing them on ice.

5.1.2 Integrity

The effort to generate data of acceptable quality and to maintain sample integrity began at the time the samples were collected to the shipment and arrival at the laboratory. Sample integrity was maintained to prevent the loss of any COCs that might be present in the sample. The loss of COCs was prevented by some of the following actions:

- Ensuring that once collected, the fish and crabs remained intact without breaks or tears.

- Shipping crabs on sufficient quantities of ice to keep them cold for up to 48 hours, via priority overnight delivery service, so that they arrived at the laboratory within less than 24 hours from the time of sample collection.

- Shipping fish on dry ice via priority overnight delivery service to arrive at the laboratory within less than 24 hours from time of shipment.

- Shipping samples by Federal Express, which provides constant tracking of shipments.

5.1.3 Documentation

Field efforts directed towards the end result of acceptable analytical data included documentation of field sample collection and handling. Documentation demonstrates data integrity and allows for accurate interpretation of results. Some of the documentation efforts to achieve acceptable data quality included:

- Recording the time of all sample collection, relinquishment by the sample team, and time of sample arrival at the laboratory on the chain of custody Form.

- Documenting all sample collection and handling in writing

- Making any corrections to written documents and initialing and dating the corrections.

- Generating chain of custody forms and field record forms that have coinciding data and sample identification so that accuracy can be verified.

5.1.4 Instrumentation

Practical steps to ensure collecting valid data included following equipment procedures and being prepared with the appropriate supplies:

- All field equipment was inspected prior to sampling.

- The discrete water measurements meter and other instruments used by the field team were calibrated according to the manufacturer's operating instructions, on a daily basis.

- Field supplies and equipment were assembled prior to the sampling event and supplemented as needed (Table 6).

6.0 Project Goal 4: Follow the Written Sampling Plan

Following a standardized sample collection and handling procedures reduces the magnitude and sources of uncertainty and their frequency of occurrence. The field team followed the procedures outlined in the plan and made decisions to deviate from the plan only when necessary.

6.1 Standard Procedure

The field team used standardized sample collection and handling procedures. The field sampling team consisted of experienced personnel trained on all field procedures detailed in the plan. The field team worked together to ensure that the field sampling and sample handling activities were in accordance with the plan.

6.2 Deviating from Standard Procedure

When necessary, the field team made decisions to deviate from the written protocol. These events are listed below:

- Two additional sample locations were authorized in the field by Dr. Rodgers. They were TR-03A in the Schooner Bayou Canal and T-01A in the East White Lake Oil and Gas Field canals.

- After measuring and weighing shad fish from three locations, the decision was made to cease measuring individual fish and shift to estimating total volume of fish collected.

7.0 References

Louisiana Department of Health and Hospitals, Louisiana Department of Environmental Quality, Louisiana Department of Agriculture and Forestry and Louisiana Department of Wildlife and Fisheries. Protocol for Issuing Public Health Advisories for Chemical Contaminants in Recreationally Caught Fish and Shellfish Chemical Contamination of Fish and Shellfish in Louisiana. May 2011.

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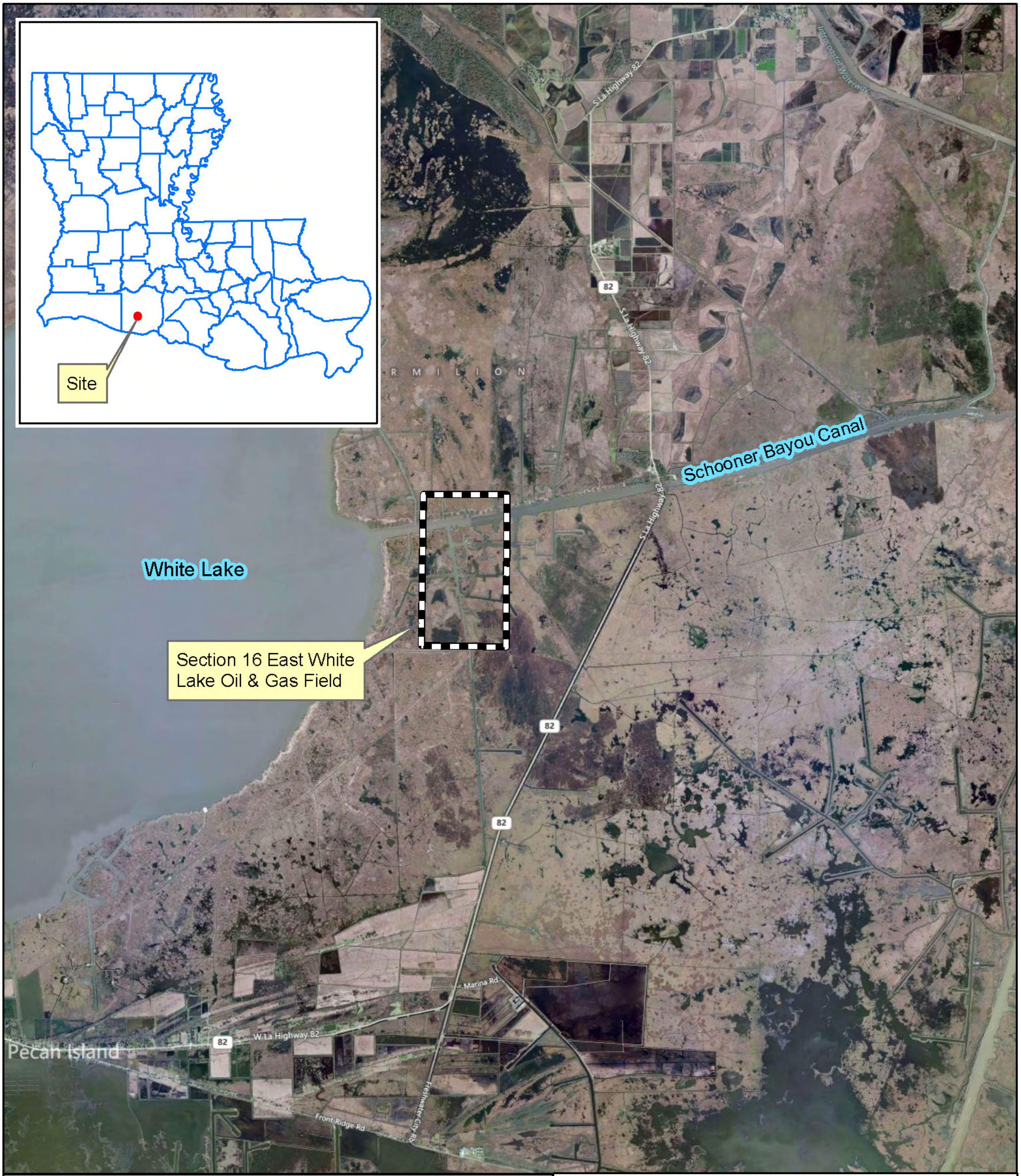
Figures

East White Lake Oil and Gas Field
Vermilion Parish, Louisiana



Bing Maps hybrid basemap via ArcGIS Online.

Figure 1
Site Location
Crab & Fish Collection Report
East White Lake Field, Vermilion Parish, LA

MICHAEL PISANI & ASSOCIATES, INC.
Environmental Consulting Services
Houston, Texas New Orleans, Louisiana Baton Rouge, Louisiana

Designed: JRB
Drawn: JRB
Checked:
Date: 3/19/2012
Project: 07-47

Figure 2
Crab and Fish Sampling Locations
East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

MICHAEL PISANI & ASSOCIATES, INC.
Environmental Management & Engineering Services
Houston, Texas New Orleans, Louisiana Baton Rouge, Louisiana

Designed: HRC	Drawn: HRC	Checked: MEP	Date:03/11/2012	Project: 07-47

● East White Lake Oil and Gas Field Site Locations

Figure 3
Site Sampling Locations
East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

MICHAEL PISANI & ASSOCIATES, INC.
Environmental Management & Engineering Services
Houston, Texas New Orleans, Louisiana Baton Rouge, Louisiana

Designed: HRC	Drawn: HRC	Checked: MEP	Date:03/15/2012	Project: 07-47

● Reference Sampling Locations

Figure 4
Reference Sampling Locations
East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

MICHAEL PISANI & ASSOCIATES, INC.
Environmental Management & Engineering Services
Houston, Texas New Orleans, Louisiana Baton Rouge, Louisiana

Designed: HRC	Drawn: HRC	Checked: MEP	Date:03/11/2012	Project: 07-47

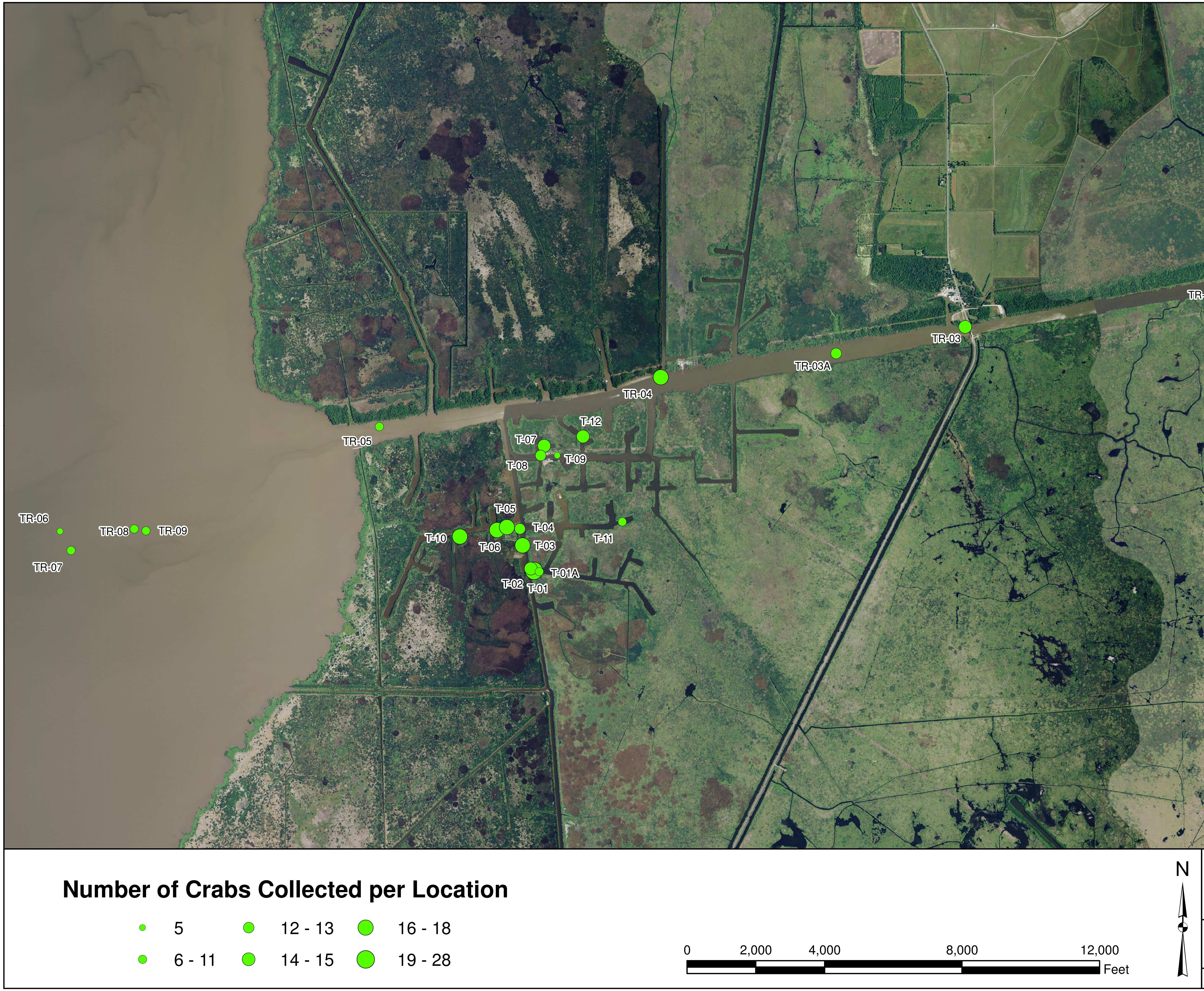


Figure 5
Number of Crabs Collected per Location
East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

MICHAEL PISANI & ASSOCIATES, INC.
Environmental Management & Engineering Services
Houston, Texas New Orleans, Louisiana Baton Rouge, Louisiana

Designed: HRC	Drawn: HRC	Checked: MEP	Date:03/15/2012	Project: 07-50

Average Crab Weight (gm)

● 167 - 175	● 201 - 208	● 228 - 240
● 176 - 200	● 209 - 227	● 241 - 251

Figure 6
Average Crab Weight by Location
East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

MICHAEL PISANI & ASSOCIATES, INC.
Environmental Management & Engineering Services
Houston, Texas New Orleans, Louisiana Baton Rouge, Louisiana

Designed: HRC	Drawn: HRC	Checked: MEP	Date:03/15/2012	Project: 07-47

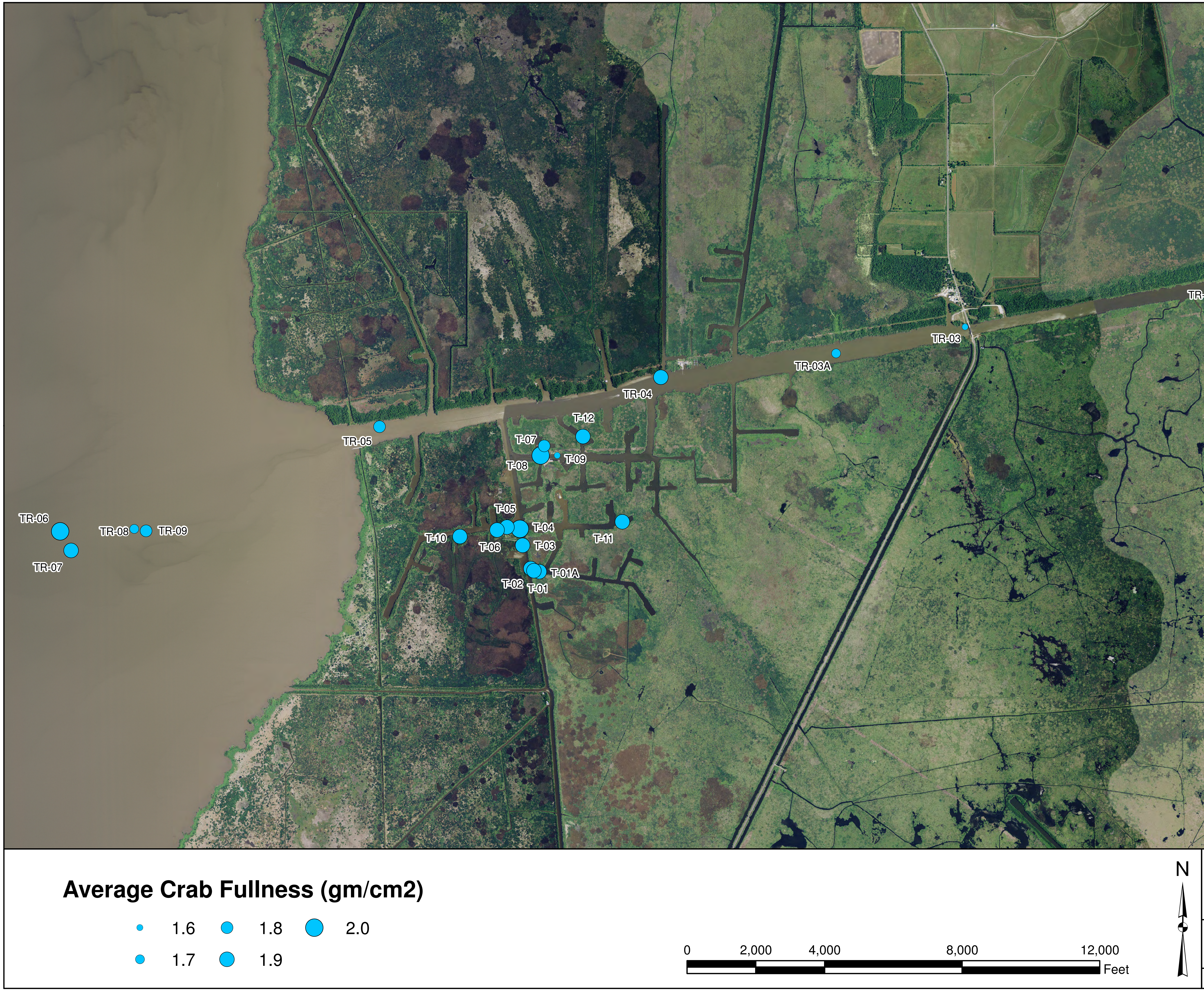


Figure 7
Average Crab Fullness per Location
East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

MICHAEL PISANI & ASSOCIATES, INC.
Environmental Management & Engineering Services
Houston, Texas New Orleans, Louisiana Baton Rouge, Louisiana

Designed: HRC	Drawn: HRC	Checked: MEP	Date:03/15/2012	Project: 07-47

Tables

East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

Table 1

Water Chemistry Measurements

East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

Site ID	Date	Time	Water Sample Depth [ft]	Temp [C]	pH [pH]	Cond [µS/cm]	Turb [NTU]	RDO [mg/L]	ORP [V]
T-01A	12/15/2010	1237	2.200	11.33	7.09	2871	367.0	9.24	0.16
T-01	12/20/2010	1236	1.000	12.15	7.40	3930	51.3	7.48	0.05
T-02	12/20/2010	1228	1.100	12.58	7.50	3946	48.1	8.37	0.11
T-02	12/21/2010	1104	1.100	13.84	7.40	4019	45.2	8.05	0.01
T-03	12/16/2010	1238	2.000	13.81	7.41	3154	70.1	9.45	0.09
T-04	12/16/2010	1237	1.200	13.61	7.47	3120	110.0	9.27	0.13
T-04	12/20/2010	1222	1.000	12.35	7.45	3965	45.9	8.05	0.14
T-05	12/20/2010	1208	1.100	12.11	7.46	3170	46.4	9.48	0.12
T-05	12/21/2010	1033	1.300	13.40	7.26	3512	46.5	8.95	0.07
T-06	12/16/2010	1215	1.000	13.79	7.25	3145	65.6	9.32	0.26
T-06	12/20/2010	1204	1.170	12.57	7.48	3185	48.2	9.83	0.13
T-07	12/21/2010	1018	1.100	12.97	6.91	2856	88.1	9.12	0.22
T-08	12/20/2010	1147	1.500	11.81	7.53	2768	95.2	9.72	0.15
T-09	12/16/2010	1143	1.500	12.73	6.82	2673	233.0	12.29	0.2
T-10	12/20/2010	1157	1.300	12.34	7.44	3200	48.5	9.30	0.18
T-11	12/21/2010	1053	1.300	13.49	7.41	3358	59.0	8.64	0.02
T-12	12/20/2010	1128	0.890	11.77	7.72	2755	92.3	9.29	0.18
TR-01	12/15/2010	1126	1.400	9.84	6.76	2523	52.0	11.56	0.21
TR-02	12/20/2010	1120	1.900	10.74	7.02	5239	18.2	7.25	0.19
TR-03A	12/14/2010	1507	1.000	8.84	7.49	2303	134.0	11.03	0.19
TR-03	12/20/2010	1107	1.000	11.66	6.99	2944	52.1	11.72	0.22
TR-04	12/14/2010	1450	1.400	9.89	7.45	2361	154.0	10.97	0.19
TR-05	12/14/2010	1440	0.833	8.81	7.50	2263	137.0	11.30	0.22
TR-06	12/14/2010	1347	0.910	8.60	7.40	2267	110.0	11.21	0.24
TR-07	12/14/2010	1350	1.170	8.56	7.44	2249	177.5	11.42	0.21
TR-08	12/14/2010	1425	1.600	8.75	7.44	2243	165.0	11.42	0.24
TR-09	12/14/2010	1400	0.500	8.47	7.44	2198	179.0	11.35	0.18

Notes:
Readings obtained using the In-Situ Troll 9500
Daily calibration conducted using In-Situ Inc, Quik Cal Solution

Table 2
Summary of Crab Measurements

East White Lake Field
Vermilion Parish, LA

	SCHOONER BAYOU CANAL REFERENCE LOCATIONS							**EAST WHITE LAKE REFERENCE LOCATIONS**					**FORMER OIL AND GAS CANALS**													
Crab Habitat	**BAYOU**							**LAKE**					**CANALS**													
Sample Location ID	**TR-01**	**TR-02**	**TR-03**	**TR-03A**	**TR-04**	**TR-05**	**Totals and Averages for TR-01 through TR-05 (BAYOU)**	**TR-06**	**TR-07**	**TR-08**	**TR-09**	**Totals and Averages for TR-06 through TR-09 (LAKE)**	**T-01**	**T-01A**	**T-02**	**T-03**	**T-04**	**T-05**	**T-06**	**T-07**	**T-08**	**T-09**	**T-10**	**T-11**	**T-12**	**Totals and Averages for T-01 through T-12 (CANALS)**
Total Number of Crabs Collected per Location	11	15	14	12	18	11	**81**	5	11	10	11	**37**	11	15	28	17	12	17	18	14	13	5	17	8	14	**189.0**
Number of Times Trap Was Checked per Location (1)	2	5	3	1	3	1	**15**	1	1	1	1	**4**	2	1	3	2	2	3	2	4	3	1	3	3	3	**32**
Average Crab Weight (gm)	207.0	169.0	171.0	186.0	207.0	235.0	**194.0**	231.0	240.0	218.0	245.0	**233.5**	206.0	223.0	222.0	214.0	228.0	210.0	204.0	212.0	255.0	184.0	212.0	226.0	190.0	**216**
Average Crab Width (cm)	16.0	15.1	15.4	16.0	15.8	18.0	**16.0**	16.2	17.2	17.3	17.5	**17.1**	15.6	16.6	16.5	16.4	15.8	16.0	15.9	16.2	17.0	16.2	15.9	16.5	15.4	**16.2**
Average Crab Length (cm)	7.0	6.4	6.5	6.7	6.7	7.3	**6.7**	7.1	7.1	7.2	7.5	**7.3**	6.8	7.2	7.1	6.9	7.1	6.9	6.8	7.1	7.3	6.8	6.9	7.2	6.6	**7.0**
Average Crab Fullness (gm/cm^2)	1.8	1.7	1.6	1.7	1.9	1.8	**1.8**	2.0	1.9	1.7	1.8	**1.9**	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.8	2.0	1.6	1.9	1.9	1.8	**1.9**

(1) Crab traps were checked and harvested for crabs until a minimum of 5 crabs were collected, as required for lab tissue analysis

(2) "Crab fullness" combines crab size and weight, and is calculated as (crab weight in grams)/(crab length x crab width in centimeters)

gm - gram

cm - centimeter

(gm/cm)^2 - gram per centimeter squared

Table 3
Fish Collection Data

East White Lake Field
Vermilion Parish, Louisiana

Fish Sampling Location	Fish Collection Date	Time Collected	Method of Collection	Type of Fish	Volume Collected or Number Collected
TR-01	12/15/10	11:26	Hoop net	*Lepomis macrochirus*	4
TR-02	12/21/10	13:15	Cast net	*Dorosoma cepedianum*	22
TR-03	12/21/10	14:00	Cast net	*Dorosoma cepedianum*	30
TR-04	12/21/10	14:20	Cast net	*Dorosoma cepedianum*	12
TR-04A	12/21/10	14:20	Cast net	*Lepomis macrochirus*	2
TR-05	1/4/11	9:30	Trawling net	*Dorosoma cepedianum*	1/2 bucket
TR-06	1/4/11	9:45	Trawling net	*Dorosoma cepedianum*	approximately 50
TR-07	1/4/11	10:50	Trawling net	*Dorosoma cepedianum*	1/2 bucket
TR-08	1/4/11	10:05	Trawling net	*Dorosoma cepedianum*	1/4 bucket
TR-09	1/4/11	10:28	Trawling net	*Dorosoma cepedianum*	not recorded
T-01	1/5/11	12:30	Trawling net	*Dorosoma cepedianum*	1/8 of bucket
T-02	1/5/11	12:30	Trawling net	*Dorosoma cepedianum*	1/8 of bucket
T-03	1/5/11	13:30	Trawling net	*Dorosoma cepedianum*	1/4 of bucket
T-04	1/5/11	13:40	Trawling net	*Dorosoma cepedianum*	not recorded
T-05	1/5/11	13:20	Trawling net	*Dorosoma cepedianum*	1/4 of bucket
T-06	1/5/11	13:50	Trawling net	*Dorosoma cepedianum*	1/4 of bucket
T-07	1/5/11	15:10	Trawling net	*Dorosoma cepedianum*	1/3 of bucket
T-08	1/5/11	15:05	Trawling net	*Dorosoma cepedianum*	1/3 of bucket
T-09	1/5/11	14:55	Trawling net	*Dorosoma cepedianum*	1/2 of bucket
T-10	1/5/11	13:55	Trawling net	*Dorosoma cepedianum*	1/2 of bucket
T-11	1/5/11	14:05	Trawling net	*Dorosoma cepedianum*	1/4 of bucket
T-12	1/5/11	14:45	Trawling net	*Dorosoma cepedianum*	1/4 of bucket

Notes:

Lepomis machrochirus - bream/bluegill
Dorosoma cepedianum - shad
A 5-gallon bucket was used for collection and measuring when referencing bucket volume

Table 4
Field Activity Log

East White Lake Field
Vermilion Parish, Louisiana

Date	Field Personel	Photograph procedures and sampling area	Set crab traps at sample locations	Calibrate water quality instrument and record water chemistry	Field planning and safety meeting Assemble supplies and equipment	Check traps for crabs and re-bait traps	Collect crabs from traps	Check hoop net for fish	Collect fish from cast net or hoop net	Weigh/measure/package crabs/fish/bait for shipping	Collect fish by trawlling from boat	Additional activities conducted	Complete field documentation and chain of custody forms - Ship samples overnight to lab
12/13/10	Gajan, Helen, Patrick, Mitchell	√	Set crab traps at TR-01 through TR-09, and T-01 through T-12		√				Tested cast net technique at 2 locations chosen by Gajan and at locations T-07, T-08, T-02, T-06, T-10, and TR-05 and TR-04			Recorded GPS coordinates of all crab trap locatioins	
12/14/10	Gajan, Helen, Patrick, John	√		Recorded water chemistry at locations: TR-01, TR-02, TR-03, TR-03A, TR-04, TR-05, TR-06, TR-07, TR-08, TR-09	√	Checked traps for crabs at locations: TR-01, TR-02, TR-03, TR-03A, TR-04 (twice), TR-05, TR-06, TR-07, TR-08, and TR-09	Collected crabs at locations: TR-03A, TR-04, TR-05, TR-06, TR-07, TR-08, and TR-09			√		Picked John up from the airport	Recorded and shipped crabs from locations: TR-03A, TR-04, TR-05, TR-06, TR-07, TR-08, and TR-09
12/15/10	Gajan, Helen, Patrick, John	√		Recorded water chemistry at locations TR-01, TR-02, T-01A	√	Checked traps for crabs at locations TR-01, TR-02, T-01A		Checked hoop net for fish at location TR-01	Collected a bream fish at location TR-01	√			Recorded and shipped crabs from locations: TR-01 and T-01A, fish from TR-01, and catfish bait
12/16/10	Gajan, Helen, Patrick, John	√	Set hoop nets at locations: T-07, between T-05 and T-06, and T-12	Recorded water chemistry at locations T-09, T-06, T-04, T-03	√	Checked traps for crabs at locations T-12, T-09, T-08, T-07, T-05, T-06, T-10, T-04, T-03, T-02, T-01, T-11, and TR-02	Collected crabs from T-09, T-06, T-04, and T-03			√		Had lunch on barge	Recorded and shipped crabs from locations: T-03, T-04, T-06, and T-09
12/20/10	Gajan, Helen, Patrick, John	√		Measured water chemistry at locations: TR-03, TR-02, T-12, 08, 10, 06, 05, 04, 02, 01	√√ (two meetings)	Checked traps for crabs at: TR-03, TR-02, T-12, 08, 07, 10, 06, 05, 11, 04, 02, 01	Collected crabs from locations: TR-03, TR-02, T-12, 08, 10, 06, 05, 04, 02, 01			√			Recorded and shipped crabs from locations: TR-03, TR-02, T-12, T-08, T-10, T-06, T-05, T-04, T-02, and T-01
12/21/10	Gajan, Helen, Patrick, John	√		Recorded water chemistry at locations: T-07, T-05, T-11, T-02	√	Checked traps for crabs at: T-07, T-05, T-11, and T-02	Collected crabs from locations: T-07, T-05, T-11, and T-02	Checked hoop nets for fish at T-12 and T-09	Collected fish from TR-02, TR-03, TR-04, and TR-04A, and T-02 and T-05	√			Recorded and shipped crabs from locations: T-02, T-05, T-07, T-11 and fish from locations TR-02, TR-03, TR-04, TR-04A, T-02, T-05
1/3/11	Gajan, Helen, Patrick, John	√			√	Checked traps for crabs at: TR-02, TR-03, TR-04 and T-03,T-07, T-08, T-10, and T-12	Collected crabs from locations: TR-02, TR-03, TR-04 and T-03, T-07, T-08, T-10, and T-12			√			Recorded and shipped crabs from locations: TR-02, TR-03, TR-04 and T-03, T-07, T-08, T-10, and T-12
1/4/11	Gajan, Helen, Patrick, John, Robert	√			√						Collected fish by trawling nets at locations: TR-05, TR-06, TR-08, TR-09, and TR-07	Suspended fish trawling to update scientific fish collection permit with Louisiana Department of Wildlife and Fisheries	
1/5/11	Helen, Patrick, John, Robert, Deckhand	√			√					√	Collected fish by trawling nets at locations: T-01, T-02, T-05, T-03, T-04, T-06, T-10, T-11, T-12, T-09, T-08, and T-07	Obtained updated scientific fish collection permit from Louisiana Department of Wildlife and Fisheries	
1/6/11													Shipped fish collected at locations: T-01, T-02, T-05, T-03, T-04, T-06, T-10, T-11, T-12, T-09, T-08, T-07, and TR-05, TR-06, TR-08, TR-09, and TR-07

GPS coordinates were measured using a handheld DeLorme Earthmate PN-40
Field personnel included Helen Connelly (Michael Pisani & Associates), Patrick Ritchie (Michael Pisani & Associates), John Rodgers (Clemson University), Julian Gajan (fisherman), Mitchell (deckhand), Robert (trawling boat captain)
Weight of crabs and fish was measured using a digital tabletop scale in grams
Water chemistry measurements were made using an In-Situ Troll 9500. Daily calibration was performed using In-Situ Inc, Quik Cal Solution. Measurements included: RDO, Temp, pH, Conductivity, ORP, Turbidity, Depth, and Time

Table 5
Crab Counts and Measurements

East White Lake Field
Vermilion Parish, Louisiana

Crab Sampling Location	Crab Collection Date	Gender (M/F)	Length (cm)	Width (cm)	Weight (gm)	Fullness [Weight/(length x width)] (gm/cm^2)
TR-01	12/15/10	M	7.0	17.0	258	2.2
	12/15/10	M	7.5	16.0	243	2.0
	12/15/10	M	7.0	14.5	162	1.6
	12/15/10	M	6.0	13.5	125	1.5
	12/15/10	F	7.5	17.5	209	1.6
	12/15/10	M	7.5	17.0	267	2.1
	12/15/10	M	7.5	17.0	213	1.7
	12/15/10	M	7.5	17.0	211	1.7
	12/15/10	M	6.5	16.0	202	1.9
	12/15/10	M	5.5	13.0	101	1.4
	12/15/10	M	8.0	17.0	283	2.1
TR-01 - Totals and Averages		11	7.0	16.0	207	1.8
TR-02	12/20/10	M	6.0	14.0	146	1.7
	12/20/10	M	6.5	14.5	172	1.8
	12/20/10	M	6.0	14.5	160	1.8
	12/20/10	M	7.0	16.5	217	1.9
	12/20/10	M	6.5	15.5	204	2.0
	01/03/11	M	6.0	13.5	143	1.8
	01/03/11	F	6.0	15.0	128	1.4
	01/03/11	F	7.5	17.0	186	1.5
	01/03/11	M	5.5	13.0	116	1.6
	01/03/11	F	7.5	18.0	201	1.5
	01/03/11	M	6.5	15.0	174	1.8
	01/03/11	M	7.5	18.5	256	1.8
	01/03/11	M	6.0	14.0	148	1.8
	01/03/11	F	6.0	15.0	139	1.5
	01/03/11	M	5.5	12.5	139	2.0
TR-02 - Totals and Averages		15	6.4	15.1	169	1.7
TR-03	12/20/10	M	6.0	14.5	135	1.6
	12/20/10	F	6.0	15.5	108	1.2
	12/20/10	M	6.5	15.0	162	1.7
	12/20/10	F	6.0	13.5	124	1.5
	12/20/10	F	6.0	14.5	121	1.4
	12/20/10	F	6.5	17.0	194	1.8
	12/20/10	M	8.5	20.0	383	2.3
	01/03/11	M	7.5	17.5	138	1.1
	01/03/11	M	7.5	15.0	318	2.8
	01/03/11	F	5.5	13.0	107	1.5
	01/03/11	F	6.0	14.5	135	1.6
	01/03/11	F	7.5	18.0	229	1.7
	01/03/11	M	6.0	13.0	118	1.5
	01/03/11	M	6.0	15.0	127	1.4
TR-03 - Totals and Averages		14	6.5	15.4	171	1.6

Table 5
Crab Counts and Measurements

East White Lake Field
Vermilion Parish, Louisiana

Crab Sampling Location	Crab Collection Date	Gender (M/F)	Length (cm)	Width (cm)	Weight (gm)	Fullness [Weight/(length x width)] (gm/cm^2)
TR-03A	12/14/10	M	8.0	17.0	298	2.2
	12/14/10	M	6.0	14.5	141	1.6
	12/14/10	F	6.0	15.5	146	1.6
	12/14/10	F	7.0	17.0	181	1.5
	12/14/10	M	5.5	14.0	152	2.0
	12/14/10	M	7.0	16.0	209	1.9
	12/14/10	F	7.0	19.0	191	1.4
	12/14/10	M	6.5	16.0	201	1.9
	12/14/10	M	6.0	14.5	149	1.7
	12/14/10	F	6.0	14.5	132	1.5
	12/14/10	F	7.0	16.5	167	1.4
	12/14/10	M	8.0	18.0	259	1.8
TR-03A - Totals and Averages		12	6.7	16.0	186	1.7
TR-04	12/14/10	M	6.0	16.0	167	1.7
	12/14/10	M	8.0	20.0	305	1.9
	12/14/10	M	5.5	14.0	122	1.6
	12/14/10	M	5.5	13.5	116	1.6
	12/14/10	M	6.0	12.5	127	1.7
	12/14/10	M	5.5	13.5	118	1.6
	12/14/10	M	6.0	15.0	161	1.8
	12/14/10	F	6.0	13.0	98	1.3
	01/03/11	M	8.5	19.0	424	2.6
	01/03/11	M	8.0	20.0	403	2.5
	01/03/11	M	5.5	13.0	130	1.8
	01/03/11	M	6.5	13.5	149	1.7
	01/03/11	M	7.5	17.5	291	2.2
	01/03/11	F	7.5	19.0	267	1.9
	01/03/11	F	7.5	17.0	219	1.7
	01/03/11	F	7.5	18.0	224	1.7
	01/03/11	F	6.5	15.0	125	1.3
	01/03/11	M	7.5	15.5	274	2.4
TR-04 - Totals and Averages		18	6.7	15.8	207	1.9
TR-05	12/14/10	M	7.0	17.0	262	2.2
	12/14/10	F	7.5	18.5	127	0.9
	12/14/10	F	7.0	18.0	189	1.5
	12/14/10	F	7.0	17.0	194	1.6
	12/14/10	F	8.0	20.0	344	2.2
	12/14/10	F	8.0	18.5	289	2.0
	12/14/10	M	8.0	19.5	373	2.4
	12/14/10	F	6.0	15.5	134	1.4
	12/14/10	M	7.5	18.5	273	2.0
	12/14/10	M	7.0	17.5	227	1.9
	12/14/10	F	7.0	18.0	172	1.4
TR-05 - Totals and Averages		11	7.3	18.0	235	1.8

Table 5
Crab Counts and Measurements

East White Lake Field
Vermilion Parish, Louisiana

Crab Sampling Location	Crab Collection Date	Gender (M/F)	Length (cm)	Width (cm)	Weight (gm)	Fullness [Weight/(length x width)] (gm/cm^2)
TR-06	12/14/10	M	7.5	16.5	269	2.2
	12/14/10	M	7.0	16.0	232	2.1
	12/14/10	F	7.5	17.0	222	1.7
	12/14/10	M	6.5	15.0	179	1.8
	12/14/10	M	7.0	16.5	253	2.2
TR-06 - Totals and Averages		5	7.1	16.2	231	2.0
TR-07	12/14/10	M	7.5	17.0	288	2.3
	12/14/10	M	7.5	18.0	258	1.9
	12/14/10	M	6.5	16.5	186	1.7
	12/14/10	F	7.5	19.5	256	1.8
	12/14/10	M	7.5	17.5	283	2.2
	12/14/10	M	8.0	18.0	323	2.2
	12/14/10	F	6.5	16.0	162	1.6
	12/14/10	M	7.5	18.0	254	1.9
	12/14/10	M	8.5	20.0	358	2.1
	12/14/10	F	5.5	14.5	128	1.6
	12/14/10	M	6.0	14.0	140	1.7
TR-07 - Totals and Averages		11	7.1	17.2	240	1.9
TR-08	12/14/10	F	7.0	16.5	187	1.6
	12/14/10	M	6.5	16.0	187	1.8
	12/14/10	F	7.5	18.0	228	1.7
	12/14/10	F	6.5	17.5	147	1.3
	12/14/10	F	7.0	16.5	207	1.8
	12/14/10	F	8.5	19.5	292	1.8
	12/14/10	M	7.5	17.5	217	1.7
	12/14/10	M	8.0	18.5	302	2.0
	12/14/10	M	6.0	14.5	152	1.7
	12/14/10	M	7.5	18.0	263	1.9
TR-08 - Totals and Averages		10	7.2	17.3	218	1.7
TR-09	12/14/10	F	7.5	18.0	231	1.7
	12/14/10	M	8.0	19.0	293	1.9
	12/14/10	F	7.0	16.0	199	1.8
	12/14/10	F	7.0	17.0	174	1.5
	12/14/10	M	7.5	17.0	279	2.2
	12/14/10	F	8.0	19.0	298	2.0
	12/14/10	F	7.5	17.5	221	1.7
	12/14/10	F	9.0	18.5	347	2.1
	12/14/10	M	6.5	15.0	143	1.5
	12/14/10	M	7.0	15.5	173	1.6
	12/14/10	M	8.0	19.5	339	2.2
TR-09 - Totals and Averages		11	7.5	17.5	245	1.8

Note: One female crab was dead and not shipped from TR-06 on 12/14/10. A total of 5 crabs were shipped from TR-06 on 12/14/10.

Table 5
Crab Counts and Measurements

East White Lake Field
Vermilion Parish, Louisiana

Crab Sampling Location	Crab Collection Date	Gender (M/F)	Length (cm)	Width (cm)	Weight (gm)	Fullness [Weight/(length x width)] (gm/cm^2)
T-01	12/20/10	M	7.0	16.0	171	1.5
	12/20/10	M	6.5	14.5	180	1.9
	12/20/10	M	6.5	14.0	177	1.9
	12/20/10	M	7.0	16.5	234	2.0
	12/20/10	M	7.5	17.0	255	2.0
	12/20/10	M	7.0	16.5	222	1.9
	12/20/10	M	7.5	18.0	273	2.0
	12/20/10	M	7.0	16.0	213	1.9
	12/20/10	M	5.5	12.0	139	2.1
	12/20/10	F	6.0	14.5	148	1.7
	12/20/10	M	7.5	16.5	253	2.0
TR-01 - Totals and Averages		11	6.8	15.6	206	1.9
T-01A	12/15/10	M	6.5	14.0	186	2.0
	12/15/10	M	7.0	16.0	219	2.0
	12/15/10	M	7.0	16.5	175	1.5
	12/15/10	M	7.5	17.0	263	2.1
	12/15/10	M	7.0	17.0	205	1.7
	12/15/10	M	7.5	18.0	240	1.8
	12/15/10	M	7.0	15.5	213	2.0
	12/15/10	M	7.0	16.0	234	2.1
	12/15/10	F	7.5	18.5	219	1.6
	12/15/10	M	7.0	15.0	205	2.0
	12/15/10	M	6.5	15.0	181	1.9
	12/15/10	M	6.5	16.0	197	1.9
	12/15/10	M	8.0	18.0	294	2.0
	12/15/10	M	7.5	18.0	247	1.8
	12/15/10	F	8.0	18.5	263	1.8
T-01A - Totals and Averages		15	7.2	16.6	223	1.9
T-02	12/20/10	M	5.5	13.0	115	1.6
	12/20/10	M	7.5	16.0	258	2.2
	12/20/10	F	8.0	18.0	276	1.9
	12/20/10	M	6.5	16.0	180	1.7
	12/20/10	M	7.0	16.0	229	2.0
	12/20/10	M	7.0	18.0	238	1.9
	12/20/10	M	7.5	19.0	276	1.9
	12/20/10	M	6.5	15.5	174	1.7
	12/20/10	M	6.5	15.0	196	2.0
	12/20/10	M	7.0	17.5	244	2.0
	12/20/10	M	7.5	16.0	284	2.4
	12/21/10	M	6.0	14.5	129	1.5
	12/21/10	M	7.5	16.0	232	1.9
	12/21/10	M	8.0	19.0	328	2.2
	12/21/10	M	7.0	16.5	219	1.9
	12/21/10	M	7.0	16.5	212	1.8
	12/21/10	M	7.5	18.0	246	1.8
	12/21/10	M	7.5	17.0	270	2.1
	12/21/10	M	6.5	15.5	145	1.4
	12/21/10	M	6.5	16.0	179	1.7
	12/21/10	M	7.0	16.5	213	1.8
	12/21/10	M	8.0	18.5	238	1.6
	12/21/10	M	7.0	15.0	186	1.8
	12/21/10	M	8.0	18.0	292	2.0
	12/21/10	M	6.5	16.0	207	2.0
	12/21/10	M	7.0	15.0	168	1.6
	12/21/10	M	7.5	16.0	211	1.8
	12/21/10	M	8.0	17.0	260	1.9
T-02 - Totals and Averages		28	7.1	16.5	222	1.9

Table 5
Crab Counts and Measurements

East White Lake Field
Vermilion Parish, Louisiana

Crab Sampling Location	Crab Collection Date	Gender (M/F)	Length (cm)	Width (cm)	Weight (gm)	Fullness [Weight/(length x width)] (gm/cm^2)
T-03	12/16/10	M	6.5	15.5	178	1.8
	12/16/10	M	7.0	15.0	212	2.0
	12/16/10	M	7.0	16.0	194	1.7
	12/16/10	M	5.5	13.5	130	1.8
	12/16/10	M	6.0	13.5	156	1.9
	01/03/11	M	7.0	17.0	195	1.6
	01/03/11	M	7.5	18.0	249	1.8
	01/03/11	M	6.5	15.0	201	2.1
	01/03/11	F	7.5	19.0	263	1.8
	01/03/11	M	6.5	15.5	183	1.8
	01/03/11	M	7.5	17.5	261	2.0
	01/03/11	M	7.0	17.5	229	1.9
	01/03/11	M	6.5	14.5	168	1.8
	01/03/11	F	7.5	18.5	203	1.5
	01/03/11	M	7.0	16.0	287	2.6
	01/03/11	F	7.5	18.5	265	1.9
	01/03/11	F	8.0	19.0	268	1.8
T-03 - Totals and Averages		17	6.9	16.4	214	1.9
T-04	12/16/10	M	7.0	16.0	201	1.8
	12/16/10	M	7.5	17.5	289	2.2
	12/16/10	M	6.5	14.5	172	1.8
	12/16/10	M	6.5	15.0	182	1.9
	12/16/10	M	8.0	18.0	298	2.1
	12/20/10	M	6.0	11.5	176	2.6
	12/20/10	M	6.5	13.5	148	1.7
	12/20/10	M	7.0	16.5	281	2.4
	12/20/10	M	7.5	16.0	237	2.0
	12/20/10	M	7.5	17.5	239	1.8
	12/20/10	M	7.5	15.5	209	1.8
	12/20/10	M	8.0	18.0	301	2.1
T-04 - Totals and Averages		12	7.1	15.8	228	2.0
T-05	12/20/10	F	7.5	18.5	217	1.6
	12/20/10	M	7.0	16.0	211	1.9
	12/20/10	M	6.5	14.5	151	1.6
	12/20/10	M	7.0	17.0	262	2.2
	12/20/10	M	7.5	17.5	251	1.9
	12/20/10	M	8.5	20.0	362	2.1
	12/20/10	M	6.0	13.5	169	2.1
	12/20/10	M	5.5	13.0	127	1.8
	12/21/10	M	6.5	15.0	174	1.8
	12/21/10	M	6.5	14.0	173	1.9
	12/21/10	M	7.0	15.5	188	1.7
	12/21/10	M	8.0	18.0	292	2.0
	12/21/10	F	7.5	17.5	227	1.7
	12/21/10	M	6.5	14.5	161	1.7
	12/21/10	M	6.5	15.0	177	1.8
	12/21/10	M	7.0	16.5	211	1.8
	12/21/10	M	7.0	16.0	222	2.0
T-05 - Totals and Averages		17	6.9	16.0	210	1.9

Table 5
Crab Counts and Measurements

East White Lake Field
Vermilion Parish, Louisiana

Crab Sampling Location	Crab Collection Date	Gender (M/F)	Length (cm)	Width (cm)	Weight (gm)	Fullness [Weight/(length x width)] (gm/cm^2)
T-06	12/16/10	M	7.0	16.0	214	1.9
	12/16/10	M	6.5	16.0	199	1.9
	12/16/10	M	6.5	14.5	139	1.5
	12/16/10	M	7.0	17.5	221	1.8
	12/16/10	M	6.5	16.0	193	1.9
	12/16/10	F	7.0	15.5	184	1.7
	12/16/10	M	7.0	16.5	233	2.0
	12/16/10	M	6.5	14.0	198	2.2
	12/20/10	M	6.5	14.5	178	1.9
	12/20/10	M	7.0	17.0	192	1.6
	12/20/10	M	8.0	16.5	298	2.3
	12/20/10	M	7.0	15.5	172	1.6
	12/20/10	M	7.0	16.5	215	1.9
	12/20/10	M	8.0	19.5	309	2.0
	12/20/10	M	6.5	14.5	174	1.8
	12/20/10	M	6.0	14.0	167	2.0
	12/20/10	M	6.0	15.0	154	1.7
	12/20/10	M	6.5	16.5	231	2.2
T-06 - Totals and Averages		18	6.8	15.9	204	1.9
T-07	12/21/10	M	7.0	15.0	191	1.8
	12/21/10	F	7.0	16.0	171	1.5
	12/21/10	M	7.0	15.5	197	1.8
	12/21/10	M	8.0	18.0	275	1.9
	12/21/10	M	7.5	17.5	240	1.8
	01/03/11	M	8.0	19.0	297	2.0
	01/03/11	M	6.5	15.0	166	1.7
	01/03/11	M	8.0	17.5	288	2.1
	01/03/11	M	7.0	16.5	226	2.0
	01/03/11	M	6.0	14.0	132	1.6
	01/03/11	M	7.0	16.0	210	1.9
	01/03/11	M	6.0	14.5	156	1.8
	01/03/11	M	7.0	16.0	246	2.2
	01/03/11	F	7.5	16.0	167	1.4
T-07 - Totals and Averages		14	7.1	16.2	212	1.8
T-08	12/20/10	M	7.0	17.5	264	2.2
	12/20/10	M	7.5	17.0	287	2.3
	12/20/10	M	7.0	16.0	224	2.0
	12/20/10	F	7.0	16.5	214	1.9
	12/20/10	F	6.5	16.0	171	1.6
	01/03/11	M	7.5	16.0	208	1.7
	01/03/11	M	8.0	18.0	256	1.8
	01/03/11	M	8.0	18.5	352	2.4
	01/03/11	M	7.5	15.0	254	2.3
	01/03/11	M	8.0	19.0	351	2.3
	01/03/11	M	6.5	15.5	196	1.9
	01/03/11	M	7.0	17.5	240	2.0
	01/03/11	M	7.5	18.0	296	2.2
T-08 - Totals and Averages		13	7.3	17.0	255	2.0

Table 5
Crab Counts and Measurements

East White Lake Field
Vermilion Parish, Louisiana

Crab Sampling Location	Crab Collection Date	Gender (M/F)	Length (cm)	Width (cm)	Weight (gm)	Fullness [Weight/(length x width)] (gm/cm^2)
T-09	12/16/10	M	7.0	16.0	227	2.0
	12/16/10	M	7.0	16.0	138	1.2
	12/16/10	M	7.0	17.0	223	1.9
	12/16/10	M	6.0	14.5	127	1.5
	12/16/10	F	7.0	17.5	203	1.7
T-09 - Totals and Averages		5	6.8	16.2	184	1.6
T-10	12/20/10	M	7.5	18.0	286	2.1
	12/20/10	M	7.0	16.5	234	2.0
	12/20/10	M	6.5	13.5	161	1.8
	12/20/10	M	7.5	17.5	284	2.2
	12/20/10	M	6.0	15.5	155	1.7
	01/03/11	M	8.0	18.5	293	2.0
	01/03/11	M	7.0	14.5	195	1.9
	01/03/11	M	6.0	15.0	157	1.7
	01/03/11	M	7.0	14.5	220	2.2
	01/03/11	M	7.0	16.0	224	2.0
	01/03/11	M	7.0	16.0	196	1.8
	01/03/11	M	6.5	15.0	192	2.0
	01/03/11	M	8.0	17.0	289	2.1
	01/03/11	M	6.5	16.0	205	2.0
	01/03/11	M	6.5	14.5	187	2.0
	01/03/11	M	7.0	17.5	207	1.7
	01/03/11	F	6.0	15.0	125	1.4
T-10 - Totals and Averages		17	6.9	15.9	212	1.9
T-11	12/21/10	M	7.0	15.5	169	1.6
	12/21/10	M	7.0	16.5	201	1.7
	12/21/10	M	6.5	14.0	167	1.8
	12/21/10	M	7.0	17.0	220	1.8
	12/21/10	M	8.0	18.0	304	2.1
	12/21/10	M	7.5	18.0	266	2.0
	12/21/10	M	7.5	17.5	269	2.0
	12/21/10	M	7.0	16.0	228	2.0
T-11 - Totals and Averages		8	7.2	16.5	226	1.9
T-12	12/20/10	M	6.5	15.0	178	1.8
	12/20/10	M	6.0	14.5	135	1.6
	12/20/10	M	7.0	16.0	231	2.1
	01/03/11	M	8.0	19.0	357	2.3
	01/03/11	M	7.0	16.5	249	2.2
	01/03/11	M	6.5	15.0	202	2.1
	01/03/11	M	7.0	15.5	178	1.6
	01/03/11	M	6.5	14.5	182	1.9
	01/03/11	M	6.0	14.5	130	1.5
	01/03/11	M	7.0	16.0	214	1.9
	01/03/11	M	6.0	15.0	131	1.5
	01/03/11	M	7.0	15.0	198	1.9
	01/03/11	M	6.0	14.0	154	1.8
	01/03/11	F	6.0	14.5	124	1.4
T-12 - Totals and Averages		14	6.6	15.4	190	1.8

Table 6
Equipment Supply List for Crab and Forage Fish Tissue Sampling

East White Lake Field
Vermilion Parish, Louisiana

1 Sampling boat for collecting crabs (including boat, motor, oars, gas, and all required safety equipment)
2 Trawling boat for collecting fish (including boat, motor, oars, gas, and all required safety equipment)
3 Nets - (including trawls, hoop nets or cast nets)
3 Crab Traps
4 Coast Guard-approved personal floatation devices
5 Maps of sampling areas, sites and access routes
6 Global Positioning System (GPS) unit/batteries
7 pH meter (including associated calibration supplies)
8 Livewell and/or buckets
9 Metric ruler
10 Ice chests
11 Heavy duty aluminum foil
12 Heavy-duty food grade polyethylene bags
13 Large plastic bags
14 Knife or scissors
15 Clean nitrile gloves
16 Field Record Forms
17 Chain-of-Custody Forms
18 Scientific collection permit or fishing license
19 Ice
20 Dry ice
21 Black ballpoint pens and/or waterproof markers
22 Clipboard
23 Packing/strapping tape
24 Overnight courier airbill and laboratory shipping address
25 First aid kit and emergency telephone numbers
26 Tongs for picking up crabs
27 Hooked gaffe for picking traps up out of the water
28 Digital camera/batteries

Quality Assurance Plan/Sampling Analysis and Assessment Plan for Crab and Forage Fish Tissue
Appendix A

East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

Environmental
Resources
Management

3838 North Causeway Boulevard
Suite 2725
Metairie, Louisiana 70002
(504) 831-6700
(504) 831-6742 (fax)

ERM

December 6, 2010

Mr. Chris Piehler, Administrator
Louisiana Department of Environmental Quality
Office of Environmental Compliance, Inspection Division
602 North Fifth Street
Baton Rouge, LA 70802

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Mr. James H. Welsh
Commissioner of Conservation
Louisiana Department of Natural Resources (LDNR)
617 North Third Street, Ninth Floor
Baton Rouge, Louisiana 70802

Mr. Robert Barham
Secretary
Louisiana Department of Wildlife and Fisheries
2000 Quail Dr.
Baton Rouge, La 70808

RE: Quality Assurance Project Plan/Sampling Analysis and Assessment Plan for Crab and Forage Fish Tissue -- East White Lake Oilfield, Vermilion Parish, Louisiana
Vermilion Parish School Board Property, Section 16 T15S, R01E

Dear Madame and Sirs:

Enclosed please find a Quality Assurance Project Plan/Sampling Analysis and Assessment Plan for Crab and Forage Fish Tissue at the East White Lake Oilfield, Vermilion Parish, Louisiana (the "Plan"). This plan has been prepared on behalf of UNOCAL in response to questions that have been raised regarding whether the historic oil and gas operations in this field have adversely impacted the crabs in the area.

In summary, pursuant to this Plan the project team will collect and analyze tissue from blue crabs and forage fish in the East White Lake Oilfield, certain reference sites identified in the Plan, and, for crab, seafood markets in the region. The tissue will be analyzed for arsenic (inorganic and total), total barium, mercury (methylmercury and total) and total petroleum hydrocarbons. We will provide a summary of the field sampling and analytical results to the agencies upon completion.

We plan to start setting crab traps on Monday, December 13, 2010, with fishing and crab collection to occur in the following days. You or your representatives are welcome to observe or participate in the collection process. In the meantime, should you have any questions or comments on the attached plan, please feel free to contact me.

Sincerely,

Environmental Resources Management Southwest, Inc.

Angela M. Levert

Angela M. Levert
Senior Associate

cc: John Rodgers
David Lingle
Barbara Beck

Enclosures

QUALITY ASSURANCE PROJECT PLAN AND SAMPLING ANALYSIS AND ASSESSMENT PLAN FOR CRAB AND FORAGE FISH TISSUE – EAST WHITE LAKE OIL AND GAS FIELD VERMILLION PARISH, LOUISIANA

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PROJECT SUMMARY

This Quality Assurance Project Plan (QAPP) and Sampling Analysis and Assessment Plan (SAP) for crab and forage fish tissue was prepared for the East White Lake Oil and Gas Field, Vermilion Parish, Louisiana. Based on recent blue crab tissue analysis (of whole animal samples), conducted on behalf of the landowner, questions have been raised concerning concentrations of arsenic, barium, mercury, and total petroleum hydrocarbons in the crabs in this area. Previous sampling and analyses of surface water and sediments from the area did not indicate that concentrations of these constituents of concern (COCs) posed a risk to human health or the environment. In order to address the questions raised by the recent tissue sampling, this study has been carefully designed to obtain accurate data to evaluate potential human health and ecological risks due to these COCs. Samples of crabs and forage fish will be collected from locations in the East White Lake Oil and Gas Field, nearby reference locations in Schooner Bayou and White Lake, as well as fish markets in the region (blue crabs only). Composite samples from the site, reference locations, and markets will be analyzed under a rigorous quality assurance/quality control (QA/QC) program.

A. PROJECT MANAGEMENT

1.0 Sampling, Analysis and Assessment Protocol - Purpose

The purpose of this document is to present a sampling and analysis plan and Quality Assurance Project Plan to measure concentrations of COCs (arsenic, barium, mercury, and total petroleum hydrocarbons [TPH]) in tissues of blue crabs (*Callinectes sapidus*) and forage fish (e.g., mosquito fish [*Gambusia affinis*]; topminnows [*Fundulus* spp.]) collected from the East White Lake Oil and Gas Field (Site) and reference locations. Laboratory analysis of COC concentrations in blue crabs from Louisiana markets in the region will also be performed. The overall objective of this study is to measure tissue concentrations of these COCs to evaluate potential exposures to:

- Blue crabs and forage fish, as well as wildlife (e.g., birds and mammals) that consume them; and
- Humans that consume blue crabs.

The laboratory analyses will be performed on a tissue-specific basis (blue crabs) and whole-body basis (forage fish) to support both the human health and ecological risk assessments. In addition to the above COCs, tissue lipid and moisture contents will also be analyzed in the laboratory.

The Site, located in Section 16, Township 15 South, Range 1 East in Vermillion Parish, Louisiana (Figure 1), is about five miles southwest of Forked Island in an area of intermediate marsh (Brupbacher et al. 1973, Visser et al. 2000; Sasser et al. 2007-8). The areas of interest are the canals and waterways within the East White Lake Oil and Gas Field, located on the eastern side of White Lake, south of Schooner Bayou. The specific area is primarily an intermediate marsh system, which is protected by water control structures operated by the United States Army Corps of Engineers. This property has been used since approximately 1935 for oil and gas exploration and production. Approximately 85 wells have been drilled since initiation of the lease, although currently, only approximately 10 shut-in productive, 8 active producing, and 2 active injection wells remain. This study will serve to provide accurate information to follow up previous or ongoing studies in the area.

2.0 Project Management Overview

This document describes the quality assurance (QA) and quality control (QC) procedures that will be used to determine COC concentrations in blue crab and/or forage fish tissue from the Site, reference locations, and Louisiana markets in the region. The QAPP was prepared consistent with the documents, *EPA Requirements for Quality Assurance Project Plans*, EPA QA/R-5 (USEPA 2001) and *EPA Guidance for Quality Assurance Project Plans*, EPA QA/G-5 (USEPA 2002b), *Protocol for Issuing Public Health Advisories for Chemical Contaminants in Recreationally Caught Fish and Shellfish* (LDHH et al. 2010), and *Protocol for Issuing Health Advisories and Bans Based on Chemical Contamination of Fish/Shellfish in Louisiana* (LDHH et al. 1997). The collection methods, procedures and protocols follow the guidelines and recommendations of *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume1: Fish Sampling and Analysis*, Third Edition (USEPA 2000a).

3.0 Project Organization

This document was developed by Dr. John Rodgers in collaboration with Dr. Barbara Beck, Angela Levert, and David Lingle. Dr. Rodgers (Project Manager) will coordinate and schedule the field work, including collection of blue crab and forage fish, and submission of those organisms to Columbia Analytical Services, Inc, (CAS) of Kelso, Washington for processing and analytical testing for arsenic, barium, mercury, lipid content, and moisture content. CAS will provide tissue aliquots to Gulf Coast Analytical Laboratories, Inc. (GCAL) of Baton Rouge, Louisiana for TPH analysis. Angela Levert will serve as the project quality assurance officer. Analytical results will be used by Dr. Barbara Beck and David Lingle in support of the human health and ecological risk assessments, respectively.

4.0 Problem Definition and Background

A previous study (Barbee 2010) has indicated the presence of arsenic, mercury, barium, and TPH in some whole body crab samples from the East White Lake Oil and Gas Field. The authors of this document have identified significant concerns regarding the design and interpretation of that previous study. A more comprehensive and thorough study is therefore being initiated. The information gathered from this study will be used to assess potential human health and ecological risks that these may pose. Blue crabs are omnivores (consuming both plant and animal tissues) and range somewhat in their search for food and during reproduction. Blue crabs are a food source for both human and ecological receptors. Forage (prey) fish spend their entire life in a relatively small area of a waterbody or wetland and they can be important indicators of local water and sediment quality. Forage fish also serve as food for higher trophic level ecological receptors. A rigorous analysis of both blue crabs and forage fish tissue is therefore being conducted to address the conclusions previously presented by Barbee (2010).

5.0 Project Description

The overall objective of this study is to measure tissue concentrations of COCs to evaluate potential exposures to:

- Blue crabs and forage fish, as well as wildlife that consume them; and
- Humans that consume blue crabs.

As part of this study, COC concentrations in blue crab and forage fish tissues collected from the Site (Figure 2) will be compared to tissue concentrations from reference locations (Figure 3) and Louisiana markets in the region (blue crabs only).

Details of the sampling plan are found in Section 9 of this document. The study involves synoptic sampling of blue crabs and forage fish from twelve (12) locations in the East White Lake Oil and Gas Field and nine (9) reference locations (five [5] in Schooner Bayou and four [4] in White Lake). Nine of the twelve Site sample locations correspond to the locations previously considered by Barbee (2010). Samples will be collected and managed by experienced personnel. Tissue samples will be analyzed by CAS (arsenic, barium, mercury, lipid content, and moisture content) and GCAL (TPH). The study targets blue crabs and forage fish that are caught and consumed by the public and predators. The goal is to collect sufficient blue crabs and forage fish to meet the tissue requirements of the laboratories.

6.0 Quality Objectives and Criteria for Measurement Data

6.1 Project Quality Objectives

The results from this study will allow project scientists to evaluate the extent to which certain COCs (arsenic, barium, mercury, and TPH) are present in blue crabs and forage fish samples from the Site and reference locations as well as market samples (blue crabs only). Sources of uncertainty inherent to the study are due to the following: 1) sampling specific species from each site; 2) limited information on the variability in analyte concentrations in blue crabs and forage fish; 3) unknown field exposures of blue crabs and forage fish; 4) compositing the samples; and 5) variability in the laboratory analysis process. The quality objectives of this project are related to the blue crab and forage fish tissue collection methods and to the laboratory procedures. Methods and procedures for the collection of blue crab and forage fish tissue described in this document are intended to reduce the magnitude and sources of uncertainty (and their frequency of occurrence) by applying the following approaches:

- use of standardized sample collection and handling procedures; and

- use of experienced scientists to perform the sample collection and handling activities.

The following approaches are intended to measure the measurement quality objectives as they relate to laboratory procedures:

- One (1) laboratory blank per batch, with a batch being up to 20 samples;
- One matrix spike (MS) and matrix spike duplicate (MSD) pair per batch; and
- One laboratory control sample per batch of known quality and concentration for laboratory comparison.

6.2 Measurement Quality Objectives

Measurement quality objectives (MQOs) are quantitative statistics that are used to interpret the degree of acceptability or utility of the data to the user for the intended purpose. The following defines the criteria for this study:

Precision

Precision is a measure of internal method consistency or variability in sample results. It is generally attributed to sampling activities and/or laboratory analysis. It can be expressed either as a range, a standard deviation or percentage of the mean of the measurements (relative range or relative standard deviation). In order to control for field-related variability, sampling activities will be standardized by adherence to the procedures and methods described in this sampling plan, and field sampling will be conducted by experienced professionals (this will also help prevent *bias*). For this study, because samples must be composited and subdivided in a strictly controlled, clean laboratory environment, duplicate composite samples will be prepared for approximately 10% of the samples to be analyzed. These duplicates are labeled with unique separate numbers and analyzed with the routine samples. The results from these duplicate samples are used to assess variability arising from sample compositing, aliquoting, and laboratory analysis processes. The study MQO requirements for analytical precision are that results from 90% of these duplicate composite samples agree within 50% relative percent difference (RPD) for values greater than 5 times the minimum level of quantification and that 90% of these duplicate composite samples agree within 100% RPD for values less than 5 times the minimum level. RPD is calculated as follows:

Relative Percent Difference	RPD	$\text{abs}\left(\frac{(x_1 - x_2)}{(x_1 + x_2)/2}\right) \text{ x } 100$

Where:

X_1 is the first measurement; and
X_2 is the duplicate measurement.

In addition to the duplicate composite samples, the laboratory will also employ a suite of laboratory quality control measures (initial precision and recovery samples, matrix spike and matrix spike duplicate samples) that provide information about the precision associated with various components of the analytical process. Other quality control elements and associated requirements may be described in more detail in the laboratory's Quality Assurance Project Plan. The results will be provided to the project scientists for interpretation and development of their reports. Major criteria for laboratory data are summarized in Tables 1 and 2.

Bias

Bias is systematic and consistent distortion of a measurement process that causes errors in one direction. Bias within the sampling and processing is controlled by training of field personnel and of the sample preparation procedures in the laboratory and by adherence to protocols. Bias within the analytical process is measured by preparing and analyzing field samples spiked with COCs of interest (matrix spike samples) or by analyzing standard reference materials (SRMs) containing the analytes of interest to verify that the procedure is in control for the tissue matrix. Potential interferences can be addressed within the laboratory by dilution of samples or by additional cleanup steps, where appropriate.

Accuracy

Accuracy is the measure of the combination of bias and precision of an analytical procedure. It reflects the closeness of a measured, observed value to a true value. Accuracy is inferred from recovery data determined by sample spiking and/or analyses of reference standards. Accuracy requirements are summarized in Tables 1 and 2.

Percent recovery for a laboratory matrix is calculated using the following equation:

Percent Recovery	%R	$\frac{x_{meas}}{x_{true}} \text{ x } 100$

Percent recovery for a sample matrix is calculated using the following equation:

Percent Recovery	%R	$\frac{\begin{pmatrix}\text{value of} & & \text{value of} \\ \text{spiked} & - & \text{unspiked} \\ \text{sample} & & \text{sample}\end{pmatrix}}{\text{value of added spike}} \text{ x } 100$

Analytical Sensitivity

Analytical sensitivity is included in the laboratory's Quality Assurance Project Plan and is reported to the project scientists in terms of the method detection limits and the minimum levels that are used to define the sensitivity of each measurement process. MQO requirements for detectability are presented in Table 3.

Representativeness

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter, variations at a sampling site, a process condition or an environmental condition. In order to achieve this, a sufficient number of representative samples are planned for collection. Preservation of the representativeness of the collected samples is assured by adhering to the sample handling protocols for storage, preservation and transportation, as described in this document. Proper documentation records that the protocols were followed and sample identification and integrity were assured.

Comparability

The objective of this parameter is to assure that data developed during this investigation are either directly comparable, or comparable with defined limitations, to literature data or other applicable criteria. Comparability is dependent on the proper design of the sampling plan and adherence to accepted sampling techniques, standard operating procedures and quality assurance guidelines. In order to fulfill the objectives of this study, all samples will be collected and prepared according to the procedures described in this project plan and any associated standard operating procedures. These procedures are consistent with the recommendations of U.S. EPA's *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume I: Fish Sampling and Analysis*, Third Edition (USEPA 2000a). The procedures for this study are also consistent with the National Study of Chemical Residues in Lake Fish Tissue, conducted by the USEPA Office of Water, Office of Science and Technology and Engineering and Analysis Division (USEPA 2000c). All field personnel involved with sampling have adequate training, appropriate experience and will use this protocol for sample collection.

Completeness

Completeness is a measure of the amount of valid data collected and deemed to be acceptable for use in the study, as compared to the amount of data expected to be obtained. Three measures of completeness are defined:

1) Sampling completeness, defined as the number of valid samples collected relative to the number of samples planned for collection;
2) Analytical completeness, defined as the number of valid sample measurements relative to the number of valid samples collected; and
3) Overall completeness, defined as the number of valid sample measurements relative to the number of samples planned for collection.

The sampling and analytical completeness goal in this study is to obtain valid measurements from 90% of the valid samples collected. In case this percentage is lower than 90%, the effects on the study conclusions and recommendations will be re-evaluated during data analysis. Blue crab and forage fish tissue specimen archives will be kept frozen, in labeled vials, for 6 months, at the laboratory.

7.0 Special Training Requirements

The field sampling team will consist of experienced personnel, all of whom are trained on all field procedures detailed in this protocol. This protocol and any requisite standard operating procedures will be distributed to all personnel involved in the field activities. Project orientation sessions will be coordinated by the project manager, who also will provide instructions on all the field sampling and sample handling activities. Skills required of the laboratory analysts performing work for this study are described in the laboratory's Quality Assurance Project Plan.

8.0 Documentation and Records

Thorough documentation of all field sample collection and handling activities is necessary for proper processing in the laboratory, for ensuring data integrity and, ultimately, for interpretation of study results. Field sample collection and handling will be documented in writing (for each sampling site) using the following forms and labels:

- Field Record data sheet that contains information about each sample and site;
- Sample Identification Label that accompanies and identifies each sample or labeled vials;
- Chain of Custody Form that provides tracking information for all samples; and
- Sample Preparation Record Form for each composite sample which will be prepared by the laboratory.

The Field Record data sheet will document the sampling date, time, sampling crew names, sampling site location/description and sample description, length or dimensions of each specimen, and the method of sample collection. The field record data sheet also will contain a unique tracking code for tracking each sample. The code will follow the format:

- The initial code for the project (EWL);
- Date of collection (MM-DD-YY);
- Sampling site identification code (letters and site number);
- Sample type identification code (C = crab; F = forage fish); and
- Numbering order of samples (001, 002, etc.).

Field record forms will be completed by the personnel in the field. All entries will be made in ink, with no erasures. If an incorrect entry is made, the information will be crossed out with a single strike mark and initialed and dated by the recorder. Two copies will be made of this form, one for the project scientists and one for the project manager. The originals will be kept in a project-dedicated binder.

Chain of custody forms will accompany each container of samples and will document sample identity (coincide with information on the field record), sampler relinquishment name, date and time and project manager receipt date and time. The field personnel responsible for quality control will also be responsible for the delivery of the samples to the laboratory. A sample preparation record form will be completed at the laboratory, for each site, and it includes information on every composite sample. It includes the name of the persons preparing the composite samples; information about the crab or fish included in each composite sample; composite sample number; the weight of each composite sample; any general comments or remarks. The table describing the compositing scheme, i.e., which tissues make up each composite sample, will be attached to the sample preparation record, and will also be kept in the project-dedicated binder. If any changes are necessary during the sample collection and handling activities, a note will be made in the field record form, and the project manager will be notified as soon as practical, preferably prior to the change actually occurring. Every effort will be made for the project manager to be accessible, either by being on site or by cellular telephone.

8.1 Analytical Laboratory Records

The analytical laboratory will be required to submit summary reports of all analytical results in electronic format and hard copy. The laboratory will be required to provide a data package with QA/QC documentation as specified in the LDEQ Risk Evaluation/Corrective Action Program (RECAP) Section 2.4, at a minimum, which allows for evaluation relative to the requirements for *definitive data* per RECAP. The laboratory reports should include a description of any problems encountered and comments on the performance of any part of a method. The results should be reported consistently in regard to reporting units (e.g., µg analyte/Kg wet weight).

B. DATA AQUISITION

9.0 Sampling Design

9.1 Rationale for Selection of Sample Locations or Sites

Blue crabs and/or forage fish will be collected if possible from the following locations:

- Twelve (12) locations in the East White Lake Oil and Gas Field (Figure 2). Nine of the twelve Site locations (T1 through T9) correspond to locations previously considered by Barbee (2010);
- Nine (9) reference locations (five [5] in Schooner Bayou and four [4] in White Lake; Figure 3);
- Market samples from locations in the region to determine the concentrations of COCs in crabs from commercial sources for comparative purposes.

Sufficient sampling locations are included in this study to permit valid comparisons and evaluations if blue crabs or forage fish are not caught at some locations. Sampling locations presented in Figures 2 and 3 are approximate and will be determined in the field using GPS equipment and consideration of local conditions such as flows and available habitat.

9.2 Rationale for Selection of Parameters

The COCs chosen for this study (arsenic, barium, mercury, and TPH) were measured in whole body crab samples from the Site in a previous study and cited by Barbee (2010) as containing concentrations of concern. Among other difficulties with the Barbee (2010) study, the crabs were analyzed as homogenized intact (shells and all) organisms. The COCs of concern as noted by Barbee are naturally occurring elements or compounds and have a variety of sources in coastal Louisiana. This study is intended to accurately measure concentrations of these COCs in blue crabs and forage fish.

Sixteen polycyclic aromatic hydrocarbons (PAHs) were previously analyzed in Site surface waters and sediment in May 2010. The PAHs are from RECAP Table D-1: acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene. PAH results for all ten surface water samples locations were below the associated laboratory reporting limits (which ranged from <0.0000091 mg/L to <0000536 mg/L). PAH detections in the co-located sediment samples were primarily non-detect, with detections limited to 5 PAHs at three locations at concentrations well below 1 mg/kg-dry weight. Given the very limited detections of PAHs in sediments (and none in surface water), this SAP focuses on TPH analysis for evaluation of petroleum hydrocarbons in blue crab and forage fish tissues.

9.3 Sample Size

CAS and GCAL have minimum tissue (mass) requirements per composite for laboratory analysis of COCs, lipid content, and moisture content. The preferred total mass of homogenized wet tissue for analytical testing by CAS and GCAL is 50-60 grams (25-30 grams minimum).

9.4 Sample Types

To meet the study objective, this study will include samples of blue crabs (*Callinectes sapidus*) and forage fish (e.g., mosquito fish [*Gambusia affinis*]; topminnows [*Fundulus* spp.]) from the area. Samples of the crabs will be analyzed to provide data for both human health and ecological risk assessment.

Each blue crab will be separated into the following four components (and weighed) by CAS:

- Meat from the body and claws;
- Hepatopancreas;
- Other soft tissues (gills, heart, intestine, testes, and eyestalks); and
- Exoskeleton.

The human health risk assessment will use the analytical results (and respective weights) of the meat and hepatopancreas. The ecological risk assessment will use the analytical results (and respective weights) of all four components listed above to derive a whole-body crab concentration. The preferred total mass of homogenized wet tissue for analytical testing by CAS and GCAL is 50-60 grams (25-30 grams minimum).

Samples of forage fish will be analyzed as intact fish (whole body). Similar for crabs, forage fish will be composited to achieve adequate mass for accurate analyses (i.e., 50-60 grams preferred; 25-30 grams minimum). Fish will be composited within species if the variability of catch across the sampling sites requires use of more than one species

(*Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 1: Fish Sampling and Analysis, Second Edition* [USEPA 2000a]). If the sampling crew is unable to collect all forage fish needed to prepare the composite sample on the same day, and the organisms used in the same composite sample will be collected on different days (no more than 1 week apart), individual fish will be frozen until all the organisms to be included in the composite sample are available for shipment to CAS. Since freezing the crabs prior to compositing makes dissection problematic, crabs will not be frozen prior to shipment to CAS. Crab samples will also be collected from commercial markets in Louisiana to assess the concentrations of the COCs. Water samples at the sites will be analyzed for standard field parameters (pH, temperature, conductivity, salinity, dissolved oxygen, turbidity). Field notes will be collected regarding weather, sampling effort, and other parameters that may be important for interpreting the results.

9.5 Sampling Period

Sampling will be conducted during December of 2010 to January of 2010 since water and weather conditions are conducive to safe and efficient field sampling, and blue crabs and forage fish are not spawning.

9.6 Evaluation of Objective

The analyte concentrations will be compared with appropriate screening values for human health (LA DEQ 2010) and ecological receptors.

10.0 Sampling Methods

10.1 Target Species

To meet the study objective, this study will include samples of blue crabs (*Callinectes sapidus*) and forage fish (e.g., mosquito fish (*Gambusia affinis*); topminnows [*Fundulus* spp.]).

10.2 Composite Sampling

The blue crab and forage fish tissues will be composited by CAS to minimize the opportunity for cross-contamination. The forage fish are prepared as whole body composites. Composite samples are effective for estimating average tissue concentrations of COCs in target species populations, and compositing ensures adequate sample mass for analysis of all target COCs. The preferred total mass of homogenized wet tissue (blue crab or forage fish) for analytical testing by CAS and GCAL is 50-60 grams (25-30 grams minimum). If insufficient tissue mass is able to be collected, CAS or GCAL will be consulted to identify the appropriate analytical strategy. Method modifications may include modified extraction techniques (e.g. adjusting the final extract volume), using a lower concentration for the lowest standard in the initial calibration, or adjusting the amount of extract injected into the instrument.

10.3 Sample Collection Methods

Collection methods for blue crabs and forage fish can be divided into two categories, passive and active. Passive collection methods for blue crabs include crab traps or pots. Passive collection devices (e.g., crab traps or pots) must be checked frequently to ensure a limited time lag between crab entrapment and sample preparation/preservation. For forage fish, active collection methods will involve sampling devices including seines and trawls. Although active collection requires greater fishing effort, it is usually more efficient than passive collection for covering a large number of sites and catching the number of individuals needed from each site for tissue analysis. The active collection methods generally require more field personnel and more complex equipment than passive collection methods.

Sampling for this study will involve an array of both active and passive gear to ensure collection of the desired target numbers of crabs and forage fish. Selection of the most appropriate gear type(s) for a particular sampling site will be at the discretion of the sampling team leader (Rodgers). A local contractor will be responsible for providing crab and forage fish sampling gear and sampling vessels. It is important that the sampling vessel(s) and equipment be clean and in good condition. Appropriate license or collection permits will be obtained prior to sampling, and sampling will be conducted in compliance with pertinent existing regulations. The analytical laboratory will provide sample packaging and shipping supplies.

10.4 Equipment and Supply List for Crab and Forage Fish Tissue Sampling

A list of equipment and expendable supplies is provided in Table 4. Sample collection, packaging, and shipment methods are presented in Section 11 of this document.

As soon as crabs or forage fish are obtained via active collection methods, or removed from passive collection devices, the species will be identified. Nontarget species collected in this study will be returned to the water. Individuals of the selected target species (blue crabs and forage fish) will be rinsed in ambient water to remove any foreign material from the external surface, will be handled using clean nitrile gloves, and placed in clean holding containers (livewell, buckets, etc.) to prevent contamination. Each blue crab and forage fish will be measured to determine length and width or total body length (mm), respectively. For blue crabs, data obtained will include sex, length, width and wet weight, For forage fish, maximum body length should be measured, i.e., the length from the anterior-most part of the fish to the tip of the longest caudal finray (when the lobes of the caudal fin are depressed dorsoventrally). When sufficient numbers of the target species have been identified to make up a suitable composite sample, the species name, specimen lengths, and all other site and sampling information should be recorded on the Field Record Form. The field objective is for sampling teams to obtain representative composite samples for both crabs and forage fish from each sample location. Each composite must consist of all the same species, and the composite must be able to deliver 50-60 grams (25-30 grams minimum) of tissue for chemical analysis.

11.0 Sample Handling and Custody Requirements

11.1 Sample Handling

Clean nitrile gloves will be worn during the entire sample handling process, beginning with removing the crabs and fish from the sampling gear. After individuals of the selected target species are rinsed in ambient water and the species and size are determined, each of the fish found to be suitable for the composite sample will be individually wrapped in extra heavy-duty aluminum foil (provided as solvent-rinsed, oven-baked sheets). A Sample Identification Label will be prepared for each aluminum foil-wrapped specimen. Each foil-wrapped fish will be placed into a plastic bag (i.e., heavy duty food grade plastic bag), and sealed with a plastic cable tie. The completed Sample Identification Label will be affixed to the cable tie, and the entire specimen package will be "double-bagged" (i.e., placed inside a large plastic bag with all the specimens of the same species from that site and sealed with another cable tie). Once packaged, samples should be immediately placed on ice for shipment. If samples will be carried back to a laboratory or other facility to be frozen before shipment (forage fish only), wet ice can be used to transport wrapped and bagged fish samples in the coolers to that laboratory or facility. If possible, all of the specimens in a composite sample should be kept together in the same shipping container (ice chest) for transport. Sampling Teams have the option, depending on site logistics, of:

- Shipping the samples packed on ice (in sufficient quantities to keep samples cold for up to 48 hours), via priority overnight delivery service (i.e., Federal Express), so that they arrive at the laboratory within less than 24 hours from the time of sample collection; or

- Freezing the forage fish (but not blue crab) within 24 hours of collection, and storing the frozen fish until shipment within 1 week of sample collection (frozen fish will subsequently be packed on dry ice and shipped to the laboratory via priority overnight delivery service to arrive within less than 24 hours from time of shipment).

The time of sample collection, relinquishment by the sample team, and time of their arrival at the laboratory must be recorded on the Chain-of-Custody Form. The field sampling teams should avoid shipping samples for weekend or holiday delivery to the laboratory unless prior plans for such a delivery have been agreed upon with the laboratory.

11.2 Sample Integrity

A critical requirement of this study is maintenance of sample integrity from the time of collection to the shipment and arrival at the final destination. Sample integrity will be maintained by preventing the loss of COCs that might be present in the sample and by taking precautions to avoid possible introduction of contaminants during handling. The loss of COCs can be prevented in the field by ensuring that the sample collected remains intact. Once a sample is collected, sample integrity will be maintained through careful and controlled sample handling, storage, and preservation procedures. Preventable sources of extraneous contamination can include the sampling gear, oils and greases on boats, spilled fuel, skin contact, contact with soil or sand, boat motor exhaust, and other potential sources. Potential sources should be identified before the onset and during sample collection, and appropriate measures should be taken to minimize or eliminate them. Examples of preventative measures include the following:

- Collection nets should be free of any potential contaminants.
- The use of tarred collection nets is prohibited.
- Boats should be positioned so that engine exhaust does not fall on the deck area where samples are being handled.
- Ice chests and other sample storage containers should be cleaned with detergent and rinsed with clean water prior to use.
- Samples should not be placed directly on ice, but should be stored inside foil, plastic bags, and plastic garbage bags first.
- Proper gloves (clean nitrile gloves) should be used when handling samples.

11.3 Custody Requirements

Each sample will be identified and tracked with a unique numbering scheme as described in Section 8.0. The same unique number will be used in all documentation including the Field Record Form, the Sample Identification Label, and the Sample Preparation Record Form. Detailed information about the samples collected in the field and about the collection location will be recorded on the Field Record Form. Two copies will be made of this form: one will accompany the samples to the laboratory and one copy will be kept in a project-dedicated binder.

As soon as possible following collection, the sampling team will begin the process of identifying, labeling, packaging, and storing the sample(s). Each sample will be identified and tracked with a unique numbering scheme as described in Section 8.0. This composite code will identify each sample on all documentation and records including the following:

- Field Record Form,
- Sample Identification Label, and
- Chain-of-Custody Form.

Each sample will be labeled by affixing a Sample Identification Label as per the instructions in Section 8.0. All sample label entries will be made with black indelible ink. The sample label will accompany each sample throughout the chain-of-custody. Each sample label will include the following information:

- project name (EWL Tissue Study),
- site identification (number),
- sample number (01 through 06),
- composite code (as in Section 8.0),

- date of sample (month/day/year),
- time of collection (military time),
- preservative used (on ice or frozen), and
- collector's name (field team leader).

Detailed documentation of the samples collected in the field (for shipment to the laboratory) and information about the collection location will be recorded on a Field Record Form. One form must be completed for each sample composite. A copy of the form (Section 8.0) will be retained by the sampler, and another copy will be included with sample shipment to the laboratory. All entries will be made in black ink and no erasures will be made. Each form will have the proper entry requirements, which includes the following information:

- composite code (as per Section 8.0),
- sampling date (month/day/year),
- time of collection (military time),
- collection method (e.g., cast net),
- collector's name (printed and signed),
- collector's affiliation, address, and telephone number,
- site name,
- site number (location of site sampled),
- sample type (e.g., crab),
- estimated maximum depth (meters), and
- length (mm) and width (mm) of each specimen (if applicable).

All samples and composites will be transferred to the receiving laboratory under chain of custody. The Chain-of-Custody Form will act as a record of sample shipment and a catalog of the contents of each shipment (coinciding with information on the field record). The forms will be produced and copied as needed with one copy retained by the sampler and one for shipment to the laboratory. The Chain-of-Custody Form shipped will be placed in a waterproof plastic bag and sealed inside the shipping container. All Chain-of-Custody Form entries will be made in black ink and will include:

- the Project Manager's name, address and telephone number (refer to the QAPP cover page),
- sampler's name and telephone number,
- project name (EWL Tissue Study),
- page number (e.g., 1 of 1),
- sample location,
- collection date and time,
- composite code and sample number,
- preservative (ice [crab and forage fish] or frozen [forage fish only]),
- number of containers,
- type of analysis required (arsenic, barium, mercury, TPH, lipids; and moisture content),

- sampler's signature, sample date, and time,
- sampler relinquishment date and time,
- laboratory recipient signature, and
- laboratory receipt date and time.

Immediately following the packing of each shipping container, each container (ice chest) will be secured with packaging tape and sealed with a Chain-of-Custody Label. The Chain-of-Custody Label must contain the signature of the sampler and the date and time written in ink. The seal must be affixed such that the shipping container cannot be opened without breaking the seal (e.g., label adhered across the ice chest latch), so as to protect and document the integrity of the contents from field to laboratory.

12.0 Analytical Methods Requirements

Composite samples will be analyzed for Total Arsenic, Inorganic Arsenic, Total Barium, Total Mercury, Methylmercury, and TPH. The analytical laboratories CAS and GCAL will conduct the analyses, using EPA methods. The results will be reported in parts per million or parts per billion, as wet weight. Analytical methods and specific method requirements are addressed by the Quality Assurance Project Plans and Standard Operating Procedures developed by the laboratories and in conjunction with requirements presented in this study plan. Lipids will also be analyzed for the composite samples. Percent moisture (wet weight and dry weight) will also be measured and reported for composite tissue samples.

Samples will be shipped under chain of custody to CAS for processing and analytical testing of metals, lipid content, and moisture content. CAS will ship tissue aliquots to GCAL for TPH analysis. Samples will be analyzed for total petroleum hydrocarbons using the Texas 1005 (Total Petroleum Hydrocarbons) and potentially Texas 1006 methods. For both analyses, the extract step described in Section 8.2 or Section 8.3 of the Texas 1006 (Characterization of NC6 to NC35 Petroleum Hydrocarbons in Environmental Samples) method will be performed. The laboratory will use the reporting protocols specified in the Texas 1005 method modified to reflect RECAP-recommended ranges for total petroleum hydrocarbons.

Sample processing and analytical testing and methods are within the scope of this QAPP. Sample processing involves dissection and compositing of the requisite tissues: 1) crabs – meat, hepatopancreas, soft tissue, and shell (exoskeleton); 2) forage fish – whole body.

Analytical testing of tissue samples for will follow standard methods:

- Total Arsenic - SW 6020;
- Inorganic Arsenic – EPA 1632A;
- Total Barium – SW 6020;
- Total Mercury – EPA 1631;
- Methylmercury – EPA 1630;
- TPH – Texas 1005/1006.

13.0 Quality Control Requirements

Data quality is addressed, in part, by consistent performance of valid procedures documented in this study plan as well as those routinely employed by the analytical laboratory. It is enhanced by experience and training of project staff and documentation of project activities. This Quality Assurance Project Plan (QAPP) will be distributed to all project scientists for review, and, in turn, to sampling personnel involved in implementation of the project's field work as well as to the analytical laboratory. The project manager will ensure that personnel have the Quality Assurance Project Plan and that an orientation and training session is undertaken by all involved.

14.0 Instrument/Equipment Testing, Inspection, and Maintenance Requirements

All field equipment will be inspected prior to sampling activities to ensure that proper use requirements are met (e.g., boats are operating correctly, nets are without defects, pH and other field meters properly calibrated). Inspection of field equipment will occur well in advance of the field operation to allow time for replacement or repair of defective equipment, and the field team will be equipped with proper backup equipment to prevent lost time on site. One member of the field team will gather and inspect all equipment on the equipment and supply list (Table 4) prior to the sampling event. All pH and other meters used by field teams will be calibrated according to the manufacturer's operating instructions, on a daily basis, while in use. Careful and thorough planning will be necessary to ensure the efficient and effective completion of the field sample collection task. A checklist of field equipment and supplies is provided in Table 4 of this document. It will be the responsibility of the field team to gather and inspect the necessary sampling gear prior to the sampling event and to inspect the sample packaging and shipping supplies. Defective packaging and shipping supplies (e.g., torn or damaged bags) will be discarded, and, if necessary, the field team will obtain replacement supplies.

15.0 Data Acquisition Requirements (Non-direct Measurements)

Non-direct measurements will include identification and/or verification of each sample location (i.e., latitude and longitude). Coordinates of the sample sites will be provided as decimal degrees or conventional degrees, minutes, and seconds.

16.0 Data Management

Samples will be documented and tracked via Sample Identification Labels, Field Record Forms, and Chain-of-Custody Forms (Section 8.0). Diligence of the Field Sampling Team in completion of the proper records will be essential. The field team leader will be responsible for reviewing all completed field forms. Any corrections should be noted, initialed, and dated by the reviewer. As mentioned in Section 8.0, Field Record Forms and Chain-of-Custody Forms will each be prepared in the field. The sampler will retain one copy each of the Field Record and Chain-of-Custody Forms, and the original copies will be delivered to the laboratory with the samples. Shipment of samples to the laboratory must be conducted by a delivery service that provides constant tracking of shipments (e.g., Federal Express). Laboratory sample log-in and data management procedures are beyond the scope of this QAPP and are covered by the laboratory QAPP. The laboratory will retain one copy of each Field Record Form and Chain-of- Custody Form. All form copies associated with this project will be maintained in a project file during the active phase of the project, and for a period of 6 months following completion of the project (unless otherwise directed). Upon completion of sampling activities, a field collection effort summary will be developed (i.e., a detailed listing of all sampling participants, sampling locations, and specimens collected) based on information recorded by all Sampling Teams on the Field Record Forms. Project data will be stored by project scientists, and will be copied to disks for archive for two years after project completion (unless otherwise directed). All data entries will be checked for errors in transcription and computer input by a minimum of two persons. If there is any indication that requirements for sample integrity or data quality have not been met, the project scientists will be notified immediately (with an accompanying explanation of the problems encountered).

C. ASSESSMENT / OVERSIGHT

17.0 Assessment and Response Actions

The project manager will be on-call throughout the duration of the sampling effort. In the event that quality problems or other difficulties arise in the field, the project manager will contact the quality assurance officer, attempt to resolve the difficulty, and determine the appropriate corrective action to be taken. The project manager will have the authority to stop work on the project if problems affecting data quality are identified that will require extensive efforts to resolve.

18.0 Reports to Project Scientists and the Study Sponsor

A summary of the work conducted will be prepared. The report will contain summaries of the field sampling and analytical results. Subsequent reports may be produced by the project scientists and others based on the results from this study.

D. DATA VALIDATION AND USABILITY

19.0 Data Review, Validation and Verification Requirements

All field record forms and chain of custody forms will be reviewed by the project manager for completeness and correctness. Data will be entered and assessed by comparing entered data with the original forms. The project manager will determine whether to accept, reject or qualify the entered data. A report will then be prepared for submittal to the project scientists.

20.0 Validation and Verification Methods

The project manager will conduct a review of the laboratory's data results and reports, verifying that methods and protocols were followed. A data quality review will be performed by qualified personnel experienced in data validation. The data quality and data usability review will be conducted based upon guidance provided in RECAP Sections 2.4 and 2.5, the USEPA Risk Assessment Guidance for Superfund (1989), and other relevant guidance. The data evaluation will include a review of analytical methods; QA/QC documentation; laboratory performance on matrix spikes, surrogate recoveries, and laboratory control samples; QC blank results (e.g. field, method, and rinsate); sample quantification limits and duplicate analyses. Specific deficiencies in the data, if any, will be identified, qualified as appropriate, and discussed in the report as they relate to data usability for exposure assessment and risk characterization.

21.0 Reconciliation with Data Quality Objectives

As soon as possible following completion of the sample collection and analyses for this project, precision, accuracy and completeness measures will be assessed by the project manager and compared with the criteria discussed in previous sections of this QAPP. This will represent the final determination of whether the data collected are of the correct type, quantity and quality to support the intended use for this project. Any problems encountered in meeting the performance criteria (or uncertainties and limitations in the use of the data) will be discussed with the project scientists, and will be reconciled, if possible.

22.0 LITERATURE CITED AND REVIEWED

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Tables

Table 1
Quality Control Performance Criteria

Quality Control Parameter	Total Arsenic; Total Barium	Inorganic Arsenic	Total Mercury	Methylmercury	Total Petroleum Hydrocarbons
Method	**SW 6020**	**EPA 1632A**	**EPA 1631**	**EPA 1630**	**Texas 1005/1006**
Method Quantitation Limit (MQL)	0.5 mg/kg (Arsenic) 0.05 mg/kg (Barium)	0.030 mg/kg	0.001 mg/kg	0.010 mg/kg	Not Available
Holding Times	Freeze or freeze-dry tissues (store at room temperature); holding time indefinite	Freeze or freeze-dry tissues (store at room temperature); holding time indefinite	Freeze or freeze-dry tissues (store at room temperature); holding time indefinite	Freeze or freeze-dry tissues (store at room temperature); holding time indefinite	Freeze, hold up to one year; extract within 24 hours of thawing
Equipment Blank	Daily per matrix and equipment type <MQL	Daily per matrix and equipment type <MQL	Daily per matrix and equipment type <MQL	Daily per matrix and equipment type <MQL	Daily per matrix and equipment type <MQL
Field Duplicate	1 every 10 samples ≤50 RPD if results greater than 5x MQL	1 every 10 samples ≤50 RPD if results greater than 5x MQL	1 every 10 samples ≤50 RPD if results greater than 5x MQL	1 every 10 samples ≤50 RPD if results greater than 5x MQL	1 every 10 samples ≤50 RPD if results greater than 5x MQL
Instrument Tune/Calibration	See Table 2	See Table 2	See Table 2	See Table 2	See Table 2
Preparation (Laboratory) Blank	Daily per digestion batch (maximum 20 samples) per matrix < ± MQL	Daily per digestion batch (maximum 10 samples) per matrix < ± MQL	Three per batch (maximum 20 samples) per matrix < ± MQL	Three per batch (maximum 20 samples) per matrix < ± MQL	Daily per digestion batch (maximum 20 samples) per matrix < MQL
Initial Calibration and Continuing Calibration Blank	Analyze immediately after each ICV and CCV < ± MDL	Analyze immediately after each ICV and CCV < ± MDL	NA (See bubble blanks below)	NA	NA
Surrogate	NA	NA	NA	NA	70 – 130 % Recovery 1-Chlorooctane or trifluoromethylbenzene (nC_6 to nC_{12}) 1-Chlorooctadecane, 2-fluorobiphenyl or o-terphenyl ($>nC_{12}$)
Matrix Spike (MS) / Matrix Spike Duplicate (MSD)	One per 20 samples per matrix 70 – 130 %Recovery ≤50 RPD if results greater than 5x MQL	One per 10 samples per matrix 50-150% Recovery (1632 Table 2) ≤50 RPD if results greater than 5x MQL	One per 10 samples per matrix 70 - 130 %Recovery ≤50 RPD if results greater than 5x MQL	One per 10 samples per matrix 65 – 135 %Recovery ≤50 RPD if results greater than 5x MQL	One per 20 samples per matrix 60 – 140 %Recovery ≤50 RPD if results greater than 5x MQL
Internal Standard Area	Each sample > 70-120% recovery.	NA	NA	NA	NA
Laboratory Control Sample (LCS) or Ongoing Precision and Recovery (OPR)	Daily per digestion batch per matrix 80 – 120 %Recovery	Daily per digestion batch (maximum 20 samples per matrix (1632 section 9.7.1) 50-150% Recovery (1632 Table 2)	Daily per digestion batch per matrix; Analyze at beginning and end of batch or each 12-hour shift 77 - 123 %Recovery	Daily per digestion batch per matrix; Analyze at end of batch or each 12-hour shift 67 - 133 %Recovery	Daily per extraction batch per matrix 60 - 140 %Recovery 25 RPD for LCSD
Identification Criteria	NA	NA	NA	NA	Within retention time windows
Confirmation Analysis	NA	NA	NA	NA	Gas chromatography/ mass spectrometry
Other	NA	QCS quarterly; Mean of three analyses within 10% of QCS value	Additional blanks: 3 system blanks or 3 bubbler blanks	QCS with each batch analyzed in the middle of the batch	The response factor for nC_{35} is ≥ the response factor for nC_{28}; Aliphatic and aromatic fractionation check per batch of silica gel (< 10 – 20% crossover) and 60-140% recovery

CCV – continuing calibration verification
ICV – initial calibration verification
MDL – method detection limit
MQL – method quantitation limit
NA – Not applicable
QCS – Quality control sample (independent source)

Table 2

Calibration Procedures Summary

		Calibration Summary	
Parameter Measured	**Method Description[1]**	**Activity**	**Requirements**
Metals (Arsenic and Barium)	SW 6020	Initial Calibration	Blank and single point standardization as per method 6020.
		Initial calibration Verification (ICV)	Analyze mid-level calibration standard. The %R for each analyte must be 90-110%.
		Continuing Calibration Verification (CCV)	Analyze mid-level calibration verification standard every 10 samples. The %R must be 90-110% of the true value.
		Interference Tests	Analyze interference check standard at the beginning of every analytical run. The %R for each analyte must be 80-120% of the true value.
Mercury (Total)	EPA 1631	Initial Calibration	Analyze a minimum of a blank and five concentrations. The acceptance criteria are a maximum %RSD (≤15%) criteria and recovery of the lowest standard is in the 75 – 125% range.
		Initial Calibration Verification	Analyze a mid-level calibration standard. The %R for each analyte must be 77-123% (QCS)
		Calibration Verification	See OPR requirements
Inorganic Arsenic	EPA 1632	Initial Calibration	Analyze a minimum of a blank and three concentrations (one at ML and one at upper range). Maximum %RSD (≤25%) criteria before any investigative samples are analyzed.
		Initial Calibration Verification	Analyze a mid-level calibration standard. The %R for each analyte must be 80-120% (Method 1632 Table 2).
		Calibration Verification	Analyze a mid-level calibration verification standard every 10 samples. The %R must be 76-116% of the true value.
Methyl Mercury	EPA 1630	Initial Calibration	Analyze a minimum of a blank and five concentrations prepared using distillation procedure. The acceptance criteria are a maximum %RSD (≤15%) criteria and recovery of the lowest standard is in the 65 – 135% range.
		Calibration Verification	See QCS requirements
Total Petroleum Hydrocarbons	Texas 1005 / 1006	Initial Calibration	Analyze minimum five concentrations for each analyte. Maximum %RSD (≤25%) or minimum correlation coefficient (0.995) criteria before any investigative samples are analyzed. A calibration curve must be prepared for any compound for which the %RSD is greater than 25%. Take corrective action when criteria not met. The lowest calibration standard establishes the MQL based on laboratory standard operating procedures for initial volume of sample and final volume of extract.
		Calibration Verification	Verify calibration curve daily, every 24 hours, or every 20 samples, whichever is more frequent, with a check standard. Maximum %D ≤25%.

CCC – Calibration check compound
CCV – Continuing Calibration Verification
ICV – Initial Calibration Verification
MQL – Method Quantitation Limit
NA – Not applicable
RPD – Relative percent difference
RRF – Relative Response Factor
%D – Percent Difference
%RSD – Percent Relative Standard Deviation
SPCC – System performance check compound

Table 3
Laboratory Methods

Parameter	CAS No	Method	MQL
Total Arsenic	7440-38-2	SW 6020	0.04 mg/kg DW
Inorganic Arsenic	7440-38-2	EPA 1632A	0.03 mg/kg DW
Total Barium	7440-39-3	SW 6020	0.05 mg/kg DW
Total Mercury	7439-97-6	EPA 1631	0.001 mg/kg DW
Methylmercury	22967-92-6	EPA 1630	0.010 mg/kg DW
Total Petroleum Hydrocarbons	NA	TX 1005/1006	N/A

MQL – Method Quantitation Limit (Method Detection Limit [MDL] for Total Arsenic).

Table 4
Equipment and Supply List for Crab and Forage Fish Tissue Sampling

1. Sampling vessel (including boat, motor, trailer, oars, gas, and all required safety equipment)
2. Nets - (including trawls and/or seines, hoop or castnets)
3. Crab Traps and /or Pots (several per sampling site)
4. Coast Guard-approved personal floatation devices
5. Maps of sampling areas, sites and access routes
6. Global Positioning System (GPS) unit
7. pH meter (including associated calibration supplies)
8. Livewell and/or buckets
9. Measuring board (millimeter scale)
10. Ice chests
11. Aluminum foil (solvent-rinsed and baked)
12. Heavy-duty food grade polyethylene bags
14. Large plastic bags
15. Knife or scissors
16. Clean nitrile gloves
17. Field Record Forms
18. Sample Identification Labels
19. Chain-of-Custody Forms
20. Chain-of-Custody Labels
21. Scientific collection permit or fishing license
22. Ice
23. Black ballpoint pens and/or waterproof markers
24. Clipboard
25. Packing/strapping tape
26. Overnight courier airbill and laboratory shipping address
27. Plastic cable ties
28. Plastic bubble-wrap
29. First aid kit and emergency telephone numbers

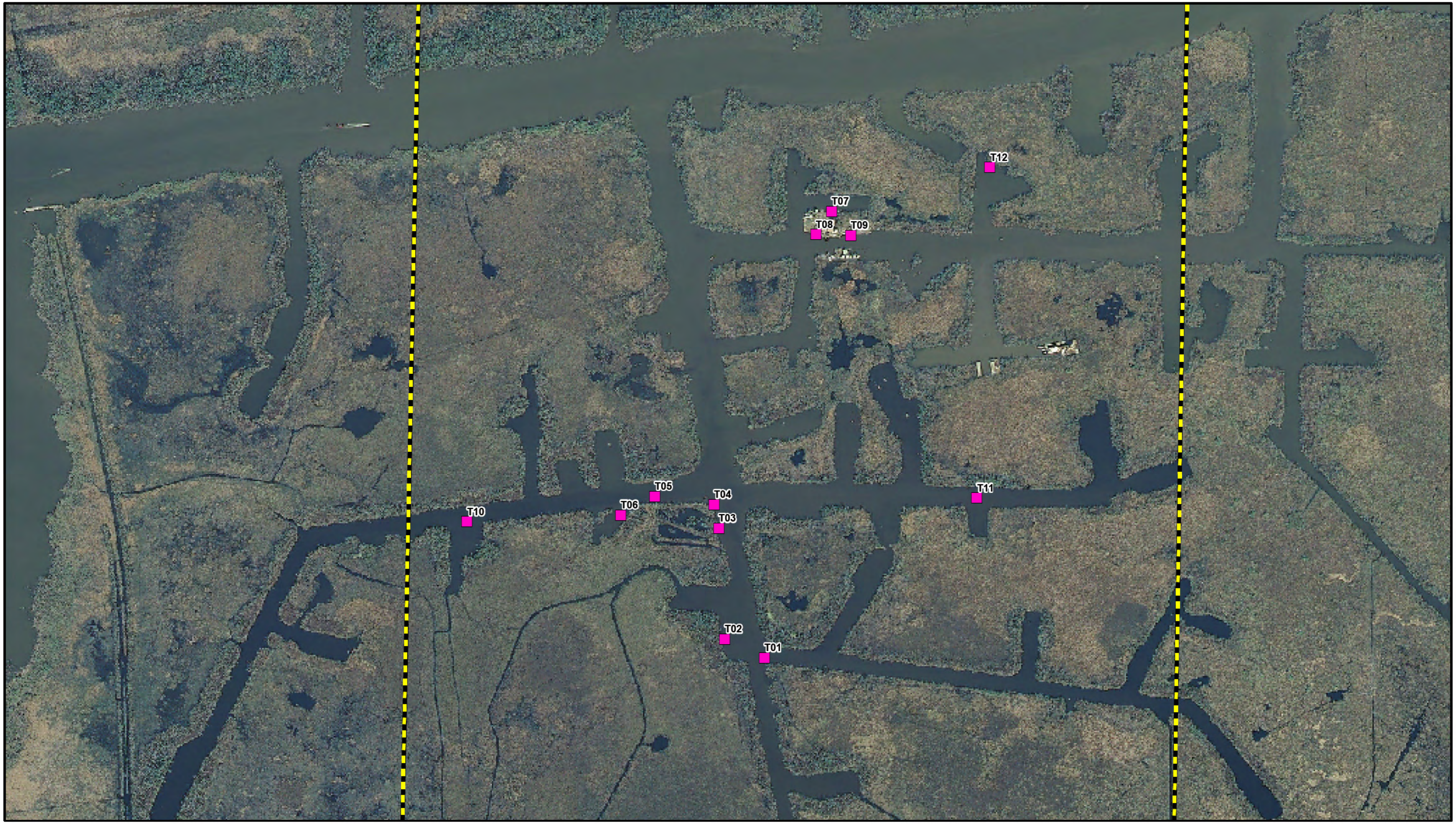
Figures

USGS High Resolution State Orthoimagery
for the Louisiana Coastal Area, 2008

Title:
Site Location Map

Project:
Crab and Forage Fish Tissue Sampling
East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

Drawn By:	Date:	Project No.:	Figure:
KPL	11/24/10		1



Legend

🟪 Proposed Site Tissue Sample Locations

▭ Section 16

USGS High Resolution State Orthoimagery
for the Louisiana Coastal Area, 2008

Title: Proposed Site Tissue Sample Locations

Project: Crab and Forage Fish Tissue Sampling
East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

Drawn By: KPL

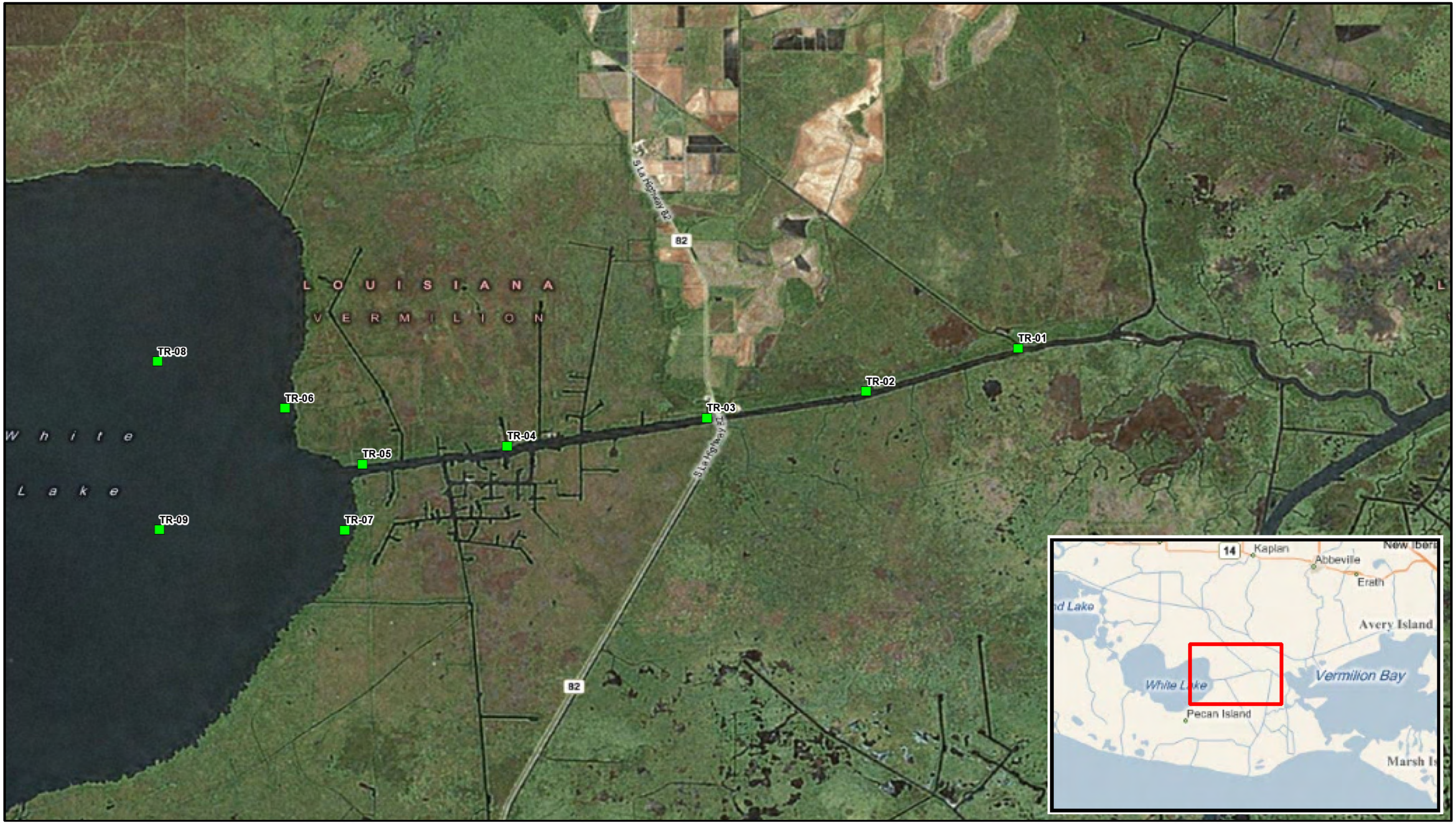
Date: 11/24/10

Project No.:

Figure: 2

K:\ENV\ENV10\25012585\GIS\MXD\TissueSampLoc.mxd

K:\ENV\ENV10\25012585\GIS\MXD\Bkgrd_TS_Samp.mxd



Legend

🟩 Proposed Reference Tissue Sample Locations

NAIP 2007 Imagery

0 0.5 1 2 Miles

N W E S

Title: Proposed Reference Tissue Sample Locations

Project: Crab and Forage Fish Tissue Sampling
East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

Drawn By:	Date:	Project No.:	Figure:
KPL	12/01/10		3

Field Notes
Appendix B

East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

Location EWL Date 12-13-10

Project / Client 07-47

~~time~~
1100 head out to first
trap
on camera: 1. traps on boat
at dock 2. catfish heads/
body bait on dock 3.
Gajun gassing up boat
Gajun. Putting OUT TRAPS
time 1119 E
TR-08 15R 557563 328974N
time 1122
TR-09 (E) 15R 557668 (N) 3288957
(photo 4) Mitchell throwing
in trap at TR-09
time 1130
TR-07 (photo 5) mitchell at TR-07 throws
TR-07 trap 15R 557004 N 3288183
at → time 1137 pulled up trap: 4 crabs, moved it
P1 TR-06 (photo 6) throws trap
at TR-06 coordinates saved in GPS
time 1142
TR-05 (photo 7+8) baiting trap
15R 559737 N 3289879

Location EWL Date 12-13-10

Project / Client 07-47

photo9 - Gajon driving to TR-04

time 1148

TR-04 15R562232 3290316

time 1153

A-01 (additional trap)
requested location by Peak
aborted, barge in the way

time 1156

T-12 15R56135 (the rest saved)

time 1158

T-09 15R561314 3289624

time 1159

T-08 15R561166 3289623

time 1201 (1201)

T-07 15R561198 3289709

time 1205

grabbing trap from P-2
one crab female - large - set
2 days ago 561017 3290021

time 1206

P-3 grabbing trap
561195 3290017, 2 females crabs
1 littleish one bigger

Location EWL Date 12-13-10

Project / Client 07-47

time 1208 to grab + throw back
P-4 1 little male
561391 3290032

time 1210

P-5 to grab trap + throw back
2 big 1 medium
561556 3290064
(photo 10 + 11) Gajon
(photo 12 Patrick)

time 1216

T-10 (photo 13) (Patrick)
(photo 14) facing east spoil banks
560451 3288906

time 1220

T-06 560781 3288964

time 1222

T-05 560869 3288990

time 1223

T-04 560982 3288975

time 1225

T-03 561008 3288828

time 1227

T-01 561094 3288605

Location EWL Date 12-13-10

Project / Client 07-47

time 1229
T-02 561094 3288612
time 1238 saved in GPS
T-11 56 32
225-281 4451 Gary Barbee
time 1308
TR-03 564930 . 3290761
2 crabs thrown back
pot new bait
time 1317
TR-02 rebaited filled
with crabs (approx 15 crabs)
567210 3291154
(photo 15 + 16) Helen pulling
time 1325 + full trap
TR-01 (photos 17, 18, 19) Patrick
pulling trap, 4 crabs, rebait
569363 3291889
try to cast net for fish

Location EWL Date 12-13-10

Project / Client 07-47 Trying Casting

time 1341 (photos 20, 21, 22, 23) casting net
cast net for fish,
location chosen by
Gajon - caught
poagie + shad, 3 casts
24 fish, 2" - 4" long
569363 3291889
time 1351
at TR-02 to try casting
net (24, 25 photos) 1st cast
nothing 2nd cast → 1 shrimp
3rd cast - nothing
time 1522 (after lunch)
3 quart baggies of
catfish bait heads/parts
using nitrile gloves)
B-01, B-02, B-03
(bait 1, 2, 3) → then into 1
2 gallon time 1528
collected from bait
ice chest on boat →
bait used for crab
traps

Location EWL Date 12-13-10

Project / Client 07-47.

looking for fish

time 1542

1st throw net at T-07

one little mud minnow

2nd throw - none

3rd throw - none

time 1545 P-6

1st throw net - 1 minnow

2nd throw - 2 shrimp

3rd throw - 1 shrimp

GPS 561216 32896 81

time 1551

near T-08

1st cast - nothing

2nd cast - nothing

3rd cast - nothing

time 1556

near T-02

1st cast - 1 Hoagie

2nd cast - nothin

3rd cast - 1 mullet 1 hoagie

P-7 561022 328675

Location EWL Date 12-13-10

Project / Client 07-47

time 1601

near T-06

1st cast - nothing

2nd cast - 1 shrimp, 1 shiner

3rd cast - nothing

time 1607

near T-10

1st cast - nothing

2nd cast - nothing

3rd cast - 7" mullet

4th cast - nothing

time 1620 P-8

between TR-5 and TR-4

1st cast - 1 minnow

2nd cast - nothing

3rd cast - 2 mullets

4th cast - nothing

5th cast -

GPS 8

560975 3289963

summary of 12/13 drove 7-9^3
9^3-4^3 worked 4^3-5^3 drove
to abbeville, 5^3-8^3 eat/bed

Location EWL Date 12-14-10

Project / Client 07-47

6:45 AM meeting for today
- ~~dry~~ PICK ice for catfish
- Pick up ice on way back from Lafayette

pick up John Redgers

Patrick 1140 time

calibrating water quality instrumentation

time 1228 - head out in boat

near TR-01 no crabs

time 1241

Field Record Form

I'll duplicate here what's on Fld Rcd Form

TR-01 C EWL 12-14-10

crab trap

RDO 15.01 mg/L Temp 9,18

pH 7,25 Cond uS/cm 2353

ORP mV .21 Turb NTU 120.7

Depth feet 1.3 Time 1253

Location EWL Date 12-14-10

Project / Client 07-47

trying to collect crabs w/ Redgers

TR-02

RDO	Temp	pH	Cond	ORP	Turb	Depth	Time
11.32	8.84	7.34	2283	.21	133.3	1.5	1311

collected 1 female crab

TR-03 → 0 crabs

RDO	temp	pH	Cond	ORP	Turb	Depth	Time
11.14	8.87	7.37	2284	0.20	135.8	0.91	1323

TR-04 0 crabs collected

RDO	temp	pH	Cond	ORP	Turb	Depth	Time
10.82	9.6	7.39	2329	.18	141	1.46	1332

Location EWL Date 12.14-10

Project / Client 07-47

(photo 24) crabs at TR-06

time 1333 head out to lake to collect crabs from location with crabs

crabs total TR-06 + 2 crabs (males)

+1 male + 3 (2 females, 1 male)

RDO	temp	pH	Cond	ORP	Turb	Depth	Time
11.21	8.6	7.40	2267	0.24	110	6.91	1347

10 crabs TR-07 (photo 25) big lake crabs

RDO	temp	pH	Cond	ORP	Turb	Depth	Time
11.42	8.56	7.44	2249	0.21	177.5	1.17	135

Location EWL Date 12-14-10

Project / Client 07-47

10 crabs (photo 26) crabs

TR-09

RDO	temp	pH	Cond	ORP	Turb	Depth	Time
11.35	8.47	7.44	2198	0.18	179	0.5	1400

11 crabs TR-08 (photo 27 photo 28) crabs

RDO	temp	pH	cond	ORP	Turb	Depth	Time
11.42	8.75	7.44	2243	0.24	165	1.6	1425

ttc

TR-065

11 crabs

RDO	temp	pH	cond	ORP	Turb	Depth	Time
11.30	8.81	7.50	2263	0.22	137	0.833	1440

Location EWL Date 12-14-10

Project / Client 07-47

1 sac o lait
1 perch

2 traps empty

note: fish chopique in trap

TR-04

3 crabs

RDo	temp	pH	Cond	ORP	turb	Depth	HC time ~~time~~
10.97	9.89	7.45	2361	,19	154	1.4	1450

white perch baggie
TR-04 - collected
as per Rodgers
TR-04 catfish
} one Bucket

1 bream

12 crabs TR-03A new location 563786 3290526 (GPS)

RDO	temp	pH	cond	ORP	turb	depth	time
~~9.19~~ 11.03	8.84	7.49	2303	0,19	134	1'	1507

put bream in a
TR-03A separate
bucket

photo 28
bream
+ Rodgers

Location EWL Date 12-14-10

Project / Client 07-47

TR-03A

cm length	cm width	wt	gender ~~M~~
8	17	298	M
6	14.5	141	M
6	15.5	146	F
7	17	181	F
5,5	14	152	M
7	16	209	M
7	19	191	F
6.5	16	201	M
6	14,5	149	M
6	14.5	132	F
7	16.5	167	F
8	18	259	

Location EWL Date 12-14-10

Project / Client 07-47

TR-04

lngt	width	wt	gender
6	16	167	M
8	20	305	M
5.5	14	122	F
5.5	13.5	116	M
6	12.5	127	M
5.5	13.5	118	M
6	15	161	M
6	13	98	F

TR-05

7	17	262	M
7.5	18.5	127	F
7	18	189	F
7	17	194	F
8	20	344	F
8	18.5	289	F
8	19.5	373	M
6	15.5	134	F
7.5	18.5	273	M
7	17.5	227	M
7	18	172	F

Location EWL Date 12-14-10

Project / Client 07-47

TR-06

length	width	wt	gender
7.5	16.5	269	M
7	16	232	M
7.5	17	222	F
6.5	15	179	M
			F
7	16.5	253	M

TR-07

7.5	17	288	M
7.5	18	258	M
6.5	16.5	186	M
7.5	19.5	256	F
7.5	17.5	283	M
8	18	323	M
6.5	16	162	F
7.5	18	254	M
8.5	20	358	M
5.5	14.5	128	F
6	14	140	M

Location EWL Date 12-14-10

Project / Client 07-47

TR-08

length	width	wt	Gender
7	16.5	187	F
6.5	16	187	M
7.5	7	228	F
6.5	17.5	147	F
7	16.5	207	F
8.5	19.5	292	F
7.5	17.5	217	M
8	18.5	302	M
6	14.5	152	M
7.5	18	263	M

14 hours to bill
6:45 - 8:45
getty supplies, crabbing, processing
shipping, recording

Location EWL Date 12-14-10

Project / Client 07-47

TR-09

length	width	wt	gender
7.5	18	231	F
8	19	293	M
7	16	199	F
7	17	174	F
7.5	17	279	M
8	19	298	F
7.5	17.5	221	F
9	18.5	347	F
6.5	15	143	M
7	15.5	173	M
8	19.5	339	M

7 locations

TOTAL count: 68
crabs

12 ✓
8 ✓
11 ✓
5 ✓
11 ✓
10 ✓

68

20
47
67

Location EWL Date 12-15-10

Project / Client 07-47

for myself
~~7:30 organizational mtg~~
8:00 planning meeting

Heading out 1114

TR-01 1/2 mile from Schooner Bayou locks

RDO	Temp	pH	Cond	ORP	Turb	Depth	Tim
11.56	9.84	6.76	2523	0.21	52	1.4	1126

1st crab trap - no crabs
checking for fish here
hoop net bream + catfish
(photo 29+30 bream/catfish
saw two recreational
fishermen at TR-01

Location EWL Date 12-15-10

Project / Client 07-47

TR-02

RDo	Temp	pH	Cond	ORP	Turb	Depth	Tim

no crabs,
check tomorrow

TR-01A 15 crabs

RDo	temp	pH	Cond	ORP	Turb	Depth	Tim
9.24	11.33	7.09	2871	0.16	367	2.2	1237

T-04, T-03, T-05
Barbee set traps
where sediments were
~~Stu~~ stirred up. Cajun
saw 20 traps all in
one area

Location EWL Date 12-15-10

Project / Client 07-47

TR-04 too big - one catfish

Sample Preparation 1354

T-01A

length	width	wt	gender
6.5	14	186	M
7	16	219.	M
7	16.5	175	M
7.5	17	263	M
7	17	205	M
7.5	18	240	M
7.5	18.5	234	M
7	15	205	M
6.5	15	181	M
6.5	16	197	M
8	18	294	M
8	18	247	M
8	14.5	263	F

Location EWL Date 12-15-10

Project / Client 07-47

TR-01

length	width	wt	gender
7	17	258	M
7.5	16	243	M
7	14.5	162	M
6	13.5	125	M
7.5	17.5	209	F
7.5	17	267	M
7.5	17	213	M
7.5	17	211	M
6.5	16	202	M
5.5	13	101	M
8	17	283	M

TR-01 bream

length	width	wt	gender
14	7	55	
4.5	5.5	63	
13	5	41	
12.5	5	45	

Location EWL Date 12-15-10

Project / Client 07-47

Heading off to Fed Ex
to ship 2 crab locations
1 fish + 1 bait 1544
12 hr day

Location EWL Date 12-16-10

Project / Client 07-47

Heading out to set fish
nets at 1041
(photo 29 mtg Aaron's Dad
Gay, Patrick → fish
net locations)

main north-south canal
is "Stelly Canal"
on way to T-12

check T-12 for crabs
one crab, put him back
(still in trap) to try to get
more crabs, rebaited @ 1100
Set out net at T-12 @ 1110
(photo 50 + 31 lunch, + barge
launch) w/ Max on ~~bar~~ barge

T-9 check crab trap
5 crabs!

%DO	temp	pH	cond	ORP	Turb	Depth	Time
12.24	12.73	6.82	2672	.2	233	1.5	1143

Location EWL Date 12-16-10

Project / Client 07-47

- approaching T-08
  2 crabs, put them back to try for more
- putting fish net trap in at 1153 near T-07
- checking crab trap at T-07 - one crab, put him back
- putting a fish net trap time between T-5 and T-6 at 1206
- one crab @ T-05 @ 1214 put it back
- checking T-06 for crabs

(photo 32 crabs at T-6)

Location EWL Date 12-16-10

Project / Client 07-47

T-06 time 1215

8 crabs!

RDO	temp	pH	Cond	ORP	Turb	Depth	Time
9,32	13,79	7.25	3145	.26	65,6	1.0	1215

heading to check T-10
3 crabs, left them
time 1226

checking T-04 5 crabs
time 1237

RDO	temp	pH	cond	ORP	Turb	Depth	Time
9,27	13,61	7,47	3120	0.13	110	1.2	1237

checking T-03 5 crabs
time 1238

RDO	temp	pH	Cond	ORP	Turb	Depth	Time
9,45	13.81	741	3154	.09	70,1	2	1238

Location EWL Date 12-16-10

Project / Client 07-47

checking T-02
2 crabs - throw it
back time 1242

---

check T-01 2 crabs)
leave them there
to try to collect more
time 1253

Check T-11
no crabs time 1257

---

checking TR-02
1 crab, threw back
in time: 1319

Location EWL Date 12-16-10

Project / Client 07-47

to package +

T-03 5 crabs)

length	width	weight	
6.5	15.5	178	M
7	15	212	M
7	16	194	M
5.5	13.5	130	M
6	13.5	156	M

T-04 5 crabs

length	width	weight	
7	16	201	M
7.5	17.5	289	M
6.5	14.5	172	M
6.5	15	182	M
8	18	298	M

Location CWL Date 12-16-10

Project / Client 07-47

T-06

8 crabs

length	width	wt	
7	16	214	M
6.5	16	199	M
6.5	14.5	139	M
7	17.5	221	M
6.5	16	193	M
7	15.5	184	F
7	16.5	233	M
6.5	14	198	M

T-09

length	width	wt	gender
7	16	227	M
7	16	138	M
7	17	223	M
6	14.5	127	M
7	17.5	203	F

Location Date

Project / Client

Location EWL Date 12-16-10

Project / Client 07-47

T-06

length	width	wt	8 crabs
7	16	214	M
6.5	16	199	M
6.5	14.5	139	M
7	17.5	221	M
6.5	16	193	M
7	15.5	184	F
7	16.5	233	M
6.5	14	198	M

T-09

length	width	wt	gender
7	16	227	M
7	16	138	M
7	17	223	M
6	14.5	127	M
7	17.5	203	F

1891-4989-1 Fed Ex sender

Location EWL Date 12-20-10

Project / Client 07-47

0700

Headed out 7:00 AM from BTR, planning meeting Stelly's Grocery (complete)

CRABS

TR-01		11
02	5	
03A	12	+ (7)
04	8	+ 7
05	11	+ 8
06	6	
07	10	
08	11	
09	10	
T-01A	15	+ 11
02	11	
03	5	
04	5	
05	8	
06	8	+ 10
07	5	
08	5	
09	5	
10	5	
11	4	
12	3	

FISH

TR-01 4

Location EWL Date 12-20-10

Project / Client 07-47

1100 heading out
checking TR-03 no crabs
time 1104

heading to time 1107
TR-0~~3~~2 within 100yds

7crabs

RDO	temp	pH	cond	ORP	Turb	Depth	time
11.72	11.66	6.99	2944	.22	52.1	1.0	1107

2M + 1M
1F, 1F, 1F, 1M

heading to time 1120
TR-02

5 crabs males

RDO	temp	pH	Cond	ORP	Turb	Depth	Time
7.25	10.74	7.02	5239	0.19	18.2	1.9	1120

Location EWL Date 12/20/10

Project / Client 07-47

Boom deployed near
barge, sheen, odor
~~near~~
time 1128

T-12 3 crabs 2 males 1 female

RDO	temp	pH	cond	ORP	turb	Depth	time
9.29	11.77	7.72	2755	0.18	92.3	0.89	1128

☆ (check this again if possible)

T-08 5 crabs
time 1147

RDO	temp	pH	cond	ORP	turb	Depth	time
9.72	11.81	7.53	2768	0.15	95.21	.5	1147

T-07 — just 2 crabs
RDO left it, put
out another traps

☆ (check again)

Location EWL Date 12-20-10

Project / Client 07-47

head to T-10 5 males

time 1157

RDO	temp	pH	Cond	ORP	turb	Depth	Time
9.30	12.34	7.44	3200	.18	48.5	1.3	1157

T-6 time 1204 10 crabs

RDO	temp	pH	Cond	ORP	turb	Depth	time
9.83	12.57	7.48	3185	0.13	48.2	1.17	1204

T-5 time 1208 8 crabs

1 male

1 female

RDO	temp	pH	cond	ORP	turb	Depth	time
9.48	12.11	7.46	3170	0.12	46.4	1.1	1208

Location EWL Date 12-20-10

Project / Client 07-47

T-11 2 crabs left them

time 1222 7 crabs

T-04

RDO	temp	pH	cond	ORP	turb	Depth	time
8.05	12.35	7.45	3965	.14	45.9	1.0	1222

T-02 1228 11 crabs 1 Female

RDO	temp	pH	cond	ORP	turb	Depth	time
8.37	12.58	7.5	3946	0.11	48.1	1.1	1228

T-01 time 1236 11 crabs 1 Female

RDO	temp	pH	cond	ORP	turb	depth	time
7.48	12.15	7.4	3930	0.05	51.3	1.0	1236

Location EWL Date 12-20-10

Project / Client 07-47

weighing, measuring processing

TR-02

length	wid	wt	Gendr
6	14	146	M
6.5	14.5	172	↓
6	14.5	160	
7	16.5	217	
6.5	15.5	204	

TR-03

6	14.5	135	M
6	15.5	108	F
6.5	15	162	M
6	13.5	124	F
6	14.5	121	F
6.5	17	194	F
8.5	20	383	M

Location EWL Date 12-20-10

Project / Client 07-47

T-01

length	width	wt	Gender
7	16	171	M
6.5	14.5	180	M
6.5	14	177	M
7	16.5	234	M
7.5	17	255	M
7	16.5	222	M
7.5	18	273	M
7	16	213	M
5.5	12	139	M
6	14.5	148	F
7.5	16.5	253	M

T-02

5.5	13	115	M
7.5	16	258	M
8	18	276	F
6.5	16	180	M
7	16	229	M
7	18	238	M
7.5	19	276	M
6.5	15.5	174	M
6.5	15	196	M
7	17.5	244	M
7.5	16	284	M

Location EWL Date 12-20-10

Project / Client 07-47

T-04

length	width	weight	gender
6	11.5	176	M
6.5	13.5	148	M
7	16.5	281	M
7.5	16	237	M
7.5	17.5	239	M
7.5	15.5	209	M
8	18	301	M

T-05

7.5	18.5	217	F
7	16	211	M
6.5	14.5	151	M
7	17	262	M
7.5	17.5	251	M
8.5	20	362	M
6	13.5	169	M
5.5	13	127	M

Location EWL Date 12-20-10

Project / Client 07-47

T-06

length	width	wt	gender
6.5	14.5	178	M
7	17	192	M
8	16.5	298	M
7	15.5	172	M
7	16.5	215	M
8	19.5	309	M
6.5	14.5	174	M
6	14	167	M
6	15	154	M
6.5	16.5	231	M

T-08

		264	M
7.5	17	287	M
7	16	224	M
7	16.5	214	F
6.5	16	171	F

Location EWL Date 12-20-10

Project / Client 07-47

T-10

length	width	wt	gendr
7.5	18	286	M
7	16.5	234	M
6.5	13.5	161	M
7.5	17.5	284	M
6	15.5	155	M

T=12

6.5	15	178	M
6	14.5	135	M
7	16	231	M

Shipped crabs
planning meeting
ice chest from Academy
back by 9:00
14 hour day

Location EWL Date 12-21-10

Project / Client 07-47

time 0958 T-12
checking net
catfish, a red fish, no bream (lots of fish)
no crabs

time 1011 checking net at T-9
(photo 33 + 34 at T-9
lots of fish)

T-#7 time 1018 5 crabs
female ② +2 crabs - ② males
males ②
+1

RDO	temp	pH	cond	ORP	turb	Depth	Time
9.12	12.97	6.91	2856	.22	88.1	1.1	1018

Location EWL Date 12-21-10

Project / Client 07-47

T-05 time 1033

3 crabs → 3 males

1 bluegill + 5 crabs males

RDO	temp	pH	cond	orp	turb	depth	time
8,95	13,4	7.26	3512	.07	46.5	1.3	1033

time 1053 T-11

4 crabs - males

+ 4 crabs - males

RDO	temp	pH	cond	ORP	turb	depth	time
8.64	13.49	7.41	3358	.02	59	1.3	1053

time 1104 T-02

sac-o-lait - 1

4 crabs mals

RDO	temp	pH	cond	ORP	turb	depth	time
8,05	13.84	7.4	4019	.01	45.2	1.1	1104

+10 more

17crabs

Location EWL Date 12-21-10

Project / Client 07-47

time 118

T-02 measure + weigh

length	width	wt	Gender
6	14.5	129	M
7.5	16	232	M
8	19	328	M
7	16.5	219	M
7	16.5	212	M
7.5	18	246	M
7.5	17	270	M
6.5	15.5	145	M
6.5	16	179	M
7	16.5	213	
8	18.5	238	
7	15	186	
8	18	292	
6.5	16	207	
7	15	168	
7.5	16	211	
		260	

Location EWL
Date 12-21-10
Project / Client 07-47

T-05

length	width	wt	Gender
6.5	15	174	M
6.5	14	173	M
7	15.5	188	M
8	18	292	M
7.5	17.5	227	F
6.5	14.5	161	M
6.5	15	177	M
7	16.5	211	M
7	16	222	M

T-07

7	15	191	M
7	16	171	F
7	15.5	197	M
8	18	275	M
7.5	17.5	240	M

Location EWL
Date 12-21-10
Project / Client 07-47

T-11

length	width	wt	Gender
7	15.5	169	M
7	16.5	201	M
6.5	14	167	M
7	17	220	M
8	18	304	M
7.5	18	266	M
7.5	17.5	269	M
7	16	228	M

T-05 bluegill

length	width	wt
13.5	7	47

T-02 sac o lait

Location EWL Date 12-21-10

Project / Client 07-47

small fish

TR-02

length cm	width cm	wt
3	10	14 gms
3	9.5	8
2.5	7.5	11
2.5	8	7
3	10	11
2.5	7.5	5
3	10	11
2.5	9	7
2.5	9	6
2.5	9	7
2	7.5	4
2.5	10.5	11
2.5	8	4
2	7.5	4
3	10.5	16
2	7	5
2	7	5
2.5	8.5	6
2.5	8	8

Location EWL Date 12-21-10

Project / Client 07-47

SHAD

length	width	wt
2.5	8.5	9
2.5	8.5	8
2	8	6

TR-03

2.5	8	11
2.5	8	7
2 ~~3~~	8.5	8
2.5	8.5	~~8.5~~ 7
3	11	12
2	9.5	7
2.5	9	8
3	11	14
2.5	10	9
3	11	13
2.5	10	10
2.5	9	7
2.5	9.5	8
2.5	10	9
2.5	9.5	7
2.5	9.5	7

Location EWL Date 12-21-10

Project / Client 07-47

TR-03 con't

length	width	wt
2.5	10	7
2	9	7
2.5	9.5	~~9~~ 6
2.5	9	7
3	10	8
3	11	12
3	11	12
2.5	9.5	7
2.5	10	10
3	10.5	10
2.5	10	9
3	10.5	9
2.5	9.5	9

SHAD

TR-04

2	9	7
2.5	9	12
2.5	9	7
2	8	7
2	8	7
2	8	6
2	8	4
2.5	9	5

Location EWL Date 12-21-10

Project / Client 07-47

TR-04 con't

length	width	wt
2.5	9	7
2.5	9	6
2	8.5	4
2	8	5
2	8	5
2	8	3
2.5	9	5
2	8	4
2	8	5
2.5	9	9
2	8.5	5
3	10	8
2.5	9	6
2	8	5
2.5	9	7
2.5	8.5	6

Location EWL Date 01-03-11

Project / Client 07-47

AM
crabs collected
John + Patrick

TR-02	10
-03	7
-04	10
T-03	12
-07	9
-08	8
-10	12
-12	11

head to Lafayette
to ship crabs
rc ~~0314~~ 1514
2 hours preparations
in morning
left BTR at noon
worked till 7:00
9 hrs worked

Location EWL Date 01-04-11

Project / Client 07-47

meeting 0700
head out in boat 0905
heading to TR-05 (photos)
nets in water 0930
collected lots fish: SHAD, catfish + mullet
Shad trawled 200 yds 2½ gallon
lots of fish - kept ½ bucket

move to TR-06
0945 trawled 200 yds
Smaller number of
fish, kept shad (about 50)
threw back catfish
and mosquito fish

head to TR-08
1005
lots of SHAD and
large catfish
filled ¼ of bucket
w/SHAD, 6 diff
species

Location EWL Date 1-4-11

Project / Client 07-47

Head to TR-09
1028
lots of fish
collected SHAD
threw back lots
of catfish perch
+ one small crab

---

head to TR-07
1050
lots of SHAD
head to canals
1/2 bucket of fish

WLF phone
763-3554

paused fishing to
complete collection
permit. Worked
till 4:00 meeting
w/ WLF
7:00-4:00 9 hour day

Location EWL Date 1-5-11

Project / Client 07-47

$ 35.64 11.28 gallons
fuel - no rec't
from pump 0940

1000 - headed over the to
WLF to try to get
permit phoned +
waiting to hear from
Manual Ruiz
Spoke to Manuel @
10:51, he has the document
on his bosses desk,
waiting to be signed
1055 - Signed!
Head to Landing
@ 1331 waiting at Stelly
for John to call
head out 1425

Location EWL Date 1-5-11

Project / Client 07-47

while I was out:

1230 T-01 barnacles on log
fish SHAD
1230 T-02 - fish - SHAD +
mos fish, catfish, crab
1320 T-05
1330 T-03
1340 T-04
1350 T-06
1355 T-10
1405 T-11

8 stations: SHAD!

heading out to T-12
T-7, 8, 9

Moving to T-12
time 1445
photos at T-12
collected SHAD
~ 40 fish
Sheen

Location EWL Date 1-5-11

Project / Client ~~07~~ 07 - 47

moving to T-7, 8, 9
T-09
time 1455 photo
tons of SHAD John

T-08 15-05 - time
photos John
fish - SHad, catfish

T-07 1510 - time
SHAD - no photo here

on way to T-09
to check crabs
time 1525
need small boat for
crab traps

Location EWL Date 1-5-11

Project / Client 07-47

beginning to process
fish at landing

T-08
1/3 of 5 gallon bucket
wrapped in foil
See record forms

T-03 TR-07
T-07 TR-05
T-08 TR-08
SHAD TR-06
TR-09

processed all
fish locations

Shipped TR-5, 6, 7, 8 9
+ T-1, 2, 3, 4, 5. 6, 7, 8
9, 10, 11, 12

Location Date

Project / Client

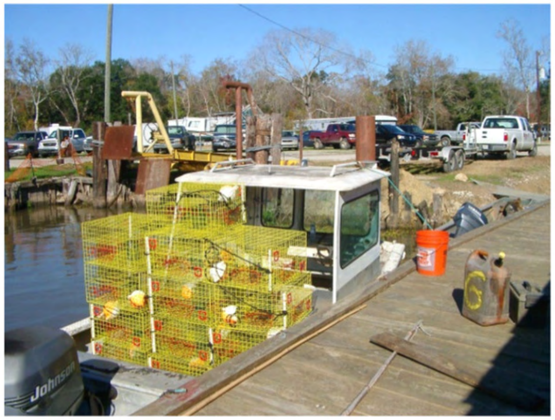
Photo Log
Appendix C

East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

Photo Journal
Crabbing and Fishing
East White Lake

12/13/2010 – 01/05/2011

Day 1
Setting Crab Traps/Cast Netting for Fish
(12/13/10)



IMGP2905: Crab traps on boat at Little Prairie Landing

IMGP2906:Catfish heads/bodies to be used for baiting crab traps

IMGP2907: Gajan adding fuel to the boat

Newly constructed platform with heater treater

Day 1
Setting Crab Traps/Cast Netting for Fish
(12/13/10)

PC130002: Newly constructed platform with heater treater

PC130003: Newly constructed platform with heater treater and flowlines

IMGP2909: Mitchell throwing in a crab trap at location TR-07

IMGP2910: Mitchell throwing in a crab trap at location TR-06

Day 1
Setting Crab Traps/Cast Netting for Fish
(12/13/10)

IMGP2911: Mitchell baiting a crab trap at location TR-05

IMGP2912: Mitchell baiting a crab trap at location TR-05

PC130004: Oil and gas field canals, former location of elevated vessel

PC130005: Oil and gas field canals, former location of elevated vessel

Day 1
Setting Crab Traps/Cast Netting for Fish
(12/13/10)

IMGP2914: Gajan, boat captain and crab fisherman, on the boat

IMGP2915: Gajan driving the boat towards location TR-04

IMGP2916: Patrick with handheld DeLorme Earthmate PN-40 GPS, used to identify location coordinates

IMGP2917: Patrick taking coordinates at location T-10 with handheld DeLorme GPS

Day 1
Setting Crab Traps/Cast Netting for Fish
(12/13/10)

IMGP2918: Oil and gas field canals, former location of elevated vessel

PC130006: Canal south of Schooner Bayou to ICON background location

PC130007: Canal south of Schooner Bayou to ICON background location

PC130008: Cast net and box with catfish bait

Day 1
Setting Crab Traps/Cast Netting for Fish
(12/13/10)

PC130009: Cast net, box of catfish bait

PC130010: Chevron dock facility

IMGP2919: Helen pulling crab trap into the boat at location TR-02

IMGP2920: Helen pulling crab trap into the boat at location TR-02

Day 1
Setting Crab Traps/Cast Netting for Fish
(12/13/10)

IMGP2921: Crabs collected in wire mesh trap at location TR-02

IMGP2922:Patrick pulling crab trap onto the boat at location TR-01

IMGP2923: Patrick pulling crab trap onto the boat at location TR-01

IMGP2924: Patrick rebaiting crab trap at location TR-01

Day 1
Setting Crab Traps/Cast Netting for Fish
(12/13/10)

IMGP2925:Gajan casting net for fish at a test location chosen by him

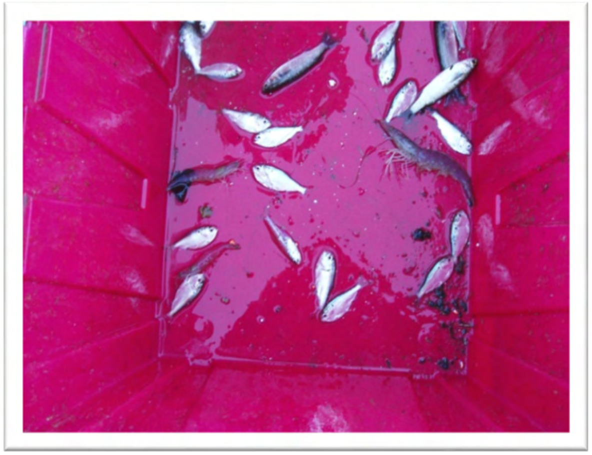
IMGP2926: Gajan pulling fishing cast net out of water at a test location chosen by him

IMGP2927: Gajan throwing cast net out to collect fish at a test location chosen by him

IMGP2928: Gajan bringing cast net with fish in it onto the boat

Day 1
Setting Crab Traps/Cast Netting for Fish
(12/13/10)

IMGP2929: Gajan checking cast net for fish at location TR-02



PC130011: Fish collected by cast net at location T-10

PC130012: Jug line/trout line between TR-04 and TR-05

PC130013: Jug line/trout line between TR-04 and TR-05

Day 1
Setting Crab Traps/Cast Netting for Fish
(12/13/10)

PC130014: Contents of cast net between TR-04 and TR- 06

PC130015: Oil and gas canal near TR-04

Day 2
Collecting/Weighing/Measuring/Shipping Crabs
(12/14/2010)

IMGP2930: Crabs fromTR-06 in basket prior to being moved to holding bucket

IMGP2931: Crab from location TR-07 held with tongs by Patrick

IMGP2933:John counting crabs and identifying their gender

IMGP2934: Crabs collected at location TR-09 in holding basket on boat

Day 2
Collecting/Weighing/Measuring/Shipping Crabs
(12/14/2010)

IMGP2935: Buckets/lids labeled by location to hold crabs once counted and gender identified

IMGP2937: Crabs collected at location TR-08 in a holding basket on the boat

IMGP2938: Catfish and bream collected at location TR-03A in a holding basket on the boat

IMGP2939: John holding a bream fish collected at TR-03A

Day 2
Collecting/Weighing/Measuring/Shipping Crabs
(12/14/2010)

IMGP2940: Patrick weighing female crab on a digital scale at Little Prarie Landing

Day 3
Collecting, Measuring and Shipping Crabs/Fish
(12/15/2010)

PC150016: Gajan pulling crab trap out of the water at TR-01

PC150017: Pulling hoop net out of the water at TR-1

PC150018: Checking hoop net at TR-01

PC150019: Returning hoop net to bottom at TR-01

Day 3
Collecting, Measuring and Shipping Crabs/Fish
(12/15/2010)

PC150020: Checking hoop net at TR-01

PC150021: Fish in hoop net at TR-01

PC150022: Hoop net partially out of water at TR-01

PC150023: Fish in hoop net at TR-01

Day 3
Collecting, Measuring and Shipping Crabs/Fish
(12/15/2010)

PC150024: Fish collected from hoop net at TR-01

PC150025: Helen and John looking at hoop net at TR-01

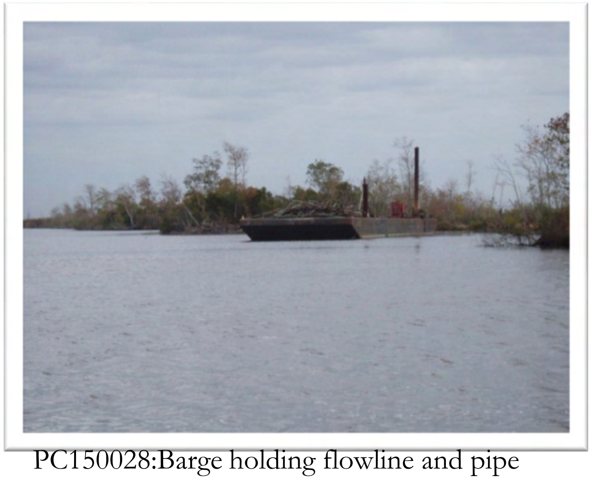
PC150026: Contents of hoop net at TR-01

IMGP2941: Bream and catfish collected by hoop net at location TR-01

Day 3
Collecting, Measuring and Shipping Crabs/Fish
(12/15/2010)

IMGP2942: Bream and catfish collected by hoop net at location TR-01

PC150027: Barge holding flowline and pipe removal debris



PC150028:Barge holding flowline and pipe removal debris

PC150029: Newly constructed platform with heater

Day 3
Collecting, Measuring and Shipping Crabs/Fish
(12/15/2010)

PC150030: Newly constructed platform with heater

PC150031: Crane/barge/tug used for flowline pipe removal

PC150032: Crane/barge/tug used for flowline pipe removal

PC150033: New signs posted by Vermilion Parish School Board restricting hunting and fishing

Day 3
Collecting, Measuring and Shipping Crabs/Fish
(12/15/2010)

PC150034: New signs posted by Vermilion Parish School Board restricting hunting and fishing

PC150035: Crane/barge/tug used for flowline pipeline removal

PC150036: Crane/barge/tug used for flowline pipeline removal

PC150037: Crane/barge/tug used for flowline pipeline removal

Day 3
Collecting, Measuring and Shipping Crabs/Fish
(12/15/2010)

PC150038: Crane/barge/tug used for flowline pipeline removal

PC150039: Crane/barge/tug used for flowline/pipeline removal

PC150040: Crane/barge/tug used for flowline/pipeline removal

PC150041: Long stick on barge conducting flowline/pipeline removal

Day 3
Collecting, Measuring and Shipping Crabs/Fish
(12/15/2010)

PC150042: Long stick on barge conducting flowline/pipeline removal

PC150043: Crane on barge conducting flowline/pipeline removal

IMGP2943: Crabs collected from location TR-01A in holding basket on boat

IMGP2944: Patrick onshore

Day 3
Collecting, Measuring and Shipping Crabs/Fish
(12/15/2010)

IMGP2945: Patrick and John at weighing and measuring station at Little Prairie Landing

Day 4
Photographing Waterways
Collecting/Measuring/Shipping Crabs
(12/16/20)

PC160044: Little Prairie Boat Landing

PC160045: Little Prairie Boat Landing

PC160046: Crab trap location at T-12

PC160047: Crab trap location at T-12

Day 4
Photographing Waterways
Collecting/Measuring/Shipping Crabs
(12/16/20)

PC160048: Gajan baiting hoop nets at T-12

PC160049: Gajan baiting hoop nets at T-12

PC160050: Gajan baiting hoop nets at T-12

PC160051: Gajan setting hoop net at T-12

Day 4
Photographing Waterways
Collecting/Measuring/Shipping Crabs
(12/16/20)

PC160052: Gajan setting hoop net at T-12

PC160053: Gajan setting hoop net at T-12

PC160054: Gajan setting hoop net at T-12

PC160055: Gajan setting hoop net at T-12

Day 4
Photographing Waterways
Collecting/Measuring/Shipping Crabs
(12/16/20)

IMGP2946: Patrick and Gajan getting on barge to have lunch with Max Hungerford

PC160056: Peak central facility tank battery

IMGP2947: Hoop nets stacked on boat

PC160057: Inspecting crab trap at T-05

Day 4
Photographing Waterways
Collecting/Measuring/Shipping Crabs
(12/16/20)

PC160058: Traveling to T-07 location

PC160059: Traveling to T-07 location

PC160060: Traveling to T-07 location

PC160061: Collecting crab trap at T-07 location

Day 4
Photographing Waterways
Collecting/Measuring/Shipping Crabs
(12/16/20)

PC160062: Collecting crab trap at T-07 location

PC160063: Gajan setting hoop nets at T-07 location

IMGP2949: The barge near location T-07

PC160066: Approaching crab trap at T-02 location

Day 4
Photographing Waterways
Collecting/Measuring/Shipping Crabs
(12/16/20)

PC160067: Approaching crab trap at T-02 location

PC160068: Approaching crab trap at location T-02

PC160070: Collecting crab trap at T-02 location

IMG_0465: Helen recording number of crabs collected at location T-06

Day 4
Photographing Waterways
Collecting/Measuring/Shipping Crabs
(12/16/20)

PC160071: Oil and Gas Field Canal

IMGP2950: Crabs collected in trap from location T-06

IMGP2951: Patrick with large crab at weighing and measuring station at Little Prairie Landing

Day 5
Collecting/Measuring/Shipping Crabs
Recording Water Chemistry
(12/20/10)

IMG_0466: Patrick holding large crab at location TR-03

IMG_0467: Helen holding large crab at location T-05

PC200072: Barge traveling down Schooner Bayou

Day 6
Hoop Netting Fish and Collecting Crabs
Shipping Crabs and Fish
(12/21/10)

IMGP2956: Fish captured in hoop net at location T-09

IMGP2957: Gajan bringing hoop net onto boat to check for fish at location T-10

IMGP2958: Patrick measuring length and width of shad fish at measuring station at Little Prairie Landing

IMGP2959: Shad fish in five gallon bucket at measuring station at Little Prairie Landing

Day 6
Hoop Netting Fish and Collecting Crabs
Shipping Crabs and Fish
(12/21/10)

PC210073: Collecting hoop net from T-11 location

PC210074: Gajan collecting hoop net at T-11

PC210075: Fish in hoop net at T-11

PC210076: Fish in hoop net at T-11

Day 6
Hoop Netting Fish and Collecting Crabs
Shipping Crabs and Fish
(12/21/10)

PC210077: Collecting hoop net at T-11

Day 7
Collecting and Shipping Crabs
Photographing Waterways
(01/03/11)

P1030078: Wildlife

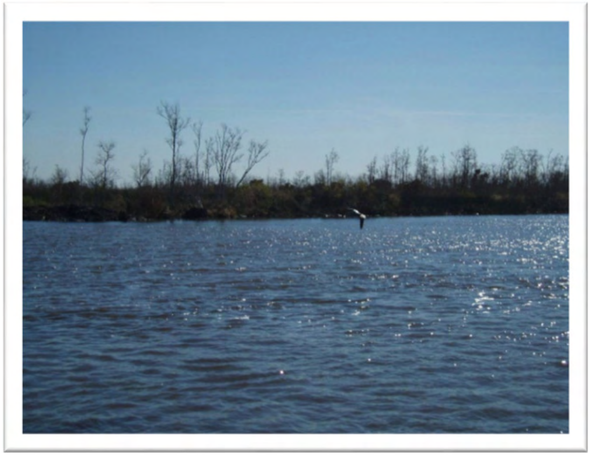
P1030079: Wildlife

P1030080: Wildlife

P1030081: Wildlife

Day 7
Collecting and Shipping Crabs
Photographing Waterways
(01/03/11)

P1030082: Wildlife



P1030083: Wildlife

P1030084: Wildlife

P1030085: Wildlife

Day 7
Collecting and Shipping Crabs
Photographing Waterways
(01/03/11)

P1030086: Wildlife

Day 8
Collecting Shad Fish by Trawling
(01/04/11)

P1040087: Double rigged trawling boat docked at Little Prairie Landing

P1040088: Double rigged trawling oat docked at Little Prairie Landing

IMG_0479: Detail of fish sorting table at back of trawling boat

IMG_0480: Gajan at back of trawling boat with fishing nets not in the water

Day 8
Collecting Shad Fish by Trawling
(01/04/11)

IMG_0481: Gajan at back of trawling boat with fishing nets not in the water

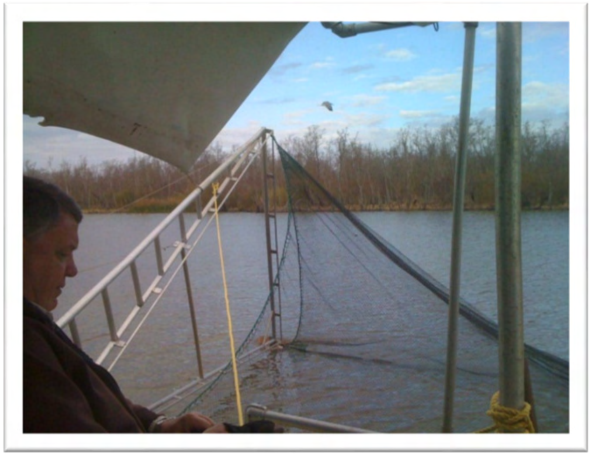
IMG_0482: Gajan at back of trawling boat with fishing nets not in the water

IMG_0483: Patrick and John near table for fish collection/sorting, nets not in the water

IMG_0484: Nets being lowered into the water at location TR-05 on the trawling boat

Day 8
Collecting Shad Fish by Trawling
(01/04/11)

IMG_0485: Pulling trawling nets through the water at location TR-05



IMG_0486: Trawling net, attached to boom, being dragged through the water at location TR-05.

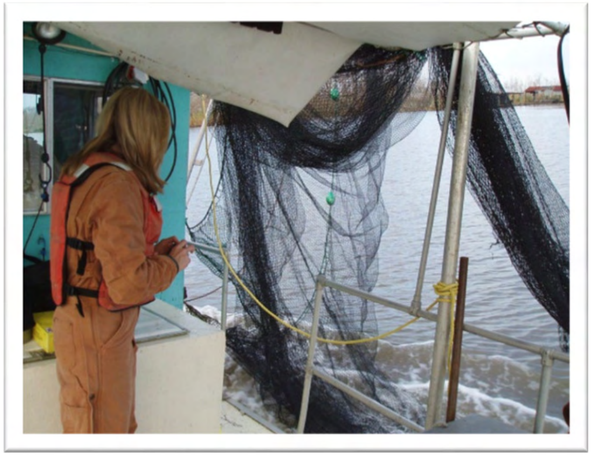
IMG_0487: Submerged net on extended boom being pulled through water at location TR-05

IMG_0488: Raising net out of water at location TR-05

Day 8
Collecting Shad Fish by Trawling
(01/04/11)

IMG_0489: Releasing fish collected in trawling net at location TR-05 to collection basket

IMG_0490: Basket of fish collected by trawling net at location TR-05



P1040089: Trawling nets being lowered into the water

P1040090: Boat captain setting trawling nets

Day 8
Collecting Shad Fish by Trawling
(01/04/11)

P1040091: Trawling net dragging in water

P1040092: Pulling trawling net through the water at TR-05

IMG_0491: Birds following fishing boat on Schooner Bayou Canal

P1040093: Helen watching trawling

Day 8
Collecting Shad Fish by Trawling
(01/04/11)

P1040094: Helen and boat captain

P1040095: Boat captain setting nets

P1040096: Pulling trawling nets through the water at TR-06

P1040097: Pulling nets through the water at TR-06

Day 8
Collecting Shad Fish by Trawling
(01/04/11)

P1040098: John observing trawling at TR-06

P1040099: Pulling trawling nets through the water at TR-06

IMG_0492: Bow of trawling fishing boat near location TR-06

IMG_0493: Trawling nets out of water/extended from sides of boat on booms near location TR-06

Day 8
Collecting Shad Fish by Trawling
(01/04/11)

P1040100: Wildlife

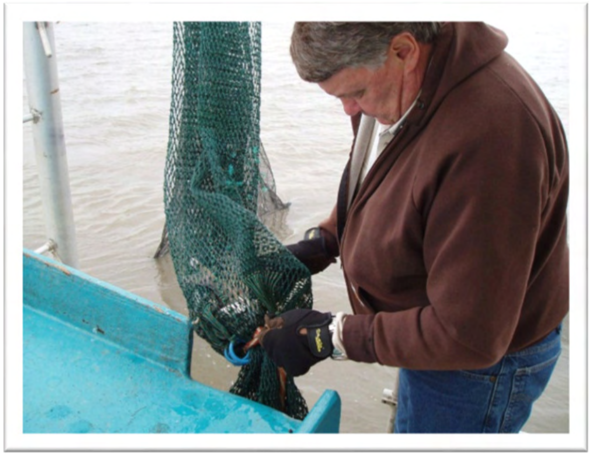
P1040101: Fish in bottom of net

P1040102: John pulling the trawling net in

P1040103: Catch from trawling at TR-06

Day 8
Collecting Shad Fish by Trawling
(01/04/11)

P1040104: Wildlife



P1040105: John releasing the tail end of the net

P1040106: Wildlife

P1040107: Helen and John sorting the catch at TR-09

Day 8
Collecting Shad Fish by Trawling
(01/04/11)

P1040108: Helen and John sorting the catch at TR-09

IMG_0494: Releasing fish captured in nets at location TR-09 to sorting table

IMG_0495: Detail of sorting table, fish collection basket, and nets on trawling boat

P1040109: Packaging shad for shipping in aluminum foil

Day 9
Collecting Fish in Trawling Nets/Shipping to Lab
(01/05/11)

IMGP2961:Cows and pasture near Little Prairie Landing

IMGP2962: Cow, oak trees and pasture near Little Prairie Landing

IMGP2963: Visible sheen on water surface at location T-12

IMGP2964: Lowering trawling nets into the water at location T-12

Day 9
Collecting Fish in Trawling Nets/Shipping to Lab
(01/05/11)

IMGP2965: Dragging trawling nets through the water at location T-12

IMGP2966: Passing a fishing boat at location T-12

IMGP2967: Captain piloting the boat. Boom is visible through the window on the starboard side of the boat

IMGP2968: Captain in the wheelhouse steering the boat

Day 9
Collecting Fish in Trawling Nets/Shipping to Lab
(01/05/11)

IMGP2969: John guiding trawling net out of the water at location T-12

IMGP2970: John untying the rope that holds fish in the net at location T-12

IMGP2971: John emptying fish from the trawling net onto the sorting table

IMGP2972: The full end of the trawling net, closed by a rope looped through rings and tied with a knot that is secure, but easily released to dump the catch.

Day 9
Collecting Fish in Trawling Nets/Shipping to Lab
(01/05/11)

IMGP2973: Fish released from trawling net onto sorting table

IMGP2974: Peak facility facing east

IMGP2975: Pulling trawling nets out of the water with in the background

IMGP2976: Emptying fish from trawling net onto sorting table with in the background

Day 9
Collecting Fish in Trawling Nets/Shipping to Lab
(01/05/11)

IMGP2977: John releasing fish from trawling net to sorting table

IMGP2978: John releasing fish from trawling net to sorting table

IMGP2979: Fish to be sorted: shad shorter than 7.0 cm and all catfish and mosquito fish are thrown back into the water

IMGP2980: Close up of fish before being sorted

Day 9
Collecting Fish in Trawling Nets/Shipping to Lab
(01/05/11)

IMGP2981: Peak facility

IMGP2982: On Schooner Bayou Canal heading back to Little Prairie Landing

IMGP2983: Sunlight on Schooner Bayou

Field Record Forms
Appendix D

East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 01A

Sample Type ([✓ C] / F)

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 12-15-10

Collection Method(s): crab trap

Collector Name (print and sign): J. Rodgers, P. Ritchie, H. Connelly

Affiliation: Clemson University (864) 650-0210

Address: Department of Forestry and Natural Resources

Site Location

Parish: Vermilion

Latitude: 561094

Longitude: 3288605

Site Name: Schooner Bayou

Site Description: Bayou

Water Body Description: Bayou

Estimated Maximum Water Depth: ______ (meters) / 20 (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP ~~N~~V	Turb NTU	Depth feet	Time
9.24	11.33	7.09	2871	0.16	367	2.2	1237

Notes: 400 yards south of T-01 on main N-S Bayou on School board property near the pilings

Sample Description

Species: callinectes sapidus

Total # of Individuals: 15

HC 12/15/10 HC 12/15/10

Specimen Composite Code	Length cm ~~(mm)~~	Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	6.5	14	186	12/08/10/0900	12/15/10/1237	catfish	M	
C	7	16	219	12/08/10/0900	12/15/10/1237	catfish	M	missing claw
C	7	16.5	175	12/08/10/0900	12/15/10/1237	catfish	M	
C	7.5	17	263	12/08/10/0900	12/15/10/1237	catfish	M	
C	7	17	205	12/08/10/0900	12/15/10/1237	catfish	M	missing claw
C	7.5	18	240	12/08/10/0900	12/15/10/1237	catfish	M	
C	7	15.5	213	12/08/10/0900	12/15/10/1237	catfish	M	
C	7	16	234	12/08/10/0900	12/15/10/1237	catfish	M	
C	7.5	18.5	219	12/08/10/0900	12/15/10/1237	catfish	F	missing claw
C	7	15	205	12/08/10/0900	12/15/10/1237	catfish	M	
C	6.5	15	181	12/08/10/0900	12/15/10/1237	catfish	M	
C	6.5	16	197	12/08/10/0900	12/15/10/1237	catfish	M	
C	8	18	294	12/08/10/0900	12/15/10/1237	catfish	M	
C	7.5	18	24	12/08/10/0900	12/15/10/1237	catfish	M	miss. claw.
C	8	18.5	263	12/08/10/0900	12/15/10/1237	catfish	F	

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: I - 01
Project Initial Code: EWL
Sampling Date: 12-20-10
Collection Method(s): crab trap
Collector Name (print and sign): P. Ritchie, H. Connelly
Affiliation: Clemson University (864) 650 0210
Address: Dept Forestry + Natural Resources

Sample Type ([✓ C] / F)
C = crab F = forage fish

Site Location

Parish: Vermilion

Latitude: 561094
Longitude: 3288605
Site Name: EWL Field
Site Description: Canal
Water Body Description: canal
Estimated Maximum Water Depth: ______ (meters) / 20 (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
7.48	18.15	7.4	3930	0.05	51.3	1.0	1236

Notes:

Sample Description

Species: callinectes sapidus
Total # of Individuals: 11

HC12/20/10 HC12/20/10

Specimen Composite Code	Length cm ~~(mm)~~	Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	7	16	171	12/13/10/1227	12/20/10/1236	catfish	M	one claw
C	6.5	14.5	180	12/13/10/1227	12/20/10/1236	catfish	M	
C	6.5	14	177	12/13/10/1227	12/20/10/1236	catfish	M	
C	7	16.5	234	12/13/10/1227	12/20/10/1236	catfish	M	
C	7.5	17	255	12/13/10/1227	12/20/10/1236	catfish	M	
C	7	16.5	222	12/13/10/1227	12/20/10/1236	catfish	M	
C	7.5	18	273	12/13/10/1227	12/20/10/1236	catfish	M	
C	7	16	213	12/13/10/1227	12/20/10/1236	catfish	M	one claw
C	5.5	12	139	12/13/10/1227	12/20/10/1236	catfish	M	
C	6	14.5	148	12/13/10/1227	12/20/10/1236	catfish	F	
C	7.5	16.5	253	12/13/10/1227	12/20/10/1236	catfish	M	

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 01
Sample Type (C / [✓ F])
C = crab F = forage fish
Project Initial Code: EWL
Sampling Date: 01-05-11
Collection Method(s): trawl
Collector Name (print and sign): J. Rodgers
Affiliation: Clemson Univ. (864) 650-0210
Address: Dept Forestry and Natural Resources

Site Location 1230
Parish: Vermilion
Latitude:
Longitude:
Site Name:
Site Description:
Water Body Description:
Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

Notes: lat, long, etc → see previous record forms

Sample Description

Species: SHAD
Total # of Individuals: 1/8 of 5 gallon bucket

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
F					01/05/11/1230			

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: I-02

Project Initial Code: EWL

Sampling Date: 12-20-10

Collection Method(s): crab trap

Collector Name (print and sign): P. Ritchie H. Connelly

Affiliation: Clemson University (864) 650-0210

Address: Dept Forestry + Natural Resources

Sample Type ([✓ C] F)
C = crab F = forage fish

Site Location

Parish: Vermilion

Latitude: 561094

Longitude: 3288612

Site Name: EWL Field

Site Description: canal

Water Body Description: canal

Estimated Maximum Water Depth: ______ (meters) / 20' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP ~~m~~V	Turb NTU	Depth feet	Time
8.37	12.58	7.5	3946	0.11	48.1	1.1	1228

Notes:

Sample Description

Species: callinectes sapidus

Total # of Individuals: 11

HC 12/20/10 HC 12/20/10

Specimen Composite Code	Length cm ~~(mm)~~	Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	5.5	13	115	12/13/10/1229	12/20/10/1228	catfish	M	
C	7.5	16	258	12/13/10/1229	12/20/10/1228	catfish	M	
C	8	18	276	12/13/10/1229	12/20/10/1228	catfish	F	
C	6.5	16	180	12/13/10/1229	12/20/10/1228	catfish	M	
C	7	16	229	12/13/10/1229	12/20/10/1228	catfish	M	one claw
C	7	18	238	12/13/10/1229	12/20/10/1228	catfish	M	
C	7.5	19	276	12/13/10/1229	12/20/10/1228	catfish	M	one claw
C	6.5	15.5	174	12/13/10/1229	12/20/10/1228	catfish	M	
C	6.5	15	196	12/13/10/1229	12/20/10/1228	catfish	M	
C	7	17.5	244	12/13/10/1229	12/20/10/1228	catfish	M	
C	7.5	16	284	12/13/10/1229	12/20/10/1228	catfish	M	

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 02
Project Initial Code: EWL
Sampling Date: 12-21-10
Collection Method(s): net
Collector Name (print and sign): P. Ritchie, H. Comelly, J. Rodgers
Affiliation: Clemson University (864) 650-0210
Address: Dept Forestry + Natural Resources

Sample Type ([✓ C] / F)
C – crab F – forage fish

Site Location

Parish: Vermilion
Latitude: 561094
Longitude: 3288612
Site Name: EWL Field
Site Description: canal
Water Body Description: canal
Estimated Maximum Water Depth: ____ (meters) / 20' (feet)

RDO mg/L	**Temp** C	**pH**	**Cond** µS/cm	**ORP** ~~m~~V	**Turb** NTU	**Depth** feet	**Time**
8.05	13.84	7.4	4019	0.01	45.2	1.1	1104

Notes:

Sample Description

Species: callinectes sapidus
Total # of Individuals: 7 + 10 = 17

HC 12/21/10 HC 12/21/10

Specimen Composite Code	Length cm ~~(mm)~~	Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	6	~~129~~ 14.5	129	12/13/10/1228	12/21/10/1104	catfish	M	
C	7.5	16	232	12/13/10/1228	12/21/10/1104	catfish	M	
C	8	19	328	12/13/10/1228	12/21/10/1104	catfish	M	
C	7	16.5	219	12/13/10/1228	12/21/10/1104	catfish	M	
C	7	16.5	212	12/13/10/1228	12/21/10/1104	catfish	M	
C	7.5	18	246	12/13/10/1228	12/21/10/1104	catfish	M	
C	7.5	17	270	12/13/10/1228	12/21/10/1104	catfish	M	
C	6.5	15.5	145	12/13/10/1228	12/21/10/1104	catfish	M	
C	6.5	16	179	12/13/10/1228	12/21/10/1104	catfish	M	
C	7	16.5	213	12/13/10/1228	12/21/10/1104	catfish	M	
C	8	18.5	238	12/13/10/1228	12/21/10/1104	catfish	M	one claw
C	7	15	186	12/13/10/1228	12/21/10/1104	catfish	M	
C	8	18	292	12/13/10/1228	12/21/10/1104	catfish	M	
C	6.5	16	207	12/13/10/1228	12/21/10/1104	catfish	M	
C	7	15	168	12/13/10/1228	12/21/10/1104	catfish	M	
C	7.5	16	211	12/13/10/1228	12/21/10/1104	catfish	M	
C	8	17	260	12/13/10/1228	12/21/10/1104	catfish	M	

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 02
Project Initial Code: EWL
Sampling Date: 01-05-11
Collection Method(s): trawl
Collector Name (print and sign): J, Rodgers
Affiliation: Clemson University (864) 650-0210
Address: Dept Forestry + Natural Resources

Sample Type (C / [✓ F])
C = crab F = forage fish

Site Location 1230
Parish: Vermilion

Latitude:
Longitude:
Site Name:
Site Description:
Water Body Description:
Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L.	**Temp** C	**pH**	**Cond** µS/cm	**ORP** mV	**Turb** NTU	**Depth** feet	**Time**

Notes: lat, long, etc → see previous record forms

Sample Description

Species: SHAD
Total # of Individuals: 1/8 5gallon bucke

Specimen Composite Code	**Length (mm)**	**Width (mm)**	**Weight (grams)**	**Date/Time Trap Set**	**Date/Time Trap Pulled**	**Type of Bait**	**Sex**	**Additional Comments**
F					01/05/11/1230			

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 03

Sample Type [✓ C] F

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 12-16-10

Collection Method(s): crab trap

Collector Name (print and sign): J. Rodgers, P. Ritchie, H. Connelly

Affiliation: Clemson University (864) 650-0210

Address: Dept Forestry and Natural Resources

Site Location

Parish: Vermilion

Latitude: 561068

Longitude: 3288828

Site Name: EWL

Site Description: EWL field

Water Body Description: canal

Estimated Maximum Water Depth: ______ (meters) / 7' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
9.45	13.81	7.41	3154	0.09	70.1	2	1238

Notes:

Sample Description

Species: callinectes sapidus

Total # of Individuals: 5

HC 12/16/10 HC 12/16/10

Specimen Composite Code	Length ~~(mm)~~ cm	Width ~~(mm)~~ cm	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	6.5	15.5	178	12/13/10/1227	12/16/10/1238	catfish	M	one claw
C	7	15	212	12/13/10/1227	12/16/10/1238	catfish	M	one claw
C	7	16	194	12/13/10/1227	12/16/10/1238	catfish	M	one claw
C	5.5	13.5	130	12/13/10/1227	12/16/10/1238	catfish	M	
C	6	13.5	156	12/13/10/1227	12/16/10/1238	catfish	M	

Notes:

JHR
PWR

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: ____ - T03
Sample Type (C / F)
[✓ C] = crab F = forage fish
Project Initial Code: EWL
Sampling Date: 01-03-11
Collection Method(s): trap
Collector Name (print and sign): John Rodgers John H Rodgers Jr.
Affiliation: Clemson University (864) 650-0210
Address: Dept. of Forestry and Natural Resources

Site Location 1133
Parish: Vermilion
Latitude: ____
Longitude: ____
Site Name: T-03
Site Description: ____
Water Body Description: ____
Estimated Maximum Water Depth: ____ (meters) / ____ (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

Notes: lat, long, site name, etc → see previous field record forms

Sample Description

Species: Callinectes sapidus
Total # of Individuals: 12

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	17	7	195	12/29/10/0900	01/03/11/1133	catfish	M	
C	18	7.5	249				M	
C	15	6.5	201				M	
C	19	7.5	263				F	
C	15.5	6.5	183				M	
C	17.5	7.5	261				M	missing claw
C	17.5	7.0	229				M	
C	14.5	6.5	168				M	
C	18.5	7.5	203				F	
C	16	7	237				M	
C	18.5	7.5	265				F	
C	19	8	268	↓	↓	↓	F	

Notes: ____

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 03

Sample Type (C [✓ F])

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 01-05-11

Collection Method(s): trawl

Collector Name (print and sign): J, Rodgers

Affiliation: Clemson Univ. (864) 650-0210

Address: Dept Forestry and Natural Resources

Site Location 1330

Parish: Vermilion

Latitude:

Longitude:

Site Name:

Site Description:

Water Body Description:

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

Notes: lat, long, etc → see previous records

Sample Description

Species: SHAD

Total # of Individuals: 1/4 of 5 gallon bucket

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
F					01/05/11/1330			

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: I -04
Sample Type ([✓ C] F)
C = crab F = forage fish
Project Initial Code: EWL
Sampling Date: 12-16-10
Collection Method(s): crab trap
Collector Name (print and sign): J. Rodgers, P. Ritchie, H. Connelly
Affiliation: Clemson University (864) 650-0210
Address: Dept Forestry and Natural Resources

Site Location

Parish: Vermilion
Latitude: 562232
Longitude: 3290316
Site Name: EWL
Site Description: EWL field
Water Body Description: canal
Estimated Maximum Water Depth: ____ (meters) / 7' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
9.27	13.61	7.47	3120	0.13	110	1.2	1237

Notes:

Sample Description

Species: callinectes sapidus
Total # of Individuals: 5

#C 12/16/10 12/16/10

Specimen Composite Code	Length ~~mm~~ cm	Width ~~mm~~ cm	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	7	16	201	12/13/10/1153	12/16/10/1237	catfish	M	one claw
C	7.5	17.5	289	12/13/10/1153	12/16/10/1237	catfish	M	
C	6.5	14.5	172	12/13/10/1153	12/16/10/1237	catfish	M	
C	6.5	15	182	12/13/10/1153	12/16/10/1237	catfish	M	
C	8	18	298	12/13/10/1153	12/16/10/1237	Catfish	M	

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: I-04

Sample Type ([✓ C] / F)
C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 12-20-10

Collection Method(s): crab trab

Collector Name (print and sign): P. Ritchie, H. Connelly

Affiliation: Clemson University (864) 650-0210

Address: Dept Forestry + Natural Resources

Site Location

Parish: Vermilion

Latitude: 560982

Longitude: 3288975

Site Name: EWL Field

Site Description: canal

Water Body Description: canal

Estimated Maximum Water Depth: ______ (meters) / 20' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
8.05	12.35	7.45	3965	0.14	45.9	1.0	1222

Notes: ______

Sample Description

Species: callinectes sapidus

Total # of Individuals: 7

HC 12/20/10 HC 12/20/10

Specimen Composite Code	Length cm ~~(mm)~~	Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	6	11,5	176	12/13/10/1223	12/20/10/1222	catfish	M	
C	6,5	13,5	148	12/13/10/1223	12/20/10/1222	catfish	M	one claw
C	7	16,5	281	12/13/10/1223	12/20/10/1222	catfish	M	
C	7,5	16	237	12/13/10/1223	12/20/10/1222	catfish	M	
C	7,5	17,5	239	12/13/10/1223	12/10/10/1222	catfish	M	
C	7,5	15,5	209	12/13/10/1223	12/20/10/1222	catfish	M	one claw
C	8	18	301	12/13/10/1223	12/20/10/1222	catfish	M	

Notes: ______

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 04
Project Initial Code: EWL
Sampling Date: 01-05-11
Collection Method(s): trawl
Collector Name (print and sign): J. Rodger
Affiliation: Clemson University (864) 650-0210
Address: Dept Forestry + Natural Resources

Sample Type (C / [✓ F])
C = crab F = forage fish

Site Location 1340

Parish: Vermilion

Latitude: ______

Longitude: ______

Site Name: ______

Site Description: ______

Water Body Description: ______

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	**Temp** C	**pH**	**Cond** µS/cm	**ORP** mV	**Turb** NTU	**Depth** feet	**Time**

Notes: lat, long, etc → see previous record forms

Sample Description

Species: SHAD

Total # of Individuals: ______

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
F					01/05/11/1340			

Notes: ______

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T-05
Sample Type ([✓ C] F)
C = crab F = forage fish
Project Initial Code: EWL
Sampling Date: 12-20-10
Collection Method(s): crab trap
Collector Name (print and sign): P. Ritchie, H. Connelly
Affiliation: Clemson University (864) 650-0210
Address: Dept Forestry + Natural Resources

Site Location

Parish: Vermilion
Latitude: 560869
Longitude: 3288990
Site Name: EWL Field
Site Description: canal
Water Body Description: canal
Estimated Maximum Water Depth: ______ (meters) / 20' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
9.48	12.11	7.46	3170	0.12	46.4	1.1	1208

Notes:

Sample Description

Species: callinectes sapidos
Total # of Individuals: 8

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	7.5	18.5	217	12/13/10/1222	12/20/10/1208	catfish	F	
C	7	16	211	12/13/10/1222	12/20/10/1208	catfish	M	
C	6.5	14.5	151	12/13/10/1222	12/20/10/1208	catfish	M	one claw
C	7	17	262	12/13/10/1222	12/20/10/1208	catfish	M	
C	7.5	17.5	251	12/13/10/1222	12/20/10/1208	catfish	M	one claw
C	8.5	20	362	12/13/10/1222	12/20/10/1208	catfish	M	
C	6	13.5	169	12/13/10/1222	12/20/10/1208	catfish	M	
C	5.5	13	127	12/13/10/1222	12/20/10/1208	catfish	M	

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 05

Sample Type ([✓ C] / F)
C = crab F = forage fish

Project Initial Code: EWL
Sampling Date: 12 - 21 - 10
Collection Method(s): net
Collector Name (print and sign): P. Ritchie, H. Connelly, J. Rodgers
Affiliation: Clemson University (864) 650 - 0210
Address: Dept Forestry + Natural Resources

Site Location

Parish: Vermilion
Latitude: 560869
Longitude: 328990
Site Name: EWL Field
Site Description: canal
Water Body Description: canal
Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP ~~m~~V	Turb NTU	Depth feet	Time
8.95	13.4	7.26	3512	0.07	46.5	1.3	1033

Notes: ______

Sample Description

Species: callinectes sapidus

Total # of Individuals: 3 + 5 + 1 = 9

HC 12/21/10 HC 12/21/10

Specimen Composite Code	Length (~~mm~~ cm)	Width (~~mm~~ cm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	6.5	15	174	12/16/10/1206	12/21/10/1033	catfish	M	
C	6.5	14	173	12/16/10/1206	12/21/10/1033	catfish	M	
C	7	15.5	188	12/16/10/1206	12/21/10/1033	catfish	M	
C	8	18	292	12/16/10/1206	12/21/10/1033	catfish	M	
C	7.5	17.5	227	12/16/10/1206	12/21/10/1033	catfish	F	
C	6.5	14.5	161	12/16/10/1206	12/21/10/1033	catfish	M	
C	6.5	15	177	12/16/10/1206	12/21/10/1033	catfish	M	
C	7	16.5	211	12/16/10/1206	12/21/10/1033	catfish	M	
C	7	16	222	12/16/10/1206	12/21/10/1033	catfish	M	

Notes: ______

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 05

Sample Type (C / [✓ F])

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 01-05-11

Collection Method(s): trawl

Collector Name (print and sign): J. Rodgers

Affiliation: Clemson Univ (864) 650-0210

Address: Dept Forestry and Natural Resources)

Site Location 1320

Parish: Vermilion

Latitude:

Longitude:

Site Name:

Site Description:

Water Body Description:

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

Notes: lat, long, etc → see previous record forms

Sample Description

Species: SHAD

Total # of Individuals: 1/4 of 5 gallon bucket

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
F					01/05/11/1320			

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 06
Sample Type ([✓ C] / F)
C = crab F = forage fish
Project Initial Code: EWL
Sampling Date: 12-16-10
Collection Method(s): Crab trap
Collector Name (print and sign): J. Rodgers, P. Ritchie, H. Connelly
Affiliation: Clemson University (864) 650-0210
Address: Dept of Forestry and Natural Resources

Site Location

Parish:

Latitude: 560781
Longitude: 328964
Site Name: EWL
Site Description: EWL field
Water Body Description: canal
Estimated Maximum Water Depth: ______ (meters) / 7' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP ~~m~~V	Turb NTU	Depth feet	Time
9.32	13.79	7.25	3145	0.26	65.6	1.0	1215

Notes:

Sample Description

Species: Callinectes Sapidus
Total # of Individuals: 8

HC 12/16/10 HC 12/16/10

Specimen Composite Code	Length cm (~~mm~~)	Width cm (~~mm~~)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	7	16	214	12/13/10/1222	12/16/10/1215	catfish	M	
C	6.5	16	199	12/13/10/1222	12/16/10/1215	catfish	M	
C	7	15.5	184	12/13/10/1222	12/16/10/1215	catfish	F	
C	6.5	14.5	139	12/13/10/1222	12/16/10/1215	catfish	M	one claw
C	7	17.5	221	12/13/10/1222	12/16/10/1215	catfish	M	one claw
C	6.5	16	193	12/13/10/1222	12/16/10/1215	catfish	M	
C	7	16.5	233	12/13/10/1222	12/16/10/1215	catfish	M	one claw
C	6.5	14	198	12/13/10/1222	12/13/10/1215	catfish	M	

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: I - 06

Project Initial Code: EWL

Sampling Date: 12-20-10

Collection Method(s): Crab trap

Collector Name (print and sign): P. Ritchie, H. Connelly

Affiliation: Clemson University (864) 650-0210

Address: Dept Forestry + Natural Resources

Sample Type ([✓ C] F)
C = crab F = forage fish

Site Location

Parish: Vermilion

Latitude: 560781

Longitude: 3288964

Site Name: EWL field

Site Description: canal

Water Body Description: canal

Estimated Maximum Water Depth: ______ (meters) / 20' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
9.83	12.57	7.48	3185	0.13	48.2	1.17	1204

Notes:

Sample Description

Species: callinectes sapidus

Total # of Individuals: 10

HC 12/20/10 HC/12/20/10

Specimen Composite Code	Length cm ~~(mm)~~	Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	6.5	14.5	178	12/13/10/1220	12/20/10/1204	catfish	M	
C	7	17	192	12/13/10/1220	12/20/10/1204	catfish	M	one claw
C	8	16.5	298	12/13/10/1220	12/20/10/1204	catfish	M	
C	7	15.5	172	12/13/10/1220	12/20/10/1204	catfish	M	one claw
C	7	16.5	215	12/13/10/1220	12/20/10/1204	catfish	M	
C	8	19.5	309	12/13/10/1220	12/20/10/1204	catfish	M	
C	6.5	14.5	174	12/13/10/1220	12/20/10/1204	catfish	M	
C	6	14	167	12/13/10/1220	12/20/10/1204	catfish	M	
C	6	15	154	12/13/10/1220	12/20/10/1204	catfish	M	
C	6.5	16.5	231	12/13/10/1220	12/20/10/1204	catfish	M	

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 06
Project Initial Code: EWL
Sampling Date: 01-05-11
Collection Method(s): trawl
Collector Name (print and sign): J. Rodgers
Affiliation: Clemson Univ. (864) 650 0210
Address: Dept Forestry and Natural Resources

Sample Type (C / [✓ F])
C = crab F = forage fish

Site Location 1350

Parish: Vermilion

Latitude:
Longitude:
Site Name:
Site Description:
Water Body Description:
Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	**Temp** C	**pH**	**Cond** µS/cm	**ORP** mV	**Turb** NTU	**Depth** feet	**Time**

Notes: for lat, long, etc → see previous record forms

Sample Description

Species: SHAD

Total # of Individuals: 1/4 of 5 gallon bucket

Specimen Composite Code	**Length (mm)**	**Width (mm)**	**Weight (grams)**	**Date/Time Trap Set**	**Date/Time Trap Pulled**	**Type of Bait**	**Sex**	**Additional Comments**
F					01/05/11/1350			

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: I-7 ~~2~~ HC 12/21/10

Sample Type ([✓ C] / F)

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 12-21-10

Collection Method(s): Crab trap

Collector Name (print and sign): P. Ritchie, H. Connelly, J. Rodgers

Affiliation: Clemson University (864) 650-0210

Address: Dept Forestry + Natural Resources

Site Location

Parish: Vermilion

Latitude: ~~557004~~ 561198 HC 12/21/10

Longitude: ~~3288783~~ 3289709 HC 12/21/10

Site Name: EWL Field

Site Description: canal

Water Body Description: canal

Estimated Maximum Water Depth: ______ (meters) / 20' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
9,12	12,97	6.91	2856	0.22	88,1	1.1	1018

Notes:

Sample Description

Species: Callinectes sapidus

Total # of Individuals: 5

HC 12/21/10 HC 12/21/10

Specimen Composite Code	Length ~~(mm)~~ cm	Width ~~(mm)~~ cm	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	7	15	191	12/13/10/1201	12/21/10/1018	catfish	M	
C	7	16	171	12/13/10/1201	12/21/10/1018	catfish	F	
C	7	15,5	197	12/13/10/1201	12/21/10/1018	catfish	M	
C	8	18	275	12/13/10/1201	12/21/10/1018	catfish	M	
C	7.5	17.5	240	12/13/10/1201	12/21/10/1018	catfish	M	

Notes:

VHR
PWR

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: ___ - T07
Sample Type (C / F)
[✓ C] = crab F = forage fish
Project Initial Code: EWL
Sampling Date: 01-03-11
Collection Method(s): trap
Collector Name (print and sign): John Rodgers John H. Rodgers Jr
Affiliation: Clemson University (864) 650-0210
Address: Dept. of Forestry and Natural Resources

Site Location T-07 1105
Parish: Vermilion
Latitude: ____
Longitude: ____
Site Name: ____
Site Description: ____
Water Body Description: ____
Estimated Maximum Water Depth: ____ (meters) / ____ (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

Notes: for lat, long, site name → see previous field record forms

Sample Description

Species: *Callinectes sapidus*
Total # of Individuals: 9

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	19	8	297	12/29/10/0900	01/03/11/1105	catfish	M	
C	15	6.5	166	|	|	|	M	
C	17.5	8	268	|	|	|	M	
C	16.5	7	226	|	|	|	M	
C	14	6	132	|	|	|	M	
C	16	7	210	|	|	|	M	
C	14.5	6	156	|	|	|	M	
C	16	7	246	|	|	|	M	
C	16	7.5	167	↓	↓	↓	F	

Notes: ____

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 07

Sample Type (C / [✓ F])

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: ~~01-04-11~~ 01-05-11

Collection Method(s): trawl HC 1/6/11

Collector Name (print and sign): J. Rodgers, H. Connelly, ~~P. Ritchie~~ HC 1/5/11

Affiliation: Clemson Univ (864) 650-0210

Address: Dept Forestry and Natural Resources

Site Location 1510

Parish: Vermilion

Latitude:

Longitude:

Site Name:

Site Description:

Water Body Description:

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

Notes: lat, long, site name, etc → see previous field record forms

Sample Description

Species: SHAD

Total # of Individuals: 1/3 of 5 gallon bucket

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
F					~~01/04/11~~	HC 1/5/11		
					01/05/11/1510			

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 08
Project Initial Code: EWL
Sampling Date: 12-20-10
Collection Method(s): crab trap
Collector Name (print and sign): P. Ritchie, H. Connelly
Affiliation: Clemson University (864) 650-0210
Address: Dept Forestry + Natural Resources

Sample Type ([✓ C] / F)
C = crab F = forage fish

Site Location

Parish: Vermilion

Latitude: 561166
Longitude: 3289623
Site Name: EWL Field
Site Description: Canal
Water Body Description: canal
Estimated Maximum Water Depth: ______ (meters) / 20' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
9.72	11.81	7.53	2768	0.15	95.2	1.5	1147

Notes:

Sample Description

Species: callinectes sapidus
Total # of Individuals: 5

HC 12/20/10 HC 12/20/10

Specimen Composite Code	Length cm ~~(mm)~~	Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	7	17.5	264	12/13/10/1159	12/20/10/1147	catfish	M	
C	7.5	17	287	12/13/10/1159	12/20/10/1147	catfish	M	
C	7	16	224	12/13/10/1159	12/20/10/1147	catfish	M	
C	7	16.5	214	12/13/10/1159	12/20/10/1147	catfish	F	
C	6.5	16	171	12/13/10/1159	12/20/10/1147	catfish	F	

Notes:

JHR
PR

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: ____-T08
Sample Type ([✓ C] F)
C = crab F = forage fish
Project Initial Code: EWL
Sampling Date: 01-03-11
Collection Method(s): trap
Collector Name (print and sign): John Rodgers John H Rodgers Jr
Affiliation: Clemson University (864) 650-0210
Address: Dept. of Forestry and Natural Resources

Site Location 1105
Parish: Vermilion

Latitude: ______
Longitude: ______
Site Name: ______
Site Description: ______
Water Body Description: ______
Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

Notes: lat, long, site name, etc → see previous record forms

Sample Description

Species: *Callinectes sapidus*
Total # of Individuals: 8

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	16	7.5	208	12/21/10/0900	01/03/11/1105	catfish	M	
C	18	8	256	↓	↓	↓	M	
C	18.5	8	352				M	
C	15	7.5	254				M	
C	19	8	351				M	
C	15.5	6.5	196				M	
C	17.5	7	240				M	
C	18	7.5	296				M	
HC 1/3/11 ~~C~~								
~~C~~								
~~C~~								

Notes: ______

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 08

Sample Type (C / [✓ F])

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: ~~01-04-11~~ 01-05-11

Collection Method(s): trawl HC 1/5/11

Collector Name (print and sign): J. Rodgers, H. Connelly, ~~F. Ritchie~~ HC 1/5/11

Affiliation: Clemson Univ (864) 650-0210

Address: Dept Forestry and Natural Resources

Site Location 1505

Parish: Vermilion

Latitude:

Longitude:

Site Name:

Site Description:

Water Body Description:

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

Notes: lat, long, site name → see previous field record forms

Sample Description

Species: SHAD

Total # of Individuals: Many individuals 1/3 of 5 gallon bucket

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
					~~01/04/11~~ HC	1/5/11		
F					01/05/11/1505			

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T-09

Sample Type ([✓ C] / F)

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 12-16-10

Collection Method(s): crab trap

Collector Name (print and sign): J. Rodgers, P. Ritchie, H. Connelly

Affiliation: Clemson University (864) 650 0210

Address: Dept of Forestry and Natural Resources

Site Location

Parish: Vermilion

Latitude: 561314

Longitude: 3289624

Site Name: EWL

Site Description: EWL field

Water Body Description: canal

Estimated Maximum Water Depth: ______ (meters) / 7' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
12.29	12.73	6.82	2673	0.2	233	1.5'	1143

Notes:

Sample Description

Species: callinectes sapidus

Total # of Individuals: 5

HC 12/16/10 HC 12/16/10

Specimen Composite Code	Length cm ~~(mm)~~	Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	7	16	227	12/13/10/1159	12/16/10/1143	catfish	M	
C	7	16	138	12/13/10/1159	12/16/10/1143	catfish	M	no claws
C	7	17	223	12/13/10/1159	12/16/10/1143	catfish	M	
C	6	14.5	127	12/13/10/1159	12/16/10/1143	catfish	M	one claw
C	7	17.5	203	12/13/10/1159	12/16/10/1143	catfish	F	one claw

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 09

Sample Type (C / [✓ F])

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 01-05-11

Collection Method(s): trawl

Collector Name (print and sign): J. Rodgers, H. Connelly

Affiliation: Clemson University 864) 650.0210

Address: Dept Forestry and Natural Resources

Site Location 1455

Parish: Vermilion

Latitude:

Longitude:

Site Name:

Site Description:

Water Body Description:

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg L	**Temp** C	**pH**	**Cond** µS/cm	**ORP** mV	**Turb** NTU	**Depth** feet	**Time**

Notes: lat, long, etc → see previous record forms

Sample Description

Species: SHAD

Total # of Individuals: 1/2 5 gallon bucket

Specimen Composite Code	**Length (mm)**	**Width (mm)**	**Weight (grams)**	**Date/Time Trap Set**	**Date/Time Trap Pulled**	**Type of Bait**	**Sex**	**Additional Comments**
F					01/05/11/1455			

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: I - 10

Sample Type ([✓ C] / F)

[✓ C = crab] F = forage fish

Project Initial Code: EWL

Sampling Date: 12-20-10

Collection Method(s): Crab trap

Collector Name (print and sign): P. Ritchie H. Connelly

Affiliation: Clemson University, (864) 650-0210

Address: Dept Forestry + Natural Resources

Site Location

Parish: Vermilion

Latitude: 560451

Longitude: 3288906

Site Name: EWL Field

Site Description: canal

Water Body Description: canal

Estimated Maximum Water Depth: ______ (meters) / 20' (feet)

RDO mg/L	**Temp** C	**pH**	**Cond** µS/cm	**ORP** ~~m~~V	**Turb** NTU	**Depth** feet	**Time**
9.30	12.34	7.44	3200	0.18	48.5	1.3	1157

Notes:

Sample Description

Species: callinectes sapidus

Total # of Individuals: 5

HC 12/20/10 H 12/20/10

Specimen Composite Code	**Length** (mm) cm	**Width** ~~(mm)~~ cm	**Weight** (grams)	**Date/Time Trap Set**	**Date/Time Trap Pulled**	**Type of Bait**	**Sex**	**Additional Comments**
C	7.5	18	286	12/13/10/1216	12/20/10/1157	catfish	M	
C	7	16.5	234	12/13/10/1216	12/20/10/1157	catfish	M	
C	6.5	13.5	161	12/13/10/1216	12/20/10/1157	catfish	M	
C	7.5	17.5	284	12/13/10/1216	12/20/10/1157	catfish	M	
C	6	15.5	155	12/13/10/1216	12/20/10/1157	catfish	M	one claw

Notes:

JFIK
PR

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: _____ - T-10

Sample Type ([✓ C] F)

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 01-03-11

Collection Method(s): trap

Collector Name (print and sign): John Rodgers John H Rodgers Jr.

Affiliation: Clemson University (___)___-____

Address: Dept. of Forestry and Natural Resources

Site Location 1123

Parish: Vermilion

Latitude: ____________

Longitude: ____________

Site Name: T-10

Site Description: T-10 EWL

Water Body Description: ____________

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

Notes: lat, long, site name, etc → see previous field record form

Sample Description

Species: Callinectes sapidus

Total # of Individuals: 12

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	18.5	8	293	12/29/10/0900	01/03/11/1123 1100	catfish	M	
C	14.5	7	195				M	
C	15	6	157				M	
C	14.5	7	220				M	
C	16	7	224				M	
C	16	7	196				M	
C	15	6.5	192				M	
C	17	8	289				M	
C	16	6.5	205				M	
C	14.5	6.5	187				M	
C	17.5	7	207				M	
C	15	6	125	↓	↓	↓	F	

Notes: ____________

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 10

Sample Type (C / [✓ F])

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 01 - 05 - 11

Collection Method(s): trawl

Collector Name (print and sign): J. Rodgers

Affiliation: Clemson Univ (864) 650-0210

Address: Dept Forestry and Natural Resources

Site Location 1355

Parish: Vermilion

Latitude: ______________

Longitude: ______________

Site Name: ______________

Site Description: ______________

Water Body Description: ______________

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	**Temp** C	**pH**	**Cond** µS/cm	**ORP** mV	**Turb** NTU	**Depth** feet	**Time**

Notes: lat, long, etc → see previous record forms

Sample Description

Species: SHAD

Total # of Individuals: 1/2 5 gallon bucket

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
F					01/05/11/1355			

Notes: ______________

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T-11

Sample Type ([✓ C] / F)

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 12-21-10

Collection Method(s): crab trap

Collector Name (print and sign): P. Ritchie, H. Connelly, J. Rodgers

Affiliation: Clemson University (864) 650-0210

Address: Dept Forestry + Natural Resources

Site Location

Parish: Vermilion

Latitude:

Longitude:

Site Name: EWL Field

Site Description: canal

Water Body Description: canal

Estimated Maximum Water Depth: ______ (meters) / 20' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
8.64	13.49	7.41	3358	0.02	59	1.3	1053

Notes:

Sample Description

Species: callinectes sapidus

Total # of Individuals: 8

HC 12/21/10 HC 12/21/10

Specimen Composite Code	Length ~~(mm)~~ cm	Width ~~(mm)~~ cm	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	7	15.5	169	12/13/10/1238	12/21/10/1053	catfish	M	
C	7	16.5	201	12/13/10/1238	12/21/10/1053	catfish	M	one claw
C	6.5	14	167	12/13/10/1238	12/21/10/1053	catfish	M	
C	7	17	220	12/13/10/1238	12/21/10/1053	catfish	M	
C	8	18	304	12/13/10/1238	12/21/10/1053	catfish	M	
C	7.5	18	266	12/13/10/1238	12/21/10/1053	catfish	M	
C	7.5	17.5	269	12/13/10/1238	12/21/10/1053	catfish	M	
C	7	16	228	12/13/10/1238	12/21/10/1053	catfish	M	one claw

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 11

Sample Type (C / [✓ F])

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 01-05-11

Collection Method(s): trawl

Collector Name (print and sign): J. Rodgers

Affiliation: Clemson Univ (864) 650-0210

Address: Dept Forestry and Natural Resources

Site Location 1405

Parish: Vermilion

Latitude:

Longitude:

Site Name:

Site Description:

Water Body Description:

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

Notes: lat, long, etc → see previous record sheets

Sample Description

Species: SHAD

Total # of Individuals: 1/4 of 5 gallon bucket

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
F					01/05/11/1405			

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 12

Sample Type ([✓ C] / F)

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 12-20-10

Collection Method(s): crab trap

Collector Name (print and sign): P, Ritchie, H. Connelly

Affiliation: Clemson University (864) 650-0210

Address: Dept Forestry + Natural Resources

Site Location

Parish: Vermilion

Latitude: 56135

Longitude: 3289789

Site Name: EWL Field

Site Description: canal

Water Body Description: canal

Estimated Maximum Water Depth: ______ (meters) / 20' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
9.29	11.77	7.72	2755	0.18	92.3	0.89	1128

Notes:

Sample Description

Species: callinectes sapidus

Total # of Individuals: 3

Specimen Composite Code	HC 12/20/10 Length cm ~~(mm)~~	HC 12/20/10 Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	6,5	15	178	12/13/10/1158	12/20/10/1128	catfish	M	
C	6	14,5	135	12/13/10/1158	12/20/10	catfish	F	
C	7	16	231	12/13/10/1158	12/20/10	catfish	M	

Notes:

JHR
PR

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: ____-T-12

Sample Type ([✓ C] / F)

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 01-03-11

Collection Method(s): trap

Collector Name (print and sign): John Rodgers John H Rodgers Jr.

Affiliation: Clemson University (864) 650-0210

Address: Dept of Forestry and Natural Resources

Site Location 1100

Parish: Vermilion

Latitude: ____________ Longitude: ____________

Site Name: ____________

Site Description: ____________

Water Body Description: ____________

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

Notes: for lat, long, site name, etc. → see previous record forms

Sample Description

Species: Callinectes sapidus

Total # of Individuals: 11

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	19	8	357	12/29/10/0900	01/03/11/1100	catfish	M	
C	16.5	7	249				M	
C	15	6.5	202				M	
C	15.5	7	178				M	
C	14.5	6.5	182				M	
C	14.5	6	130				M	
C	16	7	214				M	
C	15	6	131				M	
C	15	7	198				M	
C	14	6	154				M	
C	14.5	6	124	↓	↓	↓	F	

Notes: ____________

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 12

Sample Type (C / [✓ F])

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 01-05-11

Collection Method(s): trawl

Collector Name (print and sign): J, Rodgers

Affiliation: Clemson University (864) 650-0210

Address: Dept Forestry + Natural Resources

Site Location 1445

Parish: Vermilion

Latitude: ______

Longitude: ______

Site Name: ______

Site Description: ______

Water Body Description: ______

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	**Temp** C	**pH**	**Cond** µS/cm	**ORP** mV	**Turb** NTU	**Depth** feet	**Time**

Notes: lat, long, etc → see previous record forms

Sample Description

Species: SHAD

Total # of Individuals: 1/4 of 5 gallon bucket

Specimen Composite Code	**Length (mm)**	**Width (mm)**	**Weight (grams)**	**Date/Time Trap Set**	**Date/Time Trap Pulled**	**Type of Bait**	**Sex**	**Additional Comments**
F					01/05/11/1445			

Notes: ______

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: EWL - Bait

BAIT

Sample Type (C / F)

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 12 - 14 - 10

Collection Method(s): Bait for Crab Traps

Collector Name (print and sign): John Rodgers John H Rodgers Jr.

Affiliation: Clemson University (864) 650 - 0210

Address: Dept. of Forestry and Natural Resources

Site Location

Parish:

Latitude:

Longitude:

Site Name:

Site Description:

Water Body Description:

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	**Temp** C	**pH**	**Cond** µS/cm	**ORP** mV	**Turb** NTU	**Depth** feet	**Time**

Notes:

Sample Description

Species: Catfish Bait

Total # of Individuals:

Specimen Composite Code	**Length (mm)**	**Width (mm)**	**Weight (grams)**	**Date/Time Trap Set**	**Date/Time Trap Pulled**	**Type of Bait**	**Sex**	**Additional Comments**
EWL-Bait								

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T R - 0 1

Sample Type ([✓ C] F)

C = crab F = forage fish

Project Initial Code: E W L

Sampling Date: 12 - 15 - 10

Collection Method(s): crab trap

Collector Name (print and sign): J. Rodgers, P. Ritchie H. Connelly

Affiliation: Clemson University (864) 650-02100

Address: Dept. of Forestry and Natural Resources

Site Location

Parish: Vermilion

Latitude: 569363

Longitude: 3291889

Site Name: Schooner Bayou

Site Description: Bayou

Water Body Description: Bayou

Estimated Maximum Water Depth: ______ (meters) / 20' (feet)

RDO mg/L	**Temp** C	**pH**	**Cond** µS/cm	**ORP** mV	**Turb** NTU	**Depth** feet HC 12/15/10	**Time**
11.56	9.84	6.76	2523	0.21	52	1.4E	1126

Notes: ______

Sample Description

Species: callinectes sapidus

Total # of Individuals: ~~3~~ 2 + 9 = ⑪ HC 12/15/10

Specimen Composite Code	HC 12/15/10 **Length** cm ~~(mm)~~	HC 12/15/10 **Width** cm ~~(mm)~~	**Weight** (grams)	**Date/Time Trap Set**	**Date/Time Trap Pulled**	**Type of Bait**	**Sex**	**Additional Comments**
C	7	17	258	12/10/10/1700	12/15/10/1126	catfish	M	
C	7.5	16	243	12/10/10/1700	12/15/10/1126	catfish	M	
C	7	14.5	162	12/10/10/1700	12/15/10/1126	catfish	M	one claw
C	6	13.5	125	12/10/10/1700	12/15/10/1126	catfish	M	
C	7.5	17.5	209	12/10/10/1700	12/15/10/1126	catfish	F	
C	7.5	17	267	12/10/10/1700	12/15/10/1126	catfish	M	
C	7.5	17	213	12/10/10/1700	12/15/10/1126	catfish	M	one claw
C	7.5	17	211	12/10/10/1700	12/15/10/1126	catfish	M	
C	6.5	16	202	12/10/10/1700	12/15/10/1126	catfish	M	
C	5.5	13	101	12/10/10/1700	12/15/10/1126	catfish	M	
C	8	17	283	12/10/10/1700	12/15/10/1126	catfish	M	

Notes: ______

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: TR-01

Sample Type (C / [✓ F])
C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 12-15-10

Collection Method(s): hoop net

Collector Name (print and sign): J. Rodgers, P. Ritchie, H. Connelly

Affiliation: Clemson University (864) 650-0210

Address: Dept of Forestry and Natural Resources

Site Location

Parish: Vermilion

Latitude: 569363

Longitude: 3291889

Site Name: Schooner Bayou

Site Description: Bayou

Water Body Description: BayoU

Estimated Maximum Water Depth: ______ (meters) / 20' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
11.56	9.84	6.76	2523	0.21	52	1.4	1126

Notes:

Sample Description

HC 12/15/10

Species: lepomis mac~~h~~rochirus

Total # of Individuals: 2+2

HC 12/15/10 HC 12/15/10

Specimen Composite Code	Length cm (~~mm~~)	Width cm (~~mm~~)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
F	14	7	55	12/10/10/1700	12/15/10/1126	pogie		bream
F	14.5	5.5	63	12/10/10/1700	12/15/10/1126	pogie		
F	13	5	41	12/10/10/1700	12/15/10/1126	pogie		
F	12.5	5	45	12/10/10/1700	12/15/10/1126	pogie		

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: TR - 02
Project Initial Code: EWL
Sampling Date: 12-20-10
Collection Method(s): crab trap
Collector Name (print and sign): P. Ritchie, H. Connelly
Affiliation: Clemson University (864)650-0210
Address: Dept Forestry + Natural Resources

Sample Type ([✓ C] F)
C = crab F = forage fish

Site Location

Parish: Vermilion

Latitude: 567210
Longitude: 329 1154
Site Name: Schooner Bayou
Site Description: Bayou
Water Body Description: Bayou
Estimated Maximum Water Depth: ______ (meters) / 20 (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
7.25	10.74	7.02	5239	0.19	18.2	1.9	1120

Notes: ______

Sample Description

Species: callinectes Sapidus
Total # of Individuals: 5

LV 12/20/10 HC 12/20/10

Specimen Composite Code	Length ~~(mm)~~ cm	Width ~~(mm)~~ cm	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	6	14	146	12/13/10/1317	12/20/10/1120	catfish	M	
C	6.5	14.5	172	12/13/10/1317	12/20/10/1120	catfish	M	
C	6	14.5	160	12/13/10/1317	12/20/10/1120	catfish	M	
C	7	16.5	217	12/13/10/1317	12/20/10/1120	catfish	M	one claw
C	6.5	15.5	204	12/13/10/1317	12/20/10/1120	catfish	M	

Notes: ______

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: TR - 02

Sample Type (C / [✓ F])

C – crab F – forage fish

Project Initial Code: EWL

Sampling Date: 12-21-10

Collection Method(s): cast net

Collector Name (print and sign): J. Rodgers

Affiliation: Clemson University (864) 650 0210

Address: Dept Forestry and Natural Resources

Site Location

Parish: Vermilion

Latitude: 567210

Longitude: 3291154

Site Name: Schooner Bayou

Site Description: Bayou

Water Body Description: Bayou

Estimated Maximum Water Depth: ______ (meters) / 8' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
	See		lab	book			

Notes:

Sample Description

Species: SHAD

Total # of Individuals: 22

Specimen Composite Code	HC 12/21/10 Length cm ~~(mm)~~	HC 12/21/10 Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
F	3	10	14	12/21/10/1315	12/21/10/1315	none		SHAD
F	3	9.5	8					
F	2.5	7.5	11					
F	2.5	8	7					
F	3	10	11					
F	2.5	7.5	5					
F	3	10	11					
F	2.5	9	7					
F	2.5	9	6					
F	2.5	9	7					
F	2	7.5	4					
F	2.5	10.5	11					

Notes:

AHR
PR

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: ___ - TR-02
Sample Type ([✓ C] F)
C = crab F = forage fish
Project Initial Code: EWL
Sampling Date: 01-03-11
Collection Method(s): trap
Collector Name (print and sign): John Rodgers John H Rodgers Jr.
Affiliation: Clemson Univ. (864) 650-0210
Address: Dept. of Forestry and Natural Resources

Site Location 1016
Parish: Vermilion

Latitude: ____________
Longitude: ____________
Site Name: ____________
Site Description: ____________
Water Body Description: ____________
Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

Notes: lat, long, site name, etc → see previous field record forms

Sample Description

Species: *Callinectes sapidus*
Total # of Individuals: 10

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	13.5	6	143	12/29/10/0900	01/03/11/1016	catfish	M	
C	15	6	128				F	
C	17	9.5	186				F	
C	13	5.5	116				M	
C	18	7.5	201				F	
C	15	6.5	174				M	
C	18.5	7.5	256				M	
C	14	6	146				M	
C	15	6	139				F	
C	12.5	5.5	139	↓	↓	↓	M	

Notes: ____________

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: TR - 03A

Sample Type ([✓ C] / F)

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 12-14-10

Collection Method(s): crab traps

Collector Name (print and sign): J. Rodgers, P. Ritchie, H. Connelly

Affiliation: Clemson University (864) 650-0210

Address: Dept. of Forestry and Natural Resources

Site Location

Parish: Vermillion

Latitude: 563786

Longitude: 3290526

Site Name: Schooner Bayou

Site Description: Bayou

Water Body Description: Bayou

Estimated Maximum Water Depth: ______ (meters) / 20 (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP ~~m~~V	Turb NTU	Depth feet	Time
11.03	8.84	7.49	2303	0.19	134	1'	1507

Notes:

Sample Description

Species: callinectes sapidus

Total # of Individuals: 12

HC 12/14/10 HC 12/14/10

Specimen Composite Code	Length cm ~~(mm)~~	Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	8	17	298	12/10/10/1300	12/14/10 1507	catfish	M	
C	6	14.5	141	12/10/10/1300	12/14/10/1507	catfish	M	
C	6	15.5	146	12/10/10/1300	12/14/10/1507	catfish	F	
C	7	17 12/14/10	181	12/10/10/1300	12/14/10/1507	catfish	F	
C	5.5	14 HC	152	12/10/10/1300	12/14/10/1507	catfish	M	
C	7	16	209	12/10/10/1300	12/14/10/1507	catfish	M	
C	7	19	191	12/10/10/1300	12/14/10/1507	catfish	F	
C	6.5	16	201	12/10/10/1300	12/14/10/1507	catfish	M	
C	6	14.5	149	12/10/10/1300	12/14/10/1507	catfish	M	
C	6	14.5	132	12/10/10/1300	12/14/10/1507	catfish	F	
C	7	16.5	167	12/10/10/1300	12/14/10/1507	catfish	F	
C	8	18	259	12/10/10/1300	12/14/10/1507	catfish	HC ~~M~~ F 12/14/10	

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: TB-03
Sample Type ([✓ C] / F)
C = crab F = forage fish
Project Initial Code: EWL
Sampling Date: 12-20-10
Collection Method(s): crab traps
Collector Name (print and sign): P. Ritchie, H. Connelly
Affiliation: Clemson University (864) 650-0210
Address: Dept Forestry + Natural Resources

Site Location

Parish: Vermilion
Latitude: 564930
Longitude: 3290761
Site Name: Schooner Bayou
Site Description: Bayou
Water Body Description: Bayou
Estimated Maximum Water Depth: ____ (meters) / 20' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
11.72	11.66	6.99	2944	0.22	52.1	1.0	1107

Notes:

Sample Description

Species: callinectes sapidus
Total # of Individuals: 7

HC 12/20/10 HC 12/20/10

Specimen Composite Code	Length cm (~~mm~~)	Width cm (~~mm~~)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	6	14.5	135	12/13/10/1308	12/20/10/1107	catfish	M	
C	6	15.5	108	12/13/10/1308	12/20/10/1107	catfish	F	one claw
C	6.5	15	162	12/13/10/1308	12/20/10/1107	catfish	M	one claw
C	6	13.5	124	12/13/10/1308	12/20/10/1107	catfish	F	
C	6	14.5	121	12/13/10/1308	12/20/10/1107	catfish	F	
C	6.5	17	194	12/13/10/1308	12/20/10/1107	catfish	F	
C	8.5	20	383	12/13/10/1308	12/20/10/1107	catfish	M	

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: TR-03
Sample Type (C [✓ F])
C = crab F = forage fish
Project Initial Code: EWL
Sampling Date: 12-21-10
Collection Method(s): cast net
Collector Name (print and sign): J. Rodgers
Affiliation: Clemson University (864) 650-0210
Address: Dept Forestry + Natural Resources

Site Location

Parish: Vermilion
Latitude: 564930
Longitude: 3290761
Site Name: Schooner Bayou
Site Description: bayou
Water Body Description: bayou
Estimated Maximum Water Depth: ______ (meters) / 8' (feet)

RDO mg/l	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
		See lab book					

Notes:

Sample Description

Species: SHAD
Total # of Individuals: 30

HG 12/21/10 HG 12/21/10

Specimen Composite Code	Length cm ~~(mm)~~	Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
F	2.5	8	11	12/21/10/1400	12/21/10/1400	none		
F	2.5	8	7	12/21/10/1400	12/21/10/1400	↓		
F	2	8.5	8	↓	↓			
F	2.5	8.5	7					
F	3	11	12					
F	2.5	9.5	8					
F	2	9.5	7.					
F	2.5	9	8.					
F	3	11	14					
F	2.5	10	9					
F	3	11	13					
F	2.5	10	10					

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: ___ - TR03

Sample Type ([✓ C] / F)

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 01-03-11

Collection Method(s): trap

Collector Name (print and sign): John Rodgers John H. Rodgers, Jr.

Affiliation: Clemson University (864) 650-0210

Address: Dept. of Forestry and Natural Resources

Site Location 1036

Parish: ______

Latitude: ______

Longitude: ______

Site Name: ______

Site Description: ______

Water Body Description: ______

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	**Temp** C	**pH**	**Cond** µS/cm	**ORP** mV	**Turb** NTU	**Depth** feet	**Time**

Notes: for lat, long, site name, etc → see previous field record forms

Sample Description

Species: *Callinectes sapidus*

Total # of Individuals: 7

Specimen Composite Code	**Length (mm)**	**Width (mm)**	**Weight (grams)**	**Date/Time Trap Set**	**Date/Time Trap Pulled**	**Type of Bait**	**Sex**	**Additional Comments**
C	17.5	7.5	138	12/29/10/0900	01/03/11/1036	catfish	M	
C	15	7.5	318	↓	↓	↓	M	
C	13	5.5	107	↓	↓	↓	F	
C	14.5	6	135	↓	↓	↓	F	
C	18	7.5	229	↓	↓	↓	F	
C	13	6	118	↓	↓	↓	M	
C	15	6	127	↓	↓	↓	M	

Notes: ______

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: TR-04A
Project Initial Code: EWL
Sampling Date: 12-21-10
Collection Method(s): cast net
Collector Name (print and sign): J. Rodgers
Affiliation: Clemson University (864) 650-0210
Address: Dept Forestry + Natural Resources

Sample Type (C [✓ F])
C = crab F = forage fish

Site Location

Parish: Vermilion

Latitude: 562232
Longitude: 3290316
Site Name: Schooner Bayou
Site Description: Bayou
Water Body Description: Bayou
Estimated Maximum Water Depth: ____ (meters) / 8' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
		See		lab		book	

Notes:

Sample Description

Species: lepomis macrochirus
Total # of Individuals:

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
F	11,5	4,5	35	12/21/10/1420	12/21/10/1420	none		bluegill
F	15	7	76	12/21/10/1420	12/21/10/1420	none		bluegill

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: TR-04
Sample Type ([✓ C] / F)
C = crab F = forage fish
Project Initial Code: EWL
Sampling Date: 12-14-10
Collection Method(s): crab trap
Collector Name (print and sign): J. Rodgers, P. Ritchie, H. Connelly
Affiliation: Clemson University (864) 650-0218
Address: Dept. of Forestry and Natural Resources

Site Location

Parish: Vermillion
Latitude: 560982
Longitude: 3288975
Site Name: ~~Wh JHR~~ 12/14/10 Schooner Bayou
Site Description: Bayou
Water Body Description: Bayou
Estimated Maximum Water Depth: ______ (meters) / 20 (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
10.97	9.89	7.45	2361	0.19	154	1.4	1450

Notes: ______

Sample Description

Species: callinectes sapidus
Total # of Individuals: 8

HC 12/14/10 - HC 12/14/10

Specimen Composite Code	Length cm ~~(mm)~~	Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	6	16	167	12/10/10/1200	12/14/10/1332	catfish	M	
C	8	20	305	12/10/10/1200	12/14/10/1332	catfish	M	
C	5.5	14	122	12/10/10/1200	12/14/10/1332	catfish	M	
C	6	13	98 ~~116~~ HC	12/10/10/1200	12/14/10/1332	catfish	F	
C	5.5	13.5	116	12/10/10/1200	12/14/10/1332	catfish	M	
C	6	12.5	127	12/10/10/1200	12/14/10/1332	catfish	M	
C	5.5	13.5	118	12/10/10/1200	12/14/10/1332	catfish	M	
C	6	15	161	12/10/10/1200	12/14/10/1332	catfish	M	
			~~98~~ HC 12/14/10					

Notes: ______

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: TR - 04

Sample Type (C / [✓ F])

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 12 - 21 - 10

Collection Method(s): cast net

Collector Name (print and sign): J. Rodgers

Affiliation: clemson University (864) 650-0210

Address: Dept Forestry + Natural Resources

Site Location

Parish: Vermilion

Latitude: 562232

Longitude: 3290316

Site Name: Schooner Bayou

Site Description: Bayou

Water Body Description: Bayou

Estimated Maximum Water Depth: ____ (meters) / 8' (feet)

RDO mg/l	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

See lab book

Notes:

Sample Description

Species: SHAD

Total # of Individuals:

Specimen Composite Code	Length ~~(mm)~~ cm HC 12/21/10	Width ~~(mm)~~ cm HC 12/21/10	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
F	2	9	7	12/21/10/1420	12/21/10/1420	none		SHAD
F	2,5	9	12	12/21/10/1420	12/21/10/1420	none		
F	2,5	9	7	12/21/10/1420	12/21/10/1420	none		↓
F	2	8	7	12/21/10/1420	12/21/10/1420	none		
F	2	8	7	12/21/10/1420	12/21/10/1420	none		
F	2	8	6	12/21/10/1420	12/21/10/1420	none		
F	2	8	4	12/21/10/1420	12/21/10/1420	none		
F	2,5	9	5	12/21/10/1420	12/21/10/1420	none		
F	2,5	9	7	12/21/10/1420	12/21/10/1420	none		
F	2,5	9	6	12/21/10/1420	12/21/10/1420	none		
F	2	8.5	4	12/21/10/1420	12/21/10/1420	none		
F	2	8	5	12/21/10/1420	12/21/10/1420	none		

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: ___ - TR-04
Sample Type ([✓ C] F)
C = crab F = forage fish
Project Initial Code: EWL
Sampling Date: 01-03-11
Collection Method(s): trap
Collector Name (print and sign): John Rodgers John H Rodgers Jr
Affiliation: Clemson University (___) ___-____
Address: Dept. of Forestry and Natural Resource

Site Location 1150 AM
Parish: Vermilion

Latitude: ______ Longitude: ______
Site Name: ______
Site Description: ______
Water Body Description: ______
Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	**Temp** C	**pH**	**Cond** µS/cm	**ORP** mV	**Turb** NTU	**Depth** feet	**Time**

Notes: lat, long, sitename, etc → see previous field record form

Sample Description

Species: Callinectes sapidus
Total # of Individuals: 10

Specimen Composite Code	**Length (mm)**	**Width (mm)**	**Weight (grams)**	**Date/Time Trap Set**	**Date/Time Trap Pulled**	**Type of Bait**	**Sex**	**Additional Comments**
C	19	8.5	424	12/29/10/0900	01/03/11/1150	catfish	M	
C	20	8	403	↓	↓	↓	M	
C	13	5.5	130				M	
C	13.5	6.5	149				M	
C	17.5	7.5	291				M	
C	19	7.5	267				F	
C	17	7.5	219				F	
C	18	7.5	224				F	
C	15	6.5	125				F	
C	15.5	7.5	274	↓	↓	↓	M	

Notes: ______

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T R - 0 5
Sample Type ([✓ C] / F)
C = crab F = forage fish
Project Initial Code: E W L
Sampling Date: 12 - 14 - 10
Collection Method(s): Crab trap
Collector Name (print and sign): J. Rodgers, P. Ritchie, H. Connelly
Affiliation: Clemson Univ. (864) 650-0218
Address: Dept. of Forestry and Natural Resources +

Site Location

Parish: Vermillion
Latitude: 559737
Longitude: 3289879
Site Name: White Lake
Site Description: lake
Water Body Description: lake
Estimated Maximum Water Depth: ______ (meters) / 8 (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP ~~m~~V	Turb NTU	Depth feet	Time
11.30	8.81	7.50	2263	.22	137	.833	1440

Notes:

Sample Description

Species: callinectes sapidus
Total # of Individuals: 11

Specimen Composite Code	HC 12/14/10 Length cm ~~(mm)~~	HC 12/14/10 Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	7	17	262	12/10/10/1100	12/14/10/1440	catfish	M	
C	7,5	18.5	127	12/10/10/1100	12/14/10/1440	catfish	F	
C	7	18	189	12/10/10/1100	12/14/10/1440	catfish	F	
C	7	17	194	12/10/10/1100	12/14/10/1440	catfish	F	
C	8	20	344	12/10/10/1100	12/14/10/1440	catfish	F	
C	8	18,5	289	12/10/10/1100	12/14/10/1440	catfish	F	
C	8	19,5	373	12/10/10/1100	12/14/10/1440	catfish	M	
C	6	15,5	134	12/10/10/1100	12/14/10/1440	catfish	F	
C	7,5	18,5	273	12/10/10/1100	12/14/10/1440	catfish	M	
C	7	17.5	227	12/10/10/1100	12/14/10/1440	catfish	M	
C	7	18	172	12/10/10/1100	12/14/10/1440	catfish	F	

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T R - 0 5

Sample Type (**C** / **F**)

C = crab F = forage fish

Project Initial Code: E W L

Sampling Date: 01-04-11

Collection Method(s):

Collector Name (print and sign): John Rodgers, P. Ritchie, H. Connelly

Affiliation: Clemson Univ (864) 650-0210

Address: Dept Forestry and Natural Resources

Site Location 0930

Parish: Vermilion

Latitude:

Longitude:

Site Name:

Site Description:

Water Body Description:

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	**Temp** C	**pH**	**Cond** µS/cm	**ORP** mV	**Turb** NTU	**Depth** feet	**Time**

Notes: lat, long, site name → see previous field record forms

Sample Description

Species: SHAD

Total # of Individuals:

Specimen Composite Code	**Length (mm)**	**Width (mm)**	**Weight (grams)**	**Date/Time Trap Set**	**Date/Time Trap Pulled**	**Type of Bait**	**Sex**	**Additional Comments**
					01/04/11/0930			

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T R - 0 6

Sample Type ([✓ C] / F)
C = crab F = forage fish

Project Initial Code: E W L

Sampling Date: 1 2 - 1 4 - 1 0

Collection Method(s): crab trap

Collector Name (print and sign): J. Rodgers, P. Ritchie, H. Connelly

Affiliation: Clemson University, (864) 650-0210

Address: Dept. of Forestry and Natural Resources

Site Location

Parish: Vermillion

Latitude: 557004

Longitude: 3288783

Site Name:

Site Description:

Water Body Description:

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
11.21	8.6	7.40	2267	0.24	110	0.91	1347

Notes:

Sample Description

5 total HC 12/14/10

Species: callinectes sapidus

Total # of Individuals: 2+3 ~~+1~~ = ~~6~~ HC 12/14/10

Specimen Composite Code	HC 12/14/10 Length cm ~~(mm)~~	HC 12/14/10 Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	7.5	16.5	269	12/10/10/1000	12/14/10/1347	catfish	M	
C	7	16	232	12/10/10/1000	12/14/10/1347	catfish	M	
C	7.5	17	222	12/10/10/1000	12/14/10/1347	catfish	F	
C	6.5	15	179	12/10/10/1000	12/14/10/1347	catfish	M	
~~C~~							F	HC 12/14/10
C	7	16.5	253	12/10/10/1000	12/14/10/1347	catfish	M	

Notes: one female - dead thrown back
5 crabs shipped

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: TR - 06
Project Initial Code: EWL
Sampling Date: 01-04-11
Collection Method(s):
Collector Name (print and sign): J. Rodgers, H. Connelly, P. Ritchie
Affiliation: Clemson Univ (864) 650-0210
Address: Dept Forestry and Natural Resources)

Sample Type (C / [✓ F])
C = crab F = forage fish

Site Location 0945
Parish: Vermilion
Latitude:
Longitude:
Site Name:
Site Description:
Water Body Description:
Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

Notes: lat, long, site name, etc see previous field record forms

Sample Description

Species: SHAD
Total # of Individuals:

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
					01/04/11/0945			

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: TR-07

Sample Type ([✓ C] / **F**)
C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 12-14-10

Collection Method(s): crab trap

Collector Name (print and sign): J. Rodgers, P. Ritchie, H. Connelly

Affiliation: Clemson Univ., Dept. Forestry and Natural Resources) 864-650-0210

Address:

Site Location

Parish: Vermillion

Latitude: 557004

Longitude: 3288783

Site Name: White Lake

Site Description: Lake

Water Body Description: lake

Estimated Maximum Water Depth: ______ (meters) / 7 (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
11.42	8.86	7.44	2249	0.21	177.5	1.17	1350

Notes:

Sample Description

Species: callinectes sapidus

Total # of Individuals: ~~10~~ 11 HC 12/14/10

Specimen Composite Code	HC 12/14/10 Length ~~(mm)~~ cm	HC 12/14/10 Width ~~(mm)~~ cm	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	7.5	17	288	12/10/10/0900	12/14/10/1350	catfish	M	
C	7.5	18	258	12/10/10/0900	12/14/10/1350	Catfish	M	
C	6.5	16.5	186	12/10/10/0900	12/14/10/1350	catfish	M	
C	7.5	19.5	256	12/10/10/0900	12/14/10/1350	catfish	F	
C	7.5	17.5	283	12/10/10/0900	12/14/10/1350	catfish	M	
C	8	18	323	12/10/10/0900	12/14/10/1350	catfish	M	
C	6.5	16	162	12/10/10/0900	12/14/10/1350	catfish	~~M~~ F	HC 12/14/10
C	7.5	18	254	12/10/10/0900	12/14/10/1350	catfish	M	
C	8.5	20	358	12/10/10/0900	12/14/10/1350	catfish	M	
C	5.5	14.5	128	12/10/10/0900	12/14/10/1350	catfish	F	
C	6	14	140	12/10/10/0900	12/14/10/1350	catfish	M	

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: TR-07
Project Initial Code: EWL
Sampling Date: 01-04-11
Collection Method(s):
Collector Name (print and sign): J. Rodgers, H. Connelly, P. Ritchie
Affiliation: Clemson University (864) 650-0210
Address: Dept Forestry + Natural Resources

Sample Type (C / [✓ F])
C = crab F = forage fish

Site Location 1050
Parish: Vermilion
Latitude:
Longitude:
Site Name:
Site Description:
Water Body Description:
Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

Notes: lat, long, site name, etc → see previous field record forms

Sample Description

Species: SHAD
Total # of Individuals:

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
					01/04/11/1050			

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T R - 0 8
Sample Type ([✓ C] / F)
C = crab F = forage fish
Project Initial Code: E W L
Sampling Date: 1 2 - 1 4 - 1 0
Collection Method(s): crab trap
Collector Name (print and sign): J. Rodgers, P. Ritchie, H. Connelly
Affiliation: Clemson Univ. (864) 650-0200
Address: Dept. of Forestry and Natural Resources

Site Location

Parish: Vermillion
Latitude: 557563
Longitude: 328974
Site Name: White Lake
Site Description: lake
Water Body Description: lake
Estimated Maximum Water Depth: ______ (meters) / 8 (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
11.42	8.75	7.44	2243	0.24	165	1.6	1425

Notes:

Sample Description

Species: callinectes sapidus
Total # of Individuals: ~~11~~ 10 HC 12/14/10

Specimen Composite Code	HC 12/14/10 Length cm ~~(mm)~~	HC 12/14/10 Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	7	16.5	187	12/10/10/0800	12/14/10/1425	catfish	F	
C	6.5	16	187	12/10/10/0800	12/14/10/1425	catfish	M	
C	7.5	18	228	12/10/10/0800	12/14/10/1425	catfish	F	
C	6.5	17.5	147	12/10/10/0800	12/14/10/1425	catfish	F	
C	7	16.5	207	12/10/10/0800	12/14/10/1425	catfish	F	
C	8.5	19.5	292	12/10/10/0800	12/14/10/1425	catfish	F	
C	7.5	17.5	217	12/10/10/0800	12/14/10/1425	catfish	M	
C	8	18.5	302	12/10/10/0800	12/14/10/1425	catfish	M	
C	6	14.5	152	12/10/10/0800	12/14/10/1425	catfish	M	
C	7.5	18	263	12/10/10/0800	12/14/10/1425	catfish	M	
							~~M~~	HC 12/14/10

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: IR - 08

Sample Type (C [✓ F])
C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 01-04-11

Collection Method(s):

Collector Name (print and sign): J. Rodgers, H. Connelly, P. Ritchie

Affiliation: Clemson Univ (864) 650-0210

Address: Dept Forestry and Natural Resources

Site Location 1005

Parish: Vermilion

Latitude:

Longitude:

Site Name:

Site Description:

Water Body Description:

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

Notes: lat, long, site name, etc → see previous field record forms

Sample Description

Species: SHAD

Total # of Individuals:

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
					01/04/11/1005			

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: TR-09

Sample Type [✓ C] / F)

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 12-14-10

Collection Method(s): crab trap

Collector Name (print and sign): J. Rodgers, P. Ritchie, H. Connelly

Affiliation: Clemson University (___)___-____

Address: Dept. of Forestry and Natural Resources

Site Location

Parish: Vermillion

Latitude: 557668

Longitude: 3288957

Site Name: White Lake

Site Description: lake

Water Body Description: lake

Estimated Maximum Water Depth: ____ (meters) / 8 (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
11.35	8.47	7.44	2198	0.18	179	0.5	1400

Notes:

Sample Description

Species: callinectes sapidus

Total # of Individuals: ~~10~~ 11 HC 12/14/10

Specimen Composite Code	12/14/10 HC Length cm ~~(mm)~~	HC 12/14/10 Width cm ~~(mm)~~	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
C	7.5	18	231	12/10/10/0700	12/14/10/1400	catfish	F	
C	8	19	293	12/10/10/0700	12/14/10/1400	catfish	M	
C	7	16	199	12/10/10/0700	12/14/10/1400	catfish	F	
C	7	17	174	12/10/10/0700	12/14/10/1400	catfish	F	one claw
C	7.5	17	279	12/10/10/0700	12/14/10/1400	catfish	M	
C	8	19	298	12/10/10/0700	12/14/10/1400	catfish	F	
C	7.5	17.5	221	12/10/10/0700	12/14/10/1400	catfish	F	
C	9	18.5	347	12/10/10/0700	12/14/10/1400	catfish	F	
C	6.5	15	143	12/10/10/0700	12/14/10/1400	catfish	M	
C	7	15.5	173	12/10/10/0700	12/14/10/1400	catfish	M	
C	8	19.5	339	12/10/10/0700	12/14/10/1400	catfish	M	

Notes:

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: TR - 09

Sample Type (C / [✓ F])

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 01-04-11

Collection Method(s):

Collector Name (print and sign): J. Rodgers, H. Connelly, P. Ritchie

Affiliation: Clemson Univ ( ) -

Address: Dept Forestry and Natural Resources

Site Location 1028

Parish: Vermilion

Latitude:

Longitude:

Site Name:

Site Description:

Water Body Description:

Estimated Maximum Water Depth: ______ (meters) / ______ (feet)

RDO mg L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time

Notes: lat, long, sitename, etc. → see previous file

Sample Description

Species: SHAD

Total # of Individuals:

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
					01/04/11/1028			

Notes:

Chain of Custody and Chain of Custody Corrections

Appendix E

East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

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Client: EWL Project - D. Lingle

Project Manager: John Rodgers

CHAIN of CUSTODY

Project: EWL Tissue Study

Telephone No.

Fax No.

Page ___ of ___

Method of Shipment: FedEx

Special Detection Limit/Reporting

Sample I.D.	Lab Sample No.	No. of Containers	Matrix				Prsv.		Sampling Date	Sampling Time	Total Arsenic - SW6020	Inorganic Arsenic - EPA1632M	Total Barium - SW6020	Total Mercury - EPA1631	Methyl/mercury - EPA1630	TPH - Texas 1005/1006									Turn Around Time (working days)
			Soil	Water	Air	Other Crabs	Yes	No																	
EWLTR-03A C		1				✓			12-14-10	P.M.															
EWL TR-04 C						X																			
EWL TR-05 C						X																			
EWL TR-06 C						X																			
EWL TR-07 C						X																			
EWL TR-08 C						X																			
EWL TR-09 C						X			↓	↓	↓	↓	↓	↓	↓	↓									
~~EWL~~ JHR 12/14/10																									
~~EWL~~ JHR 12/14/10																									
EWL-Bait						X			↓	↓	↓	↓	↓	↓	↓	↓									

REMARKS

Any crabs in excess of required for Composite can be analyzed as whole crab samples. Samp ready for analysis

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name): John Rodgers John H Rodgers Jr
Date: 12-14-10 Time: 6:45 pm
Received by (Sign & Print Name)

Relinquished by
Date Time
Received by

Relinquished by
Date Time
Received by

Relinquished by
Date Time
Received by laboratory
Date Time

Lab Work No.

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Project Manager: John Rodgers

CHAIN of CUSTODY

Project: EWL Tissue Study

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Page ___ of ___

Method of Shipment: Fed Ex

Special Detection Limit/Reporting

Sample I.D.	Lab Sample No.	No. of Containers	Matrix				Prsv.		Sampling Date	Sampling Time	Total Arsenic SW 6020	EPA 1632A Inorganic Arsenic	Total Barium SW 6020	Total Mercury EPA 1631	Methylmercury EPA 1630	TPH Texas 1005/1006									Turn Around Time (working days)
			Soil	Water	Air	Other CRAB-C FISH-F	Yes	No																	
EWL TR-01 F						X			12-15-10	1126	↓	↓	↓	↓	↓	↓									
EWL TR-01 C						X			12-15-10	1126															
EWL T-01A C						X			12-15-10	1237															
EWL bait *						X			12-14-10																

REMARKS: Reminder: fish are analyzed as whole body composites. All samples ready for analysis

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name) John Rodgers John H. Rodgers, Jr.	Date 15 [illegible] 12/~~14~~/10 Time	Received by (Sign & Print Name)
Relinquished by	Date Time	Received by
Relinquished by	Date Time	Received by
Relinquished by	Date Time	Received by laboratory Date Time

Lab Work No.

* listed EWL bait on Chain of Custody Sheet from 12/14/10. Actually shipped bait with this group on 12/15/10 on dry ice. Bait is catfish parts.

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Project Manager John Rodgers

Project EWL Tissue Study

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Method of Shipment Fed Ex

Special Detection Limit/Reporting

			Matrix				Prsv.																		
Sample I.D.	Lab Sample No.	No. of Containers	Soil	Water	Air	Other Grabs	Yes	No	Sampling Date	Sampling Time	Total Arsenic SW6020	Inorganic Arsenic EPA 1632A	Total Barium SW6020	Total Mercury EPA 1631	Methyl Mercury EPA 1630	TPH - Texas 1005/1006									Turn Around Time (working days)
EWL T-03 C		1				X			12-16-10	1143 -1238	↓	↓	↓	↓	↓	↓									
EWL T-04 C		1				X																			
EWL T-06 C		1				X																			
EWL T-09 C		1				X																			

REMARKS

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name) John Rodgers John H Rodgers
Date 12-16-10 Time 1530
Received by (Sign & Print Name)

Relinquished by
Date Time
Received by

Relinquished by
Date Time
Received by

Relinquished by
Date Time
Received by laboratory
Date Time

Lab Work No.

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CHAIN of CUSTODY

Client: EWL Project - D. Lingle
Project Manager: John Rodgers
Project: EWL Tissue Study
Telephone No.:
Fax No.:
Page ___ of ___
Method of Shipment: Fedex
Special Detection Limit/Reporting:

Sample I.D.	Lab Sample No.	No. of Containers	Matrix				Prsv.		Sampling Date	Sampling Time	Total Arsenic SW6020	Inorganic Arsenic EPA 1632A	Total Barium SW6020	Total Mercury EPA 1631	Methyl Mercury EPA 1630	TPH - Texas 1005/1006									Turn Around Time (working days)
			Soil	Water	Air	Other CRAB	Yes	No																	
EWLT-01 C		1				X			12-20-10	1107-1236															
EWLT-02 C		1				X																			
EWLT-04 C		1				X																			
EWLT-05C		1				X																			
EWLT-06 C		1				X																			
EWLT-08C		1				X																			
EWLT-10 C		1				X																			
EWLT-12C		1				X																			
EWLTR-02C		1				X																			
EWLTR-03C		1				X			↓	↓	↓	↓	↓	↓	↓	↓									

REMARKS

CRABS from T-06 are for whole body analysis

T-12 only contains 3 crabs, please dissect and then hold for additional crabs we will ship for composite analysis

Sample Received Intact: Yes No
Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name): John Rodgers
Date: 12-20-10
Time:
Received by (Sign & Print Name):

Relinquished by: Date: Time: Received by:

Relinquished by: Date: Time: Received by:

Relinquished by: Date: Time: Received by laboratory: Date: Time:

Lab Work No.

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CHAIN of CUSTODY

Project: EWL Tissue Study

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Page ___ of ___

Method of Shipment: Fedex

Special Detection Limit/Reporting

			Matrix				Prsv.																		
Sample I.D.	Lab Sample No.	No. of Containers	Soil	Water	Air	Other CRAB FISH	Yes	No	Sampling Date	Sampling Time	Total Arsenic SW6020	Inorganic Arsenic EPA 1632A	Total Barium SW 6020	Total Mercury EPA 1631	Methyl Mercury EPA 1630	TPH - Texas 1005/1006									Turn Around Time (working days)
EWL T-02 C		1				X			12/21/10	1018-1420	↓	↓	↓	↓	↓	↓									
EWL T-05C		1				X																			
EWL T-07C		1				X																			
EWL T-11C		1				X																			
EWL TR-02F						X																			
EWL TR-03F						X																			
EWL TR-04F						X																			
EWL TR-04A F						X																			

REMARKS

Sample Received Intact Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name) John Rodgers	Date 12/21/10	Time	Received by (Sign & Print Name)
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory Date Time

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Project: EWL Tissue Study

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Page 1 of 1

Method of Shipment: Fed Ex

Special Detection Limit/Reporting

			Matrix				Prsv.																			
Sample I.D.	Lab Sample No.	No. of Containers	Soil	Water	Air	Other Crabs	Yes	No	Sampling Date	Sampling Time	Total Arsenic - SW6020	Inorganic Arsenic - EPA1632A	Total Barium - SW6020	Total Mercury - EPA1631	Methylmercury - EPA1630	TPH-Texas 1005/1006									Turn Around Time (working days)
EWL-NO		1				X			12-27-10	1300	X	X	X	X	X	X									

REMARKS

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name) Patrick Ritchie	Date 12-27-10	Time	Received by (Sign & Print Name)
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory / Date / Time

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			Matrix				Prsv.																		
Sample I.D.	Lab Sample No.	No. of Containers	Soil	Water	Air	Other Crabs	Yes	No	Sampling Date	Sampling Time	Total Arsenic - SW6020	Inorganic Arsenic EPA 1632A	Total Barium - SW6020	Total Mercury - EPA 1631	Methylmercury - EPA 1630	TPH - Texas 1005/1006									Turn Around Time (working days)
EWL-BR		1				X			12-27-10		X	X	X	X	X	X									

REMARKS

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name) Date Time

Received by (Sign & Print Name)

Relinquished by Date Time

Received by

Relinquished by Date Time

Received by

Relinquished by Date Time

Received by laboratory Date Time

Lab Work No.

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Client: EWL Project - D. Lingle

Project: EWL Tissue Study

Project Manager: John Rodgers

Telephone No. 864-650-0210

Fax No.

Method of Shipment: Fed Ex

Special Detection Limit/Reporting

Sample I.D.	Lab Sample No.	No. of Containers	Matrix				Prsv.		Sampling Date	Sampling Time	Total Arsenic-SW6020	Inorganic Arsenic-EPA 1632A	Total Barium-SW6020	Total Mercury-EPA 1631	Methyl Mercury-EPA 1630	TPH-Texas 1005/1006									Turn Around Time (working days)
			Soil	Water	Air	Other Crabs	Yes	No																	
EWL-T03 C		1				↓			1-3-11	A.M.	↓	↓	↓	↓	↓	↓									
EWL T07 C		↓				↓			↓	↓	↓	↓	↓	↓	↓	↓									
EWL T-08 C		↓				↓			↓	↓	↓	↓	↓	↓	↓	↓									
EWL T-10 C		↓				↓			↓	↓	↓	↓	↓	↓	↓	↓									
EWL T-12 C		↓				↓			↓	↓	↓	↓	↓	↓	↓	↓									
EWL TR-02 C		↓				↓			↓	↓	↓	↓	↓	↓	↓	↓									
EWL-TR-03 C		↓				↓			↓	↓	↓	↓	↓	↓	↓	↓									
~~EWL-T12 C~~ JHR 1-3-11		~~↓~~				~~↓~~			~~↓~~	~~↓~~	~~↓~~	~~↓~~	~~↓~~	~~↓~~	~~↓~~	~~↓~~									
EWL-TR04 C		↓				↓			↓	↓	↓	↓	↓	↓	↓	↓									

REMARKS: These crab samples are to complete the composite samples and to provide crabs for whole crab analyses as well as any other analyes (e.g. TPH).

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name)	Date	Time	Received by (Sign & Print Name)
John Rodgers John H. Rodgers, Jr.	1-3-11	4:05 PM	
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory Date Time

Lab Work No.

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Client: EWL Project - D. Lingle

Project: EWL Tissue Study

Project Manager: John Rodgers

Telephone No. 864-650-0210

Fax No.

Method of Shipment: Fed EX

Special Detection Limit/Reporting

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Water	Air	Other	Prsv.: Yes	No	Sampling Date	Sampling Time	Total Arsenic - SW6020	Inorganic Arsenic - EPA 1632A	Total Barium - SW6020	Total Mercury - EPA 1631	Methyl Mercury - EPA 1630	TPH - Texas 1005/1006									Turn Around Time (working days)
						FISH																			
EWL TR-05						↓					↓	↓	↓	↓	↓	↓									
-06						↓					↓	↓	↓	↓	↓	↓									
-07						↓					↓	↓	↓	↓	↓	↓									
-08						↓					↓	↓	↓	↓	↓	↓									
-09						↓					↓	↓	↓	↓	↓	↓									
EWL T-01						↓					↓	↓	↓	↓	↓	↓									
-02						↓					↓	↓	↓	↓	↓	↓									
-03						↓					↓	↓	↓	↓	↓	↓									
-04						↓					↓	↓	↓	↓	↓	↓									
-05						↓					↓	↓	↓	↓	↓	↓									
-06						↓					↓	↓	↓	↓	↓	↓									
-07						↓					↓	↓	↓	↓	↓	↓									
-08						↓					↓	↓	↓	↓	↓	↓									
-09						↓					↓	↓	↓	↓	↓	↓									

REMARKS

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name) John Rodgers John H. Rodgers, Jr.	Date 1-6-11 Time	Received by (Sign & Print Name)	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory	Date Time

Lab Work No.

Columbia Analytical Services™
800.695.7222
www.caslab.com

Client: EWL Project - D. Lingle

CHAIN of CUSTODY

Page 2 of 2

Project: EWL Tissue Study

Method of Shipment: FedEx

Project Manager: John Rodgers

Telephone No. 864-650-0210

Fax No.

Special Detection Limit/Reporting

			Matrix				Prsv.																		
Sample I.D.	Lab Sample No.	No. of Containers	Soil	Water	Air	Other FISH	Yes	No	Sampling Date	Sampling Time	Total Arsenic-SW6020	Inorganic Arsenic-EPA1632A	Total Barium-SW6020	Total Mercury-EPA1631	Methyl Mercury-EPA1630	TPH-Texas 1005/1006									Turn Around Time (working days)
EWL T-10 F						↓					↓	↓	↓	↓	↓	↓									
EWL T-11 F																									
EWL T-12 F																									

REMARKS

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name) John Rodgers John H Rodgers	Date 1-6-11 Time	Received by (Sign & Print Name)	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory	Date Time

Lab Work No.

MICHAEL PISANI & ASSOCIATES, INC.
Environmental Consulting Services

13313 Southwest Freeway
Suite 221
Sugar Land, Texas 77478

1100 Poydras Street
1430 Energy Centre
New Orleans, Louisiana 70163

17431 Jefferson Highway
Suite A
Baton Rouge, Louisiana 70817

Attn: Lynda Huckestein

Re: EWL Tissue Study

Lynda,

Attached are the corrections required on the final COC, along with the necessary Field Record Forms for the EWL Tissue Study.

If you have any questions/comments, please contact Patrick Ritchie.

(504)582-2472
pmritchie@ix.netcom.com

Thank You

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T - 02

Sample Type (C / [✓ F])

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 12-21-10

Collection Method(s): Net

Collector Name (print and sign): P. Ritchie, H. Connelly, J. Rodgers

Affiliation: Clemson University (864) 650-0210

Address: Dept. of Forestry + Natural Resources

Site Location

Parish: Vermilion

Latitude: 561094

Longitude: 3288612

Site Name: EWL Field

Site Description: Canal

Water Body Description: Canal

Estimated Maximum Water Depth: ______ (meters) / 20' (feet)

RDO mg/L	Temp C	pH	Cond µS/cm	ORP mV	Turb NTU	Depth feet	Time
8.05	13.84	7.4	4019	0.01	45.2	1.1	1104

Notes:

Sample Description

Species: Blue Gill

Total # of Individuals: 1

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
F				12/13/10 1238	12/21/10 1104			

Notes: K1013947

Field Record Form: 07-47 East White Lake (VPSB)

Sampling Site Identification Code: T-05

Sample Type (C [✓ F]

C = crab F = forage fish

Project Initial Code: EWL

Sampling Date: 12-21-10

Collection Method(s): Net

Collector Name (print and sign): P. Ritchie, H. Connelly, J. Rodgers

Affiliation: Clemson University (864) 650-0210

Address: Dept. of Forestry + Natural Resources

Site Location

Parish: Vermilion

Latitude: 560869

Longitude: 3288990

Site Name: EWL Field

Site Description: Canal

Water Body Description: Canal

Estimated Maximum Water Depth: ____ (meters) / 20' (feet)

RDO mg/l	Temp C	pH	Cond µS/cm	ORP ~~mV~~	Turb NTU	Depth feet	Time
8.95	13.4	7.26	3512	0.07	46.5	1.3	1033

Notes:

Sample Description

Species: Blue Gill

Total # of Individuals:

Specimen Composite Code	Length (mm)	Width (mm)	Weight (grams)	Date/Time Trap Set	Date/Time Trap Pulled	Type of Bait	Sex	Additional Comments
F				12/14/10 1206	12/21/10 1033			

Notes: K1013947

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Client: EWL Project - D. Lingle

CHAIN of CUSTODY

Page 1 of 1

Project: EWL Tissue Study

Project Manager: John Rodgers

Telephone No.

Fax No.

Method of Shipment: Fed Ex

Special Detection Limit/Reporting

			Matrix				Prsv.																		
Sample I.D.	Lab Sample No.	No. of Containers	Soil	Water	Air	Other Crabs	Yes	No	Sampling Date	Sampling Time	Total Arsenic - SW6020	Inorganic Arsenic - EPA1632A	Total Barium - SW6020	Total Mercury - EPA1631	Methylmercury - EPA1630	TPH - Texas 1005/1006									Turn Around Time (working days)
EWL-NO		1				X			12-27-10	1300	X	X	X	X	X	X									

REMARKS

K1014320

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name)	Date	Time	Received by (Sign & Print Name)		
Patrick Ritchie	12-27-10				
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by laboratory	Date	Time

Lab Work No.

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CHAIN of CUSTODY

Client: EWL Project - D. Lingle

Project Manager: John Rodgers

Project: EWL Tissue Study

Telephone No

Fax No.

Page ___ of ___

Method of Shipment: Fedex

Special Detection Limit/Reporting

Sample I.D.	Lab Sample No.	No. of Containers	Matrix				Prsv.		Sampling Date	Sampling Time	Total Arsenic SW6020	Inorganic Arsenic EPA 1632A	Total Barium SW 6020	Total Mercury EPA 1631	Methyl Mercury EPA 1630	TPH - Texas 1005/1006									Turn Around Time (working days)
			Soil	Water	Air	Other CRAB FISH	Yes	No																	
EWL T-02 C		1				X			12/21/10	1018-1420	↓	↓	↓	↓	↓	↓									
EWL T-05C		1				X			↓	↓	↓	↓	↓	↓	↓	↓									
EWL T-07C		1				X			↓	↓	↓	↓	↓	↓	↓	↓									
EWL T-11 C		1				X			↓	↓	↓	↓	↓	↓	↓	↓									
EWL TR-02F		1				X			↓	↓	↓	↓	↓	↓	↓	↓									
EWL TR-03F		1				X			↓	↓	↓	↓	↓	↓	↓	↓									
EWL TR-04F		1				X			↓	↓	↓	↓	↓	↓	↓	↓									
EWL TR-04A F		1				X			↓	↓	↓	↓	↓	↓	↓	↓									
EWL T-02 F		1				X			12/21/10	1018-1420	X	X	X	X	X	X									
EWL T-05 F		1				X			↓	↓	X	X	X	X	X	X									

MARKS

K1013947

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name) John Rodgers	Date 12/21/10	Time	Received by (Sign & Print Name)
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory

Date

Time

Lab Work No.

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Client: EWL Project - D. Lingle

Project Manager: John Rodgers

CHAIN of CUSTODY

Project: EWL Tissue Study

Telephone No. 864-650-0210

Fax No.

Page 1 of 2

Method of Shipment: Fed EX

Special Detection Limit/Reporting

Sample I.D.		Lab Sample No.	No. of Containers	Matrix: Soil	Matrix: Water	Matrix: Air	Matrix: Other FISH	Prsv.: Yes	Prsv.: No	Sampling Date	Sampling Time	Total Arsenic - SW6020	Inorganic Arsenic - EPA 1632A	Total Barium - SW6020	Total Mercury - EPA 1631	Methyl Mercury - EPA 1630	TPH - Texas 1005/1006	Turn Around Time (working days)
EWL TR-05	F		1				↓			1-4-11	930	↓	↓	↓	↓	↓	↓	
EWL TR-06	F						↓			↓	945	↓	↓	↓	↓	↓	↓	
EWL TR-07	F						↓			↓	1050	↓	↓	↓	↓	↓	↓	
EWL TR-08	F						↓			↓	1005	↓	↓	↓	↓	↓	↓	
EWL TR-09	F						↓			↓	1028	↓	↓	↓	↓	↓	↓	
EWL T-01	F						↓			1-5-11	1230	↓	↓	↓	↓	↓	↓	
EWL T-02	F						↓			↓	1230	↓	↓	↓	↓	↓	↓	
EWL T-03	F						↓			↓	1330	↓	↓	↓	↓	↓	↓	
EWL T-04	F						↓			↓	1340	↓	↓	↓	↓	↓	↓	
EWL T-05	F						↓			↓	1320	↓	↓	↓	↓	↓	↓	
EWL T-06	F						↓			↓	1350	↓	↓	↓	↓	↓	↓	
EWL T-07	F						↓			↓	1510	↓	↓	↓	↓	↓	↓	
EWL T-08	F						↓			↓	1505	↓	↓	↓	↓	↓	↓	
EWL T-09	F						↓			↓	1455	↓	↓	↓	↓	↓	↓	

REMARKS: Packed in dry ice

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name): John Rodgers John H. Rodgers Jr.
Date: 1-6-11 Time: 1105
Received by (Sign & Print Name):

Relinquished by
Date Time
Received by

Relinquished by
Date Time
Received by

Relinquished by
Date Time
Received by laboratory
Date Time

Lab Work No.

Columbia Analytical Services™
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Client: EWL Project - D. Lingle

CHAIN of CUSTODY

Page 2 of 2

Project: EWL Tissue Study

Project Manager: John Rodgers

Telephone No. 864-650-0210

Fax No.

Method of Shipment: FedEx

Special Detection Limit/Reporting

Sample I.D.	Lab Sample No.	No. of Containers	Matrix				Prsv.		Sampling Date	Sampling Time	Total Arsenic-SW6020	Inorganic Arsenic-EPA 1632A	Total Barium-SW6020	Total Mercury-EPA 1631	Methyl Mercury-EPA1630	TPH-Texas 1005/1006									Turn Around Time (working days)
			Soil	Water	Air	Other FISH	Yes	No																	
EWL T-10 F		1				↓			1-5-11	1355	↓	↓	↓	↓	↓	↓									
EWL T-11 F									↓	1405															
EWL T-12 F										1445															

REMARKS

Packed in dry ice

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name)	Date	Time	Received by (Sign & Print Name)
John Rodgers John H Rodgers	1-6-11	1105	

Relinquished by	Date	Time	Received by

Relinquished by	Date	Time	Received by

Relinquished by	Date	Time	Received by laboratory	Date	Time

Lab Work No.

Scientific Fish Collection Permit
Appendix F

East White Lake Oil and Gas Field
Vermilion Parish, Louisiana

BOBBY JINDAL
GOVERNOR

State of Louisiana
DEPARTMENT OF WILDLIFE AND FISHERIES
OFFICE OF SECRETARY

ROBERT J. BARHAM
SECRETARY

SALTWATER SCIENTIFIC COLLECTING PERMIT

ISSUED TO: **John H. Rogers** PERMITTEE # **1907**
COMPANY: **Clemson University**
ADDRESS: **Department of Forestry and Natural Resources, 261 Lehotsky Hall, Clemson, SC 29634-**
ISSUE DATE: **1/5/2011** EXPIRATION DATE: **31 December 2011**

PERMITTED ACTIVITIES:

This permits the holder to take the fish listed in Attachment A of this permit, by the means and in the areas authorized in Attachment A, provided that the Region Captain of the Louisiana Department of Wildlife and Fisheries, Enforcement Division is notified in advance and shall accompany you, or direct somebody to accompany you, if he deems it necessary, when fish are taken under the authority of this permit. If electric seines, electrofishers or chemicals are to be used, it will be necessary that the District Fisheries Biologist be notified in addition to Enforcement personnel. This permit does not allow anyone to use chemicals that are not approved for use in Louisiana by other state and federal agencies or exempt permit holders from any regulations by other state or federal agencies. This permit is good in **SALTWATER** areas only does not allow the taking of oysters from private leases unless accompanied by written permission of the lease holder.

RESTRICTIONS:

(1)Gill nets must be attended to at all times with tags on each end of the net clearly identifying the owner and operator of the gear.
(2)This permit may be cancelled at any time if in the judgment of the designated authority; the permit is being used for purposes other than those for which the permit was issued. Sale of any organisms collected under this permit, or their progeny, is prohibited. No item collected under this permit may be used for human consumption. One of the permittees must be in the company of the samples at all times. This permit and Attachment A must be in possession when taking or possessing organisms under the conditions of the permit.
(3) Alligators are not permitted to be taken with this permit.
(4) Holder agrees to submit an annual report giving a detailed description and inventory of all specimens collected within 60 days following expiration of this permit to: Louisiana Department of Wildlife and Fisheries, Office of Fisheries - Permits Manager, P.O. Box 98000, Baton Rouge, LA 70898-9000. Reports are mandatory even if no collections were made during the permit year.
(5) Failure to report may result in denial of future permit requests or suspension of existing permits.
(6) See Attachment A for additional information regarding permit restrictions.

PERMIT COMPLIANCE - PERMIT IS NOT VALID UNLESS SIGNED BY PERMITTEE

I ____,

(Permittee Signature)

agree to abide by all State and Federal fish and wildlife laws and regulations, and all State and Federal laws and regulations which relate to this permit or the permitted activity, and by all other terms and conditions of this permit.

LEGAL AUTHORITY: **R.S. 56:318**

APPROVED - authority delegated by the Secretary of the Louisiana Department of Wildlife and Fisheries in memo dated 7/29/2010:

Harry Blanchet, Biologist Director: R. H. Blanchet 1/5/11

cc: Col. Winton Vidrine, Enforcement

P.O. BOX 98000 • BATON ROUGE, LOUISIANA 70898-9000 • PHONE (225) 765-2623 • FAX (225) 765-2607
AN EQUAL OPPORTUNITY EMPLOYER

BOBBY JINDAL
GOVERNOR

State of Louisiana
DEPARTMENT OF WILDLIFE AND FISHERIES
OFFICE OF SECRETARY

ROBERT J. BARHAM
SECRETARY

The following individuals are sub-permitted under the 2011Saltwater Scientific Collecting **Permit # 1907**, for **John H. Rogers, Jr**, Department of Forestry and Natural Resources, Clemson University, SC, issued 01/05/2011, expiring 12/31/2011. This permit allows you and all subpermittee's to use the following gears listed in Attachment A.

John H. Rogers, JR ←

Sub-Permittee's on ~~Mamretto~~ Permit #1907

ok
MR
1/5/11
LDWF

Patrick W. Richie
Helen Connelly

Legal Authority: R.S. 56:318
Approved – authority delegated by the Secretary of the Louisiana Dept. of Wildlife and Fisheries in memo dated 7/29/2010:

R. H Blanchet

Harry Blanchet
Biologist Director – MarineFisheries

Cc: Col. Winton Vidrine, Enforcement

P.O. BOX 98000 • BATON ROUGE, LOUISIANA 70898-9000 • PHONE (225) 765-2623 • FAX (225) 765-2607
AN EQUAL OPPORTUNITY EMPLOYER

APPLICATION FOR SCIENTIFIC COLLECTING PERMIT
Louisiana Department of Wildlife & Fisheries

APPLICATION DATE: 1-3-2011

PERMIT # ASSIGNED LAST YEAR: (If applicable)

APPLICANT'S NAME: John H. Rodgers, Jr.

APPLICANT'S OFFICIAL TITLE/AFFILIATION: Professor, Clemson University

ADDRESS: Dept. of Forestry and Natural Resources, 261 Lehotsky Hall

CITY/STATE: Clemson, SC

ZIP CODE: 29634

PARISH: Pickens

TELEPHONE #: 864-656-0492

FAX #: 864-656-1034

E-MAIL: jrodger@clemson.edu

NAMES OF PERSONNEL CONDUCTING COLLECTING: (If firearms will be used, provide Date of Birth and Social Security Number)

Patrick W. Richie
Helen Connelly

PURPOSE OF SCIENTIFIC COLLECTION: (Attach support information as appropriate)

To measure concentrations of analytes such as arsenic and barium in crab and forage fish tissue

AREA(S) WHERE COLLECTIONS WILL BE MADE:

Vermilion Parish - White Lake, Schooner Bayou and East White Lake Field (Canals).

METHOD(S) OF COLLECTION:

Trawl, Cast Net, Hoop Net/Trap, Crab Trap

TYPES AND NUMBERS OF ORGANISMS TO BE COLLECTED:

Crabs - Callinectes sapidus - ~21 stations, ~10/station
Forage Fish - bluegill, shad, mosquito fish - ~21 stations, 10-30/station

HOW WILL SPECIMENS BE DISPOSED OF? Specimens will be consumed in analyses and residual disposed at analytical laboratory.

I have been advised and do understand that by applying for and accepting a permit issued by the La. Dept. of Wildlife & Fisheries, I am being allowed to engage in an activity which would otherwise be prohibited by law or for which a permit is required. I understand that the permit is not a license and confers no property right upon me. I specifically agree to abide by all State and Federal wildlife laws and regulations, and all State and Federal laws and regulations which relate to this permit or the permitted activity, and by all other terms and conditions of this permit. I understand that the permit for which I am applying may be suspended, canceled or revoked at anytime by the La. Dept. of Wildlife & Fisheries. I agree to immediately surrender the permit issued to me upon demand made upon me by any authorized employee of the Louisiana Dept. of Wildlife & Fisheries. I understand that my failure to fully and completely comply with the laws, regulations, terms and conditions referred to herein could result in the immediate suspension, cancellation or revocation of this and other permits issued to me by the Dept. and that I may be denied future permits as a consequence of my actions. I understand and agree that any permit issued to me by the La. Dept. of Wildlife & Fisheries is in the nature of a privilege, which is being voluntarily extended to me by the Dept. and the failure on my part to cooperate fully and completely with the Dept. or its employees can result in the loss of the privilege conferred and the denial of future requests for permits. By accepting this permit, I evidence my agreement to be bound by all conditions and stipulations set forth herein.

SIGNATURE OF APPLICANT: John H. Rodgers, Jr. DATE: 1-3-2011

1-4-2011 HL 1-4-2011

ATTACHMENT A

Ecosystem Functions and Services Report
Attachment B

Vermilion Parish School Board v.
Louisiana Land, et al

Supplemental Ecological Expert Report

Ecosystem Functions and Services Report

Section 16 T 15S R 01E

East White Lake
Vermilion Parish, Louisiana

June 5, 2014

Prepared by:

Helen Connelly, Ph.D.
1100 Poydras Street, Suite 1430
New Orleans, Louisiana 70163
(504) 582-2468

and

John H. Rodgers, Jr. Ph.D.
102 Santee Trail
Clemson, South Carolina 29631
(864) 650-0210

Ecosystem Functions and Services Report

Section 16 T 15S R 01E

East White Lake
Vermilion Parish, Louisiana

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Ecosystem Functions and Services Report

Section 16 T 15S R 01E

East White Lake
Vermilion Parish, Louisiana

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Ecosystem Functions and Services Report

Section 16 T 15S R 01E

East White Lake
Vermilion Parish, Louisiana

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List of Tables

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Ecosystem Function and Services Report

Section 16 T 15S R 01E

East White Lake
Vermilion Parish, Louisiana

1.0 Introduction

During the week of May 12, 2014, we visited and evaluated an ecosystem within the East White Lake water shed. The purpose of this field study was to update and supplement the crab field study done in this area in 2010/2011, and to evaluate the health of this ecosystem. This report includes observations made by Dr. Helen Connelly and Dr. John Rodgers (Appendix A) during the field study and conclusions based on these observations. The field study included locations in the East White Lake Oil and Gas Field canals, Schooner Bayou Canal, and White Lake.

1.1 Site Location and Description

Field work was done from May 12, 2014 through May 14, 2014 in and around Section 16, Township 15 South, Range 1 East in Vermilion Parish, Louisiana (Figure 1), which is about five miles southwest of Forked Island, Louisiana. This site is characterized as having primarily fresh and intermediate vegetation as per the recent USGS vegetation map (Sasser, 2014).

1.2 Project Goals

This study provides evidence to dispute the claims made by William J. Rogers in his 2014 report that oilfield activities have contaminated site media, so that they pose unacceptable risk to the human and ecological populations; and claims made by Gary C. Barbee in his 2010 report that ecological and human populations have been adversely affected by contamination from the site. In this field study, we provide evidence that the ecosystem is thriving and functional and provides important services to the wildlife and human populations in the area.

1.3 Ecosystem Assessment Method

The approach taken for this ecosystem assessment followed standard approaches used and recommended by a variety of scientific societies as well as state and federal agencies (USDA 2008; Novitski et al. 2009; Stein et al. 2009; USEPA 2014; Wisconsin Department of Natural Resources 2014). This ecosystem assessment involved use of a checklist/report card that included critical ecosystem structure and function parameters that serve to provide ecosystem services that would be expected of functioning ecosystems (see Appendix F). This ecosystem checklist was developed for coastal ecosystems of Louisiana that include standard features and observations that are used to identify functioning ecosystems. The ecosystem checklist was accompanied by identification of plants and animals that were observed in the vicinity of the observation point. A series of observation points distributed throughout the area of interest were visited to record data and make observations at a site. The goal here was not to develop an exhaustive list of plants and animals using this ecosystem as habitat, but to observe the dominant plants and abundant animals.

This ecosystem assessment evaluates the condition and functioning of the East White Lake ecosystem. Food chains in these ecosystems are ones that begin with the simplest algae and bacteria, end with large predators at the top of the food chain, and include very productive producers and the consumers that eat them. During this study, we identified important members of the food chain by direct observation. A functioning ecosystem, like the one in the East White Lake area, not only provides a habitat for its wildlife residents, but also provides services for the local human population and is a source of protection for the larger coastal environment. Appendix B is a photographic record of the natural services and functions observed during this field study that are provided by the highly functional and useful ecosystem in the East White Lake area.

1.4 Observation Locations

There were fourteen observation locations (Figure 2) for this field study. Ten of the locations are in the oil and gas field canals, three are in Schooner Bayou, and one is in White Lake. The observation locations are dispersed evenly throughout the site in order to be representative of the site as a whole.

For simplicity, many of the same locations and location ID numbers were used in this project as were used in the previous 2010/2011 crab study (Connelly, 2014). For this reason, the location ID numbers are not completely sequential. Oil and gas field canal locations for this study are: T-01, T-05, T-07, T-10, T-13, 1, 2, 3, 4, 5; Schooner Bayou locations are: TR-02, TR-04, TR-05; and the location in White Lake is TR-08.

Animal and plant species were observed and documented at all fourteen observation locations. Crab traps were used in nine of the fourteen locations, and fish trapping hoop nets were used in four locations. Crabs and fish were observed in abundance throughout the trapping locations. Vegetation and wildlife were also documented in abundance throughout the site.

1.5 Species Observed

Blue crabs, fish, birds, wildlife, and vegetation were the species of interest for this study. Organisms easily trapped by crab traps or hoop nets were observed and recorded. Also easy to observe and record were emergent plants and flying birds. Less easily observed were most underwater plants, most benthic organisms, microfauna and flora, and animals camouflaged in the environment. Because the ecosystem functions as an interconnected system, assumptions were made about the less visible organisms by analyzing the visible organisms available for study.

2.0 Crab Trapping

Crab traps baited with catfish and poagie were placed at nine representative observation locations spaced throughout the site. Traps were distributed to spatially represent a majority of the site and to include areas that have had flow lines removed, such as at location T-05. The following section describes crab trapping methods.

Crab traps were taken by boat on May 12, 2014 to nine locations. The nine locations were T-01, T-05, T-07, T-10, T-13, TR-02, TR-04, TR-05, and TR-08. Species observation locations were located by map (see Figure 2) and by GPS coordinates (see Appendix C). Crab collection was permitted by a scientific collection permit issued by the Louisiana Department of Wildlife and Fisheries (see Appendix D).

At each of the nine locations, a crab trap baited with catfish or poagie was thrown into the water, and remained there to be checked for crabs on May 13, 2014 and May 14, 2014. Each crab trap had a marker buoy and flagging to mark it as part of the project.

The crab traps are wire mesh boxes approximately 30 inches by 30 inches by 15 inches with hinged lids. The wire mesh resembles chicken wire with 1.5-inch square openings. The crab trap has an entrance for crabs and a bait box containing bait but no way for a larger crab to exit the trap. The crab trap has small exit holes to let small crabs escape.

To collect crabs, the traps were lifted onto the side ledge of the boat using a hooked gaffe. Crabs were shaken out of the trap through an open hinged door on the bottom of the trap.

3.0 Fish Trapping

To capture fish, a hoop net was staked to the bottom surface of the waterway in each of four locations (T-01, T-05, T-010, and T-13). The hoop net, when set up underwater, takes on the shape of a column or a tube. The net has a series of hoops spaced along the length of the net to keep it open, with a second net inside that has a narrow entrance for fish. Fish swim in but cannot exit the net. The fish can be collected when the net is lifted out of the water with a hook.

4.0 Documentation

The field study was documented by digital photography and Ecosystem Services and Functions Records Form.

4.1 Digital Photography

Field team activities, local fish and wildlife, and general habitat settings and vegetation were photographed and saved in electronic format. The photo records created during the field study are included as Appendix E to this report.

4.2 Ecosystem Services and Functions Record Forms

A report card /checklist created by Dr. John Rodgers to measure ecosystem functioning was completed at each of the fourteen locations by making visual observations and assessments of the services provided by the ecosystem. These completed forms are included as Appendix F to this report.

5.0 Primary Production and Plants in the East White Lake Ecosystem

To begin a discussion of ecosystem functioning, the term – "*a productive ecosystem*" – has to be defined. Primary production is the conversion of carbon (from CO_2 in the air) by plants into sugars. These plant sugars are also referred to as carbohydrates, fiber, or organic biomass. This natural production of organic biomass by plants is accomplished by photosynthesis at the plant cellular level. The East White Lake ecosystem is "*productive*" – which means there is a high level of primary *productivity* going on. That is, the ecosystem plants convert available carbon, from the air or other sources, into organic biomass at a greater rate than, for example, the plant species of a desert ecosystem.

Primary productivity involves not only larger plants using photosynthesis to make their own biomass, but also algae that use photosynthesis to create food (organic matter). Plants and algae making biomass from environmental carbon is what forms the base of the food chain and is responsible for supporting the platform of life in East White Lake and all ecosystems. Plant production of biomass is the source of food for the plants themselves and for the consumers that eat the plants.

5.1 Four Categories of Plants/Producers

Ecosystem plants, the "*producers*," at East White Lake can be broadly categorized into four different groups:

(1) Emergent Vascular plants: The bulk of vascular plants are the grasses and trees, which do the majority of photosynthesis in these ecosystems. The term vascular refers to plants that have the ability to transport water and produce seeds and flowers. Vascular plants are the ones most people think of as plants, and in a general way, can be described as plants other than mosses.

(2) Photosynthetic algae: These are associated with emergent plants. They live in a non-parasitic way on the surface of other plants.

(3) Benthic (bottom-dwelling) algal and bacterial communities: These are submerged and are a surface coating on bottom sediments. These benthic organisms may form visible brown or green mats on the sediment surface. They are confined to the photic zone, which means the sun can reach them within the top one to three millimeters of the sediment surface.

(4) Submerged macrophytes (aquatic plants): These plants are rooted in the bottom sediments and are primarily submerged in the water.

5.2 Discussion of Plants/Producers Observed

At each observation location, photos were taken to record ecosystem productivity and the plants observed. These records are in Appendix E and in Table 1.

5.2.1 Emergent Vascular Plants

The seasonal growth of vascular plants follows one of two patterns: annual or perennial. Annual growth is characterized by plants that die to the ground every winter, with new growth emerging in the spring. An example of an annual plant observed in the East White Lake area is southern water hemp (*Amaranthus australis*). We observed southern water hemp at locations 5 and T-10.

Perennial plants are ones that grow continuously throughout the year. The ecosystem in the East White Lake area is dominated by perennial plant species, as would be expected. Examples of perennials observed in the East White Lake area are: giant bulrush (*Schoenoplectus californicus*) and common reed (*Phragmites australis*). Three perennials we observed at most of the locations were giant cutgrass (*Cladium jamaicense*), narrow-leafed cattails (*Typha domengensis*), and bulltongue arrowhead (*Sagittaria lancifolia*). These and other perennials are continuously adding biomass (such as leaves) and dying off in a regular cycle. The decaying plants, which we observed at locations throughout the site, return nutrients to the soil and allow the area to grow and accrete, building soils and sediments. We observed more than 50 different plant species during the field study (see Table 1). Plants observed included a biodiverse assemblage of trees, grasses, rushes, vines, shrubs, and aquatic emergent plants. The specific plants observed are documented in Table 1 and Appendix E.

5.2.2 Photosynthetic Algae

Although grasses and trees are the dominant biomass producers in theses ecosystems, the biomass produced by algae on aquatic plant surfaces is important and provides a diet for aquatic microinvertebrates, which are in turn a source of food for larger organisms. All members of the ecosystem are linked, beginning with these small algae at the base of the food chain. We observed epiphytic algae throughout the site associated with shallow water aquatic plants (see Table 1).

5.2.3 Benthic Algae

Algae that form a brown or green coating on the sediment surface may be observed in areas with clear water that can be penetrated by sunlight. We observed benthic algae at location 1.

5.2.4 Submerged Aquatic Plants

Plants that are rooted in the sediment and are within the water column form an important part of aquatic structure and habitat. An example of a submerged aquatic plant found in the East White Lake area is rigid hornwort (*Ceratophyllum demersum)*. We observed rigid hornwort at location T-10 and narrow-leaved arrowhead (*Sagittaria filiformis*) at location TR-04. Submerged aquatic vegetation is used by fish and macroinvertebrates as cover and protection from predators and is also used by small invertebrates searching for the epiphytic diet of algae associated with submerged plant parts. Submerged vegetation releases detritus and nutrients into the water column, enriching the water source for other biota. The presence of submerged vegetation is a sign of a functioning ecosystem.

6.0 Consumers in the East White Lake Ecosystem

Consumers are the organisms that eat the producers (plants) and eat each other. Consumers range from the tiniest microorganisms that eat bacteria and algae to the large predators like alligators at the top of the food chain.

There is a trophic pathway of consumers in this ecosystem from: 1) organic detritus (fragments of dead organisms and feces) to 2) microbes (algae/fungus/bacteria) to 3) meiofauna (such as nematodes) to 4) macroinvertebrates to 5) fish and other predators - which represents an interconnected aquatic food web, in which all trophic levels play an important role. The following sections describe the consumers in this food web observed in the East White Lake ecosystem.

6.1 Benthos: Consumers at the Bottom of the Food Chain

The small organisms on and in the benthic sediment surface are the meiofauna. They are the benthic invertebrates (meaning no internal skeleton) that are larger than microfauna, such as bacteria and fungi, but smaller than macroinvertebrates, such as crabs. Meiobenthos are less than one millimeter in body length and include organisms such as nematodes.

Nematodes are tiny, cylindrical organisms that graze on bacteria and convert the organic matter in bacteria into their own biomass, which in turn provides nourishment for larger benthic organisms.

In the food chain, deposit feeders (ones that get nutrients from sediment) will eat meiofauna, such as nematodes, which have gotten their nutrition from bacteria, algae and fungi. The deposit feeders that eat the nematodes are then prey for small fish, shellfish, and birds. At East White Lake, we observed primarily the macroinvertebrates (such as crabs) and fish (such as catfish) rather than the much smaller consumers, such as nematodes. However, the presence and abundance of the larger organisms, such as alligators and alligator gar, assures us that the smaller and not visible consumers are present.

6.2 Blue Crabs: Macroinvertebrate Consumers

Blue crabs (*Callinectes sapidus*) were abundant throughout the site in the canals, in the lake, and in Schooner Bayou. In 2010 and 2011, we performed a study of crabs at East White Lake (Connelly, 2014). In this current field study, three years later, it was our goal to document the presence of the crabs as part of the assessment of the functionality of the ecosystem. The presence of crabs, especially in the canals where flow lines have been removed for remedial purposes, for example near the locations of T-05 and T-10, is evidence that the East White Lake system is functional and a good habitat for crabs. At T-05 and T-10, for example, we trapped crabs, catfish, crappie, and gar during this field study (see Table 2).

William J. Rogers in his 2014 report stated that crabs either avoided location C-7 at the site due to lack of forage or due to contamination in the area. He stated that he was unable to trap crabs after "36 trap hours." Gary C. Barbee stated in his 2010 report that they were unable to trap crabs at location C-7, and that the absence of crabs could indicate avoidance of the area. At this same location, T-07, we trapped crabs in 2010 and again in this recent 2014 field event. In 2010, we trapped 14 crabs at location T-07. Between 12/16/10 to 01/03/2011, the crab trap at T-07 was checked for crabs on four different days. The trap at T-07 contained crabs each time it was checked. During this recent 2014 field study the trap at T-07 contained a crab after being in place for one day. The trap was placed at T-07 on 05/12/14 and was checked on 05/13/14. Crabs were trapped at all site locations that had traps during both this field study and the study done in 2010.

6.3 Fish: Nektonic Consumers

Fish were successfully trapped in all locations where hoop nets were placed. Catfish were the most frequently caught fish, along with gar (see Table 2). The presence and abundance of these fish indicates that there is a sufficient diet and habitat for them.

6.4 Birds: A Diverse Group of Consumers

Typically in an ecosystem like East White Lake, there are more bird species than there are amphibians, reptiles, and mammals (see Table 3 and Photo Record Appendix B). We documented 26 species of birds, as compared to 20 species of other wildlife. This comparatively larger number of bird species is to be expected in a thriving ecosystem.

A habitat will be more used by birds when there is a diverse assemblage of plants, with several different plant zones, rather than homogeneous vegetation. The structure of the plant habitat may be more important for nesting than the particular vegetation. For example, bird species that prefer tall, robust vegetation can use cattails, bulrushes, or small willows. All of these nesting habitats for birds are found in the East White Lake ecosystem (see Table 1).

Functionally, birds that use Louisiana wetland ecosystems can be divided into: 1) ducks, 2) geese, 3) wading birds, 4) birds of prey, and 5) other marsh birds.

6.4.1 Ducks and Geese

Ducks and geese, which migrate from the north, are mostly only winter residents in the East White Lake area. The wintering season for these birds was over during this recent field visit, but during our previous December 2010 field visit, it was the height of migratory bird season. During that time, we observed numerous blue-wing teal (*Anas discors*), green-wing teal (*Anas crecca*), mallards (*Anas platyrhynchos*), wood ducks (*Aix sponsa*), pintails (*Anas acuta*), and mergansers (*Mergus merganser*).

6.4.2 Wading Birds

Wading birds are year-round residents in the East White Lake area. These are herons and egrets that are mostly carnivorous. Typically, the two most common wading birds in fresh and intermediate ecosystems are egrets and ibises, which are what we observed in the East White Lake area (see Table 3). The presence of egrets and ibises indicates that there is a sufficient diet of reptiles, amphibians, fish, crustaceans, worms, and insects to support their populations. There is also sufficient habitat of bushes and thickets for them to nest in (see Photo Record Appendix B). The presence of resident egrets and ibises indicates a functioning ecosystem with sufficient prey to support carnivorous birds and sufficient vegetative habitat to support their nesting needs.

Other wading birds we observed included: black-crowned night heron (*Nycticorax nycticorax*), great blue heron (*Ardea Herodias*), tri-colored heron (*Egretta tricolor*), yellow crown night heron (*Tringa flavipes*), and roseate spoonbills (*Platalea ajaja*) (see Table 3).

6.4.3 Birds of Prey and Other Birds

Birds of prey are top predators. We observed osprey at several locations throughout the site (see Table 3). Animals at the top of the food chain would be generally low in numbers or absent in a failing ecosystem. The presence of birds of prey shows that there is sufficient diet to support these predators at East White Lake. We also observed numerous passerine birds, including blackbirds, grackles, swallows, cardinals, doves, and red winged black birds. We observed rails: purple gallinule (*Porphyrio martinica*) and clapper rails (*Rallus longirostris*). We observed seabirds: double crested cormorant (*Phalacrocorax auritus*) and herring gulls (*Larus argentatus*) (see Table 3). The presence of a diverse assemblage of birds indicates a thriving ecosystem.

6.5 Alligators: Top Predator Consumers

Alligators inhabit fresh and slightly brackish waters. A favorite microhabitat for them is wax myrtle thickets, which are found in the East White Lake area. Blue crabs and other crustaceans are major alligator foods, but alligators are also reported to eat birds, fish, insects, and grasses. These diets and habitats are available for alligators in the White Lake area. Alligators were observed during this study in almost all locations we visited (see Table 2 and Photo Record Appendix B).

6.6 Nutria: Herbivore Consumers

A single nutria (*Myocaster coypus*) consumes one-and-a-half to two kilograms of vegetation each day. This diet is available in the East White Lake area and can support these small mammals. Nutria are present in locations T-10, T-07, 1, and 2.

6.7 Deer: Herbivore Consumers

One-third of Louisiana's white-tailed deer (*Odocoileus virqinianus*) population is reported to live in coastal areas, so the East White Lake area is an important habitat for this species. White-tailed deer prefer areas that are slightly elevated such as natural levees and spoil banks which can be used for travel, bedding, and fawning. These types of elevated areas preferred by deer exist in abundance at the site. Deer will eat nearly any plants that are succulent and green. Some types of vegetation commonly eaten by deer that we observed in the East White Lake area are coastal water hyssop (*Bacopa monnieri*) and cattail (*Typha domingensis*). Deer was observed during this study in the habitat area of T-05 (see Photo Record Appendix B). We also observed a deer stand at location 3.

7.0 Discussion of Ecosystem Functions and Services

All observations made during the field study the week of 05/12/14 support the conclusion that the East White Lake ecosystem is healthy, functioning, and provides services to the wildlife population, the human population, and to the watershed itself. These functions are illustrated in the Photo Record Appendix B and discussed in the following sections.

7.1 Demonstration of Function

One way to measure ecosystem functionality is by the presence of appropriate and predicted species. For this site, a good reference for species that may appear at the site can be found in the 2010 Draft Environmental Assessment: A Proposal to Establish a Non-Migratory Flock of Whooping Cranes in Southwestern Louisiana at White Lake Wetland Conservation Area, Vermilion Parish, Louisiana. This Assessment was done by US Fish and Wildlife and LDEQ. It lists species found in the nearby White Lake Conservation Area. Of the species mentioned as occurring in the fresh and intermediate portions of the White Lake Conservation Area, 18 of 29 non-migratory birds and 22 of the 38 plant species listed in the 2010 Draft Assessment were observed at our site. This is a good representation of species considering only a portion of our site was assessed over a three day period, and the White Lake Conservation area includes a total area of 70,965 acres, that has been well-studied.

Another way to assess ecosystem functionality is to identify the abundance or absence of major producers and predators. To illustrate this concept, an environment that has been sprayed with a pesticide or herbicide may be missing arthropods or weeds, as well as the predators that eat them – such as birds. The famous example of this is the absence of singing birds due to spraying massive amounts of DDT in the 50's and 60's. By contrast, in the ecosystem at East White Lake, there are not missing categories of animals and plants. There is an abundance of carnivorous wading birds, such as egrets and herons, which would not be present if their diet of smaller crustaceans, insects, fish and reptiles were absent or meager. There is an abundance of crabs, which indicates that the water quality is sufficient to provide a healthy habitat for the aquatic diet of the crabs. There is an abundance of catfish and gar, which indicates that there is sufficient diet and habitat for these fish that eat smaller organisms. The grasses, trees, shrubs and vines are flourishing. There are no missing portions of the food chain.

Another way to assess the functionality of the ecosystem is to determine if the system is providing the services it should. For example, an intact ecosystem will absorb water from a storm and tides, and will release it back into the waterways to control flooding. Removal of sediments as proposed by the plaintiffs (ICON, 2010) and destruction of onshore vegetation would reduce the ecosystem's ability to provide the water control services that it currently provides. The vegetation, soils, and waterways are currently a natural flood control system able to absorb and release water. Another function of the ecosystem is that it will have submerged and emergent plants that naturally filter the water of nitrogen and other components, improving water quality. Destruction of these plants would affect water quality negatively. Currently the water quality is good as evidenced by abundant aquatic life. A functioning ecosystem provides vegetative habitat and diet for its wildlife residents, which in turn is a service to the human residents who enjoy them. There are currently crab fishermen who use and enjoy the environment for recreation and for commercial income. Destruction of these habitats, as proposed by ICON, would remove recreational value from the ecosystem, reduce species numbers, and reduce income for the local population. These ecosystem functions representing an intact ecosystem are documented in photos and are presented in Appendix B.

7.2 Injury to the Ecosystem due to ICON Excavation/Cement Injection

The plaintiffs have described an excavation plan using a marsh excavator and clam bucket to dig and haul off by barge 75 acres of sediment from the canal bottoms of the ecosystem described in this report. For the purpose of illustration, 75 acres of sediment would fill more than 22,000 18-wheeler trucks. This sediment removal process would include damming off the downstream side of each canal. The sediment the plaintiffs propose to remove is within canals that support abundant crabs, catfish, gar, alligators, deer, herons, egrets, grasses, trees, shrubs, and aquatic plants, as observed between 05/12/14 and 05/14/14. The sediment they propose to remove includes areas near locations T-10, T-05 and T-13, which have recently been demonstrated to be abundant with catfish, gar, alligators, crabs, and diverse vegetation; as well as locations T-07, 4, and 5, which have been recently observed to support birds such as egrets, ibises and red-winged blackbirds, and vegetation such as cattails, oak, and bulltongue arrowhead grasses. A female deer was observed in the vicinity of T-05, which is in the area of ICON's proposed sediment excavation. In addition to the recent species observations, 189 crabs were collected from these canals during the last two weeks of December 2010, in canal locations that are throughout the area that the plaintiffs are planning for excavation (Connelly, 2014).

The destruction of the wetlands and canals would be devastating to the immediate plant and animal life in the canals, as well as to the wading birds and shore animals that depend on fish, reptile, crustacean, and vegetation life in the canals. The areas planned for excavation support abundant life and the excavation would destroy value provided by these ecosystems. Some of the ecosystem services and functions that would be destroyed by the sediment excavation include: loss of recreational fishing and crabbing, loss of commercial crabbing, loss of submerged plants that are a diet for birds and invertebrates, loss of aquatic plants that naturally filter the water quality, destruction of biodiversity by destroying the habitat for fish, crabs and plants, removal of diet for migratory birds, destruction of wading bird and alligator diet, loss of photosynthesis from aquatic algae on submerged plants and sediments, very likely destruction of grasses and edge habitat from instability caused by sediment bottom removal, and therefore associated loss due to edge destruction, such as loss of habitat and shore stabilization.

In addition to excavation of 75 acres of sediment from a functioning and productive ecosystem, the plaintiffs have a plan to inject cement-bentonite grout to a depth of 15 feet through the soils and sediments in the canal area to create underground walls with a cement floor, essentially enclosing a natural area within a giant concrete pool of a size that would hold more than 250,000,000 gallons of water. The cement to create these underground walls would have to be mixed on a barge brought into the canal area and injected through steel pipes every 10 feet. The location for the injection of cement includes areas near location 5 and T-13. In locations 5 and T-13 we observed diverse vegetation including: bulltongue arrowhead, common bulrush, common cattail, common reed, giant cutgrass, trees, shrubs and vines. We also observed wading birds and passerine birds at these two locations. At location T-13, we trapped catfish, crabs and crappie. In 2010, fourteen crabs were trapped at location T-12 (Connelly, 2014), which is in the area of the planned cementing.

Injecting cement into the environment to create an underground cement enclosure wall, where there are currently waterways and terrestrial habitat, destroys function and the services provided currently by those systems. Some of the ecosystem services that would be destroyed by cement injection include: killing the grasses, trees, shrubs, vines, and aquatic plants at the cement injection sites, destruction of the natural habitats and diets for birds and wildlife at the injection sites, changing the water flow and possibly creating flooding or anoxia due to restriction of natural water and oxygen movement and cycling, destruction or increase of edge habitats depending on where the cement injection occurs, addition of greenhouse gases to the atmosphere due to the operation of heavy equipment and barges - affecting local air quality for the wildlife and humans. This cement project, which would change the movement of water, carbon, and oxygen that would typically move naturally through the soil and waters, will have unpredictable effects, but it will certainly unbalance and damage the wildlife habitat.

7.3 Mitigation of Ecosystem Destruction

Excavation of sediment and injection of cement into this ecosystem would require permitting by the US Army Corps of Engineers and the Louisiana Department of Natural Resources, as well as require wetlands mitigation through the mitigation banking process. It is important to note that no mitigation banks are available for this purpose in the Vermilion Parish area. We investigated the availability of a wetlands mitigation bank in the Vermilion Parish area of Louisiana. Specifically, we requested any information on a wetland mitigation bank for coastal fresh or intermediate marshes. We directed our search to the New Orleans District of the US Army Corps of Engineers. We were informed by Mr. Brian W. Breaux of the CEMVN Regulatory Branch that the information we sought would be contained in the Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS) that is searchable on-line. After conducting an on-line search, no wetland mitigation banks were found for coastal fresh or intermediate marshes in the area.

8.0 Summary

The systematic field observations clearly demonstrated that the ecosystem in this area is providing valuable ecosystem services. The emergent vegetation habitat in this ecosystem protects areas further inland by absorbing incoming storm surge, as well as by supporting storage of large volumes of water and maintaining base flow of water in the area. Protection of shoreline and erosion control is another important attribute of this ecosystem. It is clear that this ecosystem is accreting carbon and serving to combat subsidence in this area. This ecosystem has the capability to contribute to maintenance of water quality through nutrient and element transformation as well as retention of sediments and other particulates. This ecosystem is also clearly providing recreation as an ecosystem service as evidenced by the use of this habitat by abundant wildlife and access for recreation. The wildlife habitat and biodiversity supported by this ecosystem is noteworthy. As a result of the exceptional habitat and productivity provided by this ecosystem, commercial and recreational products can be harvested (e.g., fish, crabs, deer, waterfowl, etc.).

The results from this ecosystem assessment, lead to the conclusion that the ecosystem in the East White Lake, Louisiana Oil and Gas Field in Section 16, Township 15 South, Range 1 East, in Vermilion Parish, Louisiana provides valuable ecosystem services for this area of the Gulf coast. This ecosystem is functioning as would be expected for a coastal fresh and intermediate ecosystem in this area. As noted above and supported by the attached assessment report cards along with pictures, this ecosystem provides critical habitat and other ecosystem services that are valuable in the coastal Gulf environment.

To summarize, the East White Lake ecosystem is a highly functional and productive ecosystem that provides a home for wildlife, a source of recreation and income for the human residents, and protection for the neighboring land by way of reducing flood and erosion. ICON’s proposed removal of 75 acres of canal sediments and the installation of a cement underground trap approximately the size of a 250,000,000 gallon pool in a setting where birds, fish and other wildlife are thriving, would be to destroy something that is beautiful and functioning, to produce something that is less habitable, less functional, and less useful for wildlife, humans and the larger coastal environment.

9.0 References

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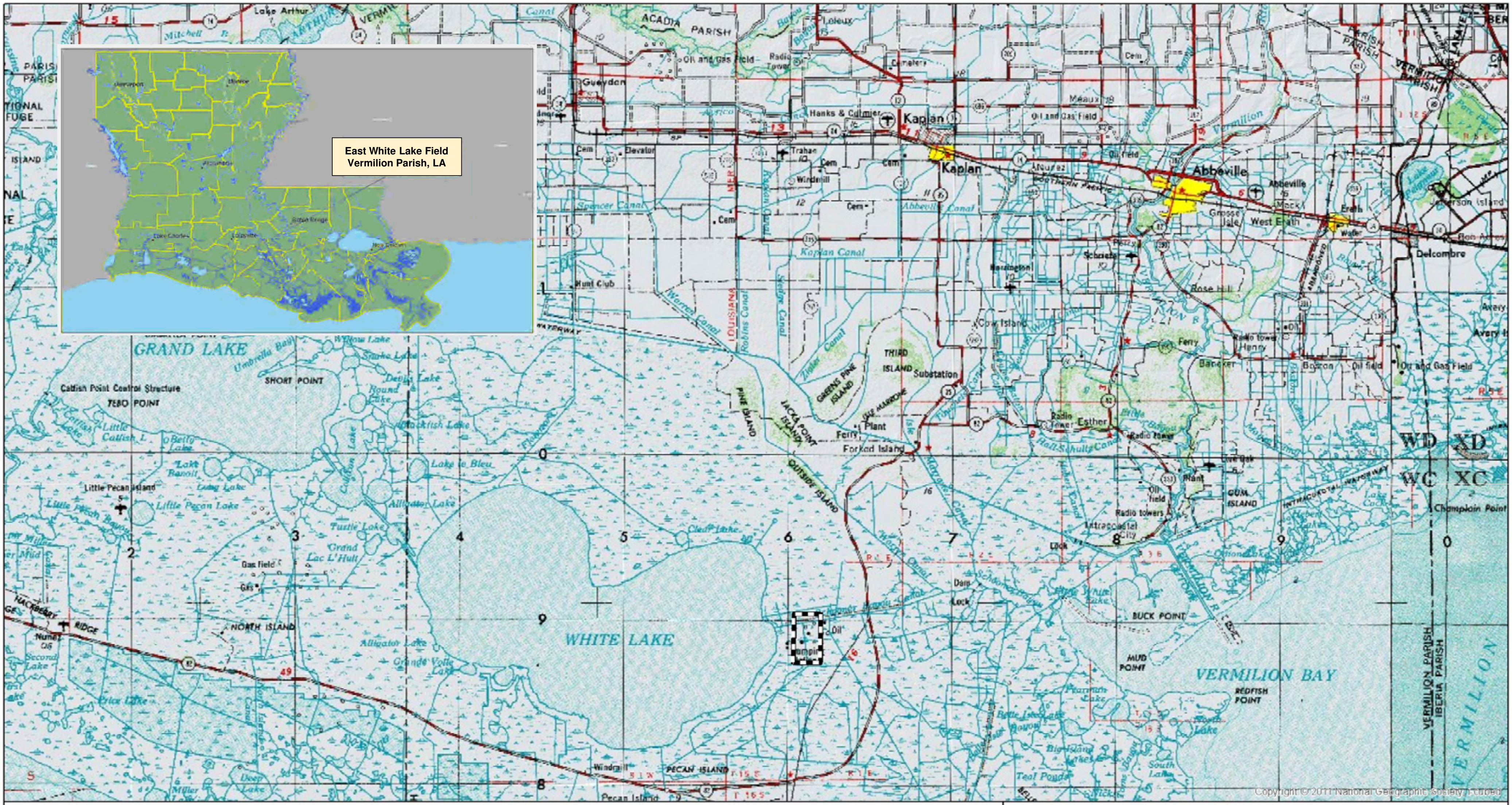
Figures

East White Lake
Vermilion Parish, Louisiana



Legend

▨ Section 16 Township 15 South Range 01 East

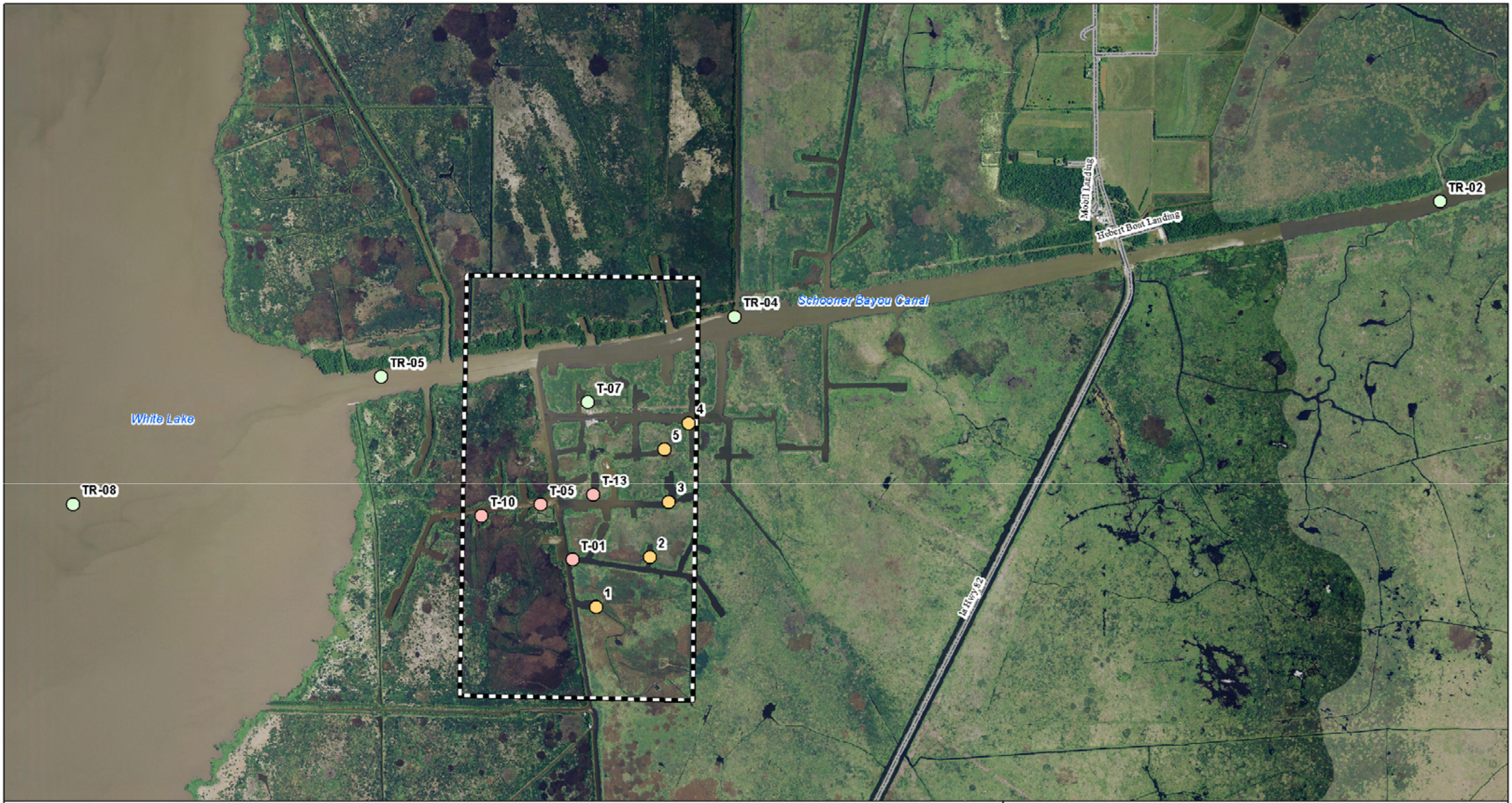
Figure 1
Site Location

East White Lake Oil and Gas Field *Vermilion Parish, Louisiana*

MICHAEL PISANI & ASSOCIATES, INC.

Environmental Consulting Services
Houston, Texas New Orleans, Louisiana Baton Rouge, Louisiana

Designed JDM	Drawn JCS	Checked HPP	Date 05/16/2014	Project 07-47



Legend

Observation Type

- 🟠 Species/functions documentation
- 🟢 Species/functions documentation & crab trap
- 🔴 Species/functions documentation & crab trap & fish trap
- ▨ Section 16 Township 15 South Range 01 East

0 2,000 4,000 6,000 8,000 10,000 Feet

N

Figure 2
Observation Locations

East White Lake Oil and Gas Field *Vermilion Parish, Louisiana*

MICHAEL PISANI & ASSOCIATES, INC.

Environmental Consulting Services
Houston, Texas New Orleans, Louisiana Baton Rouge, Louisiana

Designed: JQM	Drawn: JCS	Checked: HRC	Date: 05/16/2014	Project: 07-47

Tables

East White Lake
Vermilion Parish, Louisiana

Table 1
Vegetation Observed: May 12, 2014 through May 14, 2014

East White Lake
Vermilion Parish, Louisiana

		Observation Locations												
Common Name	*Scientific Name*	*T-01*	*T-05*	*T-07*	*T-10*	*T-13*	*TR-02*	*TR-04*	*TR-05*	*#1*	*#2*	*#3*	*#4*	*#5*
Alligator weed	*Alternanthera philoxeroides*	X	X	X	X	X	X	X	X	X	X	X	X	X
Baccharis	*Baccharis halimifolia*	X		X	X	X		X		X	X	X	X	X
Bald cypress	*Taxodium distichum*							X						
Benthic algae	*various*								X					
Bitterweed	*Helenium amarum*						X							
Black willow	*Salix nigra*		X	X	X	X	X	X	X	X	X	X	X	
Blackberry vine	*Rubus sp.*			X	X	X	X		X	X		X		
Broadleaf cattail	*Typha latifolia*			X	X	X	X	X	X	X	X	X		X
Bulltongue arrowhead	*Sagittaria lancifolia*		X	X	X	X	X	X	X	X	X	X	X	X
Buttercup	*Ranunculus sp.*	X	X		X	X					X	X	X	
Chinese tallow tree	*Triadica sebifera*	X	X	X	X	X	X	X	X	X	X	X	X	X
Coastal bristlegrass	*Setaria corrugata*		X								X			
Coastal waterhyssop	*Bacopa monnieri*									X				
Common cattail	*Typha latifolia*					X								
Common hackberry	*Cletis occidentalis*											X		
Common reed (roseau cane)	*Phragmites australis*		X			X	X	X	X		X	X		
Dwarf spikerush	*Eleocharis parvula*										X			
Epiphytic algae	*various*	X		X	X	X	X		X	X	X	X		
Eurasian watermilfoil	*Myriophyllum spicatum*	X	X	X	X	X	X		X	X	X	X		
Floating heart	*Nymphoides peltata*				X									
Frogs-bit	*Limnobium spongia*					X		X						
Giant Bulrush	*Schoenoplectus californicus*		X		X	X			X	X	X			X
Giant cutgrass	*Cladium mariscus (jamaicense)*	X	X	X	X	X	X	X	X	X	X	X	X	X
Giant ragweed	*Ambrosia trifida*												X	
Giant salvinia	*Salvinia molesta*	X	X		X	X	X	X	X	X	X	X	X	X
Grasses	*Poa sp.*							X		X				
Grassy Arrowhead	*Sagittaria graminea*											X	X	
Groundsel bush	*Baccharis capillifolium*											X		
Japanese honeysuckle	*Lonicera japonica*		X							X		X		
Jesuit's bark	*Iva frutescens*											X		
Lizard tail	*Saururus cernuu* s		X			X								
Narrow leafed cattail	*Typha domingensis*	X		X	X	X	X	X	X	X	X	X		X

Table 1
Vegetation Observed: May 12, 2014 through May 14, 2014

East White Lake
Vermilion Parish, Louisiana

		Observation Locations												
Common Name	*Scientific Name*	*T-01*	*T-05*	*T-07*	*T-10*	*T-13*	*TR-02*	*TR-04*	*TR-05*	*#1*	*#2*	*#3*	*#4*	*#5*
Narrow leaved arrowhead	*Sagittaria filiformis*							**X**						
Pickerel weed	*Pontederia cordata*				**X**	**X**								
Pokeweed	*Phytolacca americana*					**X**				**X**				
Rattlebox	*Sesbania drummondii*	**X**		**X**		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Red maple	*Acer rubrum*	**X**		**X**	**X**	**X**							**X**	
Rigid hornwort	*Ceratophyllum demersum*				**X**									
Sawtooth blackberry	*Rubus argutus*				**X**									
Small dogfennel	*Eupatorium capillifolium*	**X**			**X**	**X**		**X**	**X**	**X**	**X**	**X**	**X**	
Southern blue flag	*Iris virginica*				**X**									
Southern live oak	*Quercus virginiana*	**X**	**X**	**X**				**X**	**X**					
Southern water hemp	*Amaranthus australis*				**X**									**X**
Swamp cabbage	*Sabal Palmetto*					**X**								
Swamp mallow	*Hibiscus moscheutos*	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Swamp morning glory	*lpomoea aquatica*	**X**				**X**					**X**			
Swamp sneezeweed	*Helenium brevifolium*						**X**	**X**						
Three square sedge	*Schoenplectus americanus*				**X**	**X**								
Trumpet creeper	*Campsis radicans*					**X**								
Water lily	*Nuphar lutea*								**X**					
Water Lily	*Nymphaea odorata*									**X**				
Water Pennywort	*Hydrocotyl umbellata*	**X**	**X**	**X**	**X**	**X**	**X**	**X**		**X**		**X**		**X**
Water shield	*Brasenia sp.*		**X**											
Wax myrtle	*Morella cerifera*					**X**		**X**	**X**			**X**		
White oak	*Quercus alba*	**X**	**X**	**X**	**X**	**X**						**X**		

Table 2
Wildlife and Other Species Observed: May 12, 2014 through May 14, 2014

East White Lake
Vermilion Parish, Louisiana

		Observation Locations													
Common Name	*Scientific Name*	*T-01*	*T-05*	*T-10*	*T-13*	*T-07*	*TR-05*	*TR-04*	*TR-02*	*TR-08*	*#1*	*#2*	*#3*	*#4*	*#5*
Aquatic Invertebrates															
Blue crabs	*Callinectes sapidus*	**X**	**X**	**X**	**X**	**X**	**X**	**X**		**X**		**X**		**X**	**X**
Barnacles	*Cirripedia*		**X**												
Fish															
Alligator gar	*Atractosteus spatula*	**X**	**X**	**X**										**X**	
Bass	*Micropterus salmoides*	**X**				**X**					**X**	**X**		**X**	
Black crappie	*Pomoxis nigromaculatus*		**X**	**X**	**X**										
Channel catfish	*Ictalurus punctatus*	**X**	**X**	**X**	**X**		**X**							**X**	
Flathead catfish	*Ictalurus olivaris*	**X**													
Juvenile fish	*various*			**X**		**X**									
Mosquito fish	*Gambusia sp.*		**X**	**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**
Insects															
Carpenter bee	*Xylocopa sp.*	**X**			**X**										
Deerfly	*Chrysops sp.*	**X**		**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**
Dragonfly	*Odonata sp.*	**X**		**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**
Horsefly	*Tebanus sp.*	**X**		**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**
Lovebugs	*Plecia neactica*	**X**		**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**
Wildlife															
Alligator	*Alligator mississippiensis*	**X**	**X**	**X**		**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**
Bronze frog	*Rana c. clamitans*							**X**					**X**		
Brown frog	*Rana sp.*										**X**				
Bullfrog	*Lithobates catesbeianus*			**X**	**X**	**X**	**X**		**X**		**X**	**X**	**X**	**X**	**X**
Deer	*Odocoileus virqinianus*		**X**												
Nutria	*Myocaster coypus*			**X**		**X**					**X**	**X**			

Table 3
Birds Observed: May 12, 2014 through May 14, 2014

East White Lake
Vermilion Parish, Louisiana

		Observation Locations													
Common Name	*Scientific Name*	*T-01*	*T-05*	*T-07*	*T-10*	*T-13*	*TR-02*	*TR-04*	*TR-05*	*TR-08*	*#1*	*#2*	*#3*	*#4*	*#5*
Birds of Prey															
Osprey	*Pandion halietus*	**X**		**X**		**X**	**X**				*X*				
Herons															
Black-crowned night heron	*Nycticorax nycticorax*	**X**													
Cattle egret	*Bubulcus ibis*					**X**		**X**							
Egret	*Egretta intermedia*	**X**	**X**	**X**		**X**			**X**		**X**			**X**	**X**
Great blue heron	*Ardea herodias*	**X**			**X**										
Great egret	*Ardea alba*				**X**							**X**	**X**		**X**
Tri-colored heron	*Egretta tricolor*											**X**			
Yellow crown night heron	*Tringa flavipes*						**X**								
Passerine Birds															
Bank swallow	*Riparia riparia*	**X**		**X**	**X**							**X**			
Blackbirds	*Turdus sp.*											**X**		**X**	**X**
Cliff swallow	*Petrochelidon pyrrhonota*	**X**		**X**			**X**							**X**	**X**
Grackle	*Quiscatus quiscula*	**X**									**X**	**X**			**X**
Mockingbird	*Mimus ployglottos*											**X**			
Mourning dove	*Zenaida macroura*			**X**	**X**	**X**		**X**	**X**			**X**			**X**
Northern cardinal	*Cardinalis cardinalis*				**X**			**X**				**X**			
Red winged black bird	*Agelaius phoeniceus*	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**
Rails															
Clapper rail	*Rallus longirostris*								**X**			**X**			
Common gallinule	*Gallinula galeata*											**X**			
Purple gallinule	*Porphyrio martinica*					**X**									
Virginia rail	*Rallus limicola*											**X**			
Seabirds															
Double crested cormorant	*Phalacrocorax auritus*	**X**		**X**	**X**	**X**			**X**		**X**	**X**		**X**	**X**
Herring gull	*Larus argentatus*			**X**	**X**										
Tree-dwelling birds															
Red bellied woodpecker	*Melanerpes carolinus*			**X**							**X**	**X**	**X**		
Wading birds															
American white ibis	*Eudocimus albus*	**X**			**X**					**X**		**X**	**X**	**X**	**X**
Roseate spoonbill	*Platalea ajaja*	**X**		**X**							**X**		**X**		
White faced ibis	*Plegadis chihi*		**X**												**X**

Table 4
All Species Observed: May 12, 2014 through May 14, 2014

East White Lake
Vermilion Parish, Louisiana

Common Name	Observation Locations													
	T-01	T-05	T-07	T-10	T-13	TR-02	TR-04	TR-05	TR-08	1	2	3	4	5
algae (epiphytic)	X			X	X	X		X		X	X	X		
algae (sediment surface)								X						
alligator	X	X	X	X		X	X	X		X	X	X	X	X
alligator gar	X	X		X									X	
alligator weed	X	X	X	X	X	X	X	X		X	X	X	X	X
American white ibis				X					X			X	X	X
baccharis	X		X	X	X		X			X	X	X	X	X
bald cypress							X							
bank swallow	X		X	X							X			
barnacles		X												
bass	X		X							X	X		X	
bitterweed						X								
black crappie		X			X									
black headed night heron	X													
black willow		X	X	X	X	X	X	X		X	X	X	X	
blackberry vine			X	X	X	X		X		X		X		
blackbirds											X		X	X
blue catfish								X						
blue crabs	X	X	X	X	X		X	X	X		X		X	X
blue heron	X			X										
broadleaf cattail			X	X	X	X	X	X		X	X	X		X
bronze frog												X		
brown frog										X				
bullfrog			X	X	X	X	X	X		X	X	X	X	X
bulltongue arrowhead		X	X	X	X	X	X	X		X	X	X	X	X
buttercup	X	X		X	X						X	X	X	
cardinal				X			X				X			
carpenter bee	X				X									
cattle egret					X		X							
channel catfish	X				X			X					X	
Chinese tallow tree	X	X	X	X	X	X	X	X		X	X	X	X	X
clapper rails								X			X			
cliff swallow	X		X	X		X							X	X
coastal bristlegrass		X									X			
coastal water hyssop										X				
common cattail					X									
common gallinule											X			
common hackberry												X		
common reed (roseau cane)		X			X	X	X	X			X	X		
deer		X												
deerfly	X		X	X	X	X	X	X		X	X	X	X	X
double crested cormorant	X		X	X	X			X		X	X		X	X
dragonfly	X		X	X	X	X	X	X		X		X	X	X
dwarf spikerush											X			
egret	X	X	X		X			X		X			X	X
eurasian watermilfoil	X	X	X	X	X	X		X		X	X	X		
flathead catfish	X													
floating heart				X										
frogs-bit					X		X							
giant bulrush		X		X	X			X		X	X			X
giant cutgrass	X	X	X	X	X	X	X	X		X	X	X	X	X
giant ragweed													X	
giant salvinia	X	X		X	X	X	X	X		X	X	X	X	
grackle	X									X	X			X
grassy bulltongue arrowhead												X	X	
great egret				X							X	X		X
groundsel bush												X		
herring gull			X	X										
horsefly	X		X	X	X	X	X	X		X	X	X	X	X

Table 4
All Species Observed: May 12, 2014 through May 14, 2014

East White Lake
Vermilion Parish, Louisiana

	Observation Locations													
Common Name	T-01	T-05	T-07	T-10	T-13	TR-02	TR-04	TR-05	TR-08	1	2	3	4	5
Japanese honeysuckle		**X**								**X**		**X**		
jesuit bark												**X**		
juvenile fish			**X**	**X**										
lizard's tail		**X**			**X**									
lovebugs	**X**		**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**
mockingbird											**X**			
mosquito fish		**X**	**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**
mourning dove			**X**	**X**	**X**			**X**			**X**			**X**
narrow leafed cattail	**X**		**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**		**X**
narrow leaved arrowhead							**X**							
nutria			**X**	**X**						**X**	**X**			
oak	**X**	**X**	**X**				**X**	**X**						
osprey	**X**		**X**		**X**	**X**				**X**				
pickerel weed				**X**	**X**									
poa							**X**			**X**				
pokeweed					**X**					**X**				
purple gallinule					**X**						**X**			
rattlebox			**X**		**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**
red bellied woodpecker			**X**							**X**	**X**	**X**		
red maple	**X**		**X**		**X**								**X**	
red winged black bird	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**
rigid hornwort				**X**										
roseate spoonbill	**X**		**X**							**X**		**X**		
sabal palmetto (swamp cabbage)					**X**									
sawtooth blackberry				**X**										
small dogfennel	**X**			**X**	**X**		**X**	**X**		**X**	**X**	**X**	**X**	
southern blue flag				**X**										
southern water hemp				**X**										**X**
swamp mallow		**X**	**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**
swamp morning glory	**X**				**X**						**X**			
swamp sneezeweed						**X**	**X**							
three square sedge				**X**	**X**									
tri-colored heron												**X**		
trumpet creeper					**X**									
virginia rail											**X**			
water lily (nuphar)								**X**						
water lily (nymphea)										**X**				
water Pennywort	**X**	**X**	**X**	**X**	**X**	**X**	**X**			**X**		**X**		**X**
watershield		**X**												
wax myrtle					**X**		**X**	**X**				**X**		
white faced ibis		**X**												**X**
white oak	**X**	**X**	**X**	**X**	**X**							**X**		
yellow crown night heron						**X**								

Helen Connelly and John Rodgers
Curriculum Vitae
Appendix A

East White Lake
Vermilion Parish, Louisiana

Helen R. Connelly, Ph.D.

Fields of Competence

Environmental Toxicology
Human Health Risk Assessment
Ecological Risk Assessment
Freshwater and Estuarine Field Studies
Project Management
LDEQ RECAP Risk Assessment
Freshwater Fish Culturing
Conservation Biology

Experience Summary

Twelve years experience in environmental, human health and ecological risk assessment. Seven years experience in college academic instruction

Credentials

B.S., Geology, Louisiana State University, Baton Rouge, Louisiana
Ph.D., Environmental Toxicology/Veterinary Medical Sciences, Louisiana State University School of Veterinary Medicine, Baton Rouge, Louisiana

Professional Affiliations

Baton Rouge Geological Society
American Association of University Women
College Board Advanced Placement Environmental Science Certified Instructor
College Board Advanced Placement Human Geography Certified Instructor
Society of Environmental Toxicology and Chemistry

Publications

Connelly, Helen and Means, Jay C., Sep 2010, Immunomodulatory Effects of Dietary Exposure to Selected Polycyclic Aromatic Hydrocarbons in the Bluegill (*Lepomis macrochirus*), International Journal of Toxicology Volume: 29 Issue: 5 Pages: 532-545.

Key Projects

Performed risk assessment for a lead-impacted scenic bayou near a major petroleum refinery in St. Charles Parish. Calculated health risks to hunters and fishers consuming fish, crabs and game from the bayou area. Used the Integrated Exposure Uptake Biokinetic (IEUBK) model and the Adult Lead Model to assess lead risks.

Estimated the toxicity and calculated risk based standards for more than 150 compounds, including many tin compounds, for which no RECAP standards exist at a chemical plant in South Louisiana. Used chemically similar compounds with known toxicities as proxies for compounds with limited toxicity information.

Calculated the human health risk associated with exposure to sediments containing lead, arsenic, cadmium, and chromium at a former shipyard in St. Mary Parish located on a major river.

Worked collaboratively with the in-house research division of a large petrochemical company in St. Charles Parish to complete the risk assessment portions of a RCRA Corrective Measures Study Work Plan. Included assessment of chlorinated compounds in groundwater.

Completed a human health risk assessment/expert report for an operating shipyard and barge repair facility in Mobile, Alabama for litigation support. Developed RfD toxicity values for compounds that did not currently have published values. Assessed lead exposure using the Integrated Exposure Uptake Biokinetic (IEUBK) model and the Adult Lead Model.

Established human health exposure pathways and receptors and/or calculated site specific RECAP standards for the following sites: creosoting wood treatment facility, dry cleaning establishment, former industrial waste disposal site with onsite daycare center, gasoline spill site, paper mill, and former exploration and production sites.

Key Projects (continued)

Planned and executed two crawfish collection studies in surface waters in St. Charles Parish in ditches impacted with chlorinated compounds, benzene and other organic compounds. Prepared an analysis of crawfish abundance as affected by drought and surface water contaminants.

Initiated a preliminary human health and ecological risk screening of a heavily TPH impacted canal in St. Charles Parish. Compared sediment, water, and sheen concentrations in the samples collected to proxy MO-1 human health standards and NOAA SQUIRT standards. Attempted electrofishing sample collection, but the conductivity of the water was prohibitive.

Planned, collected and analyzed soil and ground water samples for a major petrochemical client in response to their request for RECAP compliant assistance with a pipeline spill near a sugar cane field. Analyzed reported constituent concentrations using LDEQ RECAP Screening Standards and prepared RECAP compliant report for submittal to LDEQ.

Designed a conceptual site model compliant with US EPA Region 6 Corrective Action Strategy guidelines to assist a client with a site impacted with lead. Model is based on the fate and transport mechanisms specific to lead released from a smelter via dust. Receptors included a natural stream running through the facility and residents in an adjacent upper income neighborhood.

Evaluated health risks to pipeline workers installing a pipeline thirty feet below ground surface at a Superfund site in an area with thick clays. Superfund surface contaminates included heavy metals and carcinogens. Considered inhalation, dermal and ingestion routes of exposure to workers. Established the likely geology at depth based on research of the area. Estimated the potential for constituents to migrate from the pipeline excavation via groundwater to other areas. Wrote a letter to EPA for the client to obtain approval for the pipeline installation. Approval was granted by EPA.

Designed and successfully executed a fish toxicity study to evaluate the effects of polycyclic aromatic hydrocarbons (PAH) found in energy related wastes, such as oil spills, on the proliferative behavior of immune cells in a native fish model (lepomis macrochirus). Collected large bluegill from the LSU lakes using electrofishing. Maintianed the fish in indoor tanks. Collected white blood cells from fish after feeding them a diet of 2-methylnaphthalene, 9,10-dimethylanthracene, and 2-aminoanthracene for a period of weeks. Published the results in the International Journal of Toxicology.

Analyzed crab weight, size, and fullness as related to crab habitat characteristics in a study area of natural bayou, lake, and marsh ecosystems, as well as man-made oilfield canals. Collected crabs and fish as part of a team of risk assessors working on a study of heavy metal toxicity in aquatic organisms. Reported the crab and fish collection techniques in a detailed sampling methods report.

Researched and prepared toxicity expert reports for human exposures to two different compounds: carbon monoxide and gluteraldehyde, both for litigation not in the petrochemical industry. Was deposed for opinion each time.

Challenged LDEQ on their position with regard to protocol concerning frozen fish tissue holding time to assist client and to engage best available science. Used research regarding the history and basis for the holding time protocol, along with the most current research in the field. Was successful in negotiations with LDEQ on the issue.

Challenged LDEQ on their position with regard to the definition of surface soil to assist a client with a daycare center, and to engage best available science. Used research based on EPA large scale surface soil studies with children. Was successful in negotiations with LDEQ on the issue.

Performed a crawfish ingestion analysis based on locals eating crawfish from a ditch impacted with low levels of chlorinated compounds, benzene and other organic compounds for presentation to LDEQ for a petrochemical client. Used LDEQ ingestion and exposure parameters to demonstrate acceptable risk in consuming crawfish.

Assisted in writing and publishing LDEQ community relations newsletters and planning town meetings in order to communicate health risks associated with Superfund sites and other inactive and abandoned sites with nearby residents. Provided public health information to communities surrounding Superfund sites such as Old Inger, Lincoln Creosote, and Combustion.

Wrote air sampling and analysis plan to evaluate airborne volatile hydrocarbons in the area of a residence near an underground petroleum pipeline. Researched and described best current technology for air sample collection and for identifying low levels of compounds in air. Calculated protective health-based standards for these hydrocarbon concentrations in air based on LDEQ guidelines.

Executed a complex ecological risk assessment of a fresh marsh environment for an expert report. Managed all phases of the risk assessment from the initiation of sample collection planning to the final calculations of risk. Used innovative statistical methods to identify background concentrations, extensive research to identify freshwater marsh-specific/animal-specific exposure parameters, industry-specific analyses to differentiate compound toxicities, and calculations to determine the effects of organic carbon on hydrocarbon toxicity. Risk assessment included calculating risks to native animals due to measured levels of metals in sediments and soils in a setting frequented by recreational hunters and fishermen.

Key Projects (continued)

Completed a human health risk assessment of recreational exposure to hydrocarbons and metals in a flooded fresh marsh environment for an expert report. Followed LDEQ RECAP protocol to calculate standards and to assess risk in a limited access environment. The risk assessment assumed exposure to soils and sediments and used both screening and MO-1 standards.

Calculated human health risk using LDEQ RECAP protocol for two agricultural sites of former and current oil and gas production in the Alexandria area. Both sites had salt impacted soils and groundwaters. Used identified background concentrations for groundwater standards in one assessment and determined groundwater would not pass MO-1 standards in the other assessment. Soil was evaluated using Screening standards and MO-1 standards for metals and hydrocarbons. LDNR standards and SPLP methods were used to assess salt in soils, and to delineate areas of impact. Both projects involved collaboration with environmental scientists from many disciplines all working together on the projects. Both projects involved managing, analyzing and reporting on large data sets. Wrote portions of risk assessment for both reports, including the RECAP standards calculations for both reports.

Calculated human health risk due to an airborne catalyst release from a major petrochemical refinery on the Gulf Coast for an expert report. Potentially exposed receptors included neighborhood residents adjacent to the refinery. Risk was calculated to be within acceptable levels by comparing EPA National Ambient Air Quality Standards (NAAQS) for particulate matter (PM_{10}) to PM_{10} data from the nearby LDEQ monitoring station and to modeled air concentrations. Wipe sample data was collected from surfaces in the neighborhood, and were found to be in concentrations below US Army wipe standards. The health portion of this lawsuit was dropped by opposing counsel on the day that my deposition on the matter was to occur.

Calculated human health risk due to an airborne SO_2 and H_2S release from a major petrochemical refinery on the Gulf Coast for an expert report. Potentially exposed receptors included neighborhood residents adjacent to the refinery. Health risks were calculated to be within acceptable levels by comparing LDEQ monitoring station data and air data collected in the neighborhood to protective standards. Protective standards were calculated using exposure studies from the scientific literature. All measured SO_2 and H_2S levels were below protective standards. The two parties resolved this case prior to my deposition being taken.

Prepared a human health risk assessment for recreational (swimming) exposure by children to creek surface water. The compounds of concern were benzene and methyl tert butyl ether (MTBE), due to an historical pipeline release of gasoline. Protective standards for creek surface water were calculated, using EPA guidelines, to represent concentrations that did not pose unacceptable risk of cancer. The setting for this risk assessment was a natural creek in a wooded area. There was 10 years of data for this evaluation, which reduced some levels of uncertainty normally present in a risk assessment. All concentration data for the stream was below conservative protective standards.

1/2014

CURRICULUM VITAE

John H. Rodgers, Jr.

BIRTHDATE:	February 1, 1950
BIRTHPLACE:	Dillon County, South Carolina, U.S.A.
SSN:	Available on request
MARITAL DATA:	Wife's maiden name - Martha W. Robeson Children - Daniel Joseph Rodgers (Born January 16, 1978) Frank Clifford Rodgers (Born July 7, 1985)
HOME ADDRESS:	102 Santee Trail Clemson, SC 29631 Telephone: (864) 653-3990
PRESENT POSITION:	Professor School of Agricultural, Forest and Environmental Sciences Clemson University Director, Ecotoxicology Program Co-Director, Energy and Environment Program School of Agricultural, Forest and Environmental Sciences Clemson University
PRESENT ADDRESS:	School of Agricultural, Forest and Environmental Sciences PO Box 340317 261 Lehotsky Hall Clemson University Clemson, SC 29634-0317 Telephone: (864) 656-0492 Fax: (864) 656-1034 Cell-phone: (864) 650-0210 E-mail: jrodger@clemson.edu
EDUCATION:	Virginia Polytechnic Institute and State University, Blacksburg, VA, Ph.D. Degree, Botany, Aquatic Ecology, 1977.

Clemson University, Clemson, SC,
M.S. Degree, Botany, Plant Ecology, 1974.

Clemson University, Clemson, SC,
B.S. Degree, Botany, 1972.

PROFESSIONAL EXPERIENCE:

Clemson University (1998-present):

Professor, School of Agricultural, Forest and Environmental Sciences
Director, Ecotoxicology Program
2003 – Present.

Director, Clemson Institute of Environmental Toxicology
Chair, Department of Environmental Toxicology
Professor, Department of Environmental Toxicology
Co - Director, Clemson Environmental Institute
1998 - 2003.

University of Mississippi:
(Department of Biology)

Professor, Department of Biology,
1989 - 1998.
Director, Ecotoxicology Program,
1995 – 1998.
Adjunct Research Professor, Research Institute for Pharmaceutical Sciences,
1989 - 1998.
Director, Biological Field Station,
1990 – 1995.
Director, Center for Water and Wetland Resources,
1993 – 1995.
Associate Director, Biological Field Station,
1989 - 1990.

University of North Texas:
(Division of Environmental Sciences,
Department of Biological Sciences)
Director, Water Research Field Station,
1987 - 1989.
Associate Professor, Department of Biological Sciences,
1985 - 1989.
Associate Director, Institute of Applied Sciences,

1982 - 1988.
Assistant Professor, Department of Biological Sciences, 1982 - 1985.
Research Scientist II, Institute of Applied Sciences, 1979 - 1981.

East Tennessee State University:
(Department of Environmental Sciences,
Aquatic Ecology Section)

Assistant Professor, 1978 - 1979.

Virginia Polytechnic Institute and State University:
(Biology Department, Center for
Environmental Studies)

Postdoctoral Research Associate, 1977 - 1978.
Research Assistant- Energy Research and Development Administration, 1975 - 1977.

Clemson University (1972-1974):
(Botany Department)

Research Assistant - Water Resources Research Institute, 1972 - 1974.
Laboratory Teaching Assistant – Plant Physiology, Plant Ecology, Biological Oceanology, Botany, 1972 - l974.

MILITARY SERVICE:

Distinguished Military Graduate, Clemson University, 1972.
U.S. Air Force Reserve, Second Lieutenant, 1972 - 1975.
U.S. Air Force Reserve, First Lieutenant, 1975 - 1978.
U.S. Air Force Reserve, Captain, 1978 - 1984.

U.S. Air Force (Active Duty), June 1 - August 29, 1976.
U.S. Air Force, Honorable Discharge, 1984.
Pilot Certificate - 34 hours, Single engine aircraft.

RESEARCH
SUPPORT:

Clemson University (1972-1974):

Research Assistantship, Water Resources Institute, Project No. B-053-SC ($42,000), 1972 - 1974. Impact of Thermal Effluent from a Nuclear Power Plant on Reservoir Productivity.

Thesis Parts Award, USAEC, The E.I. DuPont de Nemours & Co., Savannah River Laboratory (Thermal Effects Laboratory), Aiken, S.C., 1973-1975. Effects of Elevated Temperatures on Periphyton Productivity in Lotic Aquatic Ecosystems.

Savannah River Laboratory, Research Assistantship, Research Contract USAEC Funding ($50,000), 1973-1975. Impacts of Ash from Coal Combustion on Swamp Receiving Systems.

Virginia Polytechnic Institute and State University:

Research Assistantship, Research Contract, American Electric Power Corporation Funding ($93,000), 1974-1975. Thermal Tolerances and Electivities of Fish Adjacent to a Coal-Fired Power Plant.

Research Assistantship, Research Contract, Energy Research and Development Administration Funding ($112,000),1975 - 1976. Structural and Functional Responses of Aquatic Communities to Power Generation.

Research Assistantship, Research Contract, Energy Research and Development Administration Funding ($132,000),1976 - 1977. Responses of Aquatic Communities to Perturbations Associated with Power Generation.

Co-principal Investigator, Research Contract, Water Resources Research Institute Funding ($68,000), 1977 - 1979. Environmental Tolerances of *Corbicula fluminea* from the New River, Virginia.

East Tennessee State University:

Principal Investigator, Research Contract, ETSU Research Development Committee Funding ($3,270), 1978 - 1979. Primary Production and Nutrient Dynamics in the Watauga River, Tennessee.

Oak Ridge Associated Universities Travel Contract, 1978 - 1979. Impacts of Power Production on Aquatic Ecosystems of Savannah River Laboratory.

University of North Texas:

Co-Principal Investigator, Research Contract, Chemical Manufacturers' Association Funding ($80,000), 1979 - 1980. Modeling the Fate of Chemicals in Aquatic Environments.

Principal Investigator, Research Contract, NTSU Faculty Research Grant Funding ($4,000), 1979 - l980. Biotransformation of Xenobiotics in Aquatic Systems.

Co-principal Investigator, Research Contract, International Paper Company Funding ($149,530), 1980 - 1981. Impacts of Paper Mill Effluent on Aquatic Ecosystems.

Co-principal Investigator, Research Contract, Victor Equipment Company Funding ($5,000), 1980. Optimization of Packaged Waste Treatment System for Metal Removal.

Co-principal Investigator, Research Contract, International Paper Company Funding ($171,830),1980 -1981. Investigation of Pre- and Post-Operational Effects of a Paper Mill on Aquatic Systems.

Principal Investigator, Research Contract, NTSU Faculty Research Grant Funding ($4,620), 1980 - 1981. Predicting Bioconcentration of Chemicals by Aquatic Organisms.

Co-principal Investigator, Research Contract, Chemical Manufacturers' Association Funding ($30,000), 1981. Validation of Chemical Fate Models for Aquatic Ecosystems.

Co-principal Investigator, Research Contract, U.S. Environmental Protection Agency Funding ($305,866), 1981 - 1983. Development of a Decision Support System for Integrated Management of Nuisance Aquatic Vegetation.

Principal Investigator, Research Contract, NTSU Faculty Research Grant Funding ($3,600), 1981-1982. Fate and Effects of the Herbicide, Endothall, in Aquatic Systems.

Co-principal Investigator, Research Contract, Chemical Manufacturers' Association Funding ($59,985), 1981 - 1982. Studies of Fate and Effects of Chemicals in Aquatic Ecosystems.

Co-principal Investigator, Research Contract, International Paper Company Funding ($113,000), 1982. Effects of Paper Mill Effluent on Aquatic Ecosystems.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($24,500), 1982. Ecosystem Study of Pat Mayse Lake, A Southwestern Reservoir.

Co-principal Investigator, Research Contract, International Paper Company Funding ($348,926), 1982 - 1985. Further Studies of Effects of Paper Mill Effluent on Aquatic

Ecosystems.

Principal Investigator, Research Contract, NTSU Faculty Research Grant Funding ($3,500), 1982 - 1983. Proximate Oxygen Demand of Aquatic Plants.

Co-principal Investigator, Research Contract, U.S. Environmental Protection Agency Funding ($199,500), 1982 - 1983. Validation of Decision Support Systems for Integrated Management of Nuisance Aquatic Vegetation.

Co-principal Investigator, Research Contract, American Petroleum Institute ($83,809), 1981 - 1982. Bioavailability of Petroleum-Derived Chemicals in Aquatic Ecosystems.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($25,000), 1983. Further Studies: Pat Mayse Lake, A Southwestern Reservoir.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($1,000), 1983. Remote Sensing of Aquatic Vegetation in Pat Mayse Lake.

Co-principal Investigator, Research Contract, Shell Development Company Funding ($17,000), 1983. Impact of Petroleum Compounds on Aquatic Organisms.

Principal Investigator, Research Contract, NTSU Faculty Research Grant Funding ($4,500), 1983 - 1984. Threshold Responses of Aquatic Vegetation to Herbicides.

Co-principal Investigator, Research Contract, Shell Development Company Funding ($29,758),1984. Inter-Laboratory Comparison of Bioassays Using Freshwater and Marine Organisms.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($20,000), 1984. Water Quality Monitoring and Aquatic Vegetation in Pat Mayse Lake.

Principal Investigator, Research Contract, Pennwalt Corporation Funding ($11,500), 1984. Comparative Study of Two Aquatic Herbicides.

Principal Investigator, Research Contract, Shell Oil and Chemical Company Funding ($14,000). Aquatic Toxicology Studies for the Petrochemical Industry.

Principal Investigator, Research Contract, Dallas County Utility and Reclamation District Funding ($12,000), 1984 - 1985. Eutrophication Potential in an Impoundment Receiving Wastewater.

Co-principal Investigator, Research Contract, Shell Development Company Funding ($31,797), 1985. Development of Data on Proper Selection of Bioassay Species.

Co-principal Investigator, Research Contract, Texas Instruments, Inc. Funding (approximately $12,000, equipment), 1985. Development of Expert Systems for Water Quality Management.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($24,500), 1985. Development of a Water Quality Model and Lake Management Strategy for Pat Mayse Lake.

Co-principal Investigator, Research Foundation Award, Shell Research Foundation ($15,000), 1985. The Response of Marine and Freshwater Species to Xenobiotics.

Principal Investigator, Research Contract, NTSU Faculty Research Grant Funding ($2,700), 1986 - 1987. Experimental Analysis of Bioassay Methods.

Co-principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($168,693), 1986 - 1987. Ecological Analysis of the Lake Ray Roberts Project Site.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding, ($68,000), 1986 - 1987. Coupling an Environmental Fate and Effects Model for 2, 4-D and Water Hyacinth.

Co-principal Investigator, Research Contract, Shell Research Foundation Funding ($15,000), 1986. Osmoregulation in Marine Bioassay Species.

Principal Investigator, Research Contract, American Petroleum Institute Funding ($8,000), 1986. Evaluation of Marine Bioassay Species.

Principal Investigator, Research Contract, American Petroleum Institute and U.S. Environmental Protection Agency Funding ($10,000), 1986. A Workshop on Culture and Life History of *Mysidopsis* sp.

Co-principal Investigator, Research Contract, Shell Research Foundation Funding ($20,000), 1987. Sediment Organic Carbon Content in Aquatic Systems of the U.S.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($24,500), 1987 - 1988. Endothall Fate and Effects on *Myriophyllum spicatum* in Pat Mayse Lake, Texas.

Co-principal Investigator, Research Contract Hoechst-Roussel Agri-Vet (Hoechst-Celanese) Co. Funding ($185,000), 1987 - 1988. Development of Mesocosms and Water Research Field Station.

Co-principal Investigator, Research Contract, City of Dallas Funding ($319,964), 1987 - 1989. Ecological Survey and Study of the Trinity River, Texas.

Co-principal Investigator, Research Contract, Hoechst-Roussel Agri-Vet (Hoechst-

Celanese) Co. Funding ($325,000), 1988 - 1989. Fate and Effects of Tralomethrin in Mesocosms.

Co-principal Investigator, Research Contract, Hoechst Roussel Agri Vet (Hoechst--Celanese) Co. Funding ($185,000), 1988 - 1989. Further Development of Mesocosms and Water Research Field Station.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($24,500), 1988 - 1989. Further Development of a Water Quality Model and Lake Management Strategy for Pat Mayse Lake.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($24,550), 1988 - 1989. Research on SONAR in Pat Mayse Lake.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($107,000), 1988-1989. Water Research Field Station-Coupling a Herbicide Fate and Effects Model.

Principal Investigator, Research Contract, Pennwalt Corporation ($2,000), 1988-1989. Degradation of Endothall by Chlorine.

Co-principal Investigator, Research Contract, Mobay Corporation ($852,000), 1988-1990. Fate and Effects of Cyfluthrin in Mesocosms.

Co-principal Investigator, Research Contract, Shell Development Corporation ($55,000) 1989-1990. Bioavailability of Sediment-sorbed Chemicals to Freshwater Organisms.

University of Mississippi:

Principal Investigator, Research Contract U.S. Army Corps of Engineers - Tulsa District Funding ($24,500), 1988-1989. Limnology and Aquatic Botany of Pat Mayse Lake, Texas.

Principal Investigator, Research Contract, Shell Development Company Funding ($50,000), 1989-1990. Evaluation of Sediment Toxicity Testing Procedures.

Co-principal Investigator, Research Contract Soil Conservation Service Funding ($50,000), 1990-1991. Wetlands for Interception and Processing of Pesticides in Agricultural Runoff.

Co-principal Investigator, Research Contract Tennessee Valley Authority Funding ($171,410), 1990-1991. Analysis of Aquatic Herbicides in Lake Guntersville, Alabama for the Aquatic Plant Management Program.

Principal Investigator, Research Contract, Ciba Giegy Corporation Funding ($31,000), 1990. Effects of Atrazine on Aquatic Vascular Plants.

Co-principal Investigator, Research Contract, Dow-Elanco Corporation Funding ($40,000), 1990. Analysis of Fluridone in Florida Aquatic Plant Management Programs.

Principal Investigator, Research Contract, U.S. Environmental Protection Agency - Gulf of Mexico Program ($17,565) 1990-1991. Assistance with the Citizen's Advisory Group of the Gulf of Mexico Program.

Co-principal Investigator, CHP International, Inc. (U.S. Peace Corps) Funding ($22,000), 1990. Aquaculture Training Sessions for Volunteers for Africa.

Co-principal Investigator, University of Mississippi Funding ($1,000), 1989-1990. Water Systems for an Aquatic Toxicology Laboratory.

Principal Investigator, Internal Equipment Funding, University of Mississippi Associates Funding ($25,000), 1990-1991. Aquisition of an Ion Chromatograph/High Performance Liquid Chromatograph.

Principal Investigator, U.S. Army Corps of Engineers, Waterways Experiment Station Funding ($250,000), 1990-1993. Development of Controlled Release Herbicides for Aquatic Use.

Principal Investigator, American Petroleum Institute Funding, ($250,000), 1990 -1992. Reference Toxicants and Reference Sediments for Sediment Toxicity Testing.

Principal Investigator, Research Contract, Tennessee Valley Authority Funding ($168,000), 1991-1992. Aquatic Herbicides in Guntersville Reservoir, Alabama - National Demonstration Project.

Co-principal Investigator, Research Contract, U.S. Department of the Army, Vicksburg District, Corps of Engineers Funding ($96,036), 1991-1992. Monitoring Water Quality at Arkabutla, Enid, Grenada, and Sardis Lakes.

Principal Investigator, Research Contract, ABC Laboratories, Inc. and Zoecon Corporation Funding ($10,000), 1991. Outdoor Microcosm Study of an Insect Growth Regulator.

Co-principal Investigator, Research Contract, Shell Development Company Funding ($192,000), 1991-1993. Development of a Model Stream Facility and Evaluation of the Environmental Safety of a Surfactant.

Principal Investigator, Research Contract, U.S. Army Waterways Experiment Station

Funding ($25,000), 1991-1992. Evaluation of New Herbicide Delivery System for Control of Aquatic Plants.

Principal Investigator, Research Contract, U.S. Army Waterways Experiment Station Funding ($64,000), 1992-1993. Evaluation of New Herbicide Delivery Systems for Control of Aquatic Plants.

Principal Investigator, Research Contract, American Petroleum Institute Funding ($100,000), 1992-1993. New Sediment Bioassays and Reference Sediments. Principal Investigator, Mississippi State Department Of Wildlife, Fisheries, and Parks Funding ($6,000), 1991-1993. Cooperative Agreement for Assistance with Walleye Culture.

Co-Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($100,848), 1992-1993. Monitoring of Water Quality at Arkabutla, Sardis, Enid, and Grenada Lakes.

Principal Investigator, Mississippi State Department of Wildlife, Fisheries and Parks Funding ($3,000), 1992-1993. Cooperative Agreement for Assistance with Walleye Culture.

Principal Investigator, Research Contract, U.S. Army Waterways Experiment Station Funding ($30,000), 1992-1994. Mobility and Bioavailability of Sediment Associated Contaminants.

Principal Investigator, Research Contract, U.S. Army Waterways Experiment Station Funding ($25,000), 1992-1993. Effects of Food Quantity on Fathead Minnow Survival, Growth and Reproduction.

Principal Investigator, Research Contract, Eastman Kodak and the Silver Coalition Funding ($53,183), 1992-1994. Evaluations of the Bioavailability and Toxicity of Silver in Sediments.

Principal Investigator, Research Contract, Shell Development Company Funding ($150,000), 1992-1993. Ecological Evaluation of a Non-ionic Surfactant in Model Stream Mesocosms.

Principal Investigator, Research Contract, Shell Development Company Funding ($30,342), 1993-1994. Assistance with Development and Construction of Constructed Wetlands for Tertiary Treatment of Refinery Effluent.

Principal Investigator, U.S. Department of Agriculture/ Cooperative State Research Service Funding ($1,377,400), 1994-1995. Center for Water and Wetland Resources (Year 4).

Co-Principal Investigator, Research Contract, International Paper Company Funding

($99,631), 1994-1995. Extensive Ecological and Toxicological Evaluation of the Arkansas River at Pine Bluff, AR.

Co-Principal Investigator, Research Contract, International Paper Company Funding ($99,631), 1994-1995. Extensive Ecological and Toxicological Evaluation of the Yazoo River near Vicksburg, MS.

Principal Investigator, Research Contract, Shell Development Company Funding ($150,000), 1994-1995. Ecological Evaluation of a Homologus Non-ionic Surfactant in Model Stream Mesocosms.

Principal Investigator, Research Contract, Shell Development Company Funding ($144,242), 1994-1996. Evaluation of Constructed Wetlands for Tertiary Treatment of Refinery Effluent.

Principal Investigator, Research Contract, Texaco, Inc. Funding ($20,000), 1995-1996. Evaluation of a Constructed Wetland for Removal of Ammonia from a Refinery Effluent.

Principal Investigator, Research Contract, Texaco, Inc. Funding ($20,000), 1995-1996. Evaluation of a Constructed Wetland for Removal of Trace Metals from a Refinery Effluent.

Clemson University (1998-present):

Principal Investigator, Assistance with Design and Construction of a Wetland for Wastewater Treatment Sponsored by Shell Oil Products from 4/1/98 to 4/1/00 ($10,000).

Principal Investigator, Evaluation of the Tombigbee River. Sponsored by Weyerhauser, Inc. 1/98 – 1/02 ($22,000).

Principal Investigator, Constructed Wetland for Wastewater Treatment at IP's Mansfield, LA Facility, Sponsored by International Paper Company 8/98 – 12/00 ($18,250).

Principal Investigator, Investigations of Pesticide Toxicity, Sponsored by Applied Biochemists, Inc. 1/00 – 1/01 ($10,000).

Principal Investigator, Wetlands for Wastewater Treatment at Savannah River Site Sponsored by DOE thru SCUREF (SC Universities Research and Education Foundation) from 1/14/99 to 2/28/00 ($28,088).

Principal Investigator, A-01 Outfall Constructed Wetlands Sponsored by DOE thru Westinghouse Savannah River thru SCUREF from 7/11/99 to 9/30/00 ($624,730).

Principal Investigator, Design and Construction of a Wetland for Effluent Treatment. Sponsored by International Paper Company 6/00 – 7/01 ($25,000).

Principal Investigator, Evaluation of Foam Products. Flexible Products, Inc Funding from 9/99 – 1/01 ($15,000).

Principal Investigator, US Department of Interior Funding ($43,106), 2002-2004. Renovating Water for Conservation and Reuse.

Co-Principal investigator, US Department of Agriculture Funding ($539,677), 2002-2004. Adhesion-Specific Nanoparticles for Removal of *Campylobacter jejuni* from Poultry.

Principal Investigator, Duke Energy Corporation Funding ($54,473). 2001. Evaluation of the Oconee Nuclear Station Conventional Waste Treatment System.

Principal Investigator, Chevron Texaco Inc. Funding ($24,000), 2001-present. Evaluation of Best Management Practices for Stormwater and Other Contaminated Waste Streams.

Principal Investigator, US Department of Energy Funding ($26,024). 2001-2003. A01 Constructed Wetland Treatment Facility Redox Probe Maintenance and Consultation for the Savannah River Site (from WSRC through SCUREF).

Principal Investigator, U.S. Department of Interior Funding ($43,106). 2002-2003. Renovating Water for Conservation and Reuse.

Principal Investigator, Sustainable Universities Initiative ($7,000). 2002-2003. A Constructed Wetland Treatment System: A Green and Sustainable Solution to Prevent Water Pollution on Campus.

Principal Investigator, Duke Energy Corporation in Cooperation with Progress Energy Funding ($187,000). 2003-2004. Treatment of Mercury, Selenium and Other Targeted Constituents in FGD Wastewater: A Constructed Wetland Pilot Study.

Principal Investigator, Chevron Corporation Funding ($33,600). 2003-2004. Panama Storm Water Treatment Wetland.

Principal Investigator, Griffin Corporation Funding ($20,0000). 2002-2003. Response of Aluminum from Boat Pontoons to Komeen Exposures in Lake Murray, SC Water (with Sediments and *Hydrilla*.

Principal Investigator, Alabama Power Company Funding ($75,000). 2004-2006. Development of Strategies for Controlling Nuisiance Growths of *Lyngbya* in Alabama Power Company Reservoirs.

Principal Investigator, Department of Energy Funding ($125,000) 2004-2005. Designing constructed wetlands to treat gas storage produced waters.

Principal Investigator, Duke Energy Corporation in Cooperation with Progress Energy Funding ($105,000). 2004-2005. Continuing Studies of Treatment of Mercury, Selenium and Other Targeted Constituents in FGD Wastewater Using a Constructed Wetland Treatment System.

Principal Investigator, U.S. Department of Energy Funding ($300,000) 2005-2008. Innovative Techniques for Remediation of Nontraditional Waters for Reuse in Coal-Fired Power Plants.

Principal Investigator, Duke Energy Corporation and ENTRIX Funding ($100,000) 2006-2007. Further Evaluations of Constructed Wetland Treatment Systems for Flue Gas Desulfurization Waters.

Co-Principal Investigator, Chevron-Texaco Funding ($50,000) 2006-2007. Evaluation of Boron Biogeochemistry in Constructed Wetlands.

Co-Principal Investigator, Monsanto Company Funding ($300,000) 2006-2008. Potential Effects of Glyphosate Formulations on Amphibians.

Principal Investigator, Florida Department of Environmental Protection Funding ($60,000) 2006-2008. Effects of Invasive Algae in Crystal River, FL and Potential Control Strategies to Protect the Florida Manatee.

Co-Principal Investigator, Chevron-Texaco Funding ($50,000) 2008. Specifically Designed Constructed Wetland Treatment Systems for Produced Water in Chad.

Principal Investigator, Duke Energy Corporation and ENTRIX Funding ($30,000) 2007-2008. Additional Evaluations of Constructed Wetland Treatment Systems for Flue Gas Desulfurization Waters.

Co-Principal Investigator, Clemson University Funding ($50,000) 2006-2008. Evaluation of Constructed Wetland Treatment Systems for Parking Lot Stormwater (with Dr. Rockie English).

Principal Investigator, Applied Biochemists, Inc. Funding ($36,000) 2008-2009. Approaches for Mitigation of Risks from Harmful Algal Blooms.

Co-Principal Investigator, Chevron-Texaco Funding ($50,000) 2008. Specifically Designed Constructed Wetland Treatment Systems for Specific Produced Water (San Ardo, CA).

Co-Principal Investigator, U.S. Department of Energy Funding ($800,000) 2009. Evaluation of Constructed Wetland Treatment Systems for Produced Waters. Innovative Water Management Technology to Reduce Environmental Impacts of Produced Water (DE-NT0005682), Clemson University

Co-Principal Investigator, Chevron-Texaco Funding ($50,000) 2009. Specifically Designed Constructed Wetland Treatment Systems for Produced Water in Chad.

Co-Principal Investigator, U.S. Department of Energy Funding ($800,000) 2010. Carbon Capture and Sequestration Education (in partnership with the Southern States Energy Board). Clemson University

Co-Principal Investigator, Diamond-V Funding ($115,237) 2010. Enhancing Selenium Treatment in Waters. Clemson University

Co-Principal Investigator, U.S. Department of Energy Funding ($100,000) 2012. Evaluation of Constructed Wetland Treatment Systems for Produced Waters. Innovative Water Management Technology to Reduce Environmental Impacts of Produced Water (DE-NT0005682), Clemson University

HONORS AND AWARDS:

Phi Sigma Doctoral Research Award, April, 1977.

Sigma Xi Doctoral Research Award, May, 1978.

Who's Who in the South and Southwest, 1979.

Personalities of the South, 1981.

International Who's Who, 1981.

Directory of Distinguished Americans, 1981.

Men of Achievement (International Biographical Center), 1981.

Phi Kappa Phi Honor Society, 1982.

Gordon Research Conference Travel Award, 1982.

NTSU President's Award to the Institute of Applied Sciences, 1985.

Mortar Board NTSU "Top Prof" Teaching Award, 1985.

Elected to NTSU Graduate Faculty, 1987.

Co-author - Best Student Paper (Burton Suedel and Phil Clifford), published in 1992 in *Environmental Toxicology and Chemistry*.

Certificate of Appreciation, 1993 Mississippi Region 7 Science and Engineering Fair. 1993.

Designated “Distinguished Southerner” by Editors Of *Southern Living*. Article on Water Watchdogs In April, 1994 edition of *Southern Living*.

Co-author - Best Student Paper (Arthur Dunn), Mid-South Aquatic Plant Management Society. Birmingham, AL. 1994.

Certificate of Appreciation, Environmental Biology Review Panel, U.S. EPA, January, 1995.

President, Oxford Exchange Club – Prevention of Child Abuse, 1996-1998.

Board of Directors, Society of Environmental Toxicology and Chemistry, 1989-1991; 1995-2001. Executive Committee 1997-2000. Vice President 1998-1999. President 1999-2000.

Member, Expert Advisory Committee, Canadian Network of Toxicology Centres. Environment Canada and Health and Welfare, 1992-2000.

Chair, Expert Advisory Committee, Canadian Network of Toxicology Centres, Environment Canada and Health and Welfare, 1996-1999.

Vice President’s Award, Savannah River Technology Center. A-01 Outfall Wetland Treatment Confirmation Study, 2000.

Who’s Who Among America’s Teachers, 7th ed. 2002. p. 400.

Certificate of Appreciation for Outstanding Service to the Society of Environmental Toxicology and Chemistry, 2003.

Member, Canadian Foundation for Innovation, Science Review Panel, 2008 - 2009.

Chair, Canadian Foundation for Innovation, Science Review Panel, 2009.

Member of the Year, South Carolina Aquatic Plant Management Society, 2009.

Nominated for Governor's Research Award, 2010.

President's (USA) 'Closing the Circle' Environmental Award (with Savannah River Site) for Wetland Research and Application, 2010.

Clemson University Board of Trustees Award for Faculty Excellence, 2010.

Nominated for the 2011 Alumni Award for Outstanding Achievement in Research at Clemson University, 2011.

RESEARCH AND TEACHING INTERESTS:

Teaching Interests:
I have taught General Botany, General Biology Environmental Biology, Assessment of Water Quality, Water Quality Management, Environmental Analysis, Aquatic Toxicology, Limnology, Microbial Ecology, Radioisotopes, and Research Techniques, Aquatic Botany, Aquatic Microbiology, Sediment Toxicology, and Analysis of Biological Data, Ecological Risk Assessment, Plant Physiology, and Water Chemistry. My teaching interests also include: Plant Ecology, Wetland Ecology, and Phycology.

Research Interests:
Effects of heated effluents and other perturbations on primary productivity of vascular and non-vascular plants in terrestrial and aquatic systems.

In situ measurements of assimilatory sulfate reduction by periphytic organisms (algae, bacteria, and fungi), sulfur content and cycling in aquatic systems.

Physical models of aquatic systems as tools for the study of acute and chronic effects of industrial and power plant effluents on structural and functional aspects of aquatic microbial communities with emphasis on photosynthesis and sulfate assimilation.

Production, decomposition and role in nutrient cycling of aquatic macrophytes.

Impact of ash from industrial and power production processes on receiving systems and indigenous biota.

Decomposition and role of autochthonous and allochthonous detritus in aquatic and terrestrial systems with emphasis on the influences of macro-invertebrates, bacteria and fungi.

Invasion rates, population dynamics and elemental accumulation of the Asiatic Clam (*Corbicula fluminea*).

Extracellular products and other organic compounds as regulating factors of structural and functional aspects of aquatic microbial communities.

Benthic metabolism and physical and biological sediment characterization (using SCUBA-implemented techniques) as an index of eutrophication rates.

Electron transport system activity of benthic microflora as a pollution monitoring tool.

Serum enzymes of fish as an indicator of the quality and quantity of mixed effluents and their effects on receiving systems.

Ecosystem responses to stress in aquatic systems; Ecological risk assessment.

Relationships between carbon quantity and quality in ecosystems.

Responses of microbes (algae, bacteria, and fungi) to magnetic fields.

Ecological impacts associated with pulp and paper mills.

Biology and ecology of *Taxodium distichum* (Bald cypress) swamps in the Southwest.

Development of models for integrated control of nuisance aquatic vegetation and aquatic ecosystem management.

Microcosms and mesocosms as tools for ecological and environmental research.

Reservoir limnology and eutrophication.

Secondary aquatic plant products and biocontrol of aquatic plants.

Bioavailability of xenobiotic chemicals (e.g. pesticides) to aquatic organisms.

Sediments as sources and sinks for contaminants in aquatic ecosystems.

Population biology and physiological ecology of aquatic plants.

Artificial Intelligence in ecological problem solving.

Constructed wetlands for rehabilitation and wastewater treatment.

Metal speciation and bioavailability.

ORGANIZATIONS:

American Society of Limnology and Oceanography, Ecological Society of America, American Water Resources Association, North American Benthological Society, Water Pollution Control Federation, Phi Sigma Society Alpha Psi (VPI&SU) Chapter, Sigma Xi (VPI&SU) Chapter, American Institute of Biological Sciences, American Association for Advancement of Science, Phi Kappa Phi (NTSU) Chapter, Aquatic Plant Management Society, Society of Environmental Toxicology and Chemistry.

OTHER
PROFESSIONAL
ACTIVITIES:

Consulting Aquatic Ecologist Microbiology Department, Clemson University, 1973-1975.

Investigator on Facilities Use Agreement #15 at Savannah River Laboratory in conjunction with Clemson University and VPI & SU, 1973-1975.

Consulting Aquatic Ecologist to American Electric Power Service Corporation, Canton, Ohio, 1974 - 1975.

Investigator on Facilities Use Agreement #28 at Savannah River Laboratory in conjunction with University of Texas, School of Public Health and VPI&SU, 1975 - 1979.

Consulting Microbial Ecologist to Bioengineering Research and Development Group, Oak Ridge National Laboratory, Oak Ridge, Tennessee, 1977.

Consulting Aquatic Ecologist to Virginia State Water Control Board, Richmond, 1977.

Invited lecturer in Plant Ecology and Environmental Biology, Botany Department, Clemson University, 1977.

Consulting Aquatic Ecologist to Center for Environmental Studies VPI&SU, 1978 - 1979.

Participant in Savannah River National Environmental Research Park meeting on Aquatic Research, Aiken, S.C., 1978.

Grant Proposal Review for the Division of Environmental Biology of the National Science Foundation, 1978 - 1987.

Consulting Aquatic Ecologist to Tennessee Eastman Company, Kingsport, Tennessee, 1978 - 1979.

ETSU Research Development Committee Presidential Appointment 1978 - 1979.

Consulting Aquatic Ecologist to Victor Equipment Company, Denton, Texas, 1980 - 1983.

Review of publications for American Society for Testing and Materials.

Consulting Aquatic Ecologist to Environmental Biology Group, Oak Ridge National Laboratory, Oak Ridge, Tennessee, 1980.

Gordon Research Conference Participant (Environmental Sciences - Water), 1980.

Participant in Workshop on the role of aquatic microcosms in evaluating ecosystem effects of chemicals under the Toxic Substances Control Act (USEPA sponsored), 1980.

NTSU representative to Texas Systems of Natural Laboratories. (Presidential Appointment), 1981 - 1986.

Consulting Aquatic Ecologist to Environmental Systems Branch, U.S. Environmental Protection Agency, 1981.

School of Community Service Computing Services Advisory Council (Dean's Appointment), 1981-1986.

NTSU Biosafety Committee (Presidential Appointment), 1980 - 1987.

Peer Review of Research Program for Environmental Systems Branch of the U.S. Environmental Protection Agency (with H.T. Odum), 1981.

Participant in Workshop on Modeling the Fate of Chemicals in the Aquatic Environment (USEPA sponsored), Pellston, MI, 1981.

Co-chaired session on Microcosm Testing in Aquatic Toxicology at the Society of Environmental Toxicology and Chemistry's Annual Meeting, Washington, D.C., 1981.

Elected to Editorial Board of Environmental Toxicology and Chemistry, 1981- 1983.

Research advisor to the Ecosystem Branch of the U.S. Environmental Protection Agency, Las Vegas, 1982.

Gordon Research Conference Participant (Environmental Sciences-Water), 1982.

President, Sigma Xi, NTSU Club, 1982-1983.

Chair, Employment Service Committee of the Society of Environmental Toxicology and

Chemistry, 1982 - 1984.

Review of manuscripts for Ecological Society of America, 1981 - present.

College of Arts and Sciences Committee on Interdisciplinary Research (Dean's Appointment), 1983.

Department of Biological Sciences Radiation Safety Officer, 1983 - 1987.

Participant, Workshop on Bioavailability of Chemicals from Dredged Materials (U.S. Army Corps of Engineers sponsored) Vicksburg, Mississippi,1984.

Consulting Aquatic Ecologist to the City of Reno, Nevada, 1983 - Mitigation of Impacts of Population Growth and Development on Lake Tahoe, Truckee River and Pyramid Lake.

Consulting Aquatic Ecologist to the Las Colinas Development, 1983 - Impacts of Development on the Trinity River and Watershed.

School of Community Services Committee on Resources and Nontraditional Education (Dean's Appointment), I983 - I984.

Peer review of research programs of the Naragansett Bay, R.I., U.S. Environmental Protection Agency Research Laboratory (elected chairman of the review team), 1984.

North Texas State University Committee on Science and Technology (Presidential Appointment), 1984.

President, J.K. G. Silvey Society, North Texas State University, 1983 - 1984.

Invited Attendee, Society of Petroleum Industry Biologists, Annual Meeting, Houston, Texas, 1984.

Chair of the Annual Meeting of the Society of Environmental Toxicology and Chemistry, St. Louis, Missouri, Nov. 10-14, 1985.

Participant - Workshop on the Bioavailability of Sorbed Chemicals (U.S. Environmental Protection Agency and American Petroleum Institute sponsored) Florissant, Colorado, 1984.

Faculty Committee Member, Cooperative Education Program of the Institute of Applied Sciences, 1984.

Faculty Representative for the Sciences, elected to NTSU Faculty Senate, 1986.

Served as Chairman of Placement Committee of Aquatic Plant Management Society, 1987.

Peer review of research programs of the Gulf Breeze, FL., U.S. Environmental Protection Agency Research Laboratory (with H. Bergman and K. Solomon), 1987.

Consulting aquatic ecologist to the City of Dallas (Water Utilities), Algal Workshop, 1987.

Consulting aquatic toxicologist to the American Petroleum Institute, Bioavailability of Chemicals Sorbed to Sediments, 1987.

Consulting aquatic ecologist to the Association of Central Oklahoma Governments, Use Attainability Study of Crutcho Creek and the North Canadian River, 1987.

Chair, Professional Opportunities Committee (Placement) of the Aquatic Plant Management Society, 1987.

Co-chair (with L. Goodman), Workshop on Mysid Culture and Testing, at the Eighth Annual Meeting of the Society of Environmental Toxicology and Chemistry, Pensacola, FL, 1987.

Co-chair, sessions on Perspectives of Water Quality-Based Permitting and Field Validation of Laboratory Results, at the Eighth Annual Meeting of the Society of Environmental Toxicology and Chemistry, Pensacola, FL, 1987.

Appointed to the South Carolina Aquatic Plant Management Commission, 1987.

Presented short courses on Aquatic Plant Management in Texas, 1987.

Presented seminars at short courses on Aquatic Plant Management in Florida, Ft. Lauderdale and Orlando, FL, l987.

Advisor on American Petroleum Institute Study of Bioavailability of Sediment Bound Chemicals (with P. Chapman and C. Missimer), 1987 - 1988.

Participated in a Workshop on Mesocosm Research Sponsored by USEPA, Duluth, MN, 1987.

Promotion review team member for P.R. Parrish, Environmental Research Laboratory, Gulf Breeze, FL, 1987.

Chair, session on Sediment Criteria Development and Testing at the South Central Chapter Meeting of the Society of Environmental Toxicology and Chemistry, Houston, TX, 1987.

Scientific Advisory Group, Proctor and Gamble Corporation, Cincinnati, Ohio, 1988,

Scientific Advisory Group, Botanical Research Institute of Texas (BRIT). Fort Worth, TX, 1988.

Adjunct Faculty, University of Guelph. Guelph, Ontario, Canada, 1988-1990.

Invited participant, North American Benthological Society Annual Meeting. Blacksburg, VA, May 22, 1990.

Invited participant, Association of Southeastern Biologists Special Workshop on Teaching the Limnology Laboratory. Baltimore, MD, April 20, 1990.

Invited participant, Aquatic Plant Management Meeting. Mobile, AL, July 16, 1990.

Chair, Education Committee of the Society of Environmental Toxicology and Chemistry, 1989-1991.

Chair, Professional Opportunities Committee of the Aquatic Plant Management Society, 1989-1991.

Chair, Discussion session on Wetlands Toxicology At the Society of Environmental Toxicology and Chemistry Annual Meeting. Washington, D.C., November 12, 1990.

Member, Aquatic Effects Dialogue Group of the Conservation Foundation, 1989-1991.

Member, Advisory Group to the World Wildlife Fund,1989-1991.

Consulting Aquatic Ecologist and Toxicologist to Proctor and Gamble Company. Cincinnati, OH, 1989-1991.

Served on a discussion panel on the Future of Aquatic Plant Management with emphasis on regulatory issues regarding herbicides at the 25th Annual Meeting of the Aquatic Plant Control Research Program - U.S. Army Corps of Engineers. Orlando, FL, November 26-30, 1990.

Served on a discussion panel on the Future of Aquatic Plant Management with Emphasis on Simulation Technology and Modeling at the 25th Annual Meeting of the Aquatic Plant Control Research Program - U.S. Army Corps of Engineers. Orlando, FL. November 26-30, 1990.

Consulting Aquatic Toxicologist, U.S. Environmental Protection Agency, Ecorisk Program evaluation. 1990-1991.

Consulting Aquatic Toxicologist, International Paper Company. 1990-1991.

Consulting Aquatic Toxicologist, State of Mississippi. 1990-1991.

Consulting Aquatic Toxicologist, Environment Canada, Health and Welfare Canada - Canadian Network of Toxicology Centers, Expert Advisory Committee. 1991- 2001.

Consulting Aquatic Toxicologist, Ecorisk Forum on the Rocky Mountain Arsenal Refuge Technical Expert Advisory Panel. 1991-1992.

Consulting Biologist and Ecotoxicologist, Arkansas Department of Higher Education and Arkansas State University Ph.D. Program Development. 1991- 1998.

Invited participant, Tiered Testing Issues for Freshwater and Marine Sediments, sponsored by U.S. EPA Office of Water and Office of Research and Development. Washington, D.C., September 16-18, 1992.

Invited speaker, Workshop on the Bioavailability and Toxicity of Copper, sponsored by the University of Florida, Center for Aquatic Plants. Gainesville, FL, September 2-3, 1992.

Peer reviewer for U.S. EPA, Framework for Ecological Assessment, Risk Assessment Forum. Washington, D.C., 1992 (EPA/130/R-92/001 - February 1992).

Invited speaker, 4th Annual Meeting of the Soil and Water Conservation Society. Baltimore, MD, August 9-12, 1992.

Participant, U.S. EPA Workshop on Bioaccumulation of Hydrophobic Chemicals. Washington, D.C., June,1992.

Invited lecturer and participant, Young Scholars Program, NSF funded. Oxford, MS, 1992.

Counselor for summer interns with the Minorities Science Program, University of Mississippi funded. Oxford, MS, 1992.

Peer Review, Biology Peer Review Panel, U.S. EPA. Knoxville, TN, January, 1993.

Conference Co-organizer, First International Conference on Transport, Fate, and Effects of Silver in the Environment. University of Wisconsin, Madison, WI, August 8-10, 1993.

Chair, Exhibits Committee, 14th Annual Meeting of the Society of Environmental Toxicology and Chemistry. Houston, TX, November, 1993.

Consulting Aquatic Ecologist and Toxicologist to Weyerhaeuser Corporation. Columbus, MS, 1994 – 1999.

Member, Student Scholarship Committee, Mid-South Aquatic Plant Mangement Society. 1994 – 1997.

OSHA Safety Course. Norco, LA, 1994. Joint Agency Task Force Member, Guntersville Project. Guntersville, AL, April, 1994.

Featured speaker, Seminar on Pollution Prevention for Silver Imaging Systems. Lake Buena Vista, FL. May, 1994.

Conference Organizer, Second International Conference on Transport, Fate and Effects of Silver in the Environment. University of Wisconsin, Madison, WI, September 11-14, 1994.

Chair - Subcommittee, National Institute of Environmental Health Sciences (NIEHS) - Superfund Hazardous Substances Basic Research Program. Research Triangle Park, NC, October 16-19, 1994.

Discussion Panel Participant, 2nd International Conference on Environmental Fate and Effects Of Bleached Pulp Mill Effluents. Vancouver, B.C., Canada, November, 1994.

Genetic Toxicology Course (Audit). Oxford, MS, 1995.

Board of Directors, Society of Environmental Toxicology and Chemistry (elected), 1995.

Participant, U.S. EPA Environmental Biology Review Panel. Fort Worth, TX, January, 1995.

Participant, Society of Environmental Toxicology and Chemistry Workshop on Wetlands. Butte, MT, August, 1995.

Conference Organizer, Third International Conference on Transport, Fate and Effects of Silver in the Environment. Washington, D.C., August, 1995.

Featured Speaker, 1995 Scholars Conference, University of Mississippi. Oxford, MS, October, 1995.

Participant, Society of Environmental Toxicology and Chemistry Workshop on Whole-Effluent Toxicology. Pellston, MI, October, 1995.

Invited Participant, Round Table Discussion of Surfactant Toxicity in Aquatic Systems. Thornton, England, May, 1996.

Keynote Speaker, Mid-South Society of Environmental Toxicology and Chemistry (inaugural meeting). Memphis, TN, May, 1996.

Invited Speaker on Endocrine Disruption, Seminar on Emerging Water Issues, International Paper Company. Memphis, TN, June, 1996.

Instructor, Short Course on Constructed Wetlands, U.S. Army Waterways Experiment Station. Berkeley, CA. July, 1996.

Short Course on Constructed Wetland Design and Monitoring. Houston, TX, July, 1996.

Conference Organizer, Fourth International Conference on Transport, Fate and Effects of Silver in the Environment. Madison, WI, August, 1996.

Friends of Lake Keowee (FOLKS), Board of Directors (elected) and Member of the Technical Committee, 2003-present.

Bob C. Campbell Geology Museum, Clemson University, Board of Directors Member, 2003-present.

Associate Editor, Journal of Toxicology and Environmental Health Part B : Critical Reviews. 1999-2006.

Chair, Science Advisory Panel for the California Environmental Protection Agency – Aquatic Pesticides Committee, 2002-present.

Member, Science Advisory Panel, USDA Jimmy Carter Plant Materials Center, Americus, GA. 2003-present.

Member, Science Advisory Panel for the USEPA/ SETAC Whole Effluent Toxicity Testing Committee, 1998-2004.

Member, Science Advisory Panel for Proposal and Research Review, Water Environment Federation, 2001-present.

Member, Science Advisory Panel for the National Council for Air and Stream Improvement – Long Term Receiving Water Studies, 1999-present.

Member, Board of Directors – Aquatic Plant Management Society, (elected) 2003-2006.

Co-editor (with Dr. J.W. Castle), Special Issue of Environmental Geoscience on Constructed Wetland Treatment Systems, 2009.

Review of WET testing protocols, US EPA, 2009.

Member, Board of Directors – South Carolina Aquatic Plant Management Society, (elected) 2007-2009.

Vice-President and Annual Meeting Program Chair – South Carolina Aquatic Plant Management Society, (elected) 2008-2009.

Chair, ad hoc Committee on NPDES Permitting, South Carolina Aquatic Plant Management Society, 2008-2009.

Chair, Peer Review Panel, Canadian Foundation for Innovation, 2009.

Chair, Strategic Planning Committee, Aquatic Plant Management Society, 2008-2012.

Leader, Constructed Wetland Treatment Systems: A Short Course; presented at Synterra, Inc., Greenville, SC, June 14-18, 2010.

Chair, Peer Review Panel, Canadian Foundation for Innovation, 2010.

Peer Review Panel, Canadian Research Chairs, 2010.

Appointed Canada Review of University Environmental Programs, 2011.

Chair, Session on Components to reconstruct a successful wetland ecosystem at Key Factors to Successfully Reconstruct Boreal Wetland Ecosystems – An International Workshop. Chantilly, France. April 16-17, 2012.

Consulting Environmental Toxicologist, US Environmental Protection Agency, Science Advisory Panel, Problem Formulation and Risk Assessment, Washington,DC, June 11-14, 2012

BOOKS, BOOK CHAPTERS, AND MONOGRAPHS

M.Sc. Thesis: Rodgers, J.H., Jr. 1974. Thermal Effects on Primary Productivity of Phytoplankton, Periphyton, and Macrophytes in Lake Keowee, S.C. Botany Department, Clemson University. 88 pp.

Bi- weekly in situ determinations of Carbon-14 assimilation rates were made using SCUBA and chambers in a reservoir receiving thermal effluent from a nuclear power plant. Emphasis was placed upon relative contributions of each group of plants to the overall lake productivity and statistical correlations of productivity with water temperatures (1972-1974).

Ph.D. Dissertation: Rodgers, J.H., Jr.1977. Aufwuchs Communities of Lotic Systems: Nontaxonomic Structure and Function. Biology Department and Center for Environmental Studies, VPI&SU. 336 pp.

Six model streams were constructed to assess effects of typical industrial and municipal effluents on primary productivity, assimilatory sulfate reduction and structural aspects of assemblages of attached microorganisms. Net microbial productivity of aufwuchs and primary productivity were estimated by assimilatory (S35) sulfate reduction and carbon-14 fixation, respectively, with heterotrophic productivity being the difference. Concurrent laboratory studies verified the efficacy of these procedures. The ability of methods to discern perturbations was tested. Direct correlations between structural measurements and functions were ascertained by regression analysis. Field investigations of aufwuchs communities were inconclusive due to variability and the heterogeneous distribution of aufwuchs communities (1974 - 1977).

Guthrie, R.K., D.S. Cherry, and J.H. Rodgers, Jr. 1974. The Impact of Ash Basin Effluent on Biota in the Drainage System. *Proc. Seventh Mid-Atlantic Industrial Waste Conference*: pp. 17-43. Drexel University, Philadelphia, Pa.

Dickson, K.L., J. Cairns, Jr., J.R. Clark and J.H. Rodgers, Jr. 1978. Evaluating Pollution Stress on Ecosystems. In: K.C. Flynn and W.T. Mason (eds.) *The Freshwater Potomac - Aquatic Communities and Environmental Stress*. The Interstate Commission on the Potomac River Basin, Rockville, Maryland. pp. 80 - 83.

Rodgers, J.H., Jr., D.S. Cherry, K.L. Dickson, and J. Cairns, Jr. 1979. Invasion, Population Dynamics and Elemental Accumulation of *Corbicula fluminea* in the New River at Glen Lyn, Virginia. In: *Proc. First International Corbicula Symposium* J.C. Britton (ed.). Texas Christian University Research Foundation Publishers, Fort Worth, TX, pp. 99-110.

Rodgers, J.H., Jr., K.L. Dickson, and J. Cairns, Jr. 1979. A Review and Analysis of Some Methods Used to Measure Functional Aspects of Periphyton. In: R.L. Weitzel (ed.) *Methods and Measurements of Periphyton Communities:Review*. American Society for Testing and Materials, Philadelphia, Pennsylvania (ASTM STP 690), pp. 142-167.

Rodgers, J.H., Jr., D.S. Cherry, R.L. Graney, K.L. Dickson, and J. Cairns, Jr. 1980. Comparison of Heavy Metal Interactions in Acute and Artificial Stream Bioassay Techniques for the Asiatic Clam (*Corbicula fluminea*). In: J.G. Eaton, P.R. Parish, and A.C. Hendricks (eds.) *Aquatic Toxicology*. American Society for Testing and Materials, Philadelphia, PA. (ASTM STP 707), pp. 266-280.

Cherry, D.S., J.H. Rodgers, Jr., R.L. Graney, and J. Cairns, Jr. 1980. *Dynamics and*

Control of the Asiatic Clam in the New River,Virginia. Bulletin 123, Virginia Water Resources Research Center. Virginia Polytechnic Institute and State University, Blackburg, VA. 72 pp.

Dillon, C.R. and J.H. Rodgers, Jr. 1980. *Thermal Effects on Primary Productivity of Phytoplankton. Periphyton. and Macrophytes in Lake Keowee. S.C.* Technical Report No. 81, Clemson University Water Resources Research Institute, Clemson, S.C. 115 pp.

Rodgers, J.H., Jr., J.R. Clark, K.L. Dickson, and J. Cairns, Jr. 1980. Nontaxonomic analyses of structure and function of aufwuchs communities in lotic microcosms. In: J.P. Geisy, Jr. (ed.). *Microcosms in Ecological Research*. USDOE (CONF-781101) pp. 625-643.

Lee, C.M., H. Bergman, W. Wood, and J.H. Rodgers, Jr. 1982. Workshop Summary and Conclusions. In: K.L. Dickson, A.W. Maki and J. Cairns, Jr. (eds.) *Modeling the Fate of Chemicals in the Aquatic Environment*, Ann Arbor: Ann Arbor Science Publ. pp. 397-407.

Cairns, J., Jr., A.L. Buikema, Jr., D.S. Cherry, E.E. Herricks, R.A. Matthews, B.R. Neiderlahner, J.H. Rodgers, Jr. and W.H. Van der Schalie. 1982. *Biological Monitoring in Water Pollution*. Pergamon Press: New York. 116 pp.

Rodgers, J.H., Jr., M.E. McKevitt, D.O. Hammerland, K.L. Dickson and J. Cairns, Jr. 1983. Primary production and decomposition of submergent and emergent aquatic plants of two Appalachian rivers. In: T.D. Fontaine III and S.M. Bartell (eds.) *Dynamics of Lotic Ecosystems*. Ann Arbor Science Publ. pp. 298-301.

Staples, C.A., K.L. Dickson, F.Y. Saleh, and J.H. Rodgers, Jr. 1983. A microcosm study of lindane and naphthalene partitioning for model validation. In: W. Bishop, R.D. Caldwell, and B.B. Heidolph (eds.) *Aquatic Toxicology and Hazard Assessment*. STP 802 ASTM Publications, Philadelphia, PA. pp. 26-41.

Rodgers, J.H., Jr. K.L. Dickson, and M.J. Defoer. 1983. Bioconcentration of lindane and naphthalene in bluegills (*Lepomis macrochirus*). In: W. Bishop, R.D. Cardwell, and B.B. Heidolph (eds.) *Aquatic Toxicology and Hazard Assessment*. STP 802. ASTM Publications, Philadelphia, PA. pp. 300-311.

Saleh, F.Y., K.L. Dickson, and J.H. Rodgers, Jr. 1984. Transport Processes of Naphthalene in the Aquatic Environment. In: L. Pawlowski, A.J. Verdier, and W.J. Lacy (eds.) *Chemistry for Environmental Protection*. Elsevier Publisher. pp. 119-131.

Vance, B.D. and J.H. Rodgers, Jr. 1984. *General Botany*, 2nd Ed. Hunter Textbooks, Inc., Winston - Salem, NC. 93 pp.

Staples, C.A., K.L. Dickson, J.H. Rodgers, Jr., and F.Y. Saleh. 1985. A Model for Predicting the Influence of Suspended Sediments on Bioavailability of Neutral Organics in the Water Compartment. In: R.D. Cardwell, R.C. Bahner and R.E. Purdy (eds.) *Aquatic Toxicology and Hazard Assessment.* ASTM STP 845, ASTM Philadelphia, PA. pp. 417-428.

Dickson, K.L. and J.H. Rodgers, Jr. 1985. Assessing the Hazards of Effluents in the Aquatic Environment. In: H. Bergman, A. Maki and R. Kimerle (eds.) *Assessing the Hazards of Effluents to Aquatic Life*. Pergamon Press.

Rodgers, J.H., Jr., K.L. Dickson, F.Y. Saleh, and C.A. Staples. 1987. Bioavailability of Sediment-bound Chemicals to Aquatic Organisms; Some Theory, Evidence and Research Needs. In: K.L. Dickson, A.W. Maki and W.A. Brungs (eds.) *Fate and Effects of Sediment-Bound Chemicals in Aquatic Systems*. Pergamon: Elmsford, N.Y. pp. 245-266.

Anderson, J., W. Birge, J. Gentile, J. Lake, J.H. Rodgers, Jr. and R. Swartz. 1987. Biological Effects, Bioaccumulation, and Ecotoxicology of Sediment-associated Chemicals. In: K.L. Dickson, A.W. Maki, and W.A. Brungs (eds.) *Fate and Effects of Sediment-Bound Chemicals in Aquatic Systems*. Pergamon: Elmsford, N.Y. pp. 267-296.

Rodgers, J.H. Jr., P.A. Clifford and R.M. Stewart. 1991. Enhancement of HERBICIDE, the Aquatic Herbicide Fate and Effects Model. In: *Proceedings, 25th Annual Meeting, Aquatic Plant Control Research Program.* Misc. Paper A-91-3. pp. 279-282. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Rodgers, J.H. Jr. 1991. Herbicide Registration for Aquatic Use: A Look to the Future. In: *Proceedings, 25th Annual Meeting, Aquatic Plant Control Research Program.* Misc. Paper A-91-3. pp. 245-248. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Graney, R.L., J.H. Kennedy and J.H. Rodgers, Jr. (eds.). 1993. *Aquatic Mesocosm Studies in Ecological Risk Assessment.* Lewis Publishers, Baca Raton, FL. 723 pp.

Rodgers, J.H., Jr., A.W. Dunn and A.B. Jones. 1993. Triclopyr Concentrations in Eurasian Watermilfoil: Uptake Under Differing Exposure Scenarios. In: *Proceedings, 28th Annual Meeting, Aquatic Plant Control Research Program.* Misc. Paper A-94-2. pp. 249-259. U.S. Army Waterways Experiment Station, Baltimore, MD. November 15-18, 1993.

Rodgers, J.H., Jr. and A.W. Dunn. 1994. TVA - Guntersville Reservoir Herbicide Monitoring Survey 1991-1992. A Report to the Tennessee Valley Authority and U.S.

Army Corps of Engineers Joint Agency Program. 116 p.

Solomon, K., D. Bright, P. Hodson, K.-J. Lehtinen, B. McKague and J. Rodgers, Jr. 1999. Evaluation of ecological risks associated with the use of chlorine dioxide for the bleaching of pulp. Report prepared for the Alliance for Environmental Technology. 86 pp.

Rodgers, J.H., Jr. and J.F. Thomas. 2004. Evaluations of the Fate and Effects of Pulp and Paper Mill Effluents from a Watershed Multistressor Perspective: Progress to Date and Future Opportunities. In: Pulp and Paper Mill Effluent Environmental Fate and Effects. D. L. Borton, T. J. Hall, R.P. Fisher, and J.F. Thomas (eds.). DEStech Publications, Lancaster, PA. pp.135-146.

PAPERS AND PUBLICATIONS:

Rodgers, J.H., Jr., G.L. Powell, and J.F. Geldard. 1973. Triple-label Liquid Scintillation Radioassay: Possible or Impossible? Seventh Annual Regional Meeting (Oct . 5) Wilmington, N.C. 43 pp.

Rodgers, J.H., Jr. and R.S. Harvey. 1976. The Effect of Current on Periphyton Productivity Determined Using Carbon-14. Water Res. Bull. 12(6): 1109-1118.

Cherry, D.S., R.K. Guthrie, J.H. Rodgers, Jr., K.L. Dickson, and J. Cairns, Jr. 1976. Responses of Mosquito Fish (*Gambusia affinis*) to Ash Effluent and Thermal Stress. Trans. Am. Fish Soc. 105(6):686-694.

Rodgers, J.H., Jr., D.S. Cherry, J.R. Clark, K.L. Dickson, and J. Cairns, Jr. 1977. The Invasion of Asiatic Clam, *Corbicula manilensis* (Philippi), in the New River, Virginia. The Nautilus 91(2):43-46.

Rodgers, J.H., Jr., D.S. Cherry, and R.K. Guthrie. 1978. Cycling of Elements in Duckweed (*Lemna perpusilla* Torrey) of an Ash Settling Basin and Swamp Drainage System. Water Research 12:765-770.

Rodgers, J.H., Jr., K.L. Dickson, and J. Cairns, Jr. 1978. A Chamber for *In Situ* Measurement of Primary Productivity and Other Functional Processes of Periphyton in Lotic Systems. Arch. Hydrobiol. 84(3):389-398.

Clark, J.R., J.H. Rodgers, Jr., K.L. Dickson, and J. Cairns, Jr. 1980. Using Artificial Streams to Evaluate Perturbation Effects on Aufwuchs Structure and Function. Water Res. Bull. 16(1):100-104.

Graney, R.L., D.S. Cherry, J.H. Rodgers, Jr., and J. Cairns. 1982. The Influence of Thermal Discharges and Substrate Composition on the Population Structure and Distribution of the Asiatic Clam, *Corbicula fluminea*, in the New River, Virginia. The Nautilus 94(4):130-135.

Matthews, R.A., A.L. Buikema, J. Cairns, Jr. and J.H. Rodgers, Jr. 1982. Biological Monitoring Part IIA Receiving System Functional Methods, Relationships and Indices. Water Res. 16:129-139.

Saleh, F.Y., K.L. Dickson, and J.H. Rodgers, Jr. 1982. Fate of Lindane in the Aquatic Environment: Rate Constants of Physical and Chemical Processes. Environ. Toxicol. Chem. 1:289-297.

Dickson, K.L. and J.H. Rodgers, Jr. 1982. Assessing the Hazards of Effluents in the Aquatic Environment. In: H.L. Bergman, R.A. Kimerle and A.W. Maki (eds.) Environmental Hazard Assessment of Effluents. New York: Pergamon Press.

Rodgers, J.H., Jr., K.L. Dickson, F.Y. Saleh, and C.A. Staples. 1983. Use of Microcosms to Study Transport, Transformation and Fate of Organics in Aquatic Systems. Environ. Toxicol. Chem. 2:155-167.

Reinert, K.H. and J.H. Rodgers, Jr. 1984. Influence of Sediment Types on the Sorption of Endothall. Bulletin of Environmental Contamination and Toxicology. 32:557-564.

Rodgers, J.H., Jr., K.H. Reinert, and M.L. Hinman. 1984. Water Quality Monitoring in Conjunction with the Pat Mayse Lake Aquatic Plant Management Program. In: Proceedings, 18th Annual Meeting, Aquatic Plant Control Research Program. November 14-17, 1983. Raleigh, NC. U.S. Army Corps of Engineers. Misc. Paper A-84-4. pp.17-24.

Reinert, K.H., S. Stewart, M.L. Hinman, J.H.Rodgers, Jr., and T.J. Leslie. 1985. Release of Endothall from AQUATHOL GRANULAR AQUATIC HERBICIDE. Water Research 19:805-808.

Reinert, K.H., J.H. Rodgers, Jr., M.L. Hinman, and T.J. Leslie. 1985. Compartmentalization and Persistance of Endothall in Experimental Pools. Ecotoxicology and Environmental Safety 10:86-96.

Reinert, K.H., J.H. Rodgers, Jr., T.J. Leslie, and M.L. Hinman. 1986. Static Shake-Flask Biotransformation of Endothall. Water Research. 20:255-258.

Reinert, K.H. and J.H. Rodgers, Jr. 1984. Validation Trial of Predictive Fate Models Using and Aquatic Herbicide (Endothall). Environmental Toxicology and Chemistry 5:449-461.

Saleh, F.Y., K.L. Dickson, J.H. Rodgers, Jr. and C.A. Staples. 1985. Fate of Naphthalene in the Aquatic Environment. Environmental Toxicology and Chemistry 6: 449-461.

Jop, K.M., J.H. Rodgers, Jr., P.B. Dorn and K.L. Dickson. 1985. Use of Hexavalent Chromium as a Reference Toxicant in Aquatic Toxicity Tests. In Tim Poston and R. Purdy (eds.) *Aquatic Toxicology and Environmental Fate* ASTM STP 921, American Society for Testing and Materials, pp. 390-403.

Dorn, P.B., J.H. Rodgers, Jr., K.M. Jop, J.C. Raia and K.L. Dickson. 1987. Hexavalent Chromium as a Reference Toxicant in Effluent Toxicity Tests. Environmental Toxicology and Chemistry 6:435-444.

Reinert, K.H., P.M. Rocchio, and J.H. Rodgers, Jr. 1986. Parameterization of Predictive Fate Models: A Case Study. Environmental Toxicology and Chemistry 6:99-104.

Jop, K.M., J.H. Rodgers, Jr. E.E. Price, and K.L. Dickson. 1986. Renewal Device for Test Solutions in Daphnia Toxicity Tests. Bull. Environ. Contam. Toxicol. 36: 95-100.

Hall, W.S., K.L. Dickson, F.Y. Saleh, J.H. Rodgers, Jr., D. Wilcox and A. Entazami. 1986. Effects of Suspended Solids on the Acute Toxicity of Zinc to *Daphnia magna* and *Pimephales promelas*. Water Res. Bull. 22(6):913-920.

Jop, K.M., T.F. Parkerton, J.H. Rodgers, Jr., K.L. Dickson, and P.B. Dorn. 1987. Comparative Toxicity and Speciation of Two Hexavalent Chromium Salts in Acute Toxicity Tests. Environ. Toxicol. and Chem. 6:697-703.

Hall, W.S., K.L. Dickson, F.Y. Saleh and J.H. Rodgers, Jr. 1986. Effects of Suspended Solids on the Bioavailability of Chlordane To *Daphnia magna*. Arch. Environ. Contam. Toxicol. 15:529-534.

Fisher, F.M., K.L. Dickson, J.H. Rodgers, Jr., K. Anderson and J. Slocomb. 1988. A Statistical Approach to Assess Factors Affecting Water Chemistry Using Monitoring Data. Wat. Res. Bull. 24:1017-1026.

Dorn, P.B. and J.H. Rodgers, Jr., 1990. Variability associated with identification of toxics in NPDES effluent toxicity tests. Environ. Toxicol. and Chem. 8: 893-902.

Reinert, K.H. and J.H. Rodgers, Jr. 1987. Fate and persistence of aquatic herbicides. Reviews of Environmental Contamination and Toxicology 98:61-98.

Reinert, K.H., M.L. Hinman, and J. H. Rodgers, Jr. 1988. Fate of Endothall During the Pat Mayse Lake (Texas) Aquatic Plant Management Program. Archives of Environmental Contamination and Toxicology 17:195-199.

Davis, T.M., B.D. Vance, and J.H. Rodgers, Jr. 1988. Productivity Responses of Periphyton and Phytoplankton to Bleach-kraft Mill Effluent. Aquatic Toxicology 12:83-106.

Rodgers, J.H., Jr., P.A. Clifford, and R. M.Stewart. 1988. Development of A Coupled Herbicide Fate and Target Plant Species Effects Model (FATE). Proceedings, 22nd Annual Meeting, Aquatic Plant Control Research Program.

Parkerton, T.F., S.M. Stewart, K.L. Dickson, J.H. Rodgers, Jr., and F.Y. Saleh. 1988. Evaluation of the Indicator Species Procedure for Deriving Site-Specific Water Quality Criteria for Zinc. Aquatic Toxicol and Hazard Assess.:10th Vol, ASTM STP 971. Philadelphia. pp. 423-435.

Cassidy, K. and J.H. Rodgers, Jr. 1988. Response of Hydrilla (*Hydrilla verticillata* (L.f.) Royle) to Diquat and a Model of Uptake Under Nonequilibrium Conditions. Environ. Toxicol. Chem. 8:133-140.

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Rodgers, J.H., Jr., P.L. Rogers and E. Deaver. 1994. Responses of Aquatic Invertebrates to Silver Compounds. Platform presentation at the 15th Annual Meeting of the Society of Environmental Toxicology and Chemistry. (October 30 – November 3) Denver, CO.

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Chemistry. (October 30 - November 3) Denver, CO.

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Rodgers, J.H., Jr. 1994. Current Research Activities at the University of Mississippi's Biological Field Station and Center for Water and Wetland Resources. Presented to the Annual Meeting of the Mid-South Aquatic Plant Management Society. (October, 1994) Birmingham, AL.

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Rodgers, J.H., Jr. 1995. Use of Copper for Aquatic Plant Management. Presented at the 14th Annual Meeting of the Mid-South Aquatic Plant Management Society. (October 11-13) Sheffield, AL.

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Pardue, M., J.W.Castle, G.M. Huddleston and J.H. Rodgers. 2012. Treatment of oilfield produced water using a constructed wetland treatment system. Presented at the 20th Annual David S. Snipes / Clemson Hydrogeology Symposium. Clemson, SC. April 12, 2012.

Alley, B., B. Willis, J.H. Rodgers, Jr. and J.W. Castle. 2012. Water depth and treatment performance of free water surface constructed wetland treatment systems for simulated fresh oil-field produced water. Presented at the 20th Annual David S. Snipes / Clemson Hydrogeology Symposium. Clemson, SC. April 12, 2012.

Beebe, A., B. Alley, J.W. Castle, and J.H. Rodgers, Jr. 2012. Evaluation of coal-bed methane produced water in western Alabama for use as a water resource during drought. Presented at the 20th Annual David S. Snipes / Clemson Hydrogeology Symposium. Clemson, SC. April 12, 2012.

Van Heest, P., J.H. Rodgers, Jr., J.W. Castle, and M.M. Spacil. 2012. Treatment of selenium in pilot-scale constructed wetland treatment systems: Effects of temperature and nutrient-amendment mass loading. Presented at the 20th Annual David S. Snipes / Clemson Hydrogeology Symposium. Clemson, SC. April 12, 2012.

Willis, B. and J.H. Rodgers, Jr. 2012. Bioavailability and analytical measurements of copper residuals in sediments. Presented at the 20th Annual David S. Snipes / Clemson Hydrogeology Symposium. Clemson, SC. April 12, 2012.

Rodgers, J.H., Jr. 2012. Criteria used to measure wetland reconstruction success. Presented at Key Factors to Successfully Reconstruct Boreal Wetland Ecosystems – An International Workshop. Chantilly, France. April 16-17, 2012.

Rodgers, J.H., Jr., R. Brown, D. Isaacs, K. Gazaille, W. Ratajczyk, and J. Schmidt. 2012. Targeted algal management: Some case studies. Presented at the 52nd Annual meeting of the Aquatic Plant Management Society, Salt Lake City, UT, July 22-25, 2012.

Rodgers, J.H. Jr. 2012. Update: NPDES Permits for Pesticides, Presented at the 34th Annual Meeting of the SC Aquatic Plant Management Society. Spring Maid Beach, SC. October 17-19, 2012.

Rodgers, J.H., Jr. and J.W. Castle. 2012. Water in carbon capture and sequestration: Challenges and opportunities. Presented at the 33rd Annual Meeting of the Society of Environmental Toxicology and Chemistry. Long Beach, CA. Nov. 11-15, 2012.

Spacil, M.M., J.H. Rodgers, Jr., J.W. Castle and W.Y. Chao. 2012. Treatment of Selenium in produced water using a pilot-scale constructed wetland treatment system. Presented at the 33rd Annual Meeting of the Society of Environmental Toxicology and Chemistry. Long Beach, CA. Nov. 11-15, 2012.

Rodgers, J.H., Jr. 2012. Strategies for design of active and passive constructed wetlands for oil sands process waters. Invited presentation at Olds College, Olds, Alberta, CANADA. Nov. 15, 2013.

Willis, B. and J.H. Rodgers, Jr. 2012. Accumulation and Effects of Residual Copper in Sediments of a Pond Following an Algaecide Application. Presented at the 34th Annual South Carolina Aquatic Plant Management Society Meeting. Myrtle Beach, SC. October 18, 2011.

Rodgers, J.H. 2012. The use of algaecides in adaptive water resource management. Presented at the 32nd International Symposium of the North American Lake Management Society. Madison, WI. Nov. 7-9, 2012.

Rodgers, J. H. and A. Calomeni. The use of algaecides in adaptive water resource management: Some case studies. 2013. Presented at the Meeting of the Midwest Aquatic Plant Management Society. Cleveland, OH. March 3-5, 2013. Won the poster contest.

Rodgers, J.H. 2012. The use of algaecides in adaptive water resource management. Presented at the Annual Meeting of the Western Aqautic Plant Management Society. Coeur d'Alene, ID. March 25-27, 2013

Alley, B.L., J.H. Rodgers, Jr., and J.W. Castle. 2013. Seasonal performance of a hybrid pilot-scale constructed wetland treatment system for simulated fresh oilfield produced water. Presented at the 21st Annual David S. Snipes/Clemson Hydrogeology Symposium. Clemson, SC. April 4, 2013.

Beebe, A., J.W. Castle and J.H. Rodgers, Jr. 2013. Effects of evapotranspiration on water treatment performance in constructed wetlands. Presented at the 21st Annual David S. Snipes/Clemson Hydrogeology Symposium. Clemson, SC. April 4, 2013.

Coffey, R.E., J.W. castle and J.H. Rodgers, Jr. 2013. A demonstration constructed wetland treatment system for unconventional gas produced water. Presented at the 21st Annual David S. Snipes/Clemson Hydrogeology Symposium. Clemson, SC. April 4, 2013.

Huddleston, M., J.H. Rodgers, Jr., J.W. Castle. And M. Spacil. 2013. Treatment of Selenium as a constituent of ecological concern in energy-produced waters. Presented at the 21st Annual David S. Snipes/Clemson Hydrogeology Symposium. Clemson, SC. April 4, 2013.

Schwindaman, J.P., J.W. Castle and J.H. Rodgers, Jr. 2013. Fate and distribution of Arsenic in a pilot-scale constructed wetland treatment system for simulated Bangladesh groundwater. Presented at the 21st Annual David S. Snipes/Clemson Hydrogeology

Symposium. Clemson, SC. April 4, 2013.

Huddleston, M., J.H. Rodgers, Jr., J.W. Castle. And M. Spacil. 2013. Treatment of Selenium as a constituent of ecological concern in energy-produced waters. Presented at the SME Symposium on Environmental Considerations in Energy Production. Charleston, WV. April 14-18, 2013.

Rodgers, J.H., Jr. and A. Calomeni. 2013. The use of algaecides in adaptive water resource management. Presented at the Annual Meeting of the Aquatic Plant Management Society, San Antonio, TX. July 14-17, 2013.

Rodgers, J.H., Jr. and A. Calomeni. 2013. The use of algaecides in adaptive water resource management. Presented at the Annual Meeting of the MidSouth Aquatic Plant Management Society, Tunica, MS. Sep. 16-18, 2013.

Rodgers, J.H., Jr. and A. Calomeni. 2013. The use of algaecides in adaptive water resource management. Presented at the 37th Annual Meeting of the Florida Aquatic Plant Management Society, St. Augustine, FL. Oct. 14-17, 2013.

Rodgers, J.H., Jr. and A. Calomeni. 2013. Targeted algal management at Lake John Hay. Presented at the 35th Annual Meeting of the South Carolina Aquatic Plant Management Society, Myrtle Beach, SC. Oct. 23-25, 2013.

Haakensen, M., V. Pittit, J. Castle and J.H. Rodgers, Jr. 2013. Effects of freeze-thaw and biochar on sequestration and localization of elements within oxidizing and reducing pilot constructed wetland treatment systems. Presented at the 34th Annual Meeting of the Society of Environmental Toxicology and Chemistry (SETAC North America), Nashville, TN. 17-21 Nov. 2013.

Calomeni, A. and J.H. Rodgers, Jr. 2013. Assessment of six indicators for algal cell viability. Presented at the 34th Annual Meeting of the Society of Environmental Toxicology and Chemistry (SETAC North America), Nashville, TN. 17-21 Nov. 2013.

Huddleston, G.M., J.H. Rodgers, Jr. and A. McQueen. 2013. A proposed framework for an Environmental and Toxicology Assessment of an unleaded piston engine aviation fuel. Presented at the 34th Annual Meeting of the Society of Environmental Toxicology and Chemistry (SETAC North America), Nashville, TN. 17-21 Nov. 2013.

Tsai, K.P. and J.H. Rodgers, Jr. 2013. Toxicity of copper sulfate and copper-ethanolamine to *Microcystis aeruginosa* and *Pseudokirchneriella subcapitata* at different initial cell densities. Presented at the 34th Annual Meeting of the Society of Environmental Toxicology and Chemistry (SETAC North America), Nashville, TN. 17-21 Nov. 2013.

Beebe, D.A., J.W. Castle and J.H. Rodgers, Jr. 2013. Treatment of ammonia in pilot-scale constructed wetland treatment systems with clinoptilolite. Journal of Environmental Chemical Engineering.

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Photo Record of Ecosystem Functions and Services
Appendix B

East White Lake
Vermilion Parish, Louisiana

Functions and Services Provided by the East White Lake Ecosystem

1. Services Provided by Crabs and Fish

T-01

T-05

Provides Recreation - Crabbing

T-10

T-10

Provides Commercial Revenue - Crabbing

T-13

TR-05

Provides Recreation - Fishing

2. Functions and Services Provided by Marsh Grasses

T-7

T-10

Rushes and Forbs
Provide Waterfowl Diet

TR-02

T-07

Sedges and Grasses
Provide Shoreline Stabilization

4

T-01

Sedges and Forbs
Hold Soil in Place and Prevent Erosion

3. Services Provided
By
Wetland Trees and Shrubs

T-13

Near T-03

Tree and Shrub Roots Hold Soil in Place and Reduce Erosion

4. Services Provided by Smaller Vegetation

Buttercup T-10

Bitter weed at TR-02

Lizard tongue at T-05

TR-04 Poa

Smaller Plants
Recycle Nutrients to the Soil

T-01

5

Aquatic Plants
Naturally Filter and Improve Water Quality

T-05

South end of Site

Vegetation Biomass
Recycles and Stores Atmospheric Carbon

5. Water Control Services

T-7

South end of site

Vegetation Banks
Protect Against Storm Surge

T-05

South of T-01

Ecosystem Provides
Flood Control, Water Storage, and Release

6. Protection of Species

T-01

T-01

Wetlands Protect Biodiversity of Species

7. Protection of Migratory Birds

TR-05

T-10

East White Lake Ecosystem Provides Important Migratory Waterfowl Wintering Areas

8. Provides Habitat

T-01

TR-02

Ecosystem Provides
Habitat and Diet for Upper Level Predators

4

T-05

Ecosystem Provides Habitat for Lower Level Consumers and Decomposers

Ecosystem Provides Habitat for Large Herbivores

T-05

3

Schooner Bayou

East White Lake Ecosystem Provides Habitat for CarnivorousWading Birds

East White Lake Ecosystem Provides Vegetation for Nesting

T-13

East White Lake Ecosystem Provides Edge Habitat for Predators and Prey

Beautiful, Productive, and Functioning Ecosystem

GPS Coordinates of Observation Locations

Appendix C

East White Lake
Vermilion Parish, Louisiana

Appendix C

UTM GPS Coordinates for Crab Sampling Locations

East White Lake
Vermilion Parish, Louisiana

X	*Y*	*ID*
561094	3288605	T-01
560869	3288990	T-05
561198	3289709	T-07
560451	3288906	T-10
561240	3289062	T-13
567210	3291154	TR-02
560982	3288975	TR-04
559737	3289879	TR-05
557563	3288974	TR-08
561263	3288272	1
561642	3288625	2
561773	3289013	3
561909	3289566	4
561738	3289382	5

Footnote:

NAD 83 Zone 15 N

Scientific Collection Permit
Appendix D

East White Lake
Vermilion Parish, Louisiana

BOBBY JINDAL
GOVERNOR

State of Louisiana
DEPARTMENT OF WILDLIFE AND FISHERIES
OFFICE OF SECRETARY

ROBERT BARHAM
SECRETARY

January 1, 2014

Dear Scientific Collection Permit Holder:

The Louisiana Department of Wildlife and Fisheries (LDWF) would like to inform you of recent changes to the Scientific Collection Permit. In the past, three separate permits (Freshwater, Saltwater, Saltwater/Oyster) were required for those desiring to sample aquatic life in Louisiana. In an effort to streamline the permitting process, LDWF has adopted changes that were implemented January 1, 2014 that includes the elimination of the three permits listed above and replaced by one Office of Fisheries' permit for sampling activities in any aquatic habitat. This change eliminates the need to apply for up to three separate permits for permitted activities.

In addition, sub-permittees will not be listed on the front page of the permit. However, they will be listed on the SCP application and attached to the permit.

While the permit has changed the rules and regulations pertaining to the permit have not. Therefore all rules and regulations must be strictly adhered to. For future permit requests, please use the current application that is available on our website at: www.wlf.louisiana.gov/permits

If you have any questions, comments or concerns please contact me at 225-765-2373 or rmyers@wlf.la.gov.

Sincerely,

Randell S. Myers
Biologist DCL-B

P.O. BOX 98000 • BATON ROUGE, LOUISIANA 70898-9000 • PHONE (225) 765-2800
AN EQUAL OPPORTUNITY EMPLOYER

BOBBY JINDAL
GOVERNOR

State of Louisiana

ROBERT BARHAM
SECRETARY

DEPARTMENT OF WILDLIFE AND FISHERIES
OFFICE OF SECRETARY

OFFICE OF FISHERIES
SCIENTIFIC COLLECTING PERMIT

ISSUED TO: **Helen Connelly** PERMITTEE # **SCP 71**
COMPANY: **Michael Pisani & Assoc.**
ADDRESS: **1100 Poydras 1430 Energy Center New Orleans, LA 70163**
ISSUE DATE: **03/06/2014** EXPIRATION DATE: **12/31/2014**

PERMITTED ACTIVITIES:

This permit allows the holder to take the fish listed in **Attachment A** of this permit, by the means and in the areas authorized in **Attachment A**, provided that the Region Captain of the Louisiana Department of Wildlife and Fisheries, Enforcement Division is notified in advance and shall accompany you, or direct somebody to accompany you, if he deems it necessary, when fish are taken under the authority of this permit. If electric seines, electrofishers or chemicals are to be used, it will be necessary that the Area Fisheries Biologist be notified in addition to the Region Enforcement Captain. This permit does not allow anyone to use chemicals that are not approved for use in Louisiana by other state and federal agencies or exempt permit holders from any regulations by other state or federal agencies. This permit is valid only in the areas listed in **Attachment A**.

RESTRICTIONS:

(1)This permit may be cancelled at any time if in the judgment of the designated authority; the permit is being used for purposes other than those for which the permit was issued. Sale of any organisms collected under this permit, or their progeny, is prohibited. No item collected under this permit may be used for human consumption. One of the permittees must be in the company of the samples at all times. This permit and **Attachment A** must be in possession when taking or possessing organisms under the conditions of the permit.

(2) This permit does not allow the taking of oysters from private leases unless accompanied by written permission of the lease holder. Any sack, vessel or container into which any oysters collected under this permit are deposited or held, irregardless of where harvested, shall be clearly labeled "Polluted Oysters Not Safe for Human Consumption". The permit holders shall individually and collectively be responsible for maintaining security of all oysters removed from the site and retained such that no human consumption will be possible. In addition permit holders individually and collectively shall hold the Louisiana Department of Wildlife and Fisheries, the Louisiana Department of Health and Hospitals, the State of Louisiana and its employees harmless for any and all consequences relating to human contact with oysters collected under this permit.

(3) In saltwater areas, gill nets must be attended to at all times with tags on each end of the net clearly identifying the owner and operator of the gear.

(4) Alligators are not permitted to be taken with this permit.

(5) Holder agrees to submit an annual report giving a detailed description and inventory of all specimens collected within 60 days following expiration of this permit to: Louisiana Department of Wildlife and Fisheries, Office of Fisheries - Permits Manager, P.O. Box 98000, Baton Rouge, LA 70898-9000. Reports are mandatory even if no collections were made during the permit year.

(6) Failure to report may result in denial of future permit requests or suspension of existing permits.

(7) See Attachment A for additional information regarding permit restrictions.

PERMIT COMPLIANCE - PERMIT IS NOT VALID UNLESS SIGNED BY PERMITTEE

I ____,
(Permittee Signature)
agree to abide by all State and Federal fish and wildlife laws and regulations, and all State and Federal laws and regulations which relate to this permit or the permitted activity, and by all other terms and conditions of this permit.

LEGAL AUTHORITY: **R.S. 56:318**
APPROVED - authority delegated by the Secretary of the Louisiana Department of Wildlife and Fisheries in memo dated 1/8/13

Randell S. Myers, Biologist DCL-B:

cc: Col. Jeff Mayne, Enforcement

LOUISIANA DEPARTMENT OF WILDLIFE AND FISHERIES
SCIENTIFIC COLLECTING PERMIT INFORMATION

- The Department of Wildlife and Fisheries reserves the right to deny issuance of a scientific collecting permit to an individual who has been convicted of, or is awaiting disposition of, a citation involving a Class 2 wildlife and fisheries violation or greater.

- Permittee is limited to the personnel, purpose of collections, sampling areas, gear types and sampling techniques, and types and numbers of organisms to be collected, as indicated on the scientific collecting permit application. Any requested deviation will require Department approval.

- Permit will not allow anyone to use chemicals which are not approved for use in Louisiana by other state and federal agencies or exempt permit holder from any regulations by other state or federal agencies.

- Permittee is responsible for obtaining the proper applicator's licenses when using restricted use pesticides and other restricted use chemicals in aquatic sampling. The use of any chemicals must be fully described in the application.

- All permits shall expire on December 31 of the year of issue unless otherwise noted. The Administrator may impose time limits and other restrictions on the duration of any collection permit.

- An annual report giving a detailed description and inventory of all specimens collected is due within 60 days following expiration of permit. If no collections are made during a particular year, then a report should be submitted stating such. Permits are subject to cancellation if no report is received for prior year collections.
  Information to be included in annual report:
  1. Name and permit number of the collector.
  2. Name and location of each area, stream, or lake where collections were made.
  3. Date(s) of collection at each site or area.
  4. Number and/or weight of each species taken (list by collection site or area and date of collection).
  5. Method of collection.
  6. Disposition of all animals taken.

- The appropriate regional law enforcement captain must be notified no later than 24 hours prior to sampling, with information including scientific collecting permit number, organization, name(s) of permittees, sampling area(s) and specific gear to be used. In addition, if electrofishing gear or fish toxicants are to be used, the permittee must provide date and estimated time of sampling, specific sampling areas, and routes to be taken to these areas. The district fisheries biologist will also be notified prior to sampling with electrofishing gear or fish toxicants.

- A scientific collecting permit application that includes the proposed usage of electrofishing gear or fish toxicants for use in public waters by a non-educational or non-governmental entity must be accompanied by a letter of support by an involved state or federal governmental agency.

- Any proposed use of electrofishing gear or fish toxicants requires the written concurrence of the Enforcement Division as well as the Inland and/or Marine Fisheries Divisions.

- The use of explosives will normally not be permitted. Applicant must demonstrate to the Department's satisfaction that no other effective means are available to collect aquatic organisms. Any proposed use of explosives requires the written concurrence of the Enforcement Division as well as the Inland and/or Marine Fisheries Divisions.

- Sale of any organisms collected under the permit or their progeny, is prohibited.

- No item collected under the permit may be used for human consumption.

- *Permit holders shall contact the Enforcement Division of the Louisiana Department of Wildlife and Fisheries (Major Cliff Comeaux (225) 765-2980) in regards to the disposition of these samples. If donated for official use a receipt will be issued. Enforcement Division may authorize other means of final disposition.*

- One of the permittees must be in the company of the samples at all times. Permits are non-transferable but may be issued in more than one person's name.

- Student requests will require endorsement of professor. Apply on official college or university stationery.

- Alligators are not permitted to be taken with the permit.

- Permits will not be issued for collection of any rare or endangered species unless specifically approved.

SCIENTIFIC COLLECTING PERMIT APPLICATION

APPLICATION DATE: 2/19/14

PREVIOUS PERMIT # (if applicable):

TYPE OF PERMIT APPLIED FOR:

☒ **FRESHWATER AREA**

☒ **SALTWATER AREA**

☐ **LA NATURAL HERITAGE PROGRAM (LNHP)/ TERRESTRIAL**

APPLICANTS INFORMATION

NAME: Helen Connelly

PHONE: 225229 1810

OFFICIAL TITLE:

EMAIL: hconnelly@mpisani.com

INSTITUTION/AFFILIATION: Michael Pisani + Assoc.

ADDRESS: 1100 Poydras, 1430 Energy Center

ADDRESS 2:

CITY: New Orleans

STATE: LA

ZIP: 70163

COLLECTING PERSONNEL

NAMES OF ALL PERSONNEL CONDUCTING COLLECTING (*STATEMENT OF COMPLIANCE FORM MUST BE SIGNED BY ALL LISTED BELOW. IF FIREARMS/ELECTROFISHING GEAR WILL BE USED, PROVIDE DATE OF BIRTH AND DRIVER'S LICENSES #, YOU MUST COMPLETE THE ATTACHED FORM*):

Helen Connelly
John Rodgers

PERMIT INFORMATION

PURPOSE OF SCIENTIFIC COLLECTION (*ATTACH SUPPORT INFORMATION AS APPROPRIATE*):

To measure crab abundance / size and ecosystem health.

AREA(S) WHERE COLLECTIONS WILL BE MADE:

Schooner Bayou Canal, and adjacent canals
East part of White Lake (Vermilion Parish)

METHOD(S) OF COLLECTION (*TYPES OF GEAR OR EQUIPMENT TO BE USED AND TECHNIQUE OF DEPLOYMENT*):

wire mesh crab traps, deployed from boat with outboard motor

TYPE AND NUMBER OF ORGANISMS TO BE COLLECTED:

Callinectes sapidus
~10 traps
approximately 100 crabs

HOW WILL SPECIMENS BE DISPOSED?

sanitary landfill in Baton Rouge area

I have read the terms for issuance of this scientific collecting permit and agree to abide by them.

SIGNATURE:

DATE: 2/19/14

Print

REGION	**CONTACT**	**ADDRESS & TELEPHONE**	PARISHES
ENFORCEMENT REGION I	CAPTAIN: **RICHIE MCCARTHY** ADMINISTRATIVE SPEC: DAPHNE CLEMENTS	9961 Hwy 80 Minden, LA 71055 318/371-3049 318/371-3332 **FAX**	Bienville Bossier Caddo Claiborne DeSoto Red River Webster
ENFORCEMENT REGION II	CAPTAIN: **RICK OWENS** ADMINISTRATIVE SPEC: SHETOCQUIE WILLIS	368 Centurytel Drive Monroe, LA 71203-8732 318/362-3102 318/362-3273 **FAX**	East Carroll Jackson Lincoln Morehouse Ouachita Richland Union West Carroll Caldwell Franklin Tensas Madison
ENFORCEMENT REGION III	CAPTAIN: **CURT BELTON** ADMINISTRATIVE SPEC: ROBIN CUTTS	1995 Shreveport Highway Pineville, LA 71360 318/487-5634 318/487-5636 **FAX**	Avoyelles Grant Natchitoches Rapides Sabine Vernon Winn La Salle Catahoula Concordia
ENFORCEMENT REGION IV	CAPTAIN: **DONALD SALPRIETRA** ADMINISTRATIVE SPEC: TINA FAUL	5652 Highway 182 Opelousas, LA 70570 337/948-0257 948-0259 948-0261 337/948-0293 **FAX**	St. Landry St. Martin Pointe Coupee Lafayette Iberia Iberville West Baton Rouge
ENFORCEMENT REGION V	CAPTAIN: **ROBERT BUATT** ADMINISTRATIVE SPEC: CINDY PIPPIN	1213 N. Lakeshore Drive Lake Charles, LA 70601 337/491-2580 337/491-2971 **FAX**	Beauregard Allen Evangeline Calcasieu Cameron Acadia Vermilion Jefferson Davis
ENFORCEMENT REGION VI	CAPTAIN: **CHUCK COMEAUX** ADMINISTRATIVE SPEC: ELAINE MOORE	1102 Hwy. 3185 Thibodaux, LA 70301 985/447-0821 985/447-0824 **FAX**	Assumption Lafourche St. John St. Martin St. Mary Terrebonne
ENFORCEMENT REGION VII	CAPTAIN: **LEN YOKUM** ADMINISTRATIVE SPEC: BRITNEE BATTS	P O Box 98000 2000 Quail Drive (70808) Baton Rouge, LA 70898-9000 225/765-2999 225/763-5429 **FAX**	Ascension East Baton Rouge East Feliciana Livingston St. Helena Tangipahoa Washington West Feliciana
ENFORCEMENT REGION VIII	CAPTAIN: **STEVE MCMANUS** ADMINISTRATIVE SPEC: SENNETTA BELL	2021 Lakeshore Dr., Ste. 204 New Orleans, LA 70122 504/284-2023 504/284-2027 504/284-2026 **FAX**	Jefferson Orleans Plaquemine St. Bernard St. Charles St. James St. Tammany

ATTACHMENT B

MARINE FISHERIES DIVISION CONTACT PERSONNEL				
AREA ENCOMPASSES:	**BIOLOGIST**	**OFFICE LOCATION**	**TELEPHONE NUMBER**	**Email Address**
Mississippi Line to Southwest Pass (Miss. River)	Carl Britt	Lacombe	(985)882-0027	cbritt@wlf.la.gov
Southwest Pass (Miss. River) to Bayou Lafourche	Chris Schieble	New Orleans	(504)284-2037	kibos@wlf.la.gov
Bayou Lafourche to Atchafalaya River	Brady Carter	Bourg	(985)594-4139	vguillory@wlf.la.gov
Atchafalaya River to Freshwater Bayou	Paul Cook	New Iberia	(337)373-0032	pcook@wlf.la.gov
Freshwater Bayou to Sabine Pass	Mike Harbison	Lake Charles	(337)491-2579	mharbison@wlf.la.gov

ATTACHMENT B

LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

SCIENTIFIC COLLECTING PERMIT APPLICATION

APPLICATION DATE: 2/19/14

PREVIOUS PERMIT # (if applicable):

TYPE OF PERMIT APPLIED FOR:

☒ FRESHWATER AREA

☒ SALTWATER AREA

☐ LA NATURAL HERITAGE PROGRAM (LNHP)/ TERRESTRIAL

APPLICANTS INFORMATION

NAME: Helen Connelly

PHONE: 225229 1810

OFFICIAL TITLE:

EMAIL: hconnelly@mpisani.con

INSTITUTION/AFFILIATION: Michael Pisani + Assoc.

ADDRESS: 1100 Poydras, 1430 Energy Center

ADDRESS 2:

CITY: New Orleans

STATE: LA

ZIP: 70163

COLLECTING PERSONNEL

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Helen Connelly
John Rodgers

PERMIT INFORMATION

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To measure crab abundance / size and ecosystem health.

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Schooner Bayou Canal, and adjacent canals
East part of White Lake (Vermilion Parish)

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wire mesh crab traps, deployed from boat with outboard motor

TYPE AND NUMBER OF ORGANISMS TO BE COLLECTED:

Callinectes sapidus approximately
~10 traps 100 crabs

HOW WILL SPECIMENS BE DISPOSED?

sanitary landfill in Baton Rouge area

I have read the terms for issuance of this scientific collecting permit and agree to abide by them.

SIGNATURE:

DATE: 2/19/14

Print

Statement of Compliance

I have been advised and do understand that by applying for and accepting a permit issued by the Louisiana Department of Wildlife and Fisheries, I am being allowed to engage in an activity which would otherwise be prohibited by law or for which a permit is required. I understand that the permit is not a license and confers no property rights upon me. I specifically agree to abide by all State and Federal fish and wildlife laws and regulations, and all State and Federal laws and regulations which relate to this permit or the permitted activity, and by all other terms and conditions of this permit. I understand that the permit for which I am applying may be suspended, canceled or revoked at any time by the Louisiana Department of Wildlife and Fisheries. I agree to immediately surrender the permit issued to me upon demand made upon me by any authorized employee of the Louisiana Department of Wildlife and Fisheries. I understand that my failure to fully and completely comply with the laws, regulations, terms, and conditions referred to herein will result in the immediate suspension, cancellation or revocation of this and other permits issued to me by the Department and that I may be denied future permits as a consequence of my actions. I understand and agree that any permit issued to me by the Louisiana Department of Wildlife and Fisheries is in the nature of a privilege which is being voluntarily extended to me by the Department and the failure on my part to cooperate fully and completely with the Department or any of its employees can result in the loss of the privilege conferred and the denial of future requests for permits. By accepting a permit, I evidence my agreement to be bound by all conditions and stipulations set forth herein.

PRINT NAME: Helen Connelly

Signature

Date 2/24/14

THIS STATEMENT IS REQUIRED TO BE READ AND SIGNED BEFORE ANY PERMIT CAN BE ISSUED BY THE DEPARTMENT OF WILDLIFE AND FISHERIES, EFFECTIVE 8/18/97.

(MUST BE SIGNED BY ALL APPLICANTS WHO WISH TO BE LISTED ON THE PERMIT.)

Print

Statement of Compliance

I have been advised and do understand that by applying for and accepting a permit issued by the Louisiana Department of Wildlife and Fisheries, I am being allowed to engage in an activity which would otherwise be prohibited by law or for which a permit is required. I understand that the permit is not a license and confers no property rights upon me. I specifically agree to abide by all State and Federal fish and wildlife laws and regulations, and all State and Federal laws and regulations which relate to this permit or the permitted activity, and by all other terms and conditions of this permit. I understand that the permit for which I am applying may be suspended, canceled or revoked at any time by the Louisiana Department of Wildlife and Fisheries. I agree to immediately surrender the permit issued to me upon demand made upon me by any authorized employee of the Louisiana Department of Wildlife and Fisheries. I understand that my failure to fully and completely comply with the laws, regulations, terms, and conditions referred to herein will result in the immediate suspension, cancellation or revocation of this and other permits issued to me by the Department and that I may be denied future permits as a consequence of my actions. I understand and agree that any permit issued to me by the Louisiana Department of Wildlife and Fisheries is in the nature of a privilege which is being voluntarily extended to me by the Department and the failure on my part to cooperate fully and completely with the Department or any of its employees can result in the loss of the privilege conferred and the denial of future requests for permits. By accepting a permit, I evidence my agreement to be bound by all conditions and stipulations set forth herein.

PRINT NAME: JOHN H. RODGERS, JR.

John H. Rodgers, Jr.
Signature

2-19-2014
Date

THIS STATEMENT IS REQUIRED TO BE READ AND SIGNED BEFORE ANY PERMIT CAN BE ISSUED BY THE DEPARTMENT OF WILDLIFE AND FISHERIES, EFFECTIVE 8/18/97.

(MUST BE SIGNED BY ALL APPLICANTS WHO WISH TO BE LISTED ON THE PERMIT.)

Helen Connelly

From: Robert Bourgeois (WLF) <rbourgeois@wlf.la.gov>
Sent: Monday, March 24, 2014 3:16 PM
To: Helen Connelly
Cc: Kenneth Jenkins (kenneth.jenkins@cardno.com); jrodger@clemson.edu; Randy Myers
Subject: RE: Scientific Collection Permit

Helen,
All three of you(Helen Connelly, John Rodgers, and Ken Jenkins) has been approved and added to your Scientific Collection Permit. This email notification will serve as your approval. Therefore, please print a copy of this email and attach it to the permit. Please don't hesitate to contact us if you have any more questions.

Rob

From: Helen Connelly [mailto:hconnelly@mpisani.com]
Sent: Monday, March 24, 2014 2:09 PM
To: Robert Bourgeois (WLF)
Cc: Kenneth Jenkins (kenneth.jenkins@cardno.com); jrodger@clemson.edu
Subject: Scientific Collection Permit

Dear Mr. Bourgeois,
Thank you for discussing the crab collection permit with me on the phone.
As you requested, here is a list of the members of the collection team (including our new addition): Helen Connelly, John Rodgers, Ken Jenkins. Also, as we discussed – we will catch and release the crabs, rather than dispose at a landfill.
Thank you for updating our permit, #SCP 71.

Best Regards,
Helen Connelly, PhD
Environmental Toxicologist
Michael Pisani & Associates
1100 Poydras
Suite 1430, Energy Center
New Orleans, LA 70163
225-229-1810

Photo Journals
Appendix E

East White Lake
Vermilion Parish, Louisiana

East White Lake Ecosystem

Photos taken by Dr. Helen Connelly
05/12/14


Bank at T-1


T-1 Saw grass, seeds eaten by ducks


T-01 Giant Salvinia


T-01 Alligator Weed

T-01

T-01

T-10 Dr. Helen Connelly throwing in trap

T-10 Dr. Helen Connelly throwing in trap


T-10 Dr. Helen Connelly throwing in trap


Near T-13 Egret


T-13 Common Reed


T-13 Salt Marsh Morning Glory

T-13 Salt Marsh Morning Glory

T-13 Salt Marsh Morning Glory

T-7 Bulltongue Arrowhead

Heading down Schooner Bayou to lake entrance

TR-05 crabs in fisherman's traps

TR-05 crabs in fisherman's traps

TR-05 crabs in fisherman's traps

Boat Captain and Boat Hand

Boat Captain

South end of site alligator swimming

South end of site

South end of site alligator weed

T-10 Common bulrush

T-13 setting hoop net

T-13 setting hoop net

T-13 setting hoop net

South of T-01, 561262 3288272 (1)

South of T-01, 561262 3288272 (1)

South of T-01, 561262 3288272 (1)

South of T-01, 561262 3288272 (1) Alligator tracks

Near T-01 Egret

Near T-01 Egret

Deer Fly on boat

561773 3289013 (3) tri-colored heron

561773 3289013 (3) tri-colored heron

561773 3289013 (3) tri-colored heron

561773 3289013 (3) roseau cane and cattails

561773 3289013 (3) deer stand

561773 3289013 (3) grasses

561773 3289013 (3) grasses

Onshore at 561909 3289566 (4) numerous depressions like this

Onshore at 561909 3289566 (4) animal holes

Onshore at 561909 3289566 (4) rattlebox

Onshore at 561909 3289566 (4) fungus

Onshore at 561909 3289566 (4)

Onshore at 561909 3289566 (4)

Onshore at 561909 3289566 (4) black willow

561738 3289382 (5) bulrush and alligator weed

Between TR-04 and TR-05 in Schooner Bayou

TR-02 Fisherman’s crab traps

TR-02 Fisherman’s crab trap

TR-02 Fisherman’s crab trap

TR-02 Fisherman’s crab trap

TR-02 Fisherman’s crab trap

East White Lake Ecosystem

Photos Taken by Dr. Helen Connelly
05/13/14

Heading to site

Heading to site

Local catfisherman near lake

Local catfisherman near lake

Local catfisherman near lake

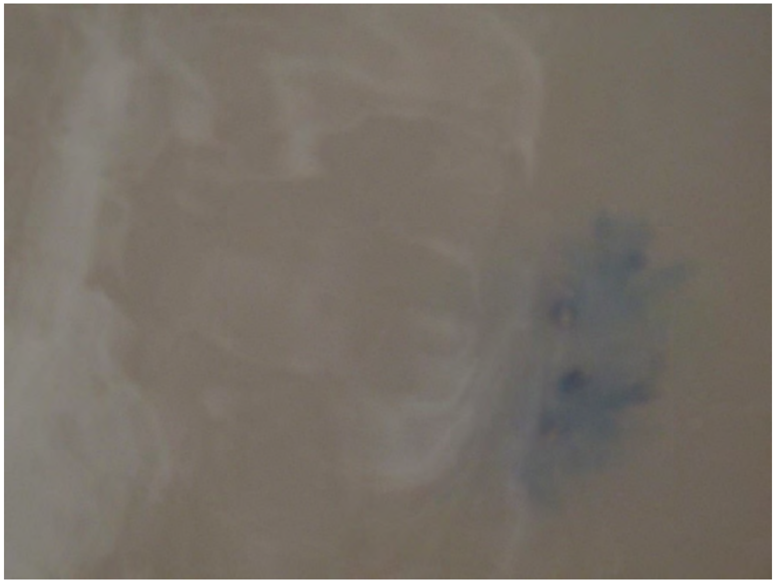
Barge near lake

Putting trap in at T-01

Saw grass at T-01

Flowering saw grass at T-01

Submerged *Myriophyllum spicatum*, Eurasian Water milfoil



Submerged *Myriophyllum spicatum*, Eurasian Water milfoil

Blue heron near T-01

Blue heron near T-01

Blue heron near T-01

Blue heron near T-01

Blue heron near T-01

Blue heron near T-01

Heading to T-05

Heading to T-05

Egret near T-05

Egret near T-05

Crabs at T-10

Crabs at T-10

Crabs at T-10

Crabs at T-10

Crab from T-10

Crabs at T-10

Crabs at T-10

Crabs at T-10

Crab from T-10

Crab from T-10

Crab from T-10

Giant bulrush at T-10

Buttercup at T-10

Red cardinal at T-10

Crabs from T-05

Crabs from T-05

Crabs from T-05

Barnacles on stump at T-05

Barnacles on stump at T-05

Barnacles on stump at T-05

Lizard’s tail at T-05

T-05

T-05

Saw grass near T-7

Bulltongue arrowhead at T-7

Change in waters lake to bayou

Flock of clapper rail near TR-05

Poa at TR-04

Poa at TR-04

Bitterweed at TR-02

Alligator at TR-02

Alligator at TR-02

Alligator at TR-02

Egret in Schooner Bayou

Poa at location 1

Algal mat on sediment at location 1

Lilies at Location 1

Boat heading to landing

Boat heading to landing

East White Lake Ecosystem

Photos Taken by Dr. Helen Connelly
05/14/14

Flock of ibis over lake at TR-08

Choppy water at TR-08

Storm clouds at TR-08

Catfish at TR-05

Fish at T-01

Dr. Helen Connelly with crab at T-01

Dr. Helen Connelly with crab at T-01

Crab at T-01

Gar at T-01

Crabs and catfish at T-01

Crabs and catfish at T-01

Crabs at T-01

Giant bulrush at 5

Giant bulrush at 5

Hoop net at T-13

Hoop net at T-13


Hoop net at T-13


Hoop net at T-13

Shoreline at T-05

Shoreline at T-05

Deer at T-05

Shoreline at T-05

Deer at T-05

Deer at T-05

Deer at T-05

Shoreline at T-05

Shoreline at T-05

Deer at T-05

Deer at T-05

Deer at T-05

Deer at T-05

Deer at T-05

Deer at T-05

Deer at T-05

Flock of ibis at T-10

Flock of ibis at T-10

Hoop net at T-10

Crabs at T-10

Crabs at T-10

White ibis at T-10

White ibis at T-10

Hoop net at T-05


Hoop net at T-05


Fish at T-05

Fish and crabs at T-05

Crabs in hold

Crabs at T-05

Crabs at T-05

Fish at T-01

Hoop net at T-01

Fish at T-01

Schooner Bayou

Schooner Bayou

Schooner Bayou

East White Lake Ecosystem

Photos Taken by Dr. John Rodgers

05/13/14

Shoreline at T-01

View of treeline at T-01

View of treeline at T-01

View of treeline at T-01

Blue Heron at T-05

Blue Heron at T-05

Blue Heron at T-05

Banks at T-05

Dense vegetation at T-10

Alligator weed at T-10

Giant bulrush at T-10

Treeline at T-10

Shoreline at T-10

Shoreline at T-10

Banks at T-05

Banks at T-05

Shoreline at T-05

Shoreline at T-05

Shoreline at T-13

Dense vegetation at T-13


Treeline at T-13


Shoreline at T-13


Shoreline at T-7


Shoreline at T-7

Shore at T-7

Shore at T-7

Treeline at T-7

Treeline at T-7

Treeline at T-7

Bulltongue Arrowhead at T-7

Bulltongue Arrowhead at T-7

Poa at T-7

Vegetated banks

Vegetated banks

Treeline

Shoreline

Shore at TR-05

Treeline at TR-05

Shoreline at TR-05

Shoreline at TR-05

Onshore at TR-04

Vegetated bank at TR-04

Shoreline at TR-04

Bank at TR-04

East White Lake Ecosystem

Photos taken by Dr. John Rodgers
05/14/14

Shoreline at 3

Shoreline at 3

Treeline at 3

Shoreline at 3

Bank at 5

Bank at 5

Treeline at 5

Treeline at 5

Shoreline at 4

Shoreline at 4

Treeline at 4

Treeline at 4

Bank at T-13

Shoreline at T-13

Treeline at T-13

Shoreline at T-13

Treeline at T-13

Hoopnet and catfish at T-13

Hoopnet and catfish at T-13

Shorelines at T-13

Shoreline at T-05

Shoreline at T-05

Shoreline at T-05

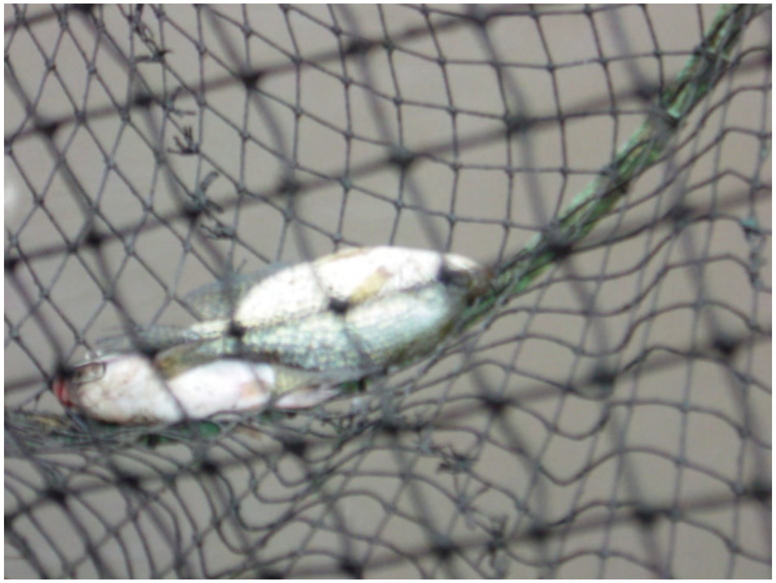
Shoreline at T-05

Deer at T-05

Deer at T-05

Deer at T-10

Gar at T-10


Fish at T-10


Crabs at T-10


Crabs at T-10


Catfish at T-10

Hoopnet at T-05

Hoopnet at T-05

Fish at T-05

Fish at T-05

Ecosystem Services and Functions Records
Appendix F

East White Lake
Vermilion Parish, Louisiana

Wetland Services and Functions - Checklist	Site T-01 JHR 5-13-2014	**Site Condition and Wetland Type**
Wetland Services	**Wetland Functions Associated With Services**	**Fresh and Intermediate**
Flood protection	-Surface water detention/storage -Coastal storm surge detention	Fully Met
Recreation	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Diverse plant habitat -Access for recreation	Fully met
Maintain water quality	-Nutrient transformation -Retention of sediments and other particulates -Element transformation	Fully met
Shoreline property protection/ Erosion control	-Shoreline stabilization -Coastal storm surge detention/mitigation -Subsidence/accretion	Fully met
Maintain baseflow in streams or adjacent lotic systems	- Streamflow maintenance -Surge protection	Met
Wildlife habitat and biodiversity	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities - Provision of habitat for federally or state protected species	Fully Met
Commercial products from wetlands (e.g. fish, shellfish, timber, etc.)	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities	Fully Met
Reduce pollutants in streams and stormwater	-Nutrient transformation -Retention of sediments and other particulates	Fully Met

Site T-01   JHR   5-13-2014

PLANTS

- *Alternanthera philoxeroides* - Alligatorweed
- *Hydrocotyl umbellata* - Water Pennywort
- *Cladium mariscus (jamaicense)* - Giant cutgrass
- *Baccharis halimifolia* - Baccharis
- *Salvinia molesta* - Giant Salvinia
- *Typha domingensis* - Tall Cattail
- *Triadica sebifera* - Chinese tallow
- *Eupatorium capillifolium* - Dogfennel
- *Hibiscus moscheutos* - Swamp Mallow
- *Quercus alba* - White Oak
- *Acer rubrum* - Red Maple
- *Myriophyllum spicatum* - Euasian Watermilfoil
- Epiphytic algae

ANIMALS

- *Riparia riparia* - Bank Swallows
- *Petrochelidon pyrrhonota* - Cliff Swallow
- *Agelaius phoeniceus* - Redwing blackbird
- *Phalacrocorax auritus* - Double Crested Cormorant
- *Platalea ajaja* - Roseate spoonbill
- *Pandion halietus* - Osprey
- *Plecia neactica* - Lovebugs
- *Tebanus sp.* - Horse fly
- *Chrysops sp.* - Deer fly
- *Odonata* - Dragonflies
- *Micropterus salmoides* - Bass
- *Ictulurus punctatus* - Channel Catfish –hoop net
- *Pylodictus olivaris* - Flathead Catfish, Mudcat - hoop net
- *Atractosteus spatula* - Alligator Gar - hoop net
- *Callinectes sapides* - Crabs - hoop net

Wetland Services and Functions - Checklist	Site T-05 JHR 5-13-2014	**Site Condition and Wetland Type**
Wetland Services	**Wetland Functions Associated With Services**	**Fresh and Intermediate**
Flood protection	-Surface water detention/storage -Coastal storm surge detention	Fully Met
Recreation	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Diverse plant habitat -Access for recreation	Fully Met
Maintain water quality	-Nutrient transformation -Retention of sediments and other particulates -Element transformation	Fully Met
Shoreline property protection/ Erosion control	-Shoreline stabilization -Coastal storm surge detention/mitigation -Subsidence/accretion	Fully Met
Maintain baseflow in streams or adjacent lotic systems	- Streamflow maintenance -Surge protection	Met
Wildlife habitat and biodiversity	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities - Provision of habitat for federally or state protected species	Fully Met
Commercial products from wetlands (e.g. fish, shellfish, timber, etc.)	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities	Fully Met
Reduce pollutants in streams and stormwater	-Nutrient transformation -Retention of sediments and other particulates	Fully Met

Site T-05 JHR 5-13-2014

PLANTS

- *Triadeca sabberiferum* - Chinese tallow
- *Alternanthera philoxeroides* - Alligatorweed
- *Salvinia molesta* - Giant Salvinia
- *Ranunculus sp.* - Buttercup
- *Cladium mariscus (jamaicense)* - Giant cutgrass
- *Hydrocotyl umbellata* - Water Pennywort
- *Schoenoplectus californicus* - Giant Bulrush
- *Salix nigra* - Black willow
- *Myriophyllum spicatum* - Eurasian watermilfoil
- *Phragmites australis* - Common reed (roseau cane)
- *Saururus cernuus* - Lizard's tail
- *Sabittaria lancifolia* - Bulltongue arrowhead
- *Hibiscus moscheutos* - Swamp Mallow
- *Setaria currugata* - Coastal bristle grass
- *Quercus alba* - White Oak
- *Lonicera japonica* - Japanese honeysuckle
- *Setaria corrugate* - Bristle grass
- *Brasenia sp.* - Water Shield

ANIMALS

- *Plegadis chihi* - White faced ibis
- *Agelaius phoeniceus* - Redwing blackbird
- *Gambusia affinis* - Mosquito Fish
- *Atractosteus spatula* - Alligator Gar
- *Callinectes sapides* - Crabs

Wetland Services and Functions - Checklist	Site T-07 JHR 5-13-2014	**Site Condition and Wetland Type**
Wetland Services	**Wetland Functions Associated With Services**	**Fresh and Intermediate**
Flood protection	-Surface water detention/storage -Coastal storm surge detention	Fully Met
Recreation	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Diverse plant habitat -Access for recreation	Fully Met
Maintain water quality	-Nutrient transformation -Retention of sediments and other particulates -Element transformation	Fully Met
Shoreline property protection/ Erosion control	-Shoreline stabilization -Coastal storm surge detention/mitigation -Subsidence/accretion	Fully Met w/ accretion
Maintain baseflow in streams or adjacent lotic systems	- Streamflow maintenance -Surge protection	Met
Wildlife habitat and biodiversity	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities - Provision of habitat for federally or state protected species	Fully Met
Commercial products from wetlands (e.g. fish, shellfish, timber, etc.)	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities	Fully Met
Reduce pollutants in streams and stormwater	-Nutrient transformation -Retention of sediments and other particulates	Fully Met

Site T-07   JHR   5-13-2014

PLANTS

- *Alternanthera philoxeroides* - Alligatorweed
- *Hydrocotyl umbellata* - Water Pennywort
- *Cladium mariscus (jamaicense)* - Giant cutgrass
- *Baccharis halimifolia* - Baccharis
- *Salvinia molesta* - Giant Salvinia
- *Typha domingensis* - Tall Cattail
- *Triadica sebifera* - Chinese tallow
- *Eupatorium capillifolium* - Dogfennel
- *Sesbania drummondii* - Rattlebox
- *Typha latifolia* - Broadleaf cattail
- *Rubus sp.* - Blackberry
- *Salix nigra* - Black willow
- *Sagittaria latifolia* - Bull tongue
- *Hibiscus moscheutos* - Swamp Mallow
- *Quercus alba* - White Oak
- *Acer rubrum* - Red Maple
- *Myriophyllum spicatum* - Euasian Watermilfoil
- Epiphytic algae

ANIMALS

- *Myocaster coypus* - Nutria
- *Riparia riparia* - Bank Swallows
- *Petrochelidon pyrrhonota* - Cliff Swallow
- *Phalacrocorax auritus* - Double Crested Cormorant
- *Platalea ajaja* - Roseate spoonbill
- *Pandion halietus* - Osprey
- *Alligator mississippiensis* - Alligator
- *Zenaida macroura* - Mourning Dove
- *Larus argentatus* - Herring gull
- *Agelaius phoeniceus* - Redwing blackbird
- *Egretta intermedia* - Egret
- *Melanerpes carolinus* - Red bellied woodpecker
- *Lithobates catesbeianus* - Bullfrog
- *Plecia neactica* - Lovebugs
- *Tebanus sp.* - Horse fly
- *Chrysops sp.* - Deer fly
- *Odonata* - Dragonflies
- *Micropterus salmoides* - Bass
- *Gambusia affinis* - Mosquitofish
- *Callinectes sapides* - Crabs

Wetland Services and Functions - Checklist	Site T-10 JHR 5-13-2014	**Site Condition and Wetland Type**
Wetland Services	**Wetland Functions Associated With Services**	**Fresh and Intermediate**
Flood protection	-Surface water detention/storage -Coastal storm surge detention	Fully Met
Recreation	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Diverse plant habitat -Access for recreation	Fully Met
Maintain water quality	-Nutrient transformation -Retention of sediments and other particulates -Element transformation	Fully Met
Shoreline property protection/ Erosion control	-Shoreline stabilization -Coastal storm surge detention/mitigation -Subsidence/accretion	Fully Met
Maintain baseflow in streams or adjacent lotic systems	- Streamflow maintenance -Surge protection	Met
Wildlife habitat and biodiversity	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities - Provision of habitat for federally or state protected species	Fully Met
Commercial products from wetlands (e.g. fish, shellfish, timber, etc.)	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities	Fully Met
Reduce pollutants in streams and stormwater	-Nutrient transformation -Retention of sediments and other particulates	Fully Met

Site T-10 JHR 5-13-2014

PLANTS

- *Pontederia cordata* - Pickerelweed
- *Rubus argutus* - Sawtooth Blackberry
- *Salix nigra* - Black willow
- *Alternanthera philoxeroides* - Alligatorweed
- *Hydrocotyl umbellata* - Water Pennywort
- *Cladium mariscus (jamaicense)* - Giant cutgrass
- *Ranunculus sp.* - Buttercup
- *Schoenoplectus californicus* - Giant bulrush
- *Schoenoplectus americanus* - Three square sedge
- *Baccharis halimifolia* - Baccharis
- *Salvinia molesta* - Giant Salvinia
- *Typha domingensis* - Tall Cattail
- *Typha latifolia* - Broadleaf cattail
- *Triadica sebifera* - Chinese tallow
- *Eupatorium capillifolium* - Dogfennel
- *Nymphoides peltata* - Floating heart
- *Hibiscus moscheutos* - Swamp Mallow
- *Quercus alba* - White Oak
- *Acer rubrum* - Red Maple
- *Saggitaria lacifolia* - Duck potato
- *Ceratophyllum demersum* - Rigid hornwort
- *Myriophyllum spicatum* - Euasian Watermilfoil
- Epiphytic algae

ANIMALS

- *Myocaster coypus* - Nutria
- *Riparia riparia* - Bank Swallows
- *Petrochelidon pyrrhonota* - Cliff Swallow
- *Agelaius phoeniceus* - Redwing blackbird
- *Phalacrocorax auritus* - Double Crested Cormorant
- *Alligator mississippiensis* - Alligator
- *Zenaida macroura* - Mourning Dove
- *Larus argentatus* - Herring gull
- *Ardea alba* - Great egret
- *Cardinalis cardinalis* - Cardinal
- *Lithobates catesbieanus* - Bullfrog
- *Plecia neactica* - Lovebugs
- *Tebanus sp.* - Horse fly
- *Chrysops sp.* - Deer fly
- *Odonata* - Dragonflies
- *Gambusia affinis* - Mosquitofish
- *Atractosteus spatula* - Alligator Gar - hoop net
- *Pomoxis nigromaculatus* - Black Crappie - hoop net
- *Ictulurus punctatus* - Channel Catfish –hoop net

Wetland Services and Functions - Checklist	Site T-13/SW-07 JHR 5-13-2014	**Site Condition and Wetland Type**
Wetland Services	**Wetland Functions Associated With Services**	**Fresh and Intermediate**
Flood protection	-Surface water detention/storage -Coastal storm surge detention	Fully Met
Recreation	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Diverse plant habitat -Access for recreation	Fully Met
Maintain water quality	-Nutrient transformation -Retention of sediments and other particulates -Element transformation	Fully Met
Shoreline property protection/ Erosion control	-Shoreline stabilization -Coastal storm surge detention/mitigation -Subsidence/accretion	Fully Met
Maintain baseflow in streams or adjacent lotic systems	- Streamflow maintenance -Surge protection	Met
Wildlife habitat and biodiversity	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities - Provision of habitat for federally or state protected species	Fully Met
Commercial products from wetlands (e.g. fish, shellfish, timber, etc.)	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities	Fully Met
Reduce pollutants in streams and stormwater	-Nutrient transformation -Retention of sediments and other particulates	Fully Met

Site T-13/SW-07 JHR 5-13-2014

PLANTS

- *Alternanthera philoxeroides* - Alligatorweed
- *Hydrocotyl umbellata* - Water Pennywort
- *Cladium mariscus (jamaicense)* - Giant cutgrass
- *Ranunculus sp.* - Buttercup
- *Myrica cerifera* - Wax Myrtle
- *Phytolacca americana* -Pokeweed
- *Baccharis halimifolia* - Baccharis
- *Salvinia molesta* - Giant Salvinia
- *Typha domingensis* - Tall Cattail
- *Typha latifolia* - Broadleaf cattail
- *Triadica sebifera* - Chinese tallow
- *Sesbania drummondii* - Rattlebox
- *Phragmites austrailis* - Roseau cane
- *Campsis radicans* - Trumpet creeper
- *Schoenoplectus californicus* - Giant bulrush
- *Schoenoplectus americanus* - Three square sedge
- *Eupatorium capillifolium* - Dogfennel
- *Hibiscus moscheutos* - Swamp Mallow
- *Quercus alba* - White Oak
- *Acer rubrum* - Red Maple
- *Rubus sp.* - Swamp Blackberry
- *Salix nigra* - Black willow
- *Sable palmetto* - Swamp cabbage
- *Saururus cernuus* - Lizzards Tail
- *Sagittaria latifolia* - Bull tongue arrowhead
- *Myriophyllum spicatum* - Eurasian Watermilfoil
- Epiphytic algae
- *Pontederia cordata* - Pickerelweed
- *Hibiscus moscheutos* - Swamp Mallow
- *Quercus alba* - White Oak
- *Acer rubrum* - Red Maple
- *Limnobium spongia* - Frogs-bit

ANIMALS

- *Zanaida macroura* - Mourning Dove
- *Agelaius phoeniceus* - Redwing blackbird
- *Egretta intermedia* - Egret
- *Bubulcus ibis* - Cattle egret
- *Phalacrocorax auritus* - Double Crested Cormorant
- *Pandion haliaetus* - Osprey
- *Lithobates catesbeianus* - Bullfrog
- *Plecia neactica* - Lovebugs

Site T-13/SW-07   JHR   5-13-2014 (CONTINUED)

ANIMALS (CONTINUED)

- *Tebanus sp.* - Horse fly
- *Chrysops sp.* - Deer fly
- *Odonata* - Dragonflies
- *Gambusia affinis* - Mosquitofish
- *Ictalurus punctatus* - Catfish - hoop net
- *Pomoxis nigromaculatus* - Crappie - hoop net

Wetland Services and Functions - Checklist	Site 1 JHR 5-13-2014	**Site Condition and Wetland Type**
Wetland Services	**Wetland Functions Associated With Services**	**Fresh and Intermediate**
Flood protection	-Surface water detention/storage -Coastal storm surge detention	Fully Met
Recreation	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Diverse plant habitat -Access for recreation	Fully Met
Maintain water quality	-Nutrient transformation -Retention of sediments and other particulates -Element transformation	Fully Met
Shoreline property protection/ Erosion control	-Shoreline stabilization -Coastal storm surge detention/mitigation -Subsidence/accretion	Fully met
Maintain baseflow in streams or adjacent lotic systems	- Streamflow maintenance -Surge protection	Met
Wildlife habitat and biodiversity	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities - Provision of habitat for federally or state protected species	Fully Met
Commercial products from wetlands (e.g. fish, shellfish, timber, etc.)	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities	Fully Met
Reduce pollutants in streams and stormwater	-Nutrient transformation -Retention of sediments and other particulates	Fully Met

Site 1 JHR 5-13-2014

PLANTS

- *Alternanthera philoxeroides* - Alligatorweed
- *Hydrocotyl umbellata* - Water Pennywort
- *Cladium mariscus (jamaicense)* - Giant cutgrass
- *Baccharis halimifolia* - Baccharis
- *Salvinia molesta* - Giant Salvinia
- *Sesbania drummondii* - Rattlebox
- *Lonicera japonica* - Japanese honeysuckle
- *Typha latifolia* - Broadleaf cattail
- *Typha domingensis* - Tall Cattail
- *Triadica sebifera* - Chinese tallow
- *Bacopa monnieri* - Coastal water hyssop
- *Eupatorium capillifolium* - Dogfennel
- *Nymphaea odorata* - Water lily
- *Rubus sp.* - Swamp Blackberry
- *Salix nigra* - Black willow
- *Hibiscus moscheutos* - Swamp Mallow
- *Sagittaria latofolia* - Bull tongue arrowhead
- *Phytolacca americana* - Pokeweed
- *Myriophyllum spicatum* - Euasian Watermilfoil
- Epiphytic algae

ANIMALS

- *Myocaster coypus* - Nutria
- *Quiscalus quiscula* - Grackle
- *Alligato mississippiensis* - Alligator
- *Agelaius phoeniceus* - Redwing blackbird
- *Phalacrocorax auritus* - Double Crested Cormorant
- *Egretta intermedia* - Egret
- *Phalacrocorax auritus* - Cormorant
- *Platalea ajaja* - Roseate spoonbill
- *Melanerpes carolinus* - Red Bellied Woodpecker
- *Pandion halietus* - Osprey
- *Lithobaetes catesbeianus* - Bullfrog
- *Plecia neactica* - Lovebugs
- *Tebanus sp.* - Horse fly
- *Chrysops sp.* - Deer fly
- *Odonata* - Dragonflies
- *Micropterus salmoides* - Bass
- *Gambusia affinis* - Mosquitofish

Wetland Services and Functions - Checklist	Site 2 JHR 5-13-2014	**Site Condition and Wetland Type**
Wetland Services	**Wetland Functions Associated With Services**	**Fresh and Intermediate**
Flood protection	-Surface water detention/storage -Coastal storm surge detention	Fully Met
Recreation	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Diverse plant habitat -Access for recreation	Fully Met
Maintain water quality	-Nutrient transformation -Retention of sediments and other particulates -Element transformation	Fully Met
Shoreline property protection/ Erosion control	-Shoreline stabilization -Coastal storm surge detention/mitigation -Subsidence/accretion	Fully Met
Maintain baseflow in streams or adjacent lotic systems	- Streamflow maintenance -Surge protection	Met
Wildlife habitat and biodiversity	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities - Provision of habitat for federally or state protected species	Fully Met
Commercial products from wetlands (e.g. fish, shellfish, timber, etc.)	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities	Fully Met
Reduce pollutants in streams and stormwater	-Nutrient transformation -Retention of sediments and other particulates	Fully Met

Site 2 JHR 5-14-2014

PLANTS

- *Alternanthera philoxeroides* - Alligatorweed
- *Cladium mariscus (jamaicense)* - Giant Cutgrass
- *Ranunculus sp.* - Buttercup
- *Baccharis halmifolia* - Baccharis
- *Salvinia molesta* - Giant Salvinia
- *Sesbania drummondii* - Rattlebox
- *Typha domingensis* - Narrowleaf cattail
- *Typha latifolia* - Broadleaf cattail
- *Triadica sabifera* - Chinese tallow
- *Eupatorium capillifolium* - Dogfennel
- *Setaria corrugata* - Coastal bristlegrass
- *Salix nigra* - Black willow
- *Hibiscus moscheutos* - Swamp mallow
- *Eleocharis parvula* - Dwarf spikerush
- *Sagittaria latifolia* - Bull tongue arrowhead
- *Myriophyllum spicatum* - Eurasian watermilfoil
- Epiphytic algae
- *Ipomoea aquatica* - Swamp morning glory

ANIMALS

- *Gallinula galeata* - Common Gallinule
- *Eudocimus albus* - American white ibis
- *Myocaster copus* - Nutria
- *Riparia riparia* - Bank Swallows
- *Alligator mississippiensis* - Alligator
- *Zenaida macroura* - Mourning Dove
- *Quiscalus quiscula* - Common Grackle
- *Cardinalis cardinalis* - Cardinal
- *Agelaius phoeniceus* - Redwing blackbird
- *Ardea alba* - Great Egret
- *Phalacrororax auritus* - Double Crested Comorant
- *Mimus ployglottos* - Mockingbird
- *Melanerpes carolinus* - Red Bellied Woodpecker
- *Rallus limicola* - Virginia rail
- *Lithobates catesbeianus* - Bullfrog
- *Plecia neactica* - Lovebugs
- *Tebanus sp.* - Horse fly
- *Chrysops sp.* - Deerfly
- *Odonata* - Dragonflies
- *Micropterus salmoides* - Bass
- *Gambusia affinis* - Mosquitofish
- *Callinectes sapides* - Crab

Wetland Services and Functions - Checklist	Site 3 JHR 5-14-2014	**Site Condition and Wetland Type**
Wetland Services	**Wetland Functions Associated With Services**	**Fresh and Intermediate**
Flood protection	-Surface water detention/storage -Coastal storm surge detention	Fully Met
Recreation	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Diverse plant habitat -Access for recreation	Fully Met
Maintain water quality	-Nutrient transformation -Retention of sediments and other particulates -Element transformation	Fully Met
Shoreline property protection/ Erosion control	-Shoreline stabilization -Coastal storm surge detention/mitigation -Subsidence/accretion	Fully Met
Maintain baseflow in streams or adjacent lotic systems	- Streamflow maintenance -Surge protection	Met
Wildlife habitat and biodiversity	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities - Provision of habitat for federally or state protected species	Fully Met
Commercial products from wetlands (e.g. fish, shellfish, timber, etc.)	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities	Fully Met
Reduce pollutants in streams and stormwater	-Nutrient transformation -Retention of sediments and other particulates	Fully Met

Site 3 JHR 5-14-2014

PLANTS

- *Alternanthera philoxeroides* - Alligatorweed
- *Hydrocotyl umbellata* - Water Pennywort
- *Cladium mariscus (jamaicense)* - Giant cutgrass
- *Ranunculus sp.* - Buttercup
- *Myrica cerifera* - Wax Myrtle
- *Baccharis halimifolia* - Baccharis
- *Salvinia molesta* - Giant Salvinia
- *Typha domingensis* - Tall Cattail
- *Typha latifolia* - broadleaf cattail
- *Triadica sebifera* - Chinese tallow
- *Sesbania drummondii* - Rattlebox
- *Lonicera japonica* - Japanese honeysuckle
- *Triadeca saberifrum* - Chinese tallow
- *Eupatorium capillifolium* - Groundsel
- *Rubus sp.* - Swamp Blackberry
- *Salix nigra* - Black willow
- *Hibiscus moscheutos* - Swamp Mallow
- *Quercus alba* - White Oak
- *Cletis occidentalis* – Common Hackberry
- *Sagittaria lancifolia* - Bull tongue arrowhead
- *Myriophyllum spicatum* - Eurasian watermilfoil
- Epiphytic algae

ANIMALS

- *Alligator mississippiensis* - Alligator
- *Agelaius phoeniceus* - Redwing blackbird
- *Ardea alba* - Great Egret
- *Platalea ajaja* - Roseate spoonbill
- *Melanerpes carolinus* - Red Bellied Woodpecker
- *Rana c. clamitans* - Bronze frog
- *Lithobates catesbeianus* - Bullfrog
- *Plecia neactica* - Lovebugs
- *Tebanus sp.* - Horse fly
- *Chrysops sp.* - Deerfly
- *Odonata* - Dragonflies
- *Gambusia affinis* - Mosquitofish

Wetland Services and Functions - Checklist	Site 4 JHR 5-14-2014	**Site Condition and Wetland Type**
Wetland Services	**Wetland Functions Associated With Services**	**Fresh and Intermediate**
Flood protection	-Surface water detention/storage -Coastal storm surge detention	Fully Met
Recreation	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Diverse plant habitat -Access for recreation	Fully Met
Maintain water quality	-Nutrient transformation -Retention of sediments and other particulates -Element transformation	Fully Met
Shoreline property protection/ Erosion control	-Shoreline stabilization -Coastal storm surge detention/mitigation -Subsidence/accretion	Fully Met
Maintain baseflow in streams or adjacent lotic systems	- Streamflow maintenance -Surge protection	Met
Wildlife habitat and biodiversity	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities - Provision of habitat for federally or state protected species	Fully Met
Commercial products from wetlands (e.g. fish, shellfish, timber, etc.)	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities	Fully Met
Reduce pollutants in streams and stormwater	-Nutrient transformation -Retention of sediments and other particulates	Fully Met

Site 4 JHR 5-14-2014

PLANTS
- *Alternanthera philoxeroides* - Alligatorweed
- *Cladium mariscus (jamaicense)* - giant cutgrass
- *Baccharis halimifolia* - Baccharis
- *Salvinia molesta* - Giant salvinia
- *Sesbania drummondii* - Rattlebox
- *Ambrosia trifida* - Giant ragweed
- *Triadeca saberifrum* - Chinese tallow
- *Acer rubrum* - Maple
- *Salix nigra* - Black willow (willow sprouts from canes)
- *Hibiscus moscheutos* - Swamp Mallow
- *Ranunculus sp.* - Buttercup
- *Sagittaria lancifolia* - Bull tongue arrowhead

ANIMALS
- *Alligator mississippiensis* - Alligator
- *Agelaius phoeniceus* - Redwing blackbird
- *Petrochelidon pyrrhonota* - Cliff Swallow
- *Eudocimus albus* - American white Ibis
- *Egretta intermedia* - Egret
- *Phalacrocorax auritus* - Double Crested Cormorant
- *Micropterus salmoides* - Bass
- *Ictalurus punctatus* - Channel Catfish
- *Atractosteus spatula* - Alligator Gar
- *Lithobates catesbeianus* - Bullfrog
- *Plecia neactica* - Lovebugs
- *Tebanus sp.* - Horse fly
- *Chrysops sp.* - Deerfly
- *Odonata* - Dragonflies
- *Gambusia affinis* - Mosquitofish
- *Callinectes sapides* - Crab

Wetland Services and Functions - Checklist	Site 5 JHR 5-14-2014	**Site Condition and Wetland Type**
Wetland Services	**Wetland Functions Associated With Services**	**Fresh and Intermediate**
Flood protection	-Surface water detention/storage -Coastal storm surge detention	Fully Met
Recreation	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Diverse plant habitat -Access for recreation	Fully Met
Maintain water quality	-Nutrient transformation -Retention of sediments and other particulates -Element transformation	Fully Met
Shoreline property protection/ Erosion control	-Shoreline stabilization -Coastal storm surge detention/mitigation -Subsidence/accretion	Fully Met
Maintain baseflow in streams or adjacent lotic systems	- Streamflow maintenance -Surge protection	Met
Wildlife habitat and biodiversity	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities - Provision of habitat for federally or state protected species	Fully Met
Commercial products from wetlands (e.g. fish, shellfish, timber, etc.)	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities	Fully Met
Reduce pollutants in streams and stormwater	-Nutrient transformation -Retention of sediments and other particulates	Fully Met

Site 5 JHR 5-14-2014

PLANTS

- *Alternanthera philoxeroides*
- *Cladium mariscus (jamaicense)* - giant cutgrass
- *Hydrocotyl umbellate* - Water Pennywort
- *Schoenoplectus californicus* - Giant Bulrush
- *Baccharis halimifolia* - Baccharis
- *Salvinia molesta* - Giant Salvinia
- *Sesbania drummondii* - Rattlebox
- *Typha latifolia* - Broadleaf cattail
- *Triadeca saberifrum* - Chinese tallow
- *Hibiscus moscheutos* - Swamp Mallow
- *Sagittaria lancifolia* - Bull tongue arrowhead

ANIMALS

- *Petrochelidon pyrrhonota* - Cliff Swallows
- *Plegadis chichi* - White faced ibis
- *Alligator mississippiensis* - Alligator
- *Zenaida macroura* - Mourning Dove
- *Quiscalus quiscula* - Common Grackle
- *Agelaius phoeniceus* - Redwing blackbird
- *Ardea alba* - Great Egret
- *Phalacrocorax auritus* - Double Crested Comorant
- *Lithobates catesbieanus* - Bullfrog
- *Plecia neactica* - Lovebugs
- *Tebanus sp.* - Horse fly
- *Chrysops sp.* - Deerfly
- *Odonata* - Dragonflies
- *Gambusia affinis* - Mosquitofish
- Callinectes sapides - Crab

Wetland Services and Functions - Checklist	Site TR-02 JHR 5-13-2014	**Site Condition and Wetland Type**
Wetland Services	**Wetland Functions Associated With Services**	**Fresh and Intermediate**
Flood protection	-Surface water detention/storage -Coastal storm surge detention	Fully Met
Recreation	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Diverse plant habitat -Access for recreation	Fully Met
Maintain water quality	-Nutrient transformation -Retention of sediments and other particulates -Element transformation	Fully Met
Shoreline property protection/ Erosion control	-Shoreline stabilization -Coastal storm surge detention/mitigation -Subsidence/accretion	Fully Met
Maintain baseflow in streams or adjacent lotic systems	- Streamflow maintenance -Surge protection	Met
Wildlife habitat and biodiversity	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities - Provision of habitat for federally or state protected species	Fully Met
Commercial products from wetlands (e.g. fish, shellfish, timber, etc.)	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities	Fully Met
Reduce pollutants in streams and stormwater	-Nutrient transformation -Retention of sediments and other particulates	Fully Met

Site TR-02 JHR 5-13-2014

PLANTS

- *Alternathera philoxeroides* - alligator weed
- *Hydrocotyl umbellate* - Water pennywort
- *Cladium mariscus (jamaicense)* - giant cutgrass
- *Phragmites austrailis* - Roseau cane
- *Hibiscus moscheutos* - Swamp Mallow
- *Salvinia molesta* - Giant Salvinia
- *Sesbania drummondii* - Rattlebox
- *Helenium brevifolium* -Swamp sneezeweed
- *Typha domingensis* - Narrowleaved Cattail
- *Typha latifolia* - Broadleved Cattail
- *Triadeca saberifrum* - Chinese tallow
- *Rubus sp.* - Swamp Blackberry
- *Salix nigra* - Black willow
- *Sagittaria lancifolia* - Bull tongue arrowhead
- *Myriophyllum spicatum* - Eurasian watermilfoil
- Epiphytic algae

ANIMALS

- *Petrochelidon pyrrhonota* - Cliff Swallows
- *Alligator mississippiensis* - Alligator
- *Tringa flavipes* - Yellow Crown Night Heron
- *Agelaius phoeniceus* - Redwing blackbird
- *Pandion halietus* - Osprey
- *Lithobates catesbieanus* - Bullfrog
- *Plecia neactica* - Lovebugs
- *Tebanus sp.* - Horse fly
- *Chrysops sp*. - Deerfly
- *Odonata* - Dragonflies
- *Gambusia affinis* - Mosquitofish

Wetland Services and Functions - Checklist	Site TR-04 JHR 5-13-2014	**Site Condition and Wetland Type**
Wetland Services	**Wetland Functions Associated With Services**	**Fresh and Intermediate**
Flood protection	-Surface water detention/storage -Coastal storm surge detention	Fully Met
Recreation	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Diverse plant habitat -Access for recreation	Fully Met
Maintain water quality	-Nutrient transformation -Retention of sediments and other particulates -Element transformation	Fully Met
Shoreline property protection/ Erosion control	-Shoreline stabilization -Coastal storm surge detention/mitigation -Subsidence/accretion	Fully Met
Maintain baseflow in streams or adjacent lotic systems	- Streamflow maintenance -Surge protection	Met
Wildlife habitat and biodiversity	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities - Provision of habitat for federally or state protected species	Fully Met
Commercial products from wetlands (e.g. fish, shellfish, timber, etc.)	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities	Fully Met
Reduce pollutants in streams and stormwater	-Nutrient transformation -Retention of sediments and other particulates	Fully Met

Site TR-04 JHR 5-13-2014

PLANTS

- *Alternathera philoxeroides* - Alligator weed
- *Hydrocotyl umbellata* - Water pennywort
- *Cladium mariscus (jamaicense)* - giant cutgrass
- *Phragmites austrailis* - Roseau cane
- *Hibiscus moscheutos* - Swamp Mallow
- *Salvinia molesta* - Giant Salvinia
- *Sesbania drummondii* - Rattlebox
- *Helenium brevifolium* - Swamp sneezeweed
- *Typha domingensis* - Narrowleaved Cattail
- *Baccharis halmaefolia* - Baccharus
- *Limnobium spongia* - Frogsbit
- *Typha latifolia* - Broadleaved cattail
- *Triadeca saberifrum* - Chinese tallow
- *Myrica cerifa* - Wax myrtle
- *Eupatorium capillifolium* - Dogfennel
- *Salix nigra* - Black willow
- *Sagittaria lancifolia* - Bull tongue arrowhead

ANIMALS

- *Cardinalis cardinalis* - Cardinal
- *Alligator mississippiensis* - Alligator
- *Zenaida macroura* - Mourning Dove
- *Agelaius phoeniceus* - Redwing blackbird
- *Bubulcus ibis* - Cattle Egret
- *Lithobates catesbieanus* - Bullfrog
- *Plecia neactica* - Lovebugs
- *Tebanus sp.* - Horse fly
- *Chrysops sp.* - Deerfly
- *Odonata* - Dragonflies
- *Gambusia affinis* - Mosquitofish

Wetland Services and Functions - Checklist	Site TR -05 JHR 5-13-2014	**Site Condition and Wetland Type**
Wetland Services	**Wetland Functions Associated With Services**	**Fresh and Intermediate**
Flood protection	-Surface water detention/storage -Coastal storm surge detention	Fully Met
Recreation	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Diverse plant habitat -Access for recreation	Fully Met
Maintain water quality	-Nutrient transformation -Retention of sediments and other particulates -Element transformation	Fully Met
Shoreline property protection/ Erosion control	-Shoreline stabilization -Coastal storm surge detention/mitigation -Subsidence/accretion	Fully Met
Maintain baseflow in streams or adjacent lotic systems	- Streamflow maintenance -Surge protection	Met
Wildlife habitat and biodiversity	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities - Provision of habitat for federally or state protected species	Fully Met
Commercial products from wetlands (e.g. fish, shellfish, timber, etc.)	-Provision of habitat for fish and other aquatic animals -Provision of waterfowl and waterbird habitat -Provision of other wildlife habitat -Provision of habitat for unique, uncommon, or highly diverse wetland plant communities	Fully Met
Reduce pollutants in streams and stormwater	-Nutrient transformation -Retention of sediments and other particulates	Fully Met

Site TR-05 JHR 5-13-2014

PLANTS

- *Alternathera philoxeroides* - Alligatorweed
- *Phragmites austailis* - Rosseau cane
- *Cladium mariscus (jamaicense)* - Giant cutgrass
- *Salvinia molesta* - Giant Salvinia
- *Sesbania drummondii* - Rattlebox
- *Typha domingensis* - Narrowleaf cattail
- *Typha latifolia* - Broadleaf cattail
- *Water lily* - Nuphar lutea
- *Triadeca saberifrum* - Chinese tallow
- *Eupatorium capillifolium* –dogfennel
- Myrica cerifera -Wax myrtle-
- *Rubus sp.* - Swamp Blackberry
- *Salix nigra* - Black willow
- *Hibiscus moscheutos* - Swamp Mallow
- *Schoenoplectus californicus* - Giant bulrush
- *Myriophyllum spicatum* - Eurasian watermilfoil
- Epiphytic algae
- *Sagittaria lancifolia* - Bull tongue arrowhead

ANIMALS

- *Alligator mississippiensis* - Alligator
- *Zenaida macroura* - Mourning Dove
- *Agelaius phoeniceus* - Redwing blackbird
- *Egretta intermedia* - Egret
- *Phalacrocorax auritus* - Double Crested Cormorant
- *Lithobates catesbeianus* - Bullfrog
- *Plecia neactica* - Lovebugs
- *Tebanus sp.* - Horse fly
- *Chrysops sp.* - Deerfly
- *Odonata* - Dragonflies
- *Ictalurus punctatus* - Channel Catfish
- *Gambusia affinis* - Mosquitofish
- *Callinectes sapides* - Crab

Curriculum Vitae
Attachment C

Vermilion Parish School Board v.
Louisiana Land, et al

Supplemental Ecological Expert Report
Helen R. Connelly, Ph.D. and John H. Rodgers, Jr., Ph.D.

Helen R. Connelly, Ph.D.

Fields of Competence

Environmental Toxicology
Human Health Risk Assessment
Ecological Risk Assessment
Freshwater and Estuarine Field Studies
Project Management
LDEQ RECAP Risk Assessment
Freshwater Fish Culturing
Conservation Biology

Experience Summary

Twelve years experience in environmental, human health and ecological risk assessment. Seven years experience in college academic instruction

Credentials

B.S., Geology, Louisiana State University, Baton Rouge, Louisiana
Ph.D., Environmental Toxicology/Veterinary Medical Sciences, Louisiana State University School of Veterinary Medicine, Baton Rouge, Louisiana

Professional Affiliations

Baton Rouge Geological Society
American Association of University Women
College Board Advanced Placement Environmental Science Certified Instructor
College Board Advanced Placement Human Geography Certified Instructor
Society of Environmental Toxicology and Chemistry

Publications

Connelly, Helen and Means, Jay C., Sep 2010, Immunomodulatory Effects of Dietary Exposure to Selected Polycyclic Aromatic Hydrocarbons in the Bluegill (*Lepomis macrochirus*), International Journal of Toxicology Volume: 29 Issue: 5 Pages: 532-545.

Key Projects

Performed risk assessment for a lead-impacted scenic bayou near a major petroleum refinery in St. Charles Parish. Calculated health risks to hunters and fishers consuming fish, crabs and game from the bayou area. Used the Integrated Exposure Uptake Biokinetic (IEUBK) model and the Adult Lead Model to assess lead risks.

Estimated the toxicity and calculated risk based standards for more than 150 compounds, including many tin compounds, for which no RECAP standards exist at a chemical plant in South Louisiana. Used chemically similar compounds with known toxicities as proxies for compounds with limited toxicity information.

Calculated the human health risk associated with exposure to sediments containing lead, arsenic, cadmium, and chromium at a former shipyard in St. Mary Parish located on a major river.

Worked collaboratively with the in-house research division of a large petrochemical company in St. Charles Parish to complete the risk assessment portions of a RCRA Corrective Measures Study Work Plan. Included assessment of chlorinated compounds in groundwater.

Completed a human health risk assessment/expert report for an operating shipyard and barge repair facility in Mobile, Alabama for litigation support. Developed RfD toxicity values for compounds that did not currently have published values. Assessed lead exposure using the Integrated Exposure Uptake Biokinetic (IEUBK) model and the Adult Lead Model.

Established human health exposure pathways and receptors and/or calculated site specific RECAP standards for the following sites: creosoting wood treatment facility, dry cleaning establishment, former industrial waste disposal site with onsite daycare center, gasoline spill site, paper mill, and former exploration and production sites.

Key Projects (continued)

Planned and executed two crawfish collection studies in surface waters in St. Charles Parish in ditches impacted with chlorinated compounds, benzene and other organic compounds. Prepared an analysis of crawfish abundance as affected by drought and surface water contaminants.

Initiated a preliminary human health and ecological risk screening of a heavily TPH impacted canal in St. Charles Parish. Compared sediment, water, and sheen concentrations in the samples collected to proxy MO-1 human health standards and NOAA SQUIRT standards. Attempted electrofishing sample collection, but the conductivity of the water was prohibitive.

Planned, collected and analyzed soil and ground water samples for a major petrochemical client in response to their request for RECAP compliant assistance with a pipeline spill near a sugar cane field. Analyzed reported constituent concentrations using LDEQ RECAP Screening Standards and prepared RECAP compliant report for submittal to LDEQ.

Designed a conceptual site model compliant with US EPA Region 6 Corrective Action Strategy guidelines to assist a client with a site impacted with lead. Model is based on the fate and transport mechanisms specific to lead released from a smelter via dust. Receptors included a natural stream running through the facility and residents in an adjacent upper income neighborhood.

Evaluated health risks to pipeline workers installing a pipeline thirty feet below ground surface at a Superfund site in an area with thick clays. Superfund surface contaminates included heavy metals and carcinogens. Considered inhalation, dermal and ingestion routes of exposure to workers. Established the likely geology at depth based on research of the area. Estimated the potential for constituents to migrate from the pipeline excavation via groundwater to other areas. Wrote a letter to EPA for the client to obtain approval for the pipeline installation. Approval was granted by EPA.

Designed and successfully executed a fish toxicity study to evaluate the effects of polycyclic aromatic hydrocarbons (PAH) found in energy related wastes, such as oil spills, on the proliferative behavior of immune cells in a native fish model (lepomis macrochirus). Collected large bluegill from the LSU lakes using electrofishing. Maintianed the fish in indoor tanks. Collected white blood cells from fish after feeding them a diet of 2-methylnaphthalene, 9,10-dimethylanthracene, and 2-aminoanthracene for a period of weeks. Published the results in the International Journal of Toxicology.

Analyzed crab weight, size, and fullness as related to crab habitat characteristics in a study area of natural bayou, lake, and marsh ecosystems, as well as man-made oilfield canals. Collected crabs and fish as part of a team of risk assessors working on a study of heavy metal toxicity in aquatic organisms. Reported the crab and fish collection techniques in a detailed sampling methods report.

Researched and prepared toxicity expert reports for human exposures to two different compounds: carbon monoxide and gluteraldehyde, both for litigation not in the petrochemical industry. Was deposed for opinion each time.

Challenged LDEQ on their position with regard to protocol concerning frozen fish tissue holding time to assist client and to engage best available science. Used research regarding the history and basis for the holding time protocol, along with the most current research in the field. Was successful in negotiations with LDEQ on the issue.

Challenged LDEQ on their position with regard to the definition of surface soil to assist a client with a daycare center, and to engage best available science. Used research based on EPA large scale surface soil studies with children. Was successful in negotiations with LDEQ on the issue.

Performed a crawfish ingestion analysis based on locals eating crawfish from a ditch impacted with low levels of chlorinated compounds, benzene and other organic compounds for presentation to LDEQ for a petrochemical client. Used LDEQ ingestion and exposure parameters to demonstrate acceptable risk in consuming crawfish.

Assisted in writing and publishing LDEQ community relations newsletters and planning town meetings in order to communicate health risks associated with Superfund sites and other inactive and abandoned sites with nearby residents. Provided public health information to communities surrounding Superfund sites such as Old Inger, Lincoln Creosote, and Combustion.

Wrote air sampling and analysis plan to evaluate airborne volatile hydrocarbons in the area of a residence near an underground petroleum pipeline. Researched and described best current technology for air sample collection and for identifying low levels of compounds in air. Calculated protective health-based standards for these hydrocarbon concentrations in air based on LDEQ guidelines.

Executed a complex ecological risk assessment of a fresh marsh environment for an expert report. Managed all phases of the risk assessment from the initiation of sample collection planning to the final calculations of risk. Used innovative statistical methods to identify background concentrations, extensive research to identify freshwater marsh-specific/animal-specific exposure parameters, industry-specific analyses to differentiate compound toxicities, and calculations to determine the effects of organic carbon on hydrocarbon toxicity. Risk assessment included calculating risks to native animals due to measured levels of metals in sediments and soils in a setting frequented by recreational hunters and fishermen.

Key Projects (continued)

Completed a human health risk assessment of recreational exposure to hydrocarbons and metals in a flooded fresh marsh environment for an expert report. Followed LDEQ RECAP protocol to calculate standards and to assess risk in a limited access environment. The risk assessment assumed exposure to soils and sediments and used both screening and MO-1 standards.

Calculated human health risk using LDEQ RECAP protocol for two agricultural sites of former and current oil and gas production in the Alexandria area. Both sites had salt impacted soils and groundwaters. Used identified background concentrations for groundwater standards in one assessment and determined groundwater would not pass MO-1 standards in the other assessment. Soil was evaluated using Screening standards and MO-1 standards for metals and hydrocarbons. LDNR standards and SPLP methods were used to assess salt in soils, and to delineate areas of impact. Both projects involved collaboration with environmental scientists from many disciplines all working together on the projects. Both projects involved managing, analyzing and reporting on large data sets. Wrote portions of risk assessment for both reports, including the RECAP standards calculations for both reports.

Calculated human health risk due to an airborne catalyst release from a major petrochemical refinery on the Gulf Coast for an expert report. Potentially exposed receptors included neighborhood residents adjacent to the refinery. Risk was calculated to be within acceptable levels by comparing EPA National Ambient Air Quality Standards (NAAQS) for particulate matter (PM_{10}) to PM_{10} data from the nearby LDEQ monitoring station and to modeled air concentrations. Wipe sample data was collected from surfaces in the neighborhood, and were found to be in concentrations below US Army wipe standards. The health portion of this lawsuit was dropped by opposing counsel on the day that my deposition on the matter was to occur.

Calculated human health risk due to an airborne SO_2 and H_2S release from a major petrochemical refinery on the Gulf Coast for an expert report. Potentially exposed receptors included neighborhood residents adjacent to the refinery. Health risks were calculated to be within acceptable levels by comparing LDEQ monitoring station data and air data collected in the neighborhood to protective standards. Protective standards were calculated using exposure studies from the scientific literature. All measured SO_2 and H_2S levels were below protective standards. The two parties resolved this case prior to my deposition being taken.

Prepared a human health risk assessment for recreational (swimming) exposure by children to creek surface water. The compounds of concern were benzene and methyl tert butyl ether (MTBE), due to an historical pipeline release of gasoline. Protective standards for creek surface water were calculated, using EPA guidelines, to represent concentrations that did not pose unacceptable risk of cancer. The setting for this risk assessment was a natural creek in a wooded area. There was 10 years of data for this evaluation, which reduced some levels of uncertainty normally present in a risk assessment. All concentration data for the stream was below conservative protective standards.

1/2014

CURRICULUM VITAE

John H. Rodgers, Jr.

BIRTHDATE:	February 1, 1950
BIRTHPLACE:	Dillon County, South Carolina, U.S.A.
SSN:	Available on request
MARITAL DATA:	Wife's maiden name - Martha W. Robeson Children - Daniel Joseph Rodgers (Born January 16, 1978) Frank Clifford Rodgers (Born July 7, 1985)
HOME ADDRESS:	102 Santee Trail Clemson, SC 29631 Telephone: (864) 653-3990
PRESENT POSITION:	Professor School of Agricultural, Forest and Environmental Sciences Clemson University Director, Ecotoxicology Program Co-Director, Energy and Environment Program School of Agricultural, Forest and Environmental Sciences Clemson University
PRESENT ADDRESS:	School of Agricultural, Forest and Environmental Sciences PO Box 340317 261 Lehotsky Hall Clemson University Clemson, SC 29634-0317 Telephone: (864) 656-0492 Fax: (864) 656-1034 Cell-phone: (864) 650-0210 E-mail: jrodger@clemson.edu
EDUCATION:	Virginia Polytechnic Institute and State University, Blacksburg, VA, Ph.D. Degree, Botany, Aquatic Ecology, 1977.

Clemson University, Clemson, SC,
M.S. Degree, Botany, Plant Ecology, 1974.

Clemson University, Clemson, SC,
B.S. Degree, Botany, 1972.

PROFESSIONAL EXPERIENCE:

Clemson University (1998-present):

Professor, School of Agricultural, Forest and Environmental Sciences
Director, Ecotoxicology Program
2003 – Present.

Director, Clemson Institute of Environmental Toxicology
Chair, Department of Environmental Toxicology
Professor, Department of Environmental Toxicology
Co - Director, Clemson Environmental Institute
1998 - 2003.

University of Mississippi:
(Department of Biology)

Professor, Department of Biology,
1989 - 1998.
Director, Ecotoxicology Program,
1995 – 1998.
Adjunct Research Professor, Research Institute for Pharmaceutical Sciences,
1989 - 1998.
Director, Biological Field Station,
1990 – 1995.
Director, Center for Water and Wetland Resources,
1993 – 1995.
Associate Director, Biological Field Station,
1989 - 1990.

University of North Texas:
(Division of Environmental Sciences,
Department of Biological Sciences)
Director, Water Research Field Station,
1987 - 1989.
Associate Professor, Department of Biological Sciences,
1985 - 1989.
Associate Director, Institute of Applied Sciences,

1982 - 1988.
Assistant Professor, Department of Biological Sciences, 1982 - 1985.
Research Scientist II, Institute of Applied Sciences, 1979 - 1981.

East Tennessee State University:
(Department of Environmental Sciences,
Aquatic Ecology Section)

Assistant Professor, 1978 - 1979.

Virginia Polytechnic Institute and State University:
(Biology Department, Center for
Environmental Studies)

Postdoctoral Research Associate, 1977 - 1978.
Research Assistant- Energy Research and Development Administration, 1975 - 1977.

Clemson University (1972-1974):
(Botany Department)

Research Assistant - Water Resources Research Institute, 1972 - 1974.
Laboratory Teaching Assistant – Plant Physiology, Plant Ecology, Biological Oceanology, Botany, 1972 - l974.

MILITARY SERVICE:

Distinguished Military Graduate, Clemson University, 1972.
U.S. Air Force Reserve, Second Lieutenant, 1972 - 1975.
U.S. Air Force Reserve, First Lieutenant, 1975 - 1978.
U.S. Air Force Reserve, Captain, 1978 - 1984.

U.S. Air Force (Active Duty), June 1 - August 29, 1976.
U.S. Air Force, Honorable Discharge, 1984.
Pilot Certificate - 34 hours, Single engine aircraft.

RESEARCH
SUPPORT:

Clemson University (1972-1974):

Research Assistantship, Water Resources Institute, Project No. B-053-SC ($42,000), 1972 - 1974. Impact of Thermal Effluent from a Nuclear Power Plant on Reservoir Productivity.

Thesis Parts Award, USAEC, The E.I. DuPont de Nemours & Co., Savannah River Laboratory (Thermal Effects Laboratory), Aiken, S.C., 1973-1975. Effects of Elevated Temperatures on Periphyton Productivity in Lotic Aquatic Ecosystems.

Savannah River Laboratory, Research Assistantship, Research Contract USAEC Funding ($50,000), 1973-1975. Impacts of Ash from Coal Combustion on Swamp Receiving Systems.

Virginia Polytechnic Institute and State University:

Research Assistantship, Research Contract, American Electric Power Corporation Funding ($93,000), 1974-1975. Thermal Tolerances and Electivities of Fish Adjacent to a Coal-Fired Power Plant.

Research Assistantship, Research Contract, Energy Research and Development Administration Funding ($112,000),1975 - 1976. Structural and Functional Responses of Aquatic Communities to Power Generation.

Research Assistantship, Research Contract, Energy Research and Development Administration Funding ($132,000),1976 - 1977. Responses of Aquatic Communities to Perturbations Associated with Power Generation.

Co-principal Investigator, Research Contract, Water Resources Research Institute Funding ($68,000), 1977 - 1979. Environmental Tolerances of *Corbicula fluminea* from the New River, Virginia.

East Tennessee State University:

Principal Investigator, Research Contract, ETSU Research Development Committee Funding ($3,270), 1978 - 1979. Primary Production and Nutrient Dynamics in the Watauga River, Tennessee.

Oak Ridge Associated Universities Travel Contract, 1978 - 1979. Impacts of Power Production on Aquatic Ecosystems of Savannah River Laboratory.

University of North Texas:

Co-Principal Investigator, Research Contract, Chemical Manufacturers' Association Funding ($80,000), 1979 - 1980. Modeling the Fate of Chemicals in Aquatic Environments.

Principal Investigator, Research Contract, NTSU Faculty Research Grant Funding ($4,000), 1979 - l980. Biotransformation of Xenobiotics in Aquatic Systems.

Co-principal Investigator, Research Contract, International Paper Company Funding ($149,530), 1980 - 1981. Impacts of Paper Mill Effluent on Aquatic Ecosystems.

Co-principal Investigator, Research Contract, Victor Equipment Company Funding ($5,000), 1980. Optimization of Packaged Waste Treatment System for Metal Removal.

Co-principal Investigator, Research Contract, International Paper Company Funding ($171,830),1980 -1981. Investigation of Pre- and Post-Operational Effects of a Paper Mill on Aquatic Systems.

Principal Investigator, Research Contract, NTSU Faculty Research Grant Funding ($4,620), 1980 - 1981. Predicting Bioconcentration of Chemicals by Aquatic Organisms.

Co-principal Investigator, Research Contract, Chemical Manufacturers' Association Funding ($30,000), 1981. Validation of Chemical Fate Models for Aquatic Ecosystems.

Co-principal Investigator, Research Contract, U.S. Environmental Protection Agency Funding ($305,866), 1981 - 1983. Development of a Decision Support System for Integrated Management of Nuisance Aquatic Vegetation.

Principal Investigator, Research Contract, NTSU Faculty Research Grant Funding ($3,600), 1981-1982. Fate and Effects of the Herbicide, Endothall, in Aquatic Systems.

Co-principal Investigator, Research Contract, Chemical Manufacturers' Association Funding ($59,985), 1981 - 1982. Studies of Fate and Effects of Chemicals in Aquatic Ecosystems.

Co-principal Investigator, Research Contract, International Paper Company Funding ($113,000), 1982. Effects of Paper Mill Effluent on Aquatic Ecosystems.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($24,500), 1982. Ecosystem Study of Pat Mayse Lake, A Southwestern Reservoir.

Co-principal Investigator, Research Contract, International Paper Company Funding ($348,926), 1982 - 1985. Further Studies of Effects of Paper Mill Effluent on Aquatic

Ecosystems.

Principal Investigator, Research Contract, NTSU Faculty Research Grant Funding ($3,500), 1982 - 1983. Proximate Oxygen Demand of Aquatic Plants.

Co-principal Investigator, Research Contract, U.S. Environmental Protection Agency Funding ($199,500), 1982 - 1983. Validation of Decision Support Systems for Integrated Management of Nuisance Aquatic Vegetation.

Co-principal Investigator, Research Contract, American Petroleum Institute ($83,809), 1981 - 1982. Bioavailability of Petroleum-Derived Chemicals in Aquatic Ecosystems.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($25,000), 1983. Further Studies: Pat Mayse Lake, A Southwestern Reservoir.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($1,000), 1983. Remote Sensing of Aquatic Vegetation in Pat Mayse Lake.

Co-principal Investigator, Research Contract, Shell Development Company Funding ($17,000), 1983. Impact of Petroleum Compounds on Aquatic Organisms.

Principal Investigator, Research Contract, NTSU Faculty Research Grant Funding ($4,500), 1983 - 1984. Threshold Responses of Aquatic Vegetation to Herbicides.

Co-principal Investigator, Research Contract, Shell Development Company Funding ($29,758),1984. Inter-Laboratory Comparison of Bioassays Using Freshwater and Marine Organisms.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($20,000), 1984. Water Quality Monitoring and Aquatic Vegetation in Pat Mayse Lake.

Principal Investigator, Research Contract, Pennwalt Corporation Funding ($11,500), 1984. Comparative Study of Two Aquatic Herbicides.

Principal Investigator, Research Contract, Shell Oil and Chemical Company Funding ($14,000). Aquatic Toxicology Studies for the Petrochemical Industry.

Principal Investigator, Research Contract, Dallas County Utility and Reclamation District Funding ($12,000), 1984 - 1985. Eutrophication Potential in an Impoundment Receiving Wastewater.

Co-principal Investigator, Research Contract, Shell Development Company Funding ($31,797), 1985. Development of Data on Proper Selection of Bioassay Species.

Co-principal Investigator, Research Contract, Texas Instruments, Inc. Funding (approximately $12,000, equipment), 1985. Development of Expert Systems for Water Quality Management.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($24,500), 1985. Development of a Water Quality Model and Lake Management Strategy for Pat Mayse Lake.

Co-principal Investigator, Research Foundation Award, Shell Research Foundation ($15,000), 1985. The Response of Marine and Freshwater Species to Xenobiotics.

Principal Investigator, Research Contract, NTSU Faculty Research Grant Funding ($2,700), 1986 - 1987. Experimental Analysis of Bioassay Methods.

Co-principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($168,693), 1986 - 1987. Ecological Analysis of the Lake Ray Roberts Project Site.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding, ($68,000), 1986 - 1987. Coupling an Environmental Fate and Effects Model for 2, 4-D and Water Hyacinth.

Co-principal Investigator, Research Contract, Shell Research Foundation Funding ($15,000), 1986. Osmoregulation in Marine Bioassay Species.

Principal Investigator, Research Contract, American Petroleum Institute Funding ($8,000), 1986. Evaluation of Marine Bioassay Species.

Principal Investigator, Research Contract, American Petroleum Institute and U.S. Environmental Protection Agency Funding ($10,000), 1986. A Workshop on Culture and Life History of *Mysidopsis* sp.

Co-principal Investigator, Research Contract, Shell Research Foundation Funding ($20,000), 1987. Sediment Organic Carbon Content in Aquatic Systems of the U.S.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($24,500), 1987 - 1988. Endothall Fate and Effects on *Myriophyllum spicatum* in Pat Mayse Lake, Texas.

Co-principal Investigator, Research Contract Hoechst-Roussel Agri-Vet (Hoechst-Celanese) Co. Funding ($185,000), 1987 - 1988. Development of Mesocosms and Water Research Field Station.

Co-principal Investigator, Research Contract, City of Dallas Funding ($319,964), 1987 - 1989. Ecological Survey and Study of the Trinity River, Texas.

Co-principal Investigator, Research Contract, Hoechst-Roussel Agri-Vet (Hoechst-

Celanese) Co. Funding ($325,000), 1988 - 1989. Fate and Effects of Tralomethrin in Mesocosms.

Co-principal Investigator, Research Contract, Hoechst Roussel Agri Vet (Hoechst--Celanese) Co. Funding ($185,000), 1988 - 1989. Further Development of Mesocosms and Water Research Field Station.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($24,500), 1988 - 1989. Further Development of a Water Quality Model and Lake Management Strategy for Pat Mayse Lake.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($24,550), 1988 - 1989. Research on SONAR in Pat Mayse Lake.

Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($107,000), 1988-1989. Water Research Field Station-Coupling a Herbicide Fate and Effects Model.

Principal Investigator, Research Contract, Pennwalt Corporation ($2,000), 1988-1989. Degradation of Endothall by Chlorine.

Co-principal Investigator, Research Contract, Mobay Corporation ($852,000), 1988-1990. Fate and Effects of Cyfluthrin in Mesocosms.

Co-principal Investigator, Research Contract, Shell Development Corporation ($55,000) 1989-1990. Bioavailability of Sediment-sorbed Chemicals to Freshwater Organisms.

University of Mississippi:

Principal Investigator, Research Contract U.S. Army Corps of Engineers - Tulsa District Funding ($24,500), 1988-1989. Limnology and Aquatic Botany of Pat Mayse Lake, Texas.

Principal Investigator, Research Contract, Shell Development Company Funding ($50,000), 1989-1990. Evaluation of Sediment Toxicity Testing Procedures.

Co-principal Investigator, Research Contract Soil Conservation Service Funding ($50,000), 1990-1991. Wetlands for Interception and Processing of Pesticides in Agricultural Runoff.

Co-principal Investigator, Research Contract Tennessee Valley Authority Funding ($171,410), 1990-1991. Analysis of Aquatic Herbicides in Lake Guntersville, Alabama for the Aquatic Plant Management Program.

Principal Investigator, Research Contract, Ciba Giegy Corporation Funding ($31,000), 1990. Effects of Atrazine on Aquatic Vascular Plants.

Co-principal Investigator, Research Contract, Dow-Elanco Corporation Funding ($40,000), 1990. Analysis of Fluridone in Florida Aquatic Plant Management Programs.

Principal Investigator, Research Contract, U.S. Environmental Protection Agency - Gulf of Mexico Program ($17,565) 1990-1991. Assistance with the Citizen's Advisory Group of the Gulf of Mexico Program.

Co-principal Investigator, CHP International, Inc. (U.S. Peace Corps) Funding ($22,000), 1990. Aquaculture Training Sessions for Volunteers for Africa.

Co-principal Investigator, University of Mississippi Funding ($1,000), 1989-1990. Water Systems for an Aquatic Toxicology Laboratory.

Principal Investigator, Internal Equipment Funding, University of Mississippi Associates Funding ($25,000), 1990-1991. Aquisition of an Ion Chromatograph/High Performance Liquid Chromatograph.

Principal Investigator, U.S. Army Corps of Engineers, Waterways Experiment Station Funding ($250,000), 1990-1993. Development of Controlled Release Herbicides for Aquatic Use.

Principal Investigator, American Petroleum Institute Funding, ($250,000), 1990 -1992. Reference Toxicants and Reference Sediments for Sediment Toxicity Testing.

Principal Investigator, Research Contract, Tennessee Valley Authority Funding ($168,000), 1991-1992. Aquatic Herbicides in Guntersville Reservoir, Alabama - National Demonstration Project.

Co-principal Investigator, Research Contract, U.S. Department of the Army, Vicksburg District, Corps of Engineers Funding ($96,036), 1991-1992. Monitoring Water Quality at Arkabutla, Enid, Grenada, and Sardis Lakes.

Principal Investigator, Research Contract, ABC Laboratories, Inc. and Zoecon Corporation Funding ($10,000), 1991. Outdoor Microcosm Study of an Insect Growth Regulator.

Co-principal Investigator, Research Contract, Shell Development Company Funding ($192,000), 1991-1993. Development of a Model Stream Facility and Evaluation of the Environmental Safety of a Surfactant.

Principal Investigator, Research Contract, U.S. Army Waterways Experiment Station

Funding ($25,000), 1991-1992. Evaluation of New Herbicide Delivery System for Control of Aquatic Plants.

Principal Investigator, Research Contract, U.S. Army Waterways Experiment Station Funding ($64,000), 1992-1993. Evaluation of New Herbicide Delivery Systems for Control of Aquatic Plants.

Principal Investigator, Research Contract, American Petroleum Institute Funding ($100,000), 1992-1993. New Sediment Bioassays and Reference Sediments. Principal Investigator, Mississippi State Department Of Wildlife, Fisheries, and Parks Funding ($6,000), 1991-1993. Cooperative Agreement for Assistance with Walleye Culture.

Co-Principal Investigator, Research Contract, U.S. Army Corps of Engineers Funding ($100,848), 1992-1993. Monitoring of Water Quality at Arkabutla, Sardis, Enid, and Grenada Lakes.

Principal Investigator, Mississippi State Department of Wildlife, Fisheries and Parks Funding ($3,000), 1992-1993. Cooperative Agreement for Assistance with Walleye Culture.

Principal Investigator, Research Contract, U.S. Army Waterways Experiment Station Funding ($30,000), 1992-1994. Mobility and Bioavailability of Sediment Associated Contaminants.

Principal Investigator, Research Contract, U.S. Army Waterways Experiment Station Funding ($25,000), 1992-1993. Effects of Food Quantity on Fathead Minnow Survival, Growth and Reproduction.

Principal Investigator, Research Contract, Eastman Kodak and the Silver Coalition Funding ($53,183), 1992-1994. Evaluations of the Bioavailability and Toxicity of Silver in Sediments.

Principal Investigator, Research Contract, Shell Development Company Funding ($150,000), 1992-1993. Ecological Evaluation of a Non-ionic Surfactant in Model Stream Mesocosms.

Principal Investigator, Research Contract, Shell Development Company Funding ($30,342), 1993-1994. Assistance with Development and Construction of Constructed Wetlands for Tertiary Treatment of Refinery Effluent.

Principal Investigator, U.S. Department of Agriculture/ Cooperative State Research Service Funding ($1,377,400), 1994-1995. Center for Water and Wetland Resources (Year 4).

Co-Principal Investigator, Research Contract, International Paper Company Funding

($99,631), 1994-1995. Extensive Ecological and Toxicological Evaluation of the Arkansas River at Pine Bluff, AR.

Co-Principal Investigator, Research Contract, International Paper Company Funding ($99,631), 1994-1995. Extensive Ecological and Toxicological Evaluation of the Yazoo River near Vicksburg, MS.

Principal Investigator, Research Contract, Shell Development Company Funding ($150,000), 1994-1995. Ecological Evaluation of a Homologus Non-ionic Surfactant in Model Stream Mesocosms.

Principal Investigator, Research Contract, Shell Development Company Funding ($144,242), 1994-1996. Evaluation of Constructed Wetlands for Tertiary Treatment of Refinery Effluent.

Principal Investigator, Research Contract, Texaco, Inc. Funding ($20,000), 1995-1996. Evaluation of a Constructed Wetland for Removal of Ammonia from a Refinery Effluent.

Principal Investigator, Research Contract, Texaco, Inc. Funding ($20,000), 1995-1996. Evaluation of a Constructed Wetland for Removal of Trace Metals from a Refinery Effluent.

Clemson University (1998-present):

Principal Investigator, Assistance with Design and Construction of a Wetland for Wastewater Treatment Sponsored by Shell Oil Products from 4/1/98 to 4/1/00 ($10,000).

Principal Investigator, Evaluation of the Tombigbee River. Sponsored by Weyerhauser, Inc. 1/98 – 1/02 ($22,000).

Principal Investigator, Constructed Wetland for Wastewater Treatment at IP's Mansfield, LA Facility, Sponsored by International Paper Company 8/98 – 12/00 ($18,250).

Principal Investigator, Investigations of Pesticide Toxicity, Sponsored by Applied Biochemists, Inc. 1/00 – 1/01 ($10,000).

Principal Investigator, Wetlands for Wastewater Treatment at Savannah River Site Sponsored by DOE thru SCUREF (SC Universities Research and Education Foundation) from 1/14/99 to 2/28/00 ($28,088).

Principal Investigator, A-01 Outfall Constructed Wetlands Sponsored by DOE thru Westinghouse Savannah River thru SCUREF from 7/11/99 to 9/30/00 ($624,730).

Principal Investigator, Design and Construction of a Wetland for Effluent Treatment. Sponsored by International Paper Company 6/00 – 7/01 ($25,000).

Principal Investigator, Evaluation of Foam Products. Flexible Products, Inc Funding from 9/99 – 1/01 ($15,000).

Principal Investigator, US Department of Interior Funding ($43,106), 2002-2004. Renovating Water for Conservation and Reuse.

Co-Principal investigator, US Department of Agriculture Funding ($539,677), 2002-2004. Adhesion-Specific Nanoparticles for Removal of *Campylobacter jejuni* from Poultry.

Principal Investigator, Duke Energy Corporation Funding ($54,473). 2001. Evaluation of the Oconee Nuclear Station Conventional Waste Treatment System.

Principal Investigator, Chevron Texaco Inc. Funding ($24,000), 2001-present. Evaluation of Best Management Practices for Stormwater and Other Contaminated Waste Streams.

Principal Investigator, US Department of Energy Funding ($26,024). 2001-2003. A01 Constructed Wetland Treatment Facility Redox Probe Maintenance and Consultation for the Savannah River Site (from WSRC through SCUREF).

Principal Investigator, U.S. Department of Interior Funding ($43,106). 2002-2003. Renovating Water for Conservation and Reuse.

Principal Investigator, Sustainable Universities Initiative ($7,000). 2002-2003. A Constructed Wetland Treatment System: A Green and Sustainable Solution to Prevent Water Pollution on Campus.

Principal Investigator, Duke Energy Corporation in Cooperation with Progress Energy Funding ($187,000). 2003-2004. Treatment of Mercury, Selenium and Other Targeted Constituents in FGD Wastewater: A Constructed Wetland Pilot Study.

Principal Investigator, Chevron Corporation Funding ($33,600). 2003-2004. Panama Storm Water Treatment Wetland.

Principal Investigator, Griffin Corporation Funding ($20,0000). 2002-2003. Response of Aluminum from Boat Pontoons to Komeen Exposures in Lake Murray, SC Water (with Sediments and *Hydrilla*.

Principal Investigator, Alabama Power Company Funding ($75,000). 2004-2006. Development of Strategies for Controlling Nuisiance Growths of *Lyngbya* in Alabama Power Company Reservoirs.

Principal Investigator, Department of Energy Funding ($125,000) 2004-2005. Designing constructed wetlands to treat gas storage produced waters.

Principal Investigator, Duke Energy Corporation in Cooperation with Progress Energy Funding ($105,000). 2004-2005. Continuing Studies of Treatment of Mercury, Selenium and Other Targeted Constituents in FGD Wastewater Using a Constructed Wetland Treatment System.

Principal Investigator, U.S. Department of Energy Funding ($300,000) 2005-2008. Innovative Techniques for Remediation of Nontraditional Waters for Reuse in Coal-Fired Power Plants.

Principal Investigator, Duke Energy Corporation and ENTRIX Funding ($100,000) 2006-2007. Further Evaluations of Constructed Wetland Treatment Systems for Flue Gas Desulfurization Waters.

Co-Principal Investigator, Chevron-Texaco Funding ($50,000) 2006-2007. Evaluation of Boron Biogeochemistry in Constructed Wetlands.

Co-Principal Investigator, Monsanto Company Funding ($300,000) 2006-2008. Potential Effects of Glyphosate Formulations on Amphibians.

Principal Investigator, Florida Department of Environmental Protection Funding ($60,000) 2006-2008. Effects of Invasive Algae in Crystal River, FL and Potential Control Strategies to Protect the Florida Manatee.

Co-Principal Investigator, Chevron-Texaco Funding ($50,000) 2008. Specifically Designed Constructed Wetland Treatment Systems for Produced Water in Chad.

Principal Investigator, Duke Energy Corporation and ENTRIX Funding ($30,000) 2007-2008. Additional Evaluations of Constructed Wetland Treatment Systems for Flue Gas Desulfurization Waters.

Co-Principal Investigator, Clemson University Funding ($50,000) 2006-2008. Evaluation of Constructed Wetland Treatment Systems for Parking Lot Stormwater (with Dr. Rockie English).

Principal Investigator, Applied Biochemists, Inc. Funding ($36,000) 2008-2009. Approaches for Mitigation of Risks from Harmful Algal Blooms.

Co-Principal Investigator, Chevron-Texaco Funding ($50,000) 2008. Specifically Designed Constructed Wetland Treatment Systems for Specific Produced Water (San Ardo, CA).

Co-Principal Investigator, U.S. Department of Energy Funding ($800,000) 2009. Evaluation of Constructed Wetland Treatment Systems for Produced Waters. Innovative Water Management Technology to Reduce Environmental Impacts of Produced Water (DE-NT0005682), Clemson University

Co-Principal Investigator, Chevron-Texaco Funding ($50,000) 2009. Specifically Designed Constructed Wetland Treatment Systems for Produced Water in Chad.

Co-Principal Investigator, U.S. Department of Energy Funding ($800,000) 2010. Carbon Capture and Sequestration Education (in partnership with the Southern States Energy Board). Clemson University

Co-Principal Investigator, Diamond-V Funding ($115,237) 2010. Enhancing Selenium Treatment in Waters. Clemson University

Co-Principal Investigator, U.S. Department of Energy Funding ($100,000) 2012. Evaluation of Constructed Wetland Treatment Systems for Produced Waters. Innovative Water Management Technology to Reduce Environmental Impacts of Produced Water (DE-NT0005682), Clemson University

HONORS AND AWARDS:

Phi Sigma Doctoral Research Award, April, 1977.

Sigma Xi Doctoral Research Award, May, 1978.

Who's Who in the South and Southwest, 1979.

Personalities of the South, 1981.

International Who's Who, 1981.

Directory of Distinguished Americans, 1981.

Men of Achievement (International Biographical Center), 1981.

Phi Kappa Phi Honor Society, 1982.

Gordon Research Conference Travel Award, 1982.

NTSU President's Award to the Institute of Applied Sciences, 1985.

Mortar Board NTSU "Top Prof" Teaching Award, 1985.

Elected to NTSU Graduate Faculty, 1987.

Co-author - Best Student Paper (Burton Suedel and Phil Clifford), published in 1992 in *Environmental Toxicology and Chemistry*.

Certificate of Appreciation, 1993 Mississippi Region 7 Science and Engineering Fair. 1993.

Designated “Distinguished Southerner” by Editors Of *Southern Living*. Article on Water Watchdogs In April, 1994 edition of *Southern Living*.

Co-author - Best Student Paper (Arthur Dunn), Mid-South Aquatic Plant Management Society. Birmingham, AL. 1994.

Certificate of Appreciation, Environmental Biology Review Panel, U.S. EPA, January, 1995.

President, Oxford Exchange Club – Prevention of Child Abuse, 1996-1998.

Board of Directors, Society of Environmental Toxicology and Chemistry, 1989-1991; 1995-2001. Executive Committee 1997-2000. Vice President 1998-1999. President 1999-2000.

Member, Expert Advisory Committee, Canadian Network of Toxicology Centres. Environment Canada and Health and Welfare, 1992-2000.

Chair, Expert Advisory Committee, Canadian Network of Toxicology Centres, Environment Canada and Health and Welfare, 1996-1999.

Vice President’s Award, Savannah River Technology Center. A-01 Outfall Wetland Treatment Confirmation Study, 2000.

Who’s Who Among America’s Teachers, 7th ed. 2002. p. 400.

Certificate of Appreciation for Outstanding Service to the Society of Environmental Toxicology and Chemistry, 2003.

Member, Canadian Foundation for Innovation, Science Review Panel, 2008 - 2009.

Chair, Canadian Foundation for Innovation, Science Review Panel, 2009.

Member of the Year, South Carolina Aquatic Plant Management Society, 2009.

Nominated for Governor's Research Award, 2010.

President's (USA) 'Closing the Circle' Environmental Award (with Savannah River Site) for Wetland Research and Application, 2010.

Clemson University Board of Trustees Award for Faculty Excellence, 2010.

Nominated for the 2011 Alumni Award for Outstanding Achievement in Research at Clemson University, 2011.

RESEARCH AND TEACHING INTERESTS:

Teaching Interests:
I have taught General Botany, General Biology Environmental Biology, Assessment of Water Quality, Water Quality Management, Environmental Analysis, Aquatic Toxicology, Limnology, Microbial Ecology, Radioisotopes, and Research Techniques, Aquatic Botany, Aquatic Microbiology, Sediment Toxicology, and Analysis of Biological Data, Ecological Risk Assessment, Plant Physiology, and Water Chemistry. My teaching interests also include: Plant Ecology, Wetland Ecology, and Phycology.

Research Interests:
Effects of heated effluents and other perturbations on primary productivity of vascular and non-vascular plants in terrestrial and aquatic systems.

In situ measurements of assimilatory sulfate reduction by periphytic organisms (algae, bacteria, and fungi), sulfur content and cycling in aquatic systems.

Physical models of aquatic systems as tools for the study of acute and chronic effects of industrial and power plant effluents on structural and functional aspects of aquatic microbial communities with emphasis on photosynthesis and sulfate assimilation.

Production, decomposition and role in nutrient cycling of aquatic macrophytes.

Impact of ash from industrial and power production processes on receiving systems and indigenous biota.

Decomposition and role of autochthonous and allochthonous detritus in aquatic and terrestrial systems with emphasis on the influences of macro-invertebrates, bacteria and fungi.

Invasion rates, population dynamics and elemental accumulation of the Asiatic Clam (*Corbicula fluminea*).

Extracellular products and other organic compounds as regulating factors of structural and functional aspects of aquatic microbial communities.

Benthic metabolism and physical and biological sediment characterization (using SCUBA-implemented techniques) as an index of eutrophication rates.

Electron transport system activity of benthic microflora as a pollution monitoring tool.

Serum enzymes of fish as an indicator of the quality and quantity of mixed effluents and their effects on receiving systems.

Ecosystem responses to stress in aquatic systems; Ecological risk assessment.

Relationships between carbon quantity and quality in ecosystems.

Responses of microbes (algae, bacteria, and fungi) to magnetic fields.

Ecological impacts associated with pulp and paper mills.

Biology and ecology of *Taxodium distichum* (Bald cypress) swamps in the Southwest.

Development of models for integrated control of nuisance aquatic vegetation and aquatic ecosystem management.

Microcosms and mesocosms as tools for ecological and environmental research.

Reservoir limnology and eutrophication.

Secondary aquatic plant products and biocontrol of aquatic plants.

Bioavailability of xenobiotic chemicals (e.g. pesticides) to aquatic organisms.

Sediments as sources and sinks for contaminants in aquatic ecosystems.

Population biology and physiological ecology of aquatic plants.

Artificial Intelligence in ecological problem solving.

Constructed wetlands for rehabilitation and wastewater treatment.

Metal speciation and bioavailability.

ORGANIZATIONS:

American Society of Limnology and Oceanography, Ecological Society of America, American Water Resources Association, North American Benthological Society, Water Pollution Control Federation, Phi Sigma Society Alpha Psi (VPI&SU) Chapter, Sigma Xi (VPI&SU) Chapter, American Institute of Biological Sciences, American Association for Advancement of Science, Phi Kappa Phi (NTSU) Chapter, Aquatic Plant Management Society, Society of Environmental Toxicology and Chemistry.

OTHER PROFESSIONAL ACTIVITIES:

Consulting Aquatic Ecologist Microbiology Department, Clemson University, 1973-1975.

Investigator on Facilities Use Agreement #15 at Savannah River Laboratory in conjunction with Clemson University and VPI & SU, 1973-1975.

Consulting Aquatic Ecologist to American Electric Power Service Corporation, Canton, Ohio, 1974 - 1975.

Investigator on Facilities Use Agreement #28 at Savannah River Laboratory in conjunction with University of Texas, School of Public Health and VPI&SU, 1975 - 1979.

Consulting Microbial Ecologist to Bioengineering Research and Development Group, Oak Ridge National Laboratory, Oak Ridge, Tennessee, 1977.

Consulting Aquatic Ecologist to Virginia State Water Control Board, Richmond, 1977.

Invited lecturer in Plant Ecology and Environmental Biology, Botany Department, Clemson University, 1977.

Consulting Aquatic Ecologist to Center for Environmental Studies VPI&SU, 1978 - 1979.

Participant in Savannah River National Environmental Research Park meeting on Aquatic Research, Aiken, S.C., 1978.

Grant Proposal Review for the Division of Environmental Biology of the National Science Foundation, 1978 - 1987.

Consulting Aquatic Ecologist to Tennessee Eastman Company, Kingsport, Tennessee, 1978 - 1979.

ETSU Research Development Committee Presidential Appointment 1978 - 1979.

Consulting Aquatic Ecologist to Victor Equipment Company, Denton, Texas, 1980 - 1983.

Review of publications for American Society for Testing and Materials.

Consulting Aquatic Ecologist to Environmental Biology Group, Oak Ridge National Laboratory, Oak Ridge, Tennessee, 1980.

Gordon Research Conference Participant (Environmental Sciences - Water), 1980.

Participant in Workshop on the role of aquatic microcosms in evaluating ecosystem effects of chemicals under the Toxic Substances Control Act (USEPA sponsored), 1980.

NTSU representative to Texas Systems of Natural Laboratories. (Presidential Appointment), 1981 - 1986.

Consulting Aquatic Ecologist to Environmental Systems Branch, U.S. Environmental Protection Agency, 1981.

School of Community Service Computing Services Advisory Council (Dean's Appointment), 1981-1986.

NTSU Biosafety Committee (Presidential Appointment), 1980 - 1987.

Peer Review of Research Program for Environmental Systems Branch of the U.S. Environmental Protection Agency (with H.T. Odum), 1981.

Participant in Workshop on Modeling the Fate of Chemicals in the Aquatic Environment (USEPA sponsored), Pellston, MI, 1981.

Co-chaired session on Microcosm Testing in Aquatic Toxicology at the Society of Environmental Toxicology and Chemistry's Annual Meeting, Washington, D.C., 1981.

Elected to Editorial Board of Environmental Toxicology and Chemistry, 1981- 1983.

Research advisor to the Ecosystem Branch of the U.S. Environmental Protection Agency, Las Vegas, 1982.

Gordon Research Conference Participant (Environmental Sciences-Water), 1982.

President, Sigma Xi, NTSU Club, 1982-1983.

Chair, Employment Service Committee of the Society of Environmental Toxicology and

Chemistry, 1982 - 1984.

Review of manuscripts for Ecological Society of America, 1981 - present.

College of Arts and Sciences Committee on Interdisciplinary Research (Dean's Appointment), 1983.

Department of Biological Sciences Radiation Safety Officer, 1983 - 1987.

Participant, Workshop on Bioavailability of Chemicals from Dredged Materials (U.S. Army Corps of Engineers sponsored) Vicksburg, Mississippi,1984.

Consulting Aquatic Ecologist to the City of Reno, Nevada, 1983 - Mitigation of Impacts of Population Growth and Development on Lake Tahoe, Truckee River and Pyramid Lake.

Consulting Aquatic Ecologist to the Las Colinas Development, 1983 - Impacts of Development on the Trinity River and Watershed.

School of Community Services Committee on Resources and Nontraditional Education (Dean's Appointment), l983 - l984.

Peer review of research programs of the Naragansett Bay, R.I., U.S. Environmental Protection Agency Research Laboratory (elected chairman of the review team), 1984.

North Texas State University Committee on Science and Technology (Presidential Appointment), 1984.

President, J.K. G. Silvey Society, North Texas State University, 1983 - 1984.

Invited Attendee, Society of Petroleum Industry Biologists, Annual Meeting, Houston, Texas, 1984.

Chair of the Annual Meeting of the Society of Environmental Toxicology and Chemistry, St. Louis, Missouri, Nov. 10-14, 1985.

Participant - Workshop on the Bioavailability of Sorbed Chemicals (U.S. Environmental Protection Agency and American Petroleum Institute sponsored) Florissant, Colorado, 1984.

Faculty Committee Member, Cooperative Education Program of the Institute of Applied Sciences, 1984.

Faculty Representative for the Sciences, elected to NTSU Faculty Senate, 1986.

Served as Chairman of Placement Committee of Aquatic Plant Management Society, 1987.

Peer review of research programs of the Gulf Breeze, FL., U.S. Environmental Protection Agency Research Laboratory (with H. Bergman and K. Solomon), 1987.

Consulting aquatic ecologist to the City of Dallas (Water Utilities), Algal Workshop, 1987.

Consulting aquatic toxicologist to the American Petroleum Institute, Bioavailability of Chemicals Sorbed to Sediments, 1987.

Consulting aquatic ecologist to the Association of Central Oklahoma Governments, Use Attainability Study of Crutcho Creek and the North Canadian River, 1987.

Chair, Professional Opportunities Committee (Placement) of the Aquatic Plant Management Society, 1987.

Co-chair (with L. Goodman), Workshop on Mysid Culture and Testing, at the Eighth Annual Meeting of the Society of Environmental Toxicology and Chemistry, Pensacola, FL, 1987.

Co-chair, sessions on Perspectives of Water Quality-Based Permitting and Field Validation of Laboratory Results, at the Eighth Annual Meeting of the Society of Environmental Toxicology and Chemistry, Pensacola, FL, 1987.

Appointed to the South Carolina Aquatic Plant Management Commission, 1987.

Presented short courses on Aquatic Plant Management in Texas, 1987.

Presented seminars at short courses on Aquatic Plant Management in Florida, Ft. Lauderdale and Orlando, FL, l987.

Advisor on American Petroleum Institute Study of Bioavailability of Sediment Bound Chemicals (with P. Chapman and C. Missimer), 1987 - 1988.

Participated in a Workshop on Mesocosm Research Sponsored by USEPA, Duluth, MN, 1987.

Promotion review team member for P.R. Parrish, Environmental Research Laboratory, Gulf Breeze, FL, 1987.

Chair, session on Sediment Criteria Development and Testing at the South Central Chapter Meeting of the Society of Environmental Toxicology and Chemistry, Houston, TX, 1987.

Scientific Advisory Group, Proctor and Gamble Corporation, Cincinnati, Ohio, 1988,

Scientific Advisory Group, Botanical Research Institute of Texas (BRIT). Fort Worth, TX, 1988.

Adjunct Faculty, University of Guelph. Guelph, Ontario, Canada, 1988-1990.

Invited participant, North American Benthological Society Annual Meeting. Blacksburg, VA, May 22, 1990.

Invited participant, Association of Southeastern Biologists Special Workshop on Teaching the Limnology Laboratory. Baltimore, MD, April 20, 1990.

Invited participant, Aquatic Plant Management Meeting. Mobile, AL, July 16, 1990.

Chair, Education Committee of the Society of Environmental Toxicology and Chemistry, 1989-1991.

Chair, Professional Opportunities Committee of the Aquatic Plant Management Society, 1989-1991.

Chair, Discussion session on Wetlands Toxicology At the Society of Environmental Toxicology and Chemistry Annual Meeting. Washington, D.C., November 12, 1990.

Member, Aquatic Effects Dialogue Group of the Conservation Foundation, 1989-1991.

Member, Advisory Group to the World Wildlife Fund,1989-1991.

Consulting Aquatic Ecologist and Toxicologist to Proctor and Gamble Company. Cincinnati, OH, 1989-1991.

Served on a discussion panel on the Future of Aquatic Plant Management with emphasis on regulatory issues regarding herbicides at the 25th Annual Meeting of the Aquatic Plant Control Research Program - U.S. Army Corps of Engineers. Orlando, FL, November 26-30, 1990.

Served on a discussion panel on the Future of Aquatic Plant Management with Emphasis on Simulation Technology and Modeling at the 25th Annual Meeting of the Aquatic Plant Control Research Program - U.S. Army Corps of Engineers. Orlando, FL. November 26-30, 1990.

Consulting Aquatic Toxicologist, U.S. Environmental Protection Agency, Ecorisk Program evaluation. 1990-1991.

Consulting Aquatic Toxicologist, International Paper Company. 1990-1991.

Consulting Aquatic Toxicologist, State of Mississippi. 1990-1991.

Consulting Aquatic Toxicologist, Environment Canada, Health and Welfare Canada - Canadian Network of Toxicology Centers, Expert Advisory Committee. 1991- 2001.

Consulting Aquatic Toxicologist, Ecorisk Forum on the Rocky Mountain Arsenal Refuge Technical Expert Advisory Panel. 1991-1992.

Consulting Biologist and Ecotoxicologist, Arkansas Department of Higher Education and Arkansas State University Ph.D. Program Development. 1991- 1998.

Invited participant, Tiered Testing Issues for Freshwater and Marine Sediments, sponsored by U.S. EPA Office of Water and Office of Research and Development. Washington, D.C., September 16-18, 1992.

Invited speaker, Workshop on the Bioavailability and Toxicity of Copper, sponsored by the University of Florida, Center for Aquatic Plants. Gainesville, FL, September 2-3, 1992.

Peer reviewer for U.S. EPA, Framework for Ecological Assessment, Risk Assessment Forum. Washington, D.C., 1992 (EPA/130/R-92/001 - February 1992).

Invited speaker, 4th Annual Meeting of the Soil and Water Conservation Society. Baltimore, MD, August 9-12, 1992.

Participant, U.S. EPA Workshop on Bioaccumulation of Hydrophobic Chemicals. Washington, D.C., June,1992.

Invited lecturer and participant, Young Scholars Program, NSF funded. Oxford, MS, 1992.

Counselor for summer interns with the Minorities Science Program, University of Mississippi funded. Oxford, MS, 1992.

Peer Review, Biology Peer Review Panel, U.S. EPA. Knoxville, TN, January, 1993.

Conference Co-organizer, First International Conference on Transport, Fate, and Effects of Silver in the Environment. University of Wisconsin, Madison, WI, August 8-10, 1993.

Chair, Exhibits Committee, 14th Annual Meeting of the Society of Environmental Toxicology and Chemistry. Houston, TX, November, 1993.

Consulting Aquatic Ecologist and Toxicologist to Weyerhaeuser Corporation. Columbus, MS, 1994 – 1999.

Member, Student Scholarship Committee, Mid-South Aquatic Plant Mangement Society. 1994 – 1997.

OSHA Safety Course. Norco, LA, 1994. Joint Agency Task Force Member, Guntersville Project. Guntersville, AL, April, 1994.

Featured speaker, Seminar on Pollution Prevention for Silver Imaging Systems. Lake Buena Vista, FL. May, 1994.

Conference Organizer, Second International Conference on Transport, Fate and Effects of Silver in the Environment. University of Wisconsin, Madison, WI, September 11-14, 1994.

Chair - Subcommittee, National Institute of Environmental Health Sciences (NIEHS) - Superfund Hazardous Substances Basic Research Program. Research Triangle Park, NC, October 16-19, 1994.

Discussion Panel Participant, 2nd International Conference on Environmental Fate and Effects Of Bleached Pulp Mill Effluents. Vancouver, B.C., Canada, November, 1994.

Genetic Toxicology Course (Audit). Oxford, MS, 1995.

Board of Directors, Society of Environmental Toxicology and Chemistry (elected), 1995.

Participant, U.S. EPA Environmental Biology Review Panel. Fort Worth, TX, January, 1995.

Participant, Society of Environmental Toxicology and Chemistry Workshop on Wetlands. Butte, MT, August, 1995.

Conference Organizer, Third International Conference on Transport, Fate and Effects of Silver in the Environment. Washington, D.C., August, 1995.

Featured Speaker, 1995 Scholars Conference, University of Mississippi. Oxford, MS, October, 1995.

Participant, Society of Environmental Toxicology and Chemistry Workshop on Whole-Effluent Toxicology. Pellston, MI, October, 1995.

Invited Participant, Round Table Discussion of Surfactant Toxicity in Aquatic Systems. Thornton, England, May, 1996.

Keynote Speaker, Mid-South Society of Environmental Toxicology and Chemistry (inaugural meeting). Memphis, TN, May, 1996.

Invited Speaker on Endocrine Disruption, Seminar on Emerging Water Issues, International Paper Company. Memphis, TN, June, 1996.

Instructor, Short Course on Constructed Wetlands, U.S. Army Waterways Experiment Station. Berkeley, CA. July, 1996.

Short Course on Constructed Wetland Design and Monitoring. Houston, TX, July, 1996.

Conference Organizer, Fourth International Conference on Transport, Fate and Effects of Silver in the Environment. Madison, WI, August, 1996.

Friends of Lake Keowee (FOLKS), Board of Directors (elected) and Member of the Technical Committee, 2003-present.

Bob C. Campbell Geology Museum, Clemson University, Board of Directors Member, 2003-present.

Associate Editor, Journal of Toxicology and Environmental Health Part B : Critical Reviews. 1999-2006.

Chair, Science Advisory Panel for the California Environmental Protection Agency – Aquatic Pesticides Committee, 2002-present.

Member, Science Advisory Panel, USDA Jimmy Carter Plant Materials Center, Americus, GA. 2003-present.

Member, Science Advisory Panel for the USEPA/ SETAC Whole Effluent Toxicity Testing Committee, 1998-2004.

Member, Science Advisory Panel for Proposal and Research Review, Water Environment Federation, 2001-present.

Member, Science Advisory Panel for the National Council for Air and Stream Improvement – Long Term Receiving Water Studies, 1999-present.

Member, Board of Directors – Aquatic Plant Management Society, (elected) 2003-2006.

Co-editor (with Dr. J.W. Castle), Special Issue of Environmental Geoscience on Constructed Wetland Treatment Systems, 2009.

Review of WET testing protocols, US EPA, 2009.

Member, Board of Directors – South Carolina Aquatic Plant Management Society, (elected) 2007-2009.

Vice-President and Annual Meeting Program Chair – South Carolina Aquatic Plant Management Society, (elected) 2008-2009.

Chair, ad hoc Committee on NPDES Permitting, South Carolina Aquatic Plant Management Society, 2008-2009.

Chair, Peer Review Panel, Canadian Foundation for Innovation, 2009.

Chair, Strategic Planning Committee, Aquatic Plant Management Society, 2008-2012.

Leader, Constructed Wetland Treatment Systems: A Short Course; presented at Synterra, Inc., Greenville, SC, June 14-18, 2010.

Chair, Peer Review Panel, Canadian Foundation for Innovation, 2010.

Peer Review Panel, Canadian Research Chairs, 2010.

Appointed Canada Review of University Environmental Programs, 2011.

Chair, Session on Components to reconstruct a successful wetland ecosystem at Key Factors to Successfully Reconstruct Boreal Wetland Ecosystems – An International Workshop. Chantilly, France. April 16-17, 2012.

Consulting Environmental Toxicologist, US Environmental Protection Agency, Science Advisory Panel, Problem Formulation and Risk Assessment, Washington,DC, June 11-14, 2012

BOOKS, BOOK CHAPTERS, AND MONOGRAPHS

M.Sc. Thesis: Rodgers, J.H., Jr. 1974. Thermal Effects on Primary Productivity of Phytoplankton, Periphyton, and Macrophytes in Lake Keowee, S.C. Botany Department, Clemson University. 88 pp.

Bi- weekly in situ determinations of Carbon-14 assimilation rates were made using SCUBA and chambers in a reservoir receiving thermal effluent from a nuclear power plant. Emphasis was placed upon relative contributions of each group of plants to the overall lake productivity and statistical correlations of productivity with water temperatures (1972-1974).

Ph.D. Dissertation: Rodgers, J.H., Jr.1977. Aufwuchs Communities of Lotic Systems: Nontaxonomic Structure and Function. Biology Department and Center for Environmental Studies, VPI&SU. 336 pp.

Six model streams were constructed to assess effects of typical industrial and municipal effluents on primary productivity, assimilatory sulfate reduction and structural aspects of assemblages of attached microorganisms. Net microbial productivity of aufwuchs and primary productivity were estimated by assimilatory (S35) sulfate reduction and carbon-14 fixation, respectively, with heterotrophic productivity being the difference. Concurrent laboratory studies verified the efficacy of these procedures. The ability of methods to discern perturbations was tested. Direct correlations between structural measurements and functions were ascertained by regression analysis. Field investigations of aufwuchs communities were inconclusive due to variability and the heterogeneous distribution of aufwuchs communities (1974 - 1977).

Guthrie, R.K., D.S. Cherry, and J.H. Rodgers, Jr. 1974. The Impact of Ash Basin Effluent on Biota in the Drainage System. *Proc. Seventh Mid-Atlantic Industrial Waste Conference*: pp. 17-43. Drexel University, Philadelphia, Pa.

Dickson, K.L., J. Cairns, Jr., J.R. Clark and J.H. Rodgers, Jr. 1978. Evaluating Pollution Stress on Ecosystems. In: K.C. Flynn and W.T. Mason (eds.) *The Freshwater Potomac - Aquatic Communities and Environmental Stress*. The Interstate Commission on the Potomac River Basin, Rockville, Maryland. pp. 80 - 83.

Rodgers, J.H., Jr., D.S. Cherry, K.L. Dickson, and J. Cairns, Jr. 1979. Invasion, Population Dynamics and Elemental Accumulation of *Corbicula fluminea* in the New River at Glen Lyn, Virginia. In: *Proc. First International Corbicula Symposium* J.C. Britton (ed.). Texas Christian University Research Foundation Publishers, Fort Worth, TX, pp. 99-110.

Rodgers, J.H., Jr., K.L. Dickson, and J. Cairns, Jr. 1979. A Review and Analysis of Some Methods Used to Measure Functional Aspects of Periphyton. In: R.L. Weitzel (ed.) *Methods and Measurements of Periphyton Communities:Review*. American Society for Testing and Materials, Philadelphia, Pennsylvania (ASTM STP 690), pp. 142-167.

Rodgers, J.H., Jr., D.S. Cherry, R.L. Graney, K.L. Dickson, and J. Cairns, Jr. 1980. Comparison of Heavy Metal Interactions in Acute and Artificial Stream Bioassay Techniques for the Asiatic Clam (*Corbicula fluminea*). In: J.G. Eaton, P.R. Parish, and A.C. Hendricks (eds.) *Aquatic Toxicology*. American Society for Testing and Materials, Philadelphia, PA. (ASTM STP 707), pp. 266-280.

Cherry, D.S., J.H. Rodgers, Jr., R.L. Graney, and J. Cairns, Jr. 1980. *Dynamics and*

Control of the Asiatic Clam in the New River,Virginia. Bulletin 123, Virginia Water Resources Research Center. Virginia Polytechnic Institute and State University, Blackburg, VA. 72 pp.

Dillon, C.R. and J.H. Rodgers, Jr. 1980. *Thermal Effects on Primary Productivity of Phytoplankton. Periphyton. and Macrophytes in Lake Keowee. S.C.* Technical Report No. 81, Clemson University Water Resources Research Institute, Clemson, S.C. 115 pp.

Rodgers, J.H., Jr., J.R. Clark, K.L. Dickson, and J. Cairns, Jr. 1980. Nontaxonomic analyses of structure and function of aufwuchs communities in lotic microcosms. In: J.P. Geisy, Jr. (ed.). *Microcosms in Ecological Research*. USDOE (CONF-781101) pp. 625-643.

Lee, C.M., H. Bergman, W. Wood, and J.H. Rodgers, Jr. 1982. Workshop Summary and Conclusions. In: K.L. Dickson, A.W. Maki and J. Cairns, Jr. (eds.) *Modeling the Fate of Chemicals in the Aquatic Environment*, Ann Arbor: Ann Arbor Science Publ. pp. 397-407.

Cairns, J., Jr., A.L. Buikema, Jr., D.S. Cherry, E.E. Herricks, R.A. Matthews, B.R. Neiderlahner, J.H. Rodgers, Jr. and W.H. Van der Schalie. 1982. *Biological Monitoring in Water Pollution*. Pergamon Press: New York. 116 pp.

Rodgers, J.H., Jr., M.E. McKevitt, D.O. Hammerland, K.L. Dickson and J. Cairns, Jr. 1983. Primary production and decomposition of submergent and emergent aquatic plants of two Appalachian rivers. In: T.D. Fontaine III and S.M. Bartell (eds.) *Dynamics of Lotic Ecosystems*. Ann Arbor Science Publ. pp. 298-301.

Staples, C.A., K.L. Dickson, F.Y. Saleh, and J.H. Rodgers, Jr. 1983. A microcosm study of lindane and naphthalene partitioning for model validation. In: W. Bishop, R.D. Caldwell, and B.B. Heidolph (eds.) *Aquatic Toxicology and Hazard Assessment*. STP 802 ASTM Publications, Philadelphia, PA. pp. 26-41.

Rodgers, J.H., Jr. K.L. Dickson, and M.J. Defoer. 1983. Bioconcentration of lindane and naphthalene in bluegills (*Lepomis macrochirus*). In: W. Bishop, R.D. Cardwell, and B.B. Heidolph (eds.) *Aquatic Toxicology and Hazard Assessment*. STP 802. ASTM Publications, Philadelphia, PA. pp. 300-311.

Saleh, F.Y., K.L. Dickson, and J.H. Rodgers, Jr. 1984. Transport Processes of Naphthalene in the Aquatic Environment. In: L. Pawlowski, A.J. Verdier, and W.J. Lacy (eds.) *Chemistry for Environmental Protection*. Elsevier Publisher. pp. 119-131.

Vance, B.D. and J.H. Rodgers, Jr. 1984. *General Botany*, 2nd Ed. Hunter Textbooks, Inc., Winston - Salem, NC. 93 pp.

Staples, C.A., K.L. Dickson, J.H. Rodgers, Jr., and F.Y. Saleh. 1985. A Model for Predicting the Influence of Suspended Sediments on Bioavailability of Neutral Organics in the Water Compartment. In: R.D. Cardwell, R.C. Bahner and R.E. Purdy (eds.) *Aquatic Toxicology and Hazard Assessment*. ASTM STP 845, ASTM Philadelphia, PA. pp. 417-428.

Dickson, K.L. and J.H. Rodgers, Jr. 1985. Assessing the Hazards of Effluents in the Aquatic Environment. In: H. Bergman, A. Maki and R. Kimerle (eds.) *Assessing the Hazards of Effluents to Aquatic Life*. Pergamon Press.

Rodgers, J.H., Jr., K.L. Dickson, F.Y. Saleh, and C.A. Staples. 1987. Bioavailability of Sediment-bound Chemicals to Aquatic Organisms; Some Theory, Evidence and Research Needs. In: K.L. Dickson, A.W. Maki and W.A. Brungs (eds.) *Fate and Effects of Sediment-Bound Chemicals in Aquatic Systems*. Pergamon: Elmsford, N.Y. pp. 245-266.

Anderson, J., W. Birge, J. Gentile, J. Lake, J.H. Rodgers, Jr. and R. Swartz. 1987. Biological Effects, Bioaccumulation, and Ecotoxicology of Sediment-associated Chemicals. In: K.L. Dickson, A.W. Maki, and W.A. Brungs (eds.) *Fate and Effects of Sediment-Bound Chemicals in Aquatic Systems*. Pergamon: Elmsford, N.Y. pp. 267-296.

Rodgers, J.H. Jr., P.A. Clifford and R.M. Stewart. 1991. Enhancement of HERBICIDE, the Aquatic Herbicide Fate and Effects Model. In: *Proceedings, 25th Annual Meeting, Aquatic Plant Control Research Program.* Misc. Paper A-91-3. pp. 279-282. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Rodgers, J.H. Jr. 1991. Herbicide Registration for Aquatic Use: A Look to the Future. In: *Proceedings, 25th Annual Meeting, Aquatic Plant Control Research Program.* Misc. Paper A-91-3. pp. 245-248. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Graney, R.L., J.H. Kennedy and J.H. Rodgers, Jr. (eds.). 1993. *Aquatic Mesocosm Studies in Ecological Risk Assessment.* Lewis Publishers, Baca Raton, FL. 723 pp.

Rodgers, J.H., Jr., A.W. Dunn and A.B. Jones. 1993. Triclopyr Concentrations in Eurasian Watermilfoil: Uptake Under Differing Exposure Scenarios. In: *Proceedings, 28th Annual Meeting, Aquatic Plant Control Research Program.* Misc. Paper A-94-2. pp. 249-259. U.S. Army Waterways Experiment Station, Baltimore, MD. November 15-18, 1993.

Rodgers, J.H., Jr. and A.W. Dunn. 1994. TVA - Guntersville Reservoir Herbicide Monitoring Survey 1991-1992. A Report to the Tennessee Valley Authority and U.S.

Army Corps of Engineers Joint Agency Program. 116 p.

Solomon, K., D. Bright, P. Hodson, K.-J. Lehtinen, B. McKague and J. Rodgers, Jr. 1999. Evaluation of ecological risks associated with the use of chlorine dioxide for the bleaching of pulp. Report prepared for the Alliance for Environmental Technology. 86 pp.

Rodgers, J.H., Jr. and J.F. Thomas. 2004. Evaluations of the Fate and Effects of Pulp and Paper Mill Effluents from a Watershed Multistressor Perspective: Progress to Date and Future Opportunities. In: Pulp and Paper Mill Effluent Environmental Fate and Effects. D. L. Borton, T. J. Hall, R.P. Fisher, and J.F. Thomas (eds.). DEStech Publications, Lancaster, PA. pp.135-146.

PAPERS AND PUBLICATIONS:

Rodgers, J.H., Jr., G.L. Powell, and J.F. Geldard. 1973. Triple-label Liquid Scintillation Radioassay: Possible or Impossible? Seventh Annual Regional Meeting (Oct . 5) Wilmington, N.C. 43 pp.

Rodgers, J.H., Jr. and R.S. Harvey. 1976. The Effect of Current on Periphyton Productivity Determined Using Carbon-14. Water Res. Bull. 12(6): 1109-1118.

Cherry, D.S., R.K. Guthrie, J.H. Rodgers, Jr., K.L. Dickson, and J. Cairns, Jr. 1976. Responses of Mosquito Fish (*Gambusia affinis*) to Ash Effluent and Thermal Stress. Trans. Am. Fish Soc. 105(6):686-694.

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Impaired Waters Using Constructed Wetland Treatment Systems," Geological Society of America Annual National Meeting, Denver, CO, November 2010, Abstract published in Geological Society of America Abstracts with Programs, v. 42, no. 5, p. 640.

Rodgers, J.H. 2010. Common algal problems and their management. Presented at the 2010 NC Turfgrass Conference & Show. (Dec. 13-15, 2010) Greensboro, NC.

Rodgers, J.H. 2010. Changing regulation of aquatic herbicides applications: How NPDES affects you. Presented at the 2010 NC Turfgrass Conference & Show. (Dec. 13-15, 2010) Greensboro, NC.

Rodgers, J.H. and B. Willis. 2011. Algae on the move: Recent range expansion of Prymnesium parvum. Presented at the 31st Annual Meeting of the Midwest Aquatic Plant Management Society, Grand Rapids, MI. Feb. 27-Mar.2, 2011.

Rodgers, J.H. 2011. Responses of *Lyngbya wollei* to copper=based algaecides: The critical burden concept. Presented at the 12th Annual Meeting of the Northeast Aquatic Plant Management Society, Portsmouth, NH, MI. Jan. 18-20, 2011.

Rodgers, J.H., W.M. Bishop and B.E. Willis. 2011. Algae on the move: Recent range expansion of Prymnesium parvum. Presented at the 12th Annual Meeting of the Northeast Aquatic Plant Management Society, Portsmouth, NH, MI. Jan. 18-20, 2011.

Beebe, D. A., Castle, J. W., and Rodgers, J. H. 2010. "Evaluation of Clinoptilolite for Use as a Sorptive Microbial Carrier in Constructed Wetland Treatment Systems Designed to Treat Ammonia," Geological Society of America, South-Central Annual Meeting, New Orleans, LA, March 2011.

Alley, B., D.A. Beebe, J.H. Rodgers, Jr., and J.W. Castle. 2011. Chemical and physical characterization of produced waters from conventional and unconventional fossil fuel resources. Presented at the 19th Annual David S, Snipes/ Clemson Hydrogeology Symposium. Clemson University, Clemson, SC. April 7, 2011.

Beebe, D. A., J.W. Castle and J.H. Rodgers, Jr. 2011. Clinoptilolite as a dual purpose sorbent and microbial carrier in constructed wetland treatment systems designed to remove ammonia. Presented at the 19th Annual David S, Snipes/ Clemson Hydrogeology Symposium. Clemson University, Clemson, SC. April 7, 2011.

Jurinko, K., C.L. Ritter, J.W. Castle and J.H. Rodgers, Jr. 2011. Biogeochemical process in a pilot-scale constructed wetland treatment system designed to remove metals from produced water. Presented at the 19th Annual David S, Snipes/ Clemson Hydrogeology Symposium. Clemson University, Clemson, SC. April 7, 2011.

Pardue, M.J., J.W. Castle and J.H. Rodgers, Jr. 2011. Evaluation of a pilot-scale constructed wetland treatment system for treatment of a specific oilfield produced water. Presented at the 19th Annual David S, Snipes/ Clemson Hydrogeology Symposium. Clemson University, Clemson, SC. April 7, 2011.

Ritter, C.L., K.N. Jurinko, J.W. Castle and J.H. Rodgers, Jr. 2011. Biogeochemical processes in a constructed wetland treatment system designed for removal of selenium from energy produced water. Presented at the 19th Annual David S, Snipes/ Clemson Hydrogeology Symposium. Clemson University, Clemson, SC. April 7, 2011.

Castle, J. W., R. W. Falta, J. R. Wagner and J. H. Rodgers, Jr. 2011. Introduction to carbon capture and sequestration. Carbon Capture and Storage (CCS) Short Course. Presented at the 19th Annual David S, Snipes/ Clemson Hydrogeology Symposium. Clemson University, Clemson, SC. April 7, 2011.

Castle, J. W., R. W. Falta, J. R. Wagner and J. H. Rodgers, Jr. 2011. Role of water in carbon capture and sequestration. Carbon Capture and Storage (CCS) Short Course. Presented at the 19th Annual David S, Snipes/ Clemson Hydrogeology Symposium. Clemson University, Clemson, SC. April 7, 2011.

Castle, J. W., R. W. Falta, J. R. Wagner and J. H. Rodgers, Jr. 2011. Carbon capture and sequestration: Opportunities and challenges. Carbon Capture and Storage (CCS) Short Course. Presented at the 19th Annual David S, Snipes/ Clemson Hydrogeology Symposium. Clemson University, Clemson, SC. April 7, 2011.

John H. Rodgers, Jr. and Ben E. Willis. 2012. Algae on the move: Recent range expansion of *Prymnesium parvum.* Presented at the 32nd Annual Meeting of the Midwest aquatic plant Management Society. February 26-29, 2012. Milwaukee WI.

John H. Rodgers, Jr. [1], West M. Bishop[2] and Ben E. Willis . 2011. Algae on the move: Recent range expansion of *Prymnesium parvum*. Presented at the 13th Annual Meeting of the Northeast aquatic Plant Management Society. January 17-19, 2011. New Castle, NH.

Rodgers, J.H., R. Brown, D. Issacs, N. Long, W.A. Ratajczyk and J.C. Schmidt. 2011. Algae taste-and-odor issues in a drinking water supply lake: Intervention and results. Presented at the 51st Annual Meeting of the Aquatic Plant Management Society, Baltimore, MD. July 24-27, 2011.

Rodgers, J. H., Jr., J.W. Castle, M. M. Spacil and Christina Ritter. 2011. Treating Selenium in Energy-Derived Produced Waters for Surface Water Discharge Using Constructed Wetland Treatment Systems. Presented at the Annual Meeting of the Geological Society of America. October 9-13, 2011. Minneapolis, MN.

John H. Rodgers, Jr., J.W. Castle, M. M. Spacil and Christina Ritter. 2011. Constructed Wetland Treatment Systems for Energy-Derived Produced Waters: Treating Selenium for Surface Water Discharge. Presented at the 32nd Annual Meeting of the Society of

Environmental Toxicology and Chemistry. November 13-17, 2011. Boston, MA.

Beebe, D. A., Song, Y., Castle, J. W., and Rodgers, J. H. Jr. 2011. Pilot Study of Constructed Wetland Treatments Systems for Ammonia in Water Produced from Oil Extraction. Presented at the 32nd Annual Meeting of the Society of Environmental Toxicology and Chemistry. November 13-17, 2011. Boston, MA.

Bethany L. Alley[1], John H. Rodgers, Jr. [1], and James W. Castle . 2011 Renovating Fresh Oilfield Produced Waters for Beneficial Uses: Managing Constructed Wetland Treatment Systems for Performance. Presented at the 32nd Annual Meeting of the Society of Environmental Toxicology and Chemistry. November 13-17, 2011. Boston, MA.

Rodgers, J.H. 2011. Presidential address: Aquatic plant management: The new normal. Presented at the 33rd Annual Meeting of South Carolina Aquatic Plant Management Society, Inc., Clemson, SC, August 17-19, 2011.

Willis, B. and J.H. Rodgers. 2011. Measuring copper residues from algaecide and herbicide applications. Presented at the 33rd Annual Meeting of South Carolina Aquatic Plant Management Society, Inc., Clemson, SC, August 17-19, 2011.

Rodgers, J.H. and R. Richardson. 2011. Update on NPDES for the SCAPMS region. Presented at the 33rd Annual Meeting of South Carolina Aquatic Plant Management Society, Inc., Clemson, SC, August 17-19, 2011.

Rodgers, J.H. 2012. Algae and Taste-and-Odor Issues in a drinking water supply lake: Intervention and Results. Presented at the Midwest Aquatic Plant Management Society, 32nd Annual Conference, Milwaukee, WI. February 26-29, 2012.

Rodgers, J.H. 2012. Use of peroxyhydrate algicide (Phycomycin) in water resource management. Presented at the 22nd Annual Conference of the Pennsylvania Lake Management Society. State College, PA. March 7-8, 2012.

Rodgers, J.H. 2012. Problematic cyanobacteria in water resources: Strategy for Intervention and Case Studies. Presented at the 22nd Annual Conference of the Pennsylvania Lake Management Society. State College, PA. March 7-8, 2012.

Rodgers, J.H. 2012. Toxicology of herbicides. Presented at Minnesota Aquatic and Invasive Species Workshop. Minneapolis, MN. March 19-20, 2012.

Pardue, M., J.W.Castle, G.M. Huddleston and J.H. Rodgers. 2012. Treatment of oilfield produced water using a constructed wetland treatment system. Presented at the 20th Annual David S. Snipes / Clemson Hydrogeology Symposium. Clemson, SC. April 12, 2012.

Alley, B., B. Willis, J.H. Rodgers, Jr. and J.W. Castle. 2012. Water depth and treatment performance of free water surface constructed wetland treatment systems for simulated fresh oil-field produced water. Presented at the 20th Annual David S. Snipes / Clemson Hydrogeology Symposium. Clemson, SC. April 12, 2012.

Beebe, A., B. Alley, J.W. Castle, and J.H. Rodgers, Jr. 2012. Evaluation of coal-bed methane produced water in western Alabama for use as a water resource during drought. Presented at the 20th Annual David S. Snipes / Clemson Hydrogeology Symposium. Clemson, SC. April 12, 2012.

Van Heest, P., J.H. Rodgers, Jr., J.W. Castle, and M.M. Spacil. 2012. Treatment of selenium in pilot-scale constructed wetland treatment systems: Effects of temperature and nutrient-amendment mass loading. Presented at the 20th Annual David S. Snipes / Clemson Hydrogeology Symposium. Clemson, SC. April 12, 2012.

Willis, B. and J.H. Rodgers, Jr. 2012. Bioavailability and analytical measurements of copper residuals in sediments. Presented at the 20th Annual David S. Snipes / Clemson Hydrogeology Symposium. Clemson, SC. April 12, 2012.

Rodgers, J.H., Jr. 2012. Criteria used to measure wetland reconstruction success. Presented at Key Factors to Successfully Reconstruct Boreal Wetland Ecosystems – An International Workshop. Chantilly, France. April 16-17, 2012.

Rodgers, J.H., Jr., R. Brown, D. Isaacs, K. Gazaille, W. Ratajczyk, and J. Schmidt. 2012. Targeted algal management: Some case studies. Presented at the 52nd Annual meeting of the Aquatic Plant Management Society, Salt Lake City, UT, July 22-25, 2012.

Rodgers, J.H. Jr. 2012. Update: NPDES Permits for Pesticides, Presented at the 34th Annual Meeting of the SC Aquatic Plant Management Society. Spring Maid Beach, SC. October 17-19, 2012.

Rodgers, J.H., Jr. and J.W. Castle. 2012. Water in carbon capture and sequestration: Challenges and opportunities. Presented at the 33rd Annual Meeting of the Society of Environmental Toxicology and Chemistry. Long Beach, CA. Nov. 11-15, 2012.

Spacil, M.M., J.H. Rodgers, Jr., J.W. Castle and W.Y. Chao. 2012. Treatment of Selenium in produced water using a pilot-scale constructed wetland treatment system. Presented at the 33rd Annual Meeting of the Society of Environmental Toxicology and Chemistry. Long Beach, CA. Nov. 11-15, 2012.

Rodgers, J.H., Jr. 2012. Strategies for design of active and passive constructed wetlands for oil sands process waters. Invited presentation at Olds College, Olds, Alberta, CANADA. Nov. 15, 2013.

Willis, B. and J.H. Rodgers, Jr. 2012. Accumulation and Effects of Residual Copper in Sediments of a Pond Following an Algaecide Application. Presented at the 34th Annual South Carolina Aquatic Plant Management Society Meeting. Myrtle Beach, SC. October 18, 2011.

Rodgers, J.H. 2012. The use of algaecides in adaptive water resource management. Presented at the 32nd International Symposium of the North American Lake Management Society. Madison, WI. Nov. 7-9, 2012.

Rodgers, J. H. and A. Calomeni. The use of algaecides in adaptive water resource management: Some case studies. 2013. Presented at the Meeting of the Midwest Aquatic Plant Management Society. Cleveland, OH. March 3-5, 2013. Won the poster contest.

Rodgers, J.H. 2012. The use of algaecides in adaptive water resource management. Presented at the Annual Meeting of the Western Aqautic Plant Management Society. Coeur d'Alene, ID. March 25-27, 2013

Alley, B.L., J.H. Rodgers, Jr., and J.W. Castle. 2013. Seasonal performance of a hybrid pilot-scale constructed wetland treatment system for simulated fresh oilfield produced water. Presented at the 21st Annual David S. Snipes/Clemson Hydrogeology Symposium. Clemson, SC. April 4, 2013.

Beebe, A., J.W. Castle and J.H. Rodgers, Jr. 2013. Effects of evapotranspiration on water treatment performance in constructed wetlands. Presented at the 21st Annual David S. Snipes/Clemson Hydrogeology Symposium. Clemson, SC. April 4, 2013.

Coffey, R.E., J.W. castle and J.H. Rodgers, Jr. 2013. A demonstration constructed wetland treatment system for unconventional gas produced water. Presented at the 21st Annual David S. Snipes/Clemson Hydrogeology Symposium. Clemson, SC. April 4, 2013.

Huddleston, M., J.H. Rodgers, Jr., J.W. Castle. And M. Spacil. 2013. Treatment of Selenium as a constituent of ecological concern in energy-produced waters. Presented at the 21st Annual David S. Snipes/Clemson Hydrogeology Symposium. Clemson, SC. April 4, 2013.

Schwindaman, J.P., J.W. Castle and J.H. Rodgers, Jr. 2013. Fate and distribution of Arsenic in a pilot-scale constructed wetland treatment system for simulated Bangladesh groundwater. Presented at the 21st Annual David S. Snipes/Clemson Hydrogeology

Symposium. Clemson, SC. April 4, 2013.

Huddleston, M., J.H. Rodgers, Jr., J.W. Castle. And M. Spacil. 2013. Treatment of Selenium as a constituent of ecological concern in energy-produced waters. Presented at the SME Symposium on Environmental Considerations in Energy Production. Charleston, WV. April 14-18, 2013.

Rodgers, J.H., Jr. and A. Calomeni. 2013. The use of algaecides in adaptive water resource management. Presented at the Annual Meeting of the Aquatic Plant Management Society, San Antonio, TX. July 14-17, 2013.

Rodgers, J.H., Jr. and A. Calomeni. 2013. The use of algaecides in adaptive water resource management. Presented at the Annual Meeting of the MidSouth Aquatic Plant Management Society, Tunica, MS. Sep. 16-18, 2013.

Rodgers, J.H., Jr. and A. Calomeni. 2013. The use of algaecides in adaptive water resource management. Presented at the 37th Annual Meeting of the Florida Aquatic Plant Management Society, St. Augustine, FL. Oct. 14-17, 2013.

Rodgers, J.H., Jr. and A. Calomeni. 2013. Targeted algal management at Lake John Hay. Presented at the 35th Annual Meeting of the South Carolina Aquatic Plant Management Society, Myrtle Beach, SC. Oct. 23-25, 2013.

Haakensen, M., V. Pittit, J. Castle and J.H. Rodgers, Jr. 2013. Effects of freeze-thaw and biochar on sequestration and localization of elements within oxidizing and reducing pilot constructed wetland treatment systems. Presented at the 34th Annual Meeting of the Society of Environmental Toxicology and Chemistry (SETAC North America), Nashville, TN. 17-21 Nov. 2013.

Calomeni, A. and J.H. Rodgers, Jr. 2013. Assessment of six indicators for algal cell viability. Presented at the 34th Annual Meeting of the Society of Environmental Toxicology and Chemistry (SETAC North America), Nashville, TN. 17-21 Nov. 2013.

Huddleston, G.M., J.H. Rodgers, Jr. and A. McQueen. 2013. A proposed framework for an Environmental and Toxicology Assessment of an unleaded piston engine aviation fuel. Presented at the 34th Annual Meeting of the Society of Environmental Toxicology and Chemistry (SETAC North America), Nashville, TN. 17-21 Nov. 2013.

Tsai, K.P. and J.H. Rodgers, Jr. 2013. Toxicity of copper sulfate and copper-ethanolamine to *Microcystis aeruginosa* and *Pseudokirchneriella subcapitata* at different initial cell densities. Presented at the 34th Annual Meeting of the Society of Environmental Toxicology and Chemistry (SETAC North America), Nashville, TN. 17-21 Nov. 2013.

Beebe, D.A., J.W. Castle and J.H. Rodgers, Jr. 2013. Treatment of ammonia in pilot-scale constructed wetland treatment systems with clinoptilolite. Journal of Environmental Chemical Engineering.

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