

FISH METHODS SUMMARY

A. Fish Methods Summary Table

Fish collection methods can be divided into two major categories: active and passive. The various types of collecting equipment, their use, and their advantages and disadvantages are summarized in **Table M-1**.

Table M-1. Summary of Fish Sampling Equipment (from DEP-SOP-001/01, FS 6200).

Device	Use	Advantages	Disadvantages
Active Methods			
Electrofishing	Shallow rivers, lakes and streams.	Most efficient nonselective method. Minimal damage to fish. Adaptable to a number of sampling conditions. Useful when other active methods cannot be used.	Nonselective (stuns or kills most fish). Cannot be used in brackish, salt, or extremely soft water. Requires extensive operator training. Can be DANGEROUS.
Seines	Shallow rivers, lakes and streams; or shore line of estuaries.	Relatively inexpensive and easily operated. Mesh size selection is available.	Cannot be used in deep water or over substrates with an irregular contour. Not completely efficient (fish can evade the net while seining).
Trawls	Used from boats in moderate to deep open bodies of water (10 to >70 m depths).	Various sizes available. Effective in deep waters not accessible by other methods. Collects large number of fish.	Requires boat and trained operators.
Angling	Generally species selective using hook and line.	Most selective method. Does not require large number of personnel. Inexpensive.	Inefficient and not always dependable.
Passive Methods			
Gill Nets	Used in lakes, rivers and estuaries; where fish movement can be expected or anticipated.	Effective for pelagic fish. Selectivity by mesh size. Relatively easy to operate.	Not effective for bottom dwellers or populations that do not exhibit movement patterns. Nets are prone to tangling or damage by fish spines. Will kill captured specimens that may undergo physiological changes if left unattended for extended periods of time.
Trammel Nets	Used in lakes, rivers and estuaries; where fish movement can be expected or anticipated. Used where fish may be scared into the net.	Slightly more efficient than a straight gill net.	(Same as gill nets.) Tangling problems may be more severe. Method may require more personnel to scare the fish, and possibly boats in deep water.
Hoop, Fyke and Pound Nets	Used in shallow rivers, lakes and estuaries, where currents are present and predictable.	Unattended operation. Very efficient in regard to long-term return and expended effort. Useful when active methods are impractical.	Inefficient for short term. Difficult to set up and maintain.
D-traps	Used for long-term capture of slow-moving fish, particularly bottom species. Can be used in all environments.	Easy to operate and set up. Particularly useful for bottom dwelling fish in deep waters. Relatively inexpensive.	Efficiency is highly variable. Not effective for pelagic fish or fish that are visually oriented. Not a good choice as a primary sampling device but valuable as a backup method.

Different field procedures for sampling and monitoring fish are summarized in **Table M-2** below. A detailed description of each fish method including the parameter reporting name/units, database elements, and the references are also presented.

Method #	Parameter	Method	Reference	Reporting Units
411	Fish Sampling (Abundance)	Fish Monitoring	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	
412	Fish sampling	Fish Monitoring: Directed Sampling by fish trapping	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	
414	Fish sampling	21.3-m Center Bag Seine	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	
415	Fish sampling	21.3-m Bay Seine Technique	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	
416	Fish sampling	21.3-M River Seine Technique	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	
417	Fish sampling	21.3-m Beach Seine Technique	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	
418	Fish sampling	183-m Center Bag Seine	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	
419	Fish sampling	183-M Purse Seine	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	
420	Fish sampling	6.1-M Otter Trawl	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	
421	Fish sampling	61-M Center-Bag Seine	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	
422	Fish sampling	Throw Trap	Kushlan, J. A. 1974. Quantitative sampling of fish populations in shallow, freshwater environments. Transaction of the American Fisheries Society. 103:348-352.	

Method #	Parameter	Method	Reference	Reporting Units
423	Fish sampling	Electrofishing	Chick, J. H., S. Coyne, and J. C. Trexler. 1999. Effectiveness of airboat electrofishing for sampling fishes in shallow vegetated habitats. North American Journal of Fisheries Management 19:957-967	
424	Fish tissue extraction for genetics	Fish tissue sampling: Muscle and Liver	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	Tissue extraction: cm or mm.
425	Fish tissue extraction for genetics	Fish tissue sampling: fin clips	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	Tissue extraction: cm or mm.
426	Fish tissue extraction for genetics	Fish tissue sampling: Tissue removal for fish < 200 mm SL)	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	Tissue extraction: cm or mm
427	Fish population age structure	Otolith Extraction, size and ring counts: Catfish, sheepshead, and jacks	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	Otolith morphology: mm and gm, # of rings deposited
429	Fish	Gonad tissue preparation and fixation	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	NA
430	Fish location detection	Radio telemetry	(Nickum, J.G. 1988. Guidelines for use of fishes in field research. Fisheries 13(2): 16-23.	latitude and longitude
431	Fish	Fish collection using electrified seine	Murphy, B.R. and Willis, D.W. 1996. Fisheries techniques, 2nd edition. American fisheries Society, Bethesda, MD(From LILA project)	Number fish (of specified taxonomic level) / unit area: #/ area unit (e.g. m ²)
432	Fish	Fish health	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	NA
433	Fish	Quality Control in the Field	Fish & Wildlife Research Institute, (2000), Fisheries-Independent Monitoring Program Procedure Manual, St. Petersburg, Florida.	

B. Fish Methods Descriptions

Group Name	Fish
Parameter	Fish Monitoring
Method	Fish Monitoring: Fish Abundance (Stratified-Random Sampling-SRS)
Method #	411
<i>Method Description</i>	
<p>Stratified-random sampling is conducted each month in as tight a window as possible to provide a synoptic overview of fish abundances throughout the estuaries. For logistical reasons, sampling with the 183-m seine and purse net are sometimes combined with the 21.3-m seine and 6.1-m otter trawl sampling. All sampling is completed during daytime.</p> <p>The selection of sample grids for both juvenile and adult SRS are made by Zone, with the number of samples taken in each Zone proportional to the number of Grids that can be sampled by that gear, bay wide. After sample sites have been selected, zone boundaries are removed and samples grouped to enhance sampling logistics. The order in which these groups of sites are sampled during the sampling period is then randomly selected.</p> <p>The sampling grids for certain gears may also be stratified by habitat. The 21.3-m bay seine is separated into two strata, shoreline stratum and non-shoreline stratum. At some field labs, the non-shoreline stratum is further subdivided into submerged aquatic vegetation (SAV) stratum and non-SAV stratum. Shoreline stratum samples must have an inshore wing on the actual shoreline or, if unable to get to the actual shoreline, directly against the nearest shoretype. The SAV and non-SAV strata samples are collected with the near shore seine wing more than 5 m from the shore or shore type. Seines collected with $\geq 25\%$ SAV are considered SAV stratum while samples with less than 24% SAV are non-SAV stratum. In some estuaries, the 21.3-m river seine and the 183-m seine are also stratified into two habitat categories based upon shore vegetation. A shoreline with greater than 10% coverage of overhanging vegetation is considered an overhanging stratum while anything less is considered a non-overhanging stratum.</p>	
<i>Reference</i>	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.
Quality Control	Skill Verification, Identification Consistency
Reporting	NA
Database	NA

Group Name	Fish
Parameter	Fish Monitoring: Sampling
Method	Fish Monitoring: Directed Sampling
Method #	412
Method Description	
<p>Directed sampling entails actively searching for and collecting specific fish species. Trammel nets deployed from the stern of a mullet skiff at speeds necessary to encircle visually identified schools of fish have been used to capture mullet and red drum. To capture spotted seatrout, purse seines have been deployed in the winter (December – February) months (when spotted seatrout are thought to aggregate in deep-water thermal refugia), and during the spring (March-April) months, in an effort to collect fish spawning aggregations. For each year that Fisheries Independent Monitoring (FIM) has conducted directed sampling, proposals have been drafted describing sampling methodology for each of the three species. Directed sampling for red drum and spotted seatrout have been discontinued (01/99 and 03/99, respectively).</p> <p>Gear Descriptions</p> <p>Striped mullet sampling (including post-spawn sampling): Monofilament trammel net, 365.8 m (400 yd), 2.4 m (8') deep w/70 mm (2 3/4") stretch inner wall and 305 mm (12") stretch outer walls.</p> <p>Red drum sampling: Nylon trammel net, 548.6 m (600 yd), 2.4 m (8') deep w/ 117.5 mm (4 5/8") stretch inner and 355.6 mm (14") stretch outer walls.</p> <p>Spotted seatrout sampling: Purse seine, 183 m long and 5.2 m deep with 50-mm stretch knotless nylon mesh. The bag portion is 16 m long and 7.6 m deep. Stainless steel alpine clips are used as the purse rings.</p>	
Reference	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.
Quality Control	Skill Verification, Identification Consistency
Reporting	NA
Database	NA

Group Name	Fish
Parameter	Fish Monitoring
Method	Fish sampling: 21.3-m Center Bag Seine
Method #	414
<i>Method Description</i>	
<p>A 21.3-m center bag seine is used to collect juvenile and small adult fish and macro-crustaceans along bay edges, river banks, shallow tidal flats and most areas where water depth is less than 1.5 m (1.8 m in rivers). Two techniques are currently employed by the FIM program to cover specific habitats. The bay technique samples areas where the water depth is less than 1.5 m, such as tidal flats, mangrove fringes, sea wall habitats, sloping beaches, and banks. The river technique samples riverine areas and tidal creeks where water depth typically increase rapidly (to not more than 1.8 m) from the shoreline, making it impossible to use the bay technique. The beach seine technique samples shallow sloping beaches and banks and was discontinued in all areas by February 2001.</p>	
Reference	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.
Quality Control	Skill Verification, Identification Consistency
Reporting	NA
Database	NA

Group Name	Fish
Parameter	Fish Monitoring
Method	Fish sampling: 21.3-m Bay Seine Technique
Method #	415
<i>Method Description</i>	
<p>The 21.3-m bay (previously called offshore) seine technique is currently being used for stratified-random sampling (SRS) in Tampa Bay, Charlotte Harbor, Cedar Key, Apalachicola, and Indian River Field Labs. This technique was implemented for SRS in Tampa Bay beginning in July 1991. It was used during fixed station sampling from January 1991 to March 1996. It was also used in conjunction with SRS drop nets from July 1990 to December 1994 and with fixed block nets from October 1991 to May 1993. The 21.3-m bay seine is separated into two strata, shoreline stratum and non-shoreline stratum. At some field labs, the non-shoreline stratum is further subdivided into submerged aquatic vegetation (SAV) stratum and non-SAV stratum. Shoreline stratum samples must have an inshore wing on the actual shoreline or, if unable to get to the actual shoreline, directly against the nearest shoretype. The SAV and non-SAV strata samples are collected with the near shore seine wing more than 5 m from the shore or shoretype. Seines collected with $\geq 25\%$ SAV are considered SAV stratum while samples with less than 25% SAV are non-SAV stratum. The shoreline stratum was implemented in January 1998 and replaced the beach seine technique in all areas by February 2001.</p>	
Reference	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.
Quality Control	Skill Verification, Identification Consistency
Reporting	NA
Database	NA

Group Name	Fish
Parameter	Fish Monitoring
Method	Fish sampling: 21.3-M River Seine Technique
Method #	416
<i>Method Description</i>	
<p>The 21.3-m river (previously called boat) seine technique is currently being used during stratified-random sampling (SRS) in Tampa Bay, Charlotte Harbor, Cedar Key, Jacksonville, and Indian River Field Labs. This technique was implemented in Tampa Bay during fixed station sampling in August 1990. In July 1991, this technique was implemented as a SRS tool. To ensure the sampling of a wide range of fish sizes and ages during an SRS survey, field technicians uses a variety of techniques and fishing gear to collect fish population data. In some estuaries the 21.3-m river seine is split into two habitat strata based upon the presence or absence of overhanging vegetation. A shoreline with greater than 10% coverage of overhanging vegetation is considered an overhanging stratum while anything less is considered a non-overhanging stratum. Overhanging vegetation is defined as a tree or shrub that extends over the water, close to the water surface so that during a majority of the time, it provides permanent shade and/or structure to the water through prop roots, braches or fronds. Floating weed mats which provide structure and shade to the water are considered overhanging vegetation. Emergent vegetation (<i>Juncus</i> spp., <i>Spartina</i> spp., and cattails) is not classified as overhanging vegetation.</p>	
Reference	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.
Quality Control	Skill Verification, Identification Consistency
Reporting	NA
Database	NA

Group Name	Fish
Parameter	Fish Monitoring
Method	Fish sampling: 21.3-m Beach Seine Technique
Method #	417
<i>Method Description</i>	
<p>The beach seine technique was first implemented in Tampa Bay in July 1991 and was expanded to each field lab. In January 1998, the beach seine technique was replaced by the shoreline stratum of the bay seine technique in all field stations except Cedar Key. In February 2001, the shoreline stratum of the bay seine technique replaced the beach seine technique in Cedar Key. (Method is not necessary if it's not being used any site. Also has no method description above)</p>	
Reference	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.
Quality Control	Skill Verification, Identification Consistency
Reporting	NA
Database	NA

Group Name	Fish
Parameter	Fish Monitoring
Method	Fish sampling: 183-m Center Bag Seine
Method #	418
<i>Method Description</i>	
<p>The 183-m haul seine is used to catch larger sub-adult and adult fishes. The seine is set in a rectangular shape along the shoreline. This gear has many inherent benefits including ease of deployment in a standardized way, deployment from a small, shallow draft mullet skiff, less size selectivity than other sampling gears (i.e., gillnets and trammel nets), and collection of a wide variety of species. To ensure the collection of adequate sample sizes of species that demonstrate strong habitat preferences, sampling is stratified in some bay systems into two habitat types (with and without overhanging shoreline vegetation).</p>	
Reference	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.
Quality Control	Skill Verification, Identification Consistency
Reporting	NA
Database	NA

Group Name	Fish
Parameter	Fish Monitoring
Method	Fish sampling: 183-M Purse Seine
Method #	419
<i>Method Description</i>	
<p>The Fisheries-Independent Monitoring (FIM) program utilizes a purse seine to sample larger sub-adult and adult fishes. This gear is a modification of near shore purse seines used in the commercial bait fish fisheries in southwest Florida. It is intended to fish seagrass and sand bottoms in depths of up to 3.3 meters. Extensive testing of this gear by FIM in 1995 and 1996 has shown the purse seine to be an effective way to capture sub-adult and adult fisheries in Tampa Bay. (Little methods description).</p>	
Reference	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.
Quality Control	Skill Verification, Identification Consistency
Reporting	NA
Database	NA

Group Name	Fish
Parameter	Fish Monitoring
Method	Fish sampling: 6.1-M Otter Trawl
Method #	420
<i>Method Description</i>	
<p>A 6.1-m otter trawl is used in the Fisheries-Independent Monitoring (FIM) program to sample areas of the estuarine system between 1.8 m and 7.6 m in depth. In addition to sampling areas of the bay not acceptable to seines, trawls tend to collect epibenthic fish and macrocrustaceans that are larger than those typically collected in seines. (no methods description).</p>	
Reference	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.
Quality Control	Skill Verification, Identification Consistency
Reporting	NA
Database	NA

Group Name	Fish
Parameter	Fish Monitoring
Method	Fish sampling: 61-M Center-Bag Seine
Method #	421
<i>Method Description</i>	
<p>The 61-m center-bag haul seine was developed to monitor the relative abundance of red drum in riverine habitats during the ongoing hatchery release project initiated by FMRI scientists in spring 2000. In addition to the targeted species, this gear collects a wide variety of other estuarine species and may be fished along various shoreline habitats. The design, deployment, and retrieval of the 61-m seine are similar to the 183-m seine. However, its smaller size allows this net to be more useful for sampling riverine habitats, which are often difficult to sample (i.e., soft muddy substrates, limited shorelines available for sampling). The 61-m seine is constructed with a 25-mm stretch mesh, permitting the capture of a wide size range of red drum and other fish species. This gear is a useful monitoring tool that will allow FMRI scientist to collect samples necessary to assess the impact of hatchery-reared red drum on the existing natural system.</p>	
Reference	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.
Quality Control	Skill Verification, Identification Consistency
Reporting	NA
Database	NA

Group Name	Fish	
Parameter	Fish density by species (Can also be used for periphyton density and composition, vascular plant density and composition per unit area.)	
Method	Fish sampling: throw trap	
Method #	422	
<i>Method Description</i>		
<p>The trap is cleared using a framed seine net. The seine net is carefully dragged along the bottom of the throw trap during each sweep and excess vegetation is discarded back into the wetland outside of the throw trap (except during late wet season periphyton collection periods). The collection is considered complete when there are no animals being caught on three consecutive sweeps of the seine net. However, if there are animals caught during these last sweeps, the clearing process begins again until there are three consecutive clear sweeps.</p>		
<i>Reference</i>		
<p>Kushlan, J. A. 1974. Quantitative sampling of fish populations in shallow, freshwater environments. Transaction of the American Fisheries Society. 103:348-352.</p> <p><i>Other references:</i></p> <p>Jordan, C. F., S. Coyne, and J. C. Trexler. 1997. Sampling fishes in heavily vegetated habitats: the effects of habitat structure on sampling characteristics of the 1-m² throw trap. Transactions of the American Fisheries Society 126:1012-1020</p>		
<i>Quality Control</i>	The number of throws per area or habitat type may need to be increased depending on variability. Specify variability target as a DQO. Skill Verification, Identification Consistency	
<i>Reporting</i>	Name	Number of fauna for each taxon.
	Units	Number of each species fish per area
<i>Database Elements</i>	Taxon name, number of each taxon, depth in meters	

Group Name	Fish	
Parameter	Fish density / fish collection	
Method	Fish sampling: Electrofishing	
Method #	423	
Method Description		
<p>1. (Boat) Electrofishing is a harmless way to collect fish, take the needed measurements, and return them to the waters. Electrofishing uses a battery or alternator to send a mild electric pulse through the water to stun the fish. Fish are collected in a net as they float to the surface.</p> <p>2. The effectiveness of a portable, backpack electrofishing unit, was evaluated for sampling assemblage structure in 11 lakes. Samples were collected with a boat-mounted, <u>350-W backpack unit (EF-BP)</u>. In wadeable streams, backpack units are frequently used and are typically powered with a 350-W generator or battery. In unwadeable rivers and most lakes, electrofishing is generally done from specially constructed boats with permanently mounted electronic components and powerful generators, e.g., 5000-W.</p>		
References		
<p>Chick, J. H., S. Coyne, and J. C. Trexler. 1999. Effectiveness of airboat electrofishing for sampling fishes in shallow vegetated habitats. <i>North American Journal of Fisheries Management</i> 19:957-967</p> <p>Vaux, P. D., Whittier, T. R., DeCesare, G., Kurtenbach, J. P. 2000. Evaluation of a backpack electrofishing unit for multiple lake surveys of fish assemblage structure, <i>North American Journal of Fisheries Management</i> 20(1):168-179.</p>		
Quality Control	Skill Verification, Identification Consistency	
Reporting	Name	
	Units	
Database Elements	Fish taxon, number of fish per area?	

Group Name	Fish	
Parameter	Fish tissue removal for genetic analysis	
Method	Fish tissue extraction for Genetics Sampling: Muscle and Liver	
Method #	424	
<i>Method Description</i>		
Culled specimens or tissue (i.e., fin clips) should immediately be bagged, tagged, and submerged on ice in the field.		
<i>Test description</i>		
Note: Method used to acquire genetics samples is determined by the genetics lab and may vary.		
<ol style="list-style-type: none"> Using scissors or scalpel, remove 1 cm² (thumb nail size) of white muscle tissue from the left dorsal area, above the lateral line and anterior to the origin of the first dorsal fin If the liver is small, extract as much tissue as possible. If the liver is large, either cut off its tip or remove a 1 cm² section from the body of the liver. Note: Be sure to rinse off the scissors and/or scalpel between samples to avoid contamination. Clean muscle and liver of any extraneous material (scales, skin, bone) Washing with water is acceptable. Include a waterproof tag with the tissue sample listing the field number, specimen number species, location (grid), and standard length of the fish. After extraction of muscle or liver samples, the tissue sample from a single fish should be placed together on a Saran Wrap square (~ 10 cm²). The Saran Wrap square should be folded up within a similarly sized aluminum foil square with an ID tab placed between the Saran Wrap and aluminum foil. Deliver to the Genetics Lab within two weeks of collection. 		
<i>Reference</i>	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.	
<i>Quality Control</i>	Recommend Replicates, Skill Verification, Identification Consistency	
<i>Reporting</i>	Name	Tissue extraction
	Units	cm or mm
<i>Database Elements</i>	Taxon, sex, length, tissue type	

Group Name	Fish	
Parameter	Fish tissue removal for genetic analysis	
Method	Fish tissue extraction for Genetics Sampling: fin clips	
Method #	425	
<i>Method Description</i>		
Culled specimens or tissue (i.e., fin clips) should immediately be bagged, tagged, and submerged on ice in the field.		
<i>Test description</i>		
Note: Method used to acquire genetics samples is determined by the genetics lab and may vary.		
<ol style="list-style-type: none"> Fin clips can come from any fin, however, the second dorsal or anal fin is best Fin clips should be thumb-nail size (~1 cm²). Keep individual clips separate and be sure the fin clip can be associated with a particular fish length, location (grid), and sample number. Note: Be sure to rinse off the scissors between samples to avoid contamination. Include a waterproof tag with the fin clip, listing the field number, specimen number, species, location (grid), a standard length of the fish. Make sure each fin clip clearly matches the sample information. Keep individual clips separate. Freeze samples and forward to the genetics laboratory. 		
<i>Reference</i>	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.	
<i>Quality Control</i>	Recommend Replicates, Skill Verification, Identification Consistency	
<i>Reporting</i>	Name	Tissue extraction
	Units	cm or mm
<i>Database Elements</i>	Taxon, sex, length, tissue type	

Group Name	Fish	
Parameter	Fish tissue removal for genetic analysis	
Method	Fish tissue extraction for Genetics Sampling: Tissue removal for fish < 200 mm SL)	
Method #	426	
<i>Method Description</i>		
Culled specimens or tissue (i.e., fin clips) should immediately be bagged, tagged, and submerged on ice in the field.		
<i>Test description</i>		
Note: Method used to acquire genetics samples is determined by the genetics lab and may vary.		
<ol style="list-style-type: none"> If the specimen is small (<200 mm) but needed for genetics, bring back the entire specimen. After returning to the lab, measure and weigh each fish and record all pertinent information. Include a waterproof tag with each specimen listing the field number, specimen number, species, location (grid), and standard length of the fish. Keep individual specimens separate. Freeze the samples and transport to a genetics laboratory. 		
<i>Reference</i>	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.	
<i>Quality Control</i>	Recommend Replicates, Skill Verification, Identification Consistency	
<i>Reporting</i>	Name	Tissue extraction
	Units	cm or mm
<i>Database Elements</i>	Taxon, sex, length, tissue type	

Group Name	Fish	
Parameter	Otolith size and weight	
Method	Otolith Extraction: Catfish, sheepshead, and jacks	
Method #	427	
<i>Method Description</i>		
<p>A hacksaw is used to saw straight down from the pre-opercle to the top of the skull. A second cut is made perpendicular to the first, meeting at the bulla. The otoliths should be visible. They are washed with water to remove remaining tissue or blood and completely dried on a paper towel. The dried otoliths are placed in a clear glass vial with a label that includes the collection number, specimen number, and species placed inside as well.</p>		
<i>Reference</i>	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.	
<i>Quality Control</i>	Precision=0.1 mm and 0.1 gm, Skill Verification, Identification Consistency	
<i>Reporting</i>	Name	Otolith morphology
	Units	mm and gm g
<i>Data Reporting Elements</i>	<ol style="list-style-type: none"> 1. FIELD NUMBER-Collection number used on the field data sheet 2. DAY-The day of the month the fish were collected in the field 3. SPECIES-The species of fish the otoliths were removed from 4. DATE PROCESSED-The actual date otoliths were extracted from the fish 5. PROJECTS- The project code from the field data sheet 6. PRINCIPAL INVESTIGATOR-The PI of the field sampling trip 7. INITIALS-Person in the lab removing the otoliths 8. SPECIMEN NUMBER-A number to identify a particular fish in a group of fish from the same collection number 9. MEASUREMENTS-Recorded in millimeters 10. WEIGHTS-Measured in grams to nearest 0.1 gram 11. SEX-(M) male, (F) female, or (I) immature 12. SAMPLES TAKEN-Identify the type of tissue samples that were taken. 	

Group Name	Fish	
Parameter	Gonad tissue preparation and fixation	
Method	Gonad tissue preparation and fixation	
Method #	429	
<i>Method Description</i>		
<p>Immediately upon capture, place fish in a cooler and completely surround it with ice. The gonads are removed and preserved immediately upon return to the lab, or the following morning if the specimen was properly iced down. Weigh and measure the entire fish, then excise and weigh both gonad lobes. For gonads <8 mm thick, fix the entire gonad. For those >8 mm, dissect a ≤4-mm sample with a razor blade and immediately place the tissue in 10% phosphate (0.1 M PO₄, pH=7.4)-buffered formalin (minimum ratio of fixative to tissue = 10:1). Make certain that the tissue is completely surrounded by fixative. Place a waterproof tag with species, collection number, specimen number, collection date, and sex in the jar and write the collection number and species on the jar lid. For most samples, fixation time in formalin is 48-60 hours. Place jars with gonad tissue in a refrigerator or store in ice for 24 hours. Wash samples with water for a minimum of two hours after fixation, doing at least four water changes. Place samples in 70% histology-grade ethanol containing eosin dye (pink).</p>		
<i>Reference</i>	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.	
<i>Quality Control</i>	Precision=0.1 cm and 0.01 gm, Skill Verification, Identification Consistency	
<i>Reporting</i>	Name	Gonad tissue preparation and fixation
	Units	cm or mm and grams
<i>Database Elements</i>	NA	

Group Name	Fish	
Parameter	Fish location detection using radio telemetry	
Method	Fish location detection using radio telemetry	
Method #	430	
<i>Method Description</i>		
<p>Fish movements are measured using radio telemetry and individual fishes implanted with radio transmitters. The transmitters weigh approximately 1.5 g and will be inserted in the body cavity of fishes approximately 30 g in mass (~10 cm in length) using established techniques that conform to accepted guidelines for the use of fishes in field research (Nickum 1988). Transmitter weight is expected to be 5% of body weight, which is considered acceptable for more weight-sensitive animals like birds. Longevity of transmitter battery life and transmitter range is inversely related. Using a target battery longevity of two months, transmitter range is expected to be approximately 200 m, accounting for heavy vegetation and 50 cm of water depth. Actual range may be greater because of open structure of sloughs and the shallower water depths for much of the dry season. The location of all radio equipped fishes will be monitored weekly from the perimeter levees using a hand-held antenna. Semi permanent antennas may also be used. It also may be necessary to supplement readings from the levee with those taken in the marsh. To determine short-term movement patterns and ensure that daily locations are indicative of diurnal movements, a random radio equipped fish from each plot will be monitored hourly for one 24-h period each month.</p>		
<i>Reference</i>	(Nickum, J. G. 1988. Guidelines for use of fishes in field research. Fisheries 13(2):16-23.	
<i>Quality Control</i>	Skill Verification, Identification Consistency	
<i>Reporting</i>	Name	Radio telemetry
	Units	
<i>Database Elements</i>	Number fish per habitat type	

Group Name	Fish	
Parameter	Fish density per unit area	
Method	Fish collection using electrified seine	
Method #	431	
<i>Method Description</i>		
Electrified seine is used to stun large fish and therefore enhance collection efficiency. This method used for shallow fresh water only. need to expand methods description		
<i>Reference</i>	Murphy, B.R. and Willis, D.W. 1996. Fisheries techniques, 2 nd edition. American fisheries Society, Bethesda, MD	
<i>Quality Control</i>	Recommend replicates, Skill Verification, Identification Consistency	
<i>Reporting</i>	Name	Number fish (of specified taxonomic level) / unit area
	Units	#/ area unit (e.g. m ²)
<i>Database Elements</i>	Fish taxon, number of fish	

Group Name	Fish	
Parameter	Fish health	
Method	Fish Health - Visual inspection	
Method #	432	
<i>Method Description</i>		
Specimens are visually examined for external abnormalities and if found, are measured and assigned a Fish Health Code (FHC). Fish brought back to the lab are assigned a USE code of 'N' (non-random cull); fish released are assigned a code of 'F' (set free). Each species with an external abnormality is entered as a separate datum record. Specimens are labeled with a tag, bagged, and placed on ice. If an inordinate amount of fish with a particular abnormality are collected, all specimens from each affected species should be measured and counted and a representative sub-sample of each species should be taken. All other "normal" specimens are handled according to standard procedures.		
<i>Reference</i>	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.	
<i>Quality Control</i>	Skill Verification, Identification Consistency	
<i>Reporting</i>	Name	
	Units	
<i>Database Elements</i>	NA	

Group Name	Fish	
Parameter	Gonad tissue preparation and fixation	
Method	Fish Monitoring: Principal Investigator Duties – Quality Control in the Field	
Method #	433	
<i>Method Description</i>		
<p>The PI must make sure all samples brought back to the lab are completely worked up (age and growth specimens) or delivered to the appropriate sections (fish health and genetic specimens). Make sure all Species Action Notice specimens collected for others are stored appropriately and the contact person is notified. Check the field and length sheets to make sure they are properly filled out. Have an experienced crew member review data sheets against the original selected grids, the float plan, and the trip report. This will reduce the number of errors in the data set and make analysis much easier. Also, the PI is responsible for ensuring the collection of representative samples, unidentified specimens and Species Action Notice specimens.</p>		
<i>Reference</i>	Fish & Wildlife Research Institute, (2000), <i>Fisheries-Independent Monitoring Program Procedure Manual</i> , St. Petersburg, Florida.	
<i>Quality Control</i>	Skill Verification, Identification Consistency	
<i>Reporting</i>	Name	Principal Investigator Duties
	Units	NA
<i>Database Elements</i>	NA	