



**Title:** Fish Field Collection Methods

**SOP Number:** 026

**Purpose:** These methods follow the recommendation of The American Fishery Society (Use of Fishes in Research Committee 2014) to select and deploy sampling gears in a manner that reduces injury and stress to sampled fishes, as well as to minimize any potential environmental impacts of sampling. Fishes can be collected using a variety of methods, including *seining, gill or trammel nets, trawls, cast nets, lift or push nets, rigid traps (e.g., minnow traps, slat traps), hoop nets, fyke nets, weirs, or angling*. These are accepted practices by the American Fisheries Society (AFS), American Society of Ichthyologists and Herpetologists, and the American Institute of Fishery Research Biologists (Use of Fishes in Research Committee 2014).

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## RESPONIBILITIES

- A. PIs and Instructors of Record must have the appropriate permits and permissions before beginning any sampling (e.g., Federal, state and/or international permits, University IACUC protocol approval, etc.).
- B. It is the responsibility of all personnel to participate in university OH&S programs, follow approved procedures, and use the required PPE. If personnel are not experienced (e.g., beginning students), then they should be supervised by a trained individual, who can provide direction and corrections.
- C. Individuals deploying techniques from boats should be trained in watercraft safety.

## ELECTROFISHING

- A. Background Information
  1. Electrofishing is the collection of fishes that are momentarily stunned by introduction of an electric current into the water. A typical electrofishing unit consists of a generator that produces an electric current, a power control device that allows modification of the electric current to maximize efficiency and reduce potential injuries to the fish, and one or more electrodes that are submerged beneath the water surface.
  2. DC (direct current) is the recommended current (either constant or pulsed) because of low mortality rates. Standard sampling is usually a pulse rate of 60 Hz, duty cycle of 10 – 15%, and voltage settings around 220 -280 for general surveys at conductivities between 70 and 700 uS/cm (Bonar 2009). Complex pulse systems, wave bursts or a pulse rate of 30 Hz should be considered for sensitive populations or species. Some fishes, such as catfishes requires shorter pulse rates to penetrate deeper waters. AC (alternating current) causes the greatest mortality and therefore should be used only for eradication projects
  3. Fish within the electric field, will generally approach the anode (positively charged electrode). There is a progressive inhibition of swimming as the fish nears the anode, which includes taxis (induced movement toward the anode), narcosis (a state of electrically induce immobility in which the muscles are relaxed), and loss of equilibrium.

## B. Protocol for Field Collection of Fishes Using Electrofishing

1. It is highly recommended that persons conducting electrofishing review the USFWS, National Conservation Training Center, "Principles and Techniques of Electrofishing," which is a **free** comprehensive online training program that covers all aspects of electrofishing. (<https://www.fws.gov/training/CSP2C01-principles-and-techniques-of-electrofishing-online> )
2. Fishes can be collected with either a boat or raft-mounted electrofishing unit, tow-barge,, backpack, or shore unit.
3. Electrofishing units, either boat, raft, tow-barge, shore or backpack, should be the smallest model capable of producing sufficient electric current for local conditions. These local conditions, including ambient conductivity determine the target voltage gradient or power density to be used. Electrical field experiments are recommended to fine tune and standardize the study design for given habitats or species (Miranda 2009).
4. When using the unit, create a relatively small electrical field in the water with the minimum current pulse rate and duration necessary based on that location to induce taxis and narcosis in fishes and minimize the length of time fish are subject to current Once stunned, fishes should only be immobilized briefly (5-10 seconds) before they recover and swim off. Stunned fishes are captured using dip net or other appropriate procedure, placed in an oxygenated container such as a livewell for processing

## GILL NETTING

### A. Background Information

1. Gill nets are used for standard sampling of both warm and coldwater fishes in all standing waters and coldwater fishes in rivers. The standardized core gill net is made of monofilament panels of netting of various mesh sizes that are suspended in the water column. Along the top and bottom of the gill net, there are, respectively, a series of floats and a weighted "lead" line that keep the net upright in the water. (Bonar 2009, Table A.3 for detailed specifications).
2. The largest possible mesh in gill nets should be used, consistent with capture of targeted species, to minimize the incidence of non-target collections.

### B. Protocol for Field Collection of Fishes Using Gill Netting

1. Gill nets are set in the late afternoon and retrieved the following morning to encompass both crepuscular periods. For sensitive species or populations nets will be set for 2-h intervals during daylight.
2. Gill nets are set perpendicular or oblique to the shore and anchored on both ends and taut.
3. Fish are removed from the net as they come out of the water, and held in oxygenated tanks for processing,

## SEINING

### A. Background Information

1. A seine is a woven-nylon mesh net, both ends of which are attached, top and bottom, to poles (brailles). Seines are pulled through the water to concentrate and

capture fishes. A weighted line keeps the bottom of the net at the bottom of the water body and a series of floats keeps the top of the net above water.

2. Seines vary widely in length, depth, and mesh size depending on the species targeted, size of individuals, and the body of water being sampled.
  3. Researchers should attempt to minimize stress by keeping the length of the seine hauls to the shortest distance consistent with study objectives. This reduces stresses associated with herding and concentrating fish and minimizes the time fish are in the seine prior to removal and processing.
- B. Protocol for Field Collection of Fishes Using Seining
1. The standard seine haul is an entire habitat type or 10 – 15 m pulling the seine downstream faster than the current if possible.
  2. Fishes collected with seines may be identified, counted, and immediately released, or may be held in oxygenated holding tanks during processing.

## **TRAWLING**

- A. Background information
1. A trawl is a funnel-shaped net that can be towed along the bottom or through the water column either wading or by watercraft. There are a large variety of different sizes and types of trawls suited for use in different habitats or targeting specific taxa.
  2. Trawl distances will be minimized, consistent with study objectives, to minimize injury and stress to fish as a result of crowding during the tow.
  3. Regulations regarding trawls, such as requiring the use of turtle excluder devices (TEDs) or other bycatch-reduction devices must be followed.
- B. Protocol for field collection of fishes using trawls
1. Fishes may be sampled with trawls of a size and mesh appropriate for the habitat being sampled, the vessel being used, or the species being targeted.
  2. If trawling with a boat, trawling should be done off the bow in reverse direction in large rivers, this is safer than forward downstream stern trawling. The trawl and otter boards are deployed in the water while the vessel is operated in reverse downstream moving slightly faster than the current. Sensitive habitats, such as reef structures, should be avoided. Tow duration should be the minimum necessary to achieve study objectives.

## **LARVAL FISH COLLECTING METHODS**

- A. Background information
1. Due to their small size and incomplete development, larval fishes must be collected with specialized equipment and must be handled delicately to keep specimens intact for identification.
  2. A common method for passively collecting larval fishes is the use of larval light traps. Because early stages of many species are positively phototactic, the light in the trap functions as an attractant when traps are set during night hours. Most light traps have a quatrefoil shape with a light source (either chemical light stick or L.E.D. bulb) in the center and a collecting cup at the bottom. The traps float near the surface and are secured to the substrate or the bank. They are most efficiently used in shallow, low-velocity habitats.

3. A common method for actively collecting larval fishes is the use of ichthyoplankton nets (push nets) which are small nets with small mesh that are either pushed or towed horizontally through the water column.
- B. Protocol for field collection using larval push nets and light traps
1. Larval light traps are deployed at night for greatest efficiency and should be used in low-velocity habitat types to reduce the possibility of injury to the fishes
  2. The timing of push net deployment is based on the species of interest. These nets can be deployed from a boat or used by hand.
  3. Upon completion of larval net transects and upon retrieval of light traps, any nontarget captures will be identified and immediately released.
  4. Because larvae must be examined under a microscope for identification, all larval fishes captured will be euthanized and preserved.
  5. Light traps should be examined within 8-12 hours of deployment, and shorter intervals may be necessary if high densities of larvae are encountered to reduce stress and injury.
  6. Larval net transects or tows should cover the shortest distance possible while remaining consistent with study objectives to minimize injury and stress.

## REFERENCES

- Use of Fishes in Research Committee (joint committee of the American Fisheries Society, the American Institute of Fishery Research Biologists, and the American Society of Ichthyologists and Herpetologists). 2014. Guidelines for the use of fishes in research. American Fisheries Society, Bethesda, Maryland. <https://fisheries.org/policy-media/science-guidelines/guidelines-for-the-use-of-fishes-in-research/> Accessed 18 Jan 2024.
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