



**STANDARD OPERATING PROCEDURE FOR:
FISH SAMPLING WITH SEINES**

TVA-KIF-SOP-32

Prepared by

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1.0 PURPOSE

The objective of this Standard Operating Procedure (SOP) is to describe the standard methods for seine sampling (seining) of juvenile fish to generate samples for analysis of contaminants and/or teratogenic deformities relative to the ash spill at the Kingston Fossil Plant (KIF). These procedures have been developed so that samples are collected, preserved, and prepared for shipping in a systematic manner and that appropriate documentation is maintained.

2.0 GENERAL CONSIDERATIONS

Potential hazards associated with the planned tasks are thoroughly evaluated prior to conducting field activities. The *Site-Wide Safety and Health Plan* (SWSHP) provides a description of potential hazards and associated safety and control measures. A pre-job safety analysis (JSA) highlighting potential hazards is discussed at each sampling event (see Table 4). Sampling is only conducted by properly trained personnel.

When collecting or processing samples for contaminant analysis, sampling personnel wear powder-free nitrile gloves while performing the procedures described in this SOP. Specifically, powder-free nitrile gloves are worn while preparing sample bottleware, preparing and decontaminating sampling equipment, collecting and processing samples, and packing samples. At a minimum, nitrile gloves are changed prior to the collection of samples at each site, or as necessary to prevent the possibility of cross-contamination with the sample, the sample bottleware, or the sampling equipment.

Field sampling equipment that may come in contact with fish that have been collected is decontaminated in accordance with *Decontamination of Equipment* SOP (TVA-KIF-SOP-08) procedures prior to use.

Photographs are taken and managed in accordance with the *Photograph Management* SOP (TVA-KIF-SOP-26).

Additionally, if a boat is used to access sampling sites, a Float Plan is completed prior to traveling anywhere on a water vessel. A Float Plan includes a description of the water vessel, specifies who is on board, provides a description of the safety equipment being carried, and indicates destination and expected time of return.

2.1 General Seine Considerations

Seining is widely used in the fisheries profession as a method for sampling fish in streams, ponds, and reservoirs. There are two basic techniques for collecting fish with a seine. The seine can be pulled through the water to trap fish (seine hauling) or fish in streams can be driven downstream into a seine held stationary in the current (driving). Quantitative

samples can be collected over a series of measured transects and the mean number of each species captured per transect used as an indication of abundance.

Seining can be advantageous because it can be used to sample a variety of habitat types over a large area, can be used to sample smaller fish than possible with most techniques, and usually results in a minimal amount of fish mortality. Disadvantages of seining include: it is usually restricted to water less than 1.5 m deep, large fish can often avoid capture by out-maneuvering the seine, and heavy cover such as dense growths of vegetation, stumps, and boulders can make seining difficult and less effective.

Another aspect of seining that should be considered is the size of the seine and size of the mesh to be used. A seine 1.5 m by 4.5 m or larger is usually more suitable for collecting large quantities of fish and larger fish than a smaller seine, but it is also more awkward and requires more effort to handle. A smaller seine is more suitable for sampling heavy cover. Selection of mesh size is based on the objectives of the sampling. For mesh size, ¼-inch to 3/16-inch bar mesh is commonly used and is suitable for collecting a large size range of fish. Smaller mesh sizes are required if very small juvenile or larval fish are to be collected.

3.0 PROCEDURES

The following sections describe the procedures for seining and processing of samples. Deviations from these procedures are approved by the Project Manager and Quality Assurance (QA) Officer, and the deviation is fully documented. Field work progresses as deviations are approved or resolved.

Field sampling crews are responsible for performing work in accordance with this procedure and other applicable procedures, keeping proper records, and reporting problems to the crew leader.

3.1 Pre-Job Preparation

The Project Manager is responsible for overall implementation of this procedure and ensuring that it complies with current regulations and standards as these are subject to change. The Project Manager is also responsible for the following activities.

- a. Coordination with appropriate regulatory agencies to ensure that appropriate documentation and/or permits are obtained.
- b. Review project work control documents including the *Quality Assurance Project Plan* (TVA-KIF-QAPP), SWSHP, and appropriate SOPs to determine appropriate field protocols.

- c. Refer to specific Sampling and Analysis Plan (SAP) to ensure project objectives are met such as sample type (individual animal, composite), sample size (necessary biomass/volume of material needed and number of specimens needed to meet those requirements), number of replicates, and sample locations (transects, random, stratified).
- d. Identify approximate sampling locations. If necessary, perform a reconnaissance visit of perspective sampling locations to evaluate their suitability.
- e. Obtain legal right-of-entry from appropriate landowners and jurisdictions as needed.
- f. Discuss project objectives and potential hazards with project personnel.
- g. Coordinate with Field Team Leader to make sure that appropriate field equipment and safety gear are available.
- h. Identify appropriate laboratories to perform analyses and confirm that they have been contacted and are prepared to receive the samples.
- i. Make sure that the training requirements and needs have been identified and that project personnel complete the necessary training.

3.2 Field Preparation

The Field Team Leader is responsible for implementation of the field collection process. The Field Team Leader confirms that samples are safely collected, that decontamination protocols are used to maintain sample integrity, and that the associated data are accurate and well-documented. The Field Team Leader is also responsible for the following activities.

- a. Gather equipment necessary for completing the collection and sampling activities (refer to Table 1 for an example checklist).
- b. Provide a summary of potential hazards (or review JSA in Table 4) and provide appropriate safety equipment to the field sampling team.
- c. Confirm that QA and quality control (QC) protocols are followed.
- d. Maintain documentation of field activities and Chain-of-Custody (COC) records in accordance with the *Field Documentation* SOP (TVA-KIF-SOP-06).
- e. Prior to departure (a week in advance if possible), notify the appropriate district office of the state fish and wildlife agency of the sampling schedule and of the area where seining will be conducted.
- f. Coordinate with personnel processing fish for contaminants or health analysis.

3.3 Sampling

Fish are collected from the shallow littoral zone (water general less than 1.5 meters deep) of reservoirs by seine hauling. Three people are recommended for seining —two holding the brails of the seine and the third to help lift the seine after completion of a seine haul and to help field process samples.

- a. With a person holding each brail of the seine, walk pulling the seine through the water to trap the fish. The seine can be pulled parallel with the shoreline or perpendicular to the shoreline by starting in deeper water and walking toward shore. Make sure the leadline maintains contact with the bottom as much as possible during the haul.
- b. Terminate the seine hauls at the shoreline. When using a seine less than 4.6 m (15 feet) wide, the seine haul can be terminated by lifting the seine prior to reaching shore.
- c. Maintain enough slack to create a pocket in the seine while hauling and lifting.
- d. Alternatively, hold one brail stationary at the shore or bank and pull the other brail from a perpendicular position to complete the quadrant haul as shown in Figure 1.
- e. Regardless of seining technique, at the completion of each haul, lift the seine out of the water to collect the trapped fish.

3.4 Field Processing of Samples

Fish are processed while still on the water. After completion of seine haul, samples are processed as quickly as possible to reduce stress to fish that will be released. When small numbers of fish are collected, fish may be identified and sorted as they are removed from the seine. If numerous fish are collected, fish are placed in a clean holding tank filled with water from the site to allow more time for field processing. Release live fish not needed for the project. The SAP lists the species of fish and the size class(s) to retain for analysis.

Note: Any specimen known to be an endangered species must be released immediately unless prior arrangements (such as permits) have been made for the collection of endangered species. If a mortality of an endangered species occurs, the specimen must be preserved in 10% formalin and the project leader notified within 12 hours of the mortality.

3.4.1 Field Processing of Samples for Teratogenic Deformities

- a. Place all fish meeting the requirements listed in the SAP into a pre-labeled sample jar(s) and preserve in 10% formalin. (Refer to JSA in Table 4 for safety and handling precautions for formalin.) It is not necessary to maintain each species separately.
- b. Include on sample labels project name, site/location (with reservoir or river name), sample replicate number, date and time, name or initials of collector(s).
- c. Record results on a *Reservoir Fisheries Field Data Form for Seining* (Table 2) and the *Biota Field Sampling Form* (Table 3) for sample custody.
- d. Obtain and record geographic coordinates with a portable GPS unit at each sampling location.
- e. Maintain samples under appropriate chain of custody in accordance with *Sample Labeling, Packing, and Shipping* SOP (TVA-KIF-SOP-07) until shipment to the appropriate laboratory.

3.4.2 Field Processing of Samples for Contaminant Analysis

- a. Prior to the collection of each set of samples at a site, wash forceps and holding tank with a Liqui-Nox® wash/scrub (or similar phosphate-free detergent) and rinse with surface water. Rinse seine(s) thoroughly by repeatedly dunking the seine(s) in the water at the site.
- b. Place fish meeting the requirements listed in the SAP into clean, pre-labeled sample jar(s). It is not necessary to maintain each species separately.
- c. Record results on a *Reservoir Fisheries Field Data Form for Seining* (Table 2) and the *Biota Field Sampling Form* (Table 3) for sample custody.
- d. Include on sample labels project name, site/location (with reservoir or river name), sample replicate number, date and time, name or initials of collector(s).
- e. Immediately place sample jar(s) containing fish in a cooler with ice; ensure ice completely covers the jar(s). Maintain samples on ice in a cooler until initial laboratory processing.
- f. Obtain and record geographic coordinates with a portable GPS unit at each sampling location.
- g. Maintain samples under appropriate chain of custody in accordance with *Sample Labeling, Packing, and Shipping* SOP (TVA-KIF-SOP-07) until shipment to the appropriate laboratory.

3.5 Initial Laboratory Processing of Samples for Contaminants Analysis

Fish placed on wet ice should undergo initial laboratory processing and be frozen within 24 hours of collection to prevent loss of contaminants of potential concern (COPC).

Coordination with personnel processing the fish is critical during the collection process.

- a. Process each sample separately.
- b. Rinse each sample with deionized (DI) water in the initial sample jar. Fill a sample jar containing fish with DI water, seal, and gently agitate. Pour the DI water from the jar by loosening the lid and holding the lid slightly askew to form a small opening for water to escape. Care is taken to avoid expelling fish from the jar with the discarded water.

- c. Place fish in a clean plastic pan filled with DI water.

- d. Sort and count fish by species.

- e. Measure and weigh fish as required (refer to SAP for specific requirements).

Note: Weigh the fish using a scale that has been calibrated using check weights. See Table 5 for *Weekly Balance Check* scale calibration table.

- f. Place fish in additional clean, plastic tray containing DI water for final rinse.

- g. After the final rinse, transfer fish, separated by species (or as stated in the SAP), to new, pre-labeled, pre-weighted, certified, glass jars to obtain sample weight. Place jars in secure freezer under appropriate chain of custody in accordance with *Sample Labeling, Packing, and Shipping* SOP (TVA-KIF-SOP-07) until shipment to the analytical laboratory.

- h. Include on sample labels project name, site/location (with reservoir or river name), sample replicate number, date and time, name or initials of collector(s).

- i. Record the species, replicate number, size class-range (total lengths, mm), number of fish, and sample weight (g) in the appropriate columns at the bottom of the *Reservoir Fisheries Field Data Form for Seining* (Table 2).

- j. Decontaminate forceps, plastic sorting trays, and measuring board prior to processing each sample with a Liqui-Nox® wash/scrub (or similar phosphate-free detergent), rinse with potable water, and then rinse with DI water following general protocols in *Decontamination or Equipment* SOP (TVA-KIF-SOP-08).

3.6 Data Recording

Data are recorded on the *Reservoir Fisheries Field Data Form* (Table 2) using the procedures defined below.

- a. At the top of each form, list the reservoir name, river and mile, station ID, sample date, and gear.
- b. Enter the date as MMDDYY.
- c. Record the initials of all members of the field sampling crew, with crew leader's initials listed first.
- d. Record the time (military time) for the start of each sample (for example, 3:00 p.m. would be recorded as 1500).

Note: End times are recorded when gear such as light traps are used.

- e. In the appropriate columns, list the common name of each species collected (such as largemouth bass), the number of each species collected, and any abnormalities observed (such as scoliosis, blind eye, or fungus).
- f. At the end of the sample day, check the field form for completeness and correctness of data entered.
- g. After field samples have undergone initial laboratory processing and samples have been generated for contaminant analysis, record the species, replicate number, size class-range (total lengths, mm), number of fish, and sample weight (g) in the appropriate columns at the bottom of the *Reservoir Fisheries Field Data Form for Seining* (Table 2).

3.7 Sample Labeling and Sealing

Samples are labeled and custody sealed in accordance with the *Sample Labeling, Packing, and Shipping* SOP (TVA-KIF-SOP-07).

An EQUIS-based COC form is prepared, and the samples are shipped or delivered to the appropriate laboratory.

3.8 Field Logbook Documentation

Field logbooks to record daily activities, including sample collection and tracking information, are maintained by the Field Team Leader. Information is entered into the field logbook by the appropriate field team member using waterproof ink. In addition to the minimum requirements discussed in the *Field Documentation* SOP (TVA-KIF-SOP-06), the field logbooks document those collection and sampling characteristics specific to this SOP and as defined in the SAP.

The Field Team Leader and/or designee reviews the field logbook entries on a weekly basis at a minimum (daily review is preferred) for completeness and accuracy and indicates this review by initialing the entries. The Field Team Leader is also responsible for the completion of required data collection forms.

3.9 Decontamination and Waste Management

Sampling equipment decontamination is performed in a manner consistent with the *Decontamination of Equipment* SOP (TVA-KIF-SOP-08). Investigation-derived wastes produced during field sampling or decontamination are managed in accordance with *Management of Investigation-Derived Waste* SOP (TVA-KIF-SOP-12).

4.0 REFERENCES

- Tennessee Valley Authority (TVA). *Decontamination of Equipment* SOP (TVA-KIF-SOP-08), 2010.
- TVA. *Field Documentation* SOP (TVA-KIF-SOP-06), 2010.
- TVA. *Management of Investigation-Derived Waste* SOP (TVA-KIF-SOP-12), 2010.
- TVA. *Photograph Management* SOP (TVA-KIF SOP 26), 2009.
- TVA. *Quality Assurance Project Plan for the Tennessee Valley Authority Kingston Ash Recovery Project* (TVA-KIF-QAPP), December 18, 2009.
- TVA. *Sample Labeling, Packing, and Shipping* SOP (TVA-KIF-SOP-07), 2010.
- TVA. *Site-Wide Safety and Health Plan for the TVA Kingston Fossil Plant Ash Release Response* (SWSHP), June 2009.

Table 1: Suggested Seine Sampling Equipment and Materials Checklist	
Item Description	Check
Health & Safety	
Nitrile gloves	
Field first-aid kit	
Rubber waders (per person) and repair kit	
Safety glasses, hard hat, and steel-toed boots	
Rain gear, sunscreen, and knife	
U.S. Coast Guard approved life jacket (1 per person)	
U.S. Coast Guard approved boat cushion (at least 1) and paddle(s) (if a boat is used)	
Paperwork	
Job Safety Analysis (generic)	
Bound field logbook and pen with indelible ink	
One set of maps of the sampling area and vicinity	
Sample labels	
Field data form (Table 2) and Biota Field Sampling Form (Table 3)	
Permanent markers	
Two sheets each of label paper (waterproof paper type for inside of collection jar and adhesive label for outside)	
Chain-of-custody forms and custody seals	
MSDS	
Equipment/Materials	
Clean forceps, ~5 inches long (plastic, plastic of Teflon coated, or stainless steel) ¹	
Clean, glass sample containers ¹	
Clean plastic pans (1 or more) ¹	
One or two 2-gallon to 5-gallon buckets	
Sufficient cooler capacity to hold ice and all sample containers	
Ice and/or dry ice	
One or more seines (duplicate seines for backup)	
Digital camera	
Digital weighing scales	
Formalin (1L)	
Global positioning system (GPS) unit and spare batteries	
Decontamination and Waste Management Equipment	
Deionized water	
Laboratory-grade detergent (such as Liqui-Nox® or Alconox® Powdered Precision Cleaner)	

¹ If these items cannot be certified as contaminant-free, they must be cleaned per *Decontamination of Equipment* SOP (TVA-KIF-SOP-08).

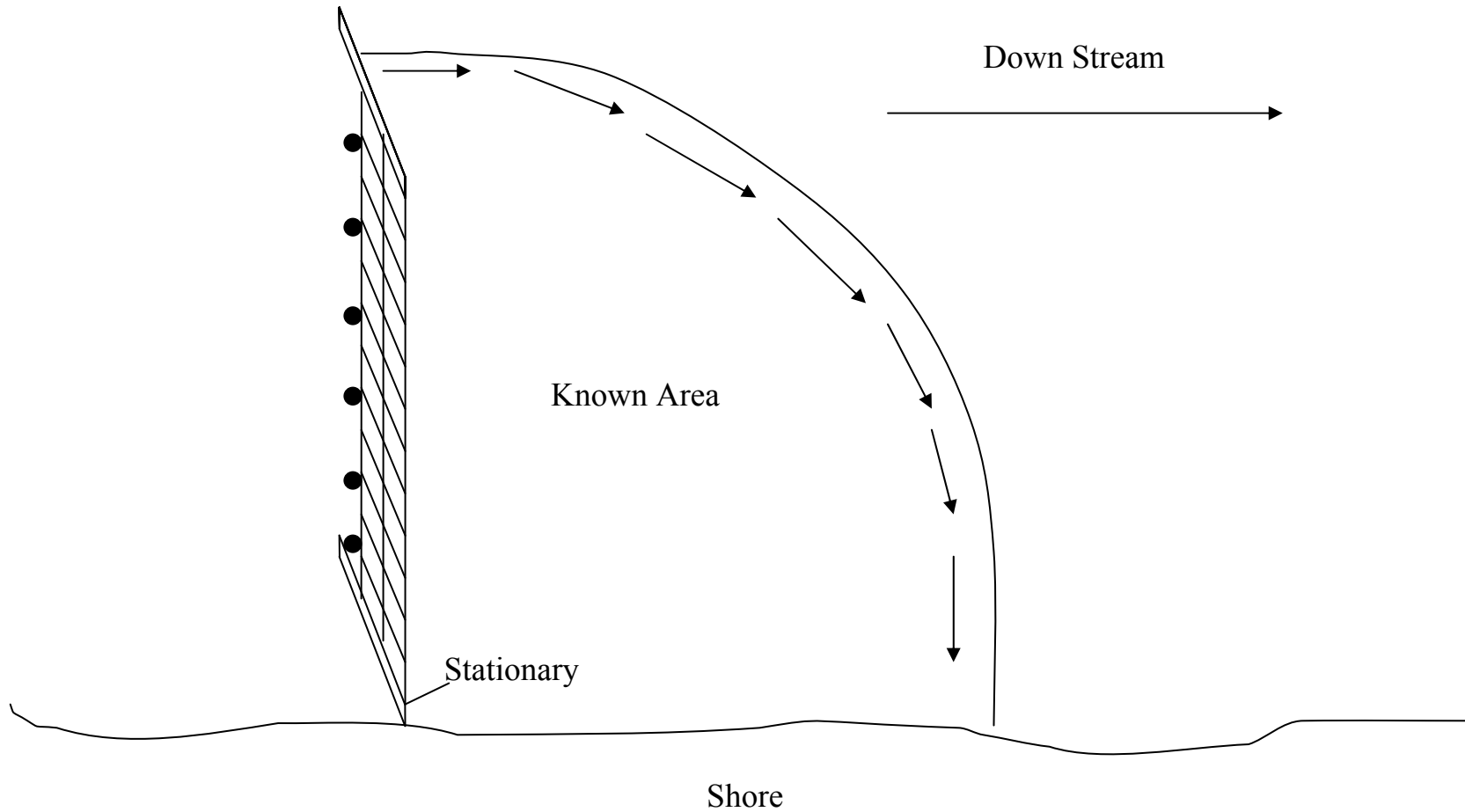


Figure 1. Illustration of quadrant seine haul.

Table 4. Job Safety Analysis (JSA) Worksheet

Number:		Job: Use of Entrapment/Entanglement Gear (i.e., gill nets, seines, and fyke, hoop, and trap nets).		Date: August 10, 2010	
Page 1 of 4		Supervisor: Sandra S. Robertson		Plant / Facility:	
Skills Required: Boat Operation		Reviewed By: Tyler F. Baker		Analysis By: Dennis S. Baxter	
Skills Required: Boat Operation		Reviewed By: Tyler F. Baker		Approved By: Dennis H. Yankee	
Required Personal Protective Equipment: PFD, foul weather gear for various weather conditions					
Tools and Equipment Required: Boat with depth finder, GPS, B-1 class hand portable fire extinguisher, paddles, boat hook, nets, floats, rope, anchors(concrete), dragging hook, net picks, knife, pocket knife, first aid kit, sun screen, live well tank or wash tub, bucket, tool box, spare boat plug, and spare trailer bulbs					
Job Preparation: Read and understand JSA's pertaining to work performed and project work plan Conduct pre-job briefing Implement two-minute rule upon arriving at job site					
Hazardous Materials: Gasoline, Formaldehyde (Formalin)			Special Requirements: Boating Safety Certification, Review MSDS sheets		
Number	Sequence of Basic Job Steps	Potential Accidents or Hazards		Recommended Safe Job Procedures	
1.	I. Pre Job Safety Discussion Crew Leader conducts safety discussion to ensure crew members are aware of project-specific procedures before starting field work.	Back strain, foot injury, slips, trips and falls.		Crew leader reviews sampling procedures and safety topics (weather, hazards, back strain) before gear is loaded and sampling begins. Crew leader should review Safe Boat Operation JSA prior to work.	
2.	All trailer and vehicle lights should be checked before leaving for the field.	Improperly lit vehicles are illegal and create an accident hazard on the highway.		Crew leader and Operator of vehicle should check all trailer and vehicle lights to ensure they are in good working order.	
3.	Crew leaders should ensure that safety equipment (e.g., first aid kits, fire extinguishers, and life jackets) are available. Each employee should have foul weather gear available.	Without the proper PPE's, the employees are at risk for injury.		All crew members should have basic first aid training and be knowledgeable of the proper use of fire extinguishers. Crew members must always wear a personal floatation device while on the water.	
4.	Before conducting a sample, physical factors such as weather, water flow, etc., should be taken into consideration.	Examples of project-specific potential hazards include, but are not limited to, netting in thunderstorms with lightning, freezing weather when ice may form on boat decks and cause a slipping hazard, and areas of extremely fast current such as those existing near turbine discharges of hydroelectric dams which can increase the danger of falling overboard due to sudden shifts in boat position.		Sampling should never be conducted when there is a danger of lightning strikes. Extreme caution should be exercised when sampling in freezing weather and/or in areas of fast current to avoid falling overboard. If sampling conditions are considered unsafe, the crew leader has the option and responsibility to postpone sampling until more favorable conditions occur.	

Table 4. Job Safety Analysis (JSA) Worksheet (continued)

5.	Preserving samples with formalin	Formalin is a known carcinogen. Do not expose skin or eyes to chemical.	Read the Material Safety Data Sheets (MSDS). Ensure ample ventilation. Use appropriate protective equipment (i.e., gloves and safety glasses). Fill jar with water before adding formalin to reduce risk of eye injury in the event that formalin was splashed
6.	II. Gear Preparation A. Ensure all necessary equipment is available and in good working order. B. Ensure gunwales of boat are free of sharp edges or rough or irregular surfaces that can cut or snag nets or ropes.	A. Tangled nets can cause an injury to fingers and hands. Tubs which have jagged edges can cause cuts or lacerations. B. Sharp edges or rough or irregular surfaces can damage sampling equipment, snag the equipment and cause the boat to lurch suddenly (possibly resulting in personnel falling overboard), or causing personal injury.	A. Ensure that nets are free of tangles and debris, and that storage tubs are free of any jagged edges which might snag the net. B. Inspect front and gunwales of boat for sharp edges or rough or irregular surfaces. If such is found, either change boats or have the problem areas repaired.
7.	III. Loading Equipment into the Boat and Tow Vehicle A. Heavy tubs of nets, net anchors, and tool boxes should be loaded in the boat and tow vehicle in a manner such that the load is properly distributed. B. Ensure entrapment gear (e.g., trap nets and hoop nets) is loaded properly. C. Ensure proper loading of lightweight objects such as empty tubs, floats, rope, etc.	A. Improper weight distribution can cause boat to sway uncontrollably while towing, potentially resulting in an accident. Net weights can cause foot injuries if not handled and stored properly. Back injuries can occur if proper lifting techniques are not employed. B. If this equipment is not properly stored, it could bounce out of the boat on rough roads or curves and cause a hazard to following traffic. C. Lightweight objects can easily blow out of the boat while trailering, causing a hazard to following/oncoming traffic.	A. Net anchors, heavy tubs of nets and tool boxes should be stored in the boat just forward of the rear axle of the trailer. The load should be braced or tied to prevent shifting. If the load in the boat exceeds the towing capacity of the tow vehicle, load some of the gear in the back of an additional vehicle. Exercise caution while loading anchors to prevent dropping them on your feet. To prevent back injuries, two people, using proper lifting techniques, should load tubs of nets and other heavy equipment into boat and vehicle. B. Lay this type of equipment flat on the bottom of the boat and brace it or tie it in place. C. Secure lightweight materials by placing them in enclosed compartments, tying them down, weighting them, or by loading them in the tow vehicle.
8.	IV. Deployment of Nets A. Anchor leading edge of net.	A. Cuts, insect bite or stings, animal bites, noxious plants, and falling overboard are potential hazards.	A. If tie-off or anchor rope is to be cut, always cut away from the body to avoid injury. If net is to be anchored to an onshore object, carefully inspect the shore area for wasp or hornet nests (or other biting/stinging insects), snakes or other potentially dangerous animals, and poisonous or other noxious plants. Exercise caution to avoid falling overboard due to boat collision with underwater objects or boat operator putting engine in reverse.

Table 4. Job Safety Analysis (JSA) Worksheet (continued)

<p>8.</p>	<p>B. Ensure that float(s), weight(s), and any other items to be deployed with the net are available at the proper location(s).</p> <p>C. Boat operator slowly runs the boat in reverse while other personnel guide the net into the water from the bow of the boat.</p> <p>D. Continue to deploy net until rear anchor line is reached.</p> <p>E. Ensure that net is straight by pulling on end.</p> <p>F. Drop anchor and float into the water. Depending on the type of net (e.g., hoop nets), the float rope may need to be pulled taut once the anchor is released to stretch the anchor rope.</p> <p>G. If wings/leads are present on the sampling gear, the boat operator should navigate to the proper position so the wings/leads can be set. Set wings/leads and throw out appropriate anchors at approximately 45° to the throat of the net. Then tighten the net's rear anchor line to ensure net is fishing properly.</p>	<p>B. Tripping and falling overboard arc potential hazards.</p> <p>C. Tripping, falling overboard and receiving cuts from net mesh arc potential hazards.</p> <p>D. Grasping the net can cause the hands to become entangled in the netting. This could result in being pulled overboard.</p> <p>E. Back or muscle strain injuries are potential hazards.</p> <p>F. Being pulled overboard and back injuries are potential hazards.</p> <p>G. Possible hazards are being pulled overboard and strained muscle or back injury.</p>	<p>B. Use caution to avoid feet and/or hands becoming entangled in ropes or attachment lines.</p> <p>C. Employees working nets should not wear jewelry (e.g., rings) which might catch in the net. Wearing these items can cause finger injuries and could result in being pulled overboard by net. Watch out for net mesh tangling around buttons on clothing.</p> <p>D. Allow net to slide over the boat deck, or to slide through the hands. Do not attempt to grasp the net.</p> <p>E. Caution should be exercised to prevent undue muscle or back strain.</p> <p>F. Exercise caution to avoid being pulled overboard. In situations where heavy pulling is required, the rope can be tied with a slip knot to the net rail of the boat to help avoid injury.</p> <p>G. Exercise caution to avoid being pulled overboard. Lift and throw anchors carefully, using proper lifting techniques, to avoid muscle strains and back injuries. Use appropriate weights for existing conditions, i.e., do not use excessive weight.</p>
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Table 4. Job Safety Analysis (JSA) Worksheet (continued)

<p>9.</p>	<p>V. Checking/Retrieving Nets</p> <p>A. Boat operator approaches the appropriate float from "downstream." Float should be approached from the "downstream" side. This refers to the direction in which the float is drifting and, depending on wind direction and currents, is not necessarily down river of the sampling site.</p> <p>B. Boat crew retrieves float and pulls net onto bow of boat. Depending on the sampling gear involved, only a portion of the net may be brought into the boat. This would be true of certain trap nets and fyke nets.</p> <p>C. If sampling is to be continued, fish are removed from the net and the gear reset. If sampling is not to be continued, the gear is stored either in tubs or in the bottom of the boat.</p>	<p>A. Falling overboard is a potential hazard.</p> <p>B. Potential hazards are falling or being pulled overboard and strained muscles or back injury.</p> <p>C. Potential hazards or accidents are slipping, tripping, falling overboard; and punctures, cuts, or abrasions from fish spines, operculum, gill rakers, or teeth. Leaving fish, fish spines, and/or fish hooks in nets increases the possibility of puncture wounds and cuts as nets are being handled.</p>	<p>A. To reduce the possibility of falling overboard, the boat crew should be braced for any sharp turns or changes in speed made by the boat operator.</p> <p>B. For large heavy nets, an electric winch may be used to pull the net thereby reducing the possibility of muscle strain.</p> <p>C. The boat should be kept as neat as possible during these operations to maximize working room. The boat deck should be periodically washed with water between samples. Washing the deck cleans it of fish slime and reduces the possibility of accidents due to slipping. Keeping the boat neat minimizes the risk of injury due to tripping. Caution should be exercised while removing fish from nets, especially gill nets, to avoid cuts, punctures, and abrasions. All fish, fish spines, and any fish hooks should be removed from nets before storing.</p>
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- 1. Struck By (SB)
- 2. Struck Against (SA)
- 3. Contact By (CB)

- 4. Contact With (CW)
- 5. Caught On (CO)
- 6. Caught In (CI)

- 7. Caught Between (CBT)
- 8. Foot Level Fall (FLF)
- 9. Fall to Below (FB)

- 10. Overexertion (OE)
- 11. Exposure (E)

