

# **FISH EXCLUSION – PROTOCOL AND STANDARDS**

## **Washington State Department of Transportation**

### **Introduction**

The Washington State Department of Transportation (WSDOT) requires the following protocol and standards for fish exclusion, capture, handling, and relocation (hereafter referred to as “fish exclusion protocol (FEP)” or “fish moving”) to reduce the risk of potential injury to fish during construction.

This protocol generally meets Endangered Species Act (ESA) Section 7 consultation and Hydraulic Project Approval (HPA) requirements, but specific consultation or permit conditions take precedence over any project-specific components that conflict with these best practices.

### **When to Use this Guidance**

This guidance is applicable for work proposed in fish-bearing waters. Work should be conducted in isolation from flowing water, if practicable. **Work shall be allowed in water if:** (1) this FEP is implemented, (2) placement or removal of material (wood or rock, etc.) is small in quantity, (3) installation of best management practices (BMPs) (turbidity curtain, etc.) is performed under site conditions where the potential to affect fish is minimized<sup>1</sup>, and/or (4) work is conducted under a declared emergency, under emergency conditions, or when flow conditions preclude safe implementation of this FEP.

### **Directing Biologist**

The FEP shall be planned and supervised by a WSDOT biologist or qualified biologist under contract with WSDOT (hereafter referred to as the Directing Biologist). The Directing Biologist must possess the required knowledge, training, and experience for safe and effective implementation of the FEP (**Appendix A**).

The Directing Biologist shall work with maintenance, construction, and/or environmental staff to plan and manage the FEP. This plan should consider the size and channel characteristics of the area to be isolated, dewatering method (diversion with bypass flume or culvert, washed gravel bags, sheet pile, cofferdam, etc.), and most effective manner by which to move fish.

### **Assisting Staff**

All assisting staff shall have the required training, knowledge, skills, and ability to safely and effectively, move fish (**Appendix A**).

## **Fish Exclusion - Considerations**

The Directing Biologist shall implement the FEP in consideration of the following: (1) habitat connectivity and fish habitat requirements, (2) duration and extent of planned in-water work, (3) anticipated flow and temperature conditions during in-water work, and (4) risk of fish exposure to turbidity or other water quality and site conditions during construction.

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<sup>1</sup> WSDOT shall make this determination after consulting with regulatory agencies with jurisdiction, including the Washington State Department of Fish and Wildlife (WDFW), U.S. Fish and Wildlife Service (USFWS), and/or NOAA-National Marine Fisheries Service (NMFS). In some locations the Tribes will have jurisdiction. This exception is not applicable to in-water excavation or work that may increase turbidity beyond the immediate work area for more than 15 minutes.

**When the work area to be isolated is small**, depth is shallow, and/or conditions are conducive to fish capture, it may be possible to isolate the work area and move fish prior to dewatering or flow diversion.

**When the area to be isolated is large**, water is deeper, flow volume and/or velocity is higher, and/or conditions are not conducive to fish capture, it may be necessary to commence with dewatering or flow diversion concurrent with fish moving. WSDOT should have oversight and final approval in this situation. The Directing Biologist shall use best professional judgment in implementing the FEP in a manner that minimizes exposure of fish to potential stress or injury.

**If the area to be isolated includes only a portion of the wetted channel width** (e.g., in large and/or deep rivers), or if a bypass flume or culvert will effectively maintain fish passage during construction, it may be suitable to move fish out of the in-water work area (IWA).

However, if the IWA includes the entire wetted channel width, and it is unlikely that fish passage can be maintained during construction, the Directing Biologist must **decide whether to move fish upstream and/or downstream** of the IWA, depending on available habitat conditions.

If a large number of fish is to be moved, it may be appropriate to relocate fish both upstream and downstream of the IWA to avoid concentrating fish in areas where their habitat needs may not be met. Where habitat connectivity or quality is poor, the Directing Biologist should determine whether relocated fish will have access to suitable habitat for the duration of planned in-water work. If such habitat is not present in the vicinity, it may be appropriate to relocate fish a greater distance upstream and/or downstream (even thousands of feet or miles). When a distant relocation is deemed necessary, WSDOT shall provide notice in advance to agencies with jurisdiction.

## **Block Nets**

The Directing Biologist shall select block nets that are appropriate for site conditions and fish species present. It may be necessary to contact other WSDOT regions or offices for access to nets, equipment and/or materials. A suitable block net is composed of **1/8-inch nylon mesh**. Smaller mesh is preferred if practicable depending on site conditions.

Block nets must be **secured to both banks and the channel bottom** to prevent failure due to debris accumulation, high flow, and/or flanking. Supplemental block net support may be required (e.g., hardware cloth, affixed metal fence posts, batter T-posts, etc.). Block nets should be **installed at an angle to the direction of flow** (i.e., 45-degree angle if practicable and not directly perpendicular to flow) to reduce the risk of impinging fish. Anchor bags, filled with clean, washed gravel, can be used to support nets that may remain in place for more than two weeks or high flow events are expected. Any use or manipulation of native substrates or other materials on site should be incidental and shall not measurably affect the channel bed or bank baseline condition.

The Directing Biologist shall **determine appropriate locations for block nets** based on site characteristics and in consideration of the type and extent of planned in-water work. Locations with lower flow volume and/or velocity, uniformity of depth, and good accessibility are preferred. Sites with heavy vegetation, large cobble or boulders, undercut banks, and deep pools should be avoided due to the difficulty of securing and/or maintaining nets. Sites with a narrow channel cross-section (constriction) should be avoided if foreseeable flow conditions might increase likelihood of fish impingement or overwhelm or dislodge the nets.

Except when planning to herd fish upstream, an **upstream block net (UBN)** shall be placed first. With the UBN in place, a second block net can be used as a seine to herd fish downstream, starting at the UBN. When the IWA includes a culvert, deep pools, undercut banks, or other cover attractive to fish (thick overhanging vegetation, rootwads, logjams, etc.) it may be appropriate to isolate these

areas, or several areas, of the IWA rather than attempting to herd fish from the entirety of the IWA in a single downstream pass. Try to avoid herding fish into these areas of the IWA.

Fish capture and removal will be most successful if fish are strategically concentrated in areas where they can more easily be seined and netted. Care shall be taken not to herd fish toward areas where they are exposed to sources of stress. If unavoidable, do not allow fish to be concentrated in such areas for more than 30 minutes.

Depending upon site characteristics and how the FEP is implemented, it may not be necessary to place a **downstream block net** (DBN). However, a DBN is typically required to prevent downstream fish from entering the work area. A DBN is recommended if (1) groundwater seepage or site drainage has a tendency to re-wet the work area, (2) the area to be isolated is low-gradient or subject to backwatering, (3) the area to be isolated is large and considerable effort will be expended in capturing and removing fish, and/or (4) foreseeable flow conditions during work might enable fish to re-enter the work area from downstream.

When gradual dewatering or flow diversion is staged concurrently with fish moving, it may be appropriate to delay installation of the DBN until fish have first been allowed sufficient time to move downstream by their own choosing (volitional movement). Gradual dewatering can be an effective method to reduce the risk of fish stress or injury. Encouragement of volitional fish movement out of the work area is particularly important where the IWA is large and may hold many fish. However, when the IWA includes a culvert, deep pools, undercut banks, or other cover attractive to fish, fish may not move downstream. In this case, the Directing Biologist should use best professional judgment in determining how to best move fish.

**Block nets shall remain in place until** work is complete and conditions are suitable for the reintroduction of fish.<sup>2</sup> Block nets require frequent inspection and debris removal. Inspection may be conducted by the WSDOT Environmental Compliance Inspector or contractors that have been provided on-site training. They shall immediately notify the Directing Biologist if any impinged, injured or deceased fish are observed or net repair/adjustment is necessary. An individual trained in fish handling shall be assigned the responsibility of safely relocating any impinged fish and repairing nets.

**Net inspection frequency** shall be in accordance with General Special Provision (GSP) 7-06.3(5). They shall, at a minimum, be inspected at least three times daily or as requested by the Directing Biologist. An inspection shall be completed at the start, middle and end of the workday. On non-working days, an inspection shall be performed between 6:00 am and 8:00 am, 11:00 am and 1:00 pm and 4:00 pm and 6:00 pm. Nets may need to be checked more frequently for the first 24 hours after a significant rainfall, change in flow volume or velocity, or significant windstorm that can result in leaf drop. If fish are impinged on the net or weather and/or flow conditions change significantly, the Directing Biologist shall adjust the frequency of net inspections to minimize risk to fish.

**Pumps:** If dewatering and/or flow diversion requires the use of pumps, this work shall comply with the HPA issued by the Washington Department of Fish and Wildlife (WDFW) as well as any Terms and Conditions issued by the USFWS and/or NMFS in a Biological Opinion. Commitments may also appear in ESA minimization measures or the project description.

**Pump intakes shall be screened** to prevent fish from entering the intake. Screens shall comply with Washington State law (RCW 77.57.010 and 77.57.070), guidelines provided by the NMFS,<sup>3</sup> and the

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<sup>2</sup> If a FEP is implemented for installing a cofferdam BMP, AND construction is isolated from suitable fish habitat by the cofferdam, AND construction is scheduled for a long period of time (weeks, months), it may be appropriate to remove block nets and allow fish to re-enter suitable habitat from which they were moved.

<sup>3</sup> National Marine Fisheries Service. 2011. Anadromous Salmonid Passage Facility Design. Chapter 11: Fish Screen and Bypass Facilities.

HPA. If pumps are to be used for a longer period of time to divert flow around the IWA, the dewatering plan shall address contingencies for extremes in flow and/or weather. The plan shall include ready access to a larger, or additional, backup pump with appropriately-screened intake. Pumps must be monitored outside of active construction hours/days. There must be sufficient fuel safely stored onsite.

Once the Directing Biologist confirms that (1) the work area is isolated and all fish have been excluded, (2) there is no risk of entraining fish, and (3) a contingency plan is in place (including a routine schedule for inspection), then pumps may be operated **without a screened intake**. Note that block nets do not meet screening criteria.

## Moving Fish

Methods for the safe relocation of fish are described below. At most locations, a combination of methods may be necessary.

In order to avoid and minimize the risk of injury to fish, **an attempt to seine and/or net fish should always precede the use of an electrofisher**. Via visual observation techniques, including snorkeling, surveying with polarized glasses, or using Plexiglas-bottomed buckets, the effectiveness of seining/netting can be determined.

**If fish moving has not been addressed during ESA consultation** and fish listed under the ESA may be present, the Directing Biologist must stop work and reinitiate Section 7 consultation with the Services in advance of in-water work. Work conducted under a declared emergency, or emergency conditions, shall follow established ESA notification protocol.

**When fish listed under the ESA may be present**, the Directing Biologist shall insure that fish moving adheres, at a minimum, to the following guidelines:

- (1) Only dip nets and seines composed of knotless (non-abrasive) material shall be used.
- (2) Electrofishing equipment shall be used only after less-injurious methods have removed most, if not all, fish over 300 mm, by completing a minimum of three passes with seines and/or nets.
- (3) The success of fish moving shall be confirmed prior to dewatering or other work within the IWA.
- (4) Fish listed under the ESA shall not be held in containers for more than 10 minutes unless containers are dark-colored, lidded, and fitted with a portable aerator.
- (5) A plan for achieving efficient and rapid return of fish to suitable habitat will be developed before fish moving.

## Minnow Traps

Baited Minnow Traps are typically used before seining. They shall be inspected at least four times daily to remove captured fish and thereby minimize predation in the trap. Traps should be checked more frequently if temperatures exceed 15 degrees C (59 F).

Traps may be left in the IWA overnight. However, predation in the trap may present an unacceptable risk because large sculpin and other predators are typically more active at night. The Directing Biologist shall consider the risk of predation when determining whether to utilize traps at night.

## **Seining**

Seining is the preferred method for fish capture. Other methods shall be used when seining is not possible or is proven ineffective. Seines, once pursed, should remain in the water while fish are removed with dip nets. Seines with a bag are advantageous because they minimize handling stress. They are also preferred when obstructions inhibit access to water or when seine deployment/retrieval is difficult.

In general, seining is more effective if fish, especially juvenile fish, are moved away (“flushed”) from under cover. Flush efficiency can be increased by conducting seining during dawn or dusk, in conjunction with snorkeling. In flowing waters, especially where flow volume and/or velocity is higher, seines that employ a heavy lead line and variable mesh size are preferred. Small mesh sizes are more effective across the full spectrum of fish sizes (and age classes), but they also increase resistance and can make seine deployment/retrieval more difficult in flowing waters. Seines with a small-diameter mesh size in the bag (or body), and a larger, less resistant, mesh size in the wings, may be more effective and efficient.

## **Dip Nets**

Dip Nets shall be used in conjunction with seining. This method is particularly effective during gradual dewatering or flow diversion. To minimize stress and risk of injury to fish, dewatering or flow diversion should proceed at a measured pace (within constraints), to encourage the volitional downstream movement of fish, and reduce the risk of stranding. Work shall not proceed unless there are sufficient staff and materials on site to properly relocate fish. Generally, this will require a minimum of two staff (three, if electrofishing).

Once netted, fish shall remain in water until transferred to a bucket, cooler, or holding tank. Dip nets which retain a volume of water (sanctuary nets) are preferred. However, sanctuary nets may be ineffective where flow volume or velocity is higher due to increased resistance. Where water depth is shallow and/or fish are concentrated in very small receding pools or coarse substrate, a small aquarium net may be a more effective option.

## **Connecting Rod Snake**

A Connecting Rod Snake (CRS) can be used to flush fish out of culverts. Like other cover attractive to fish, culverts (especially long culverts), can present a challenge in moving fish. A first step in implementing the FEP should be to place block nets immediately upstream and/or downstream of culvert to minimize the number of fish that might seek cover within the culvert. Fish should then be herded into areas where they can be easily seined and netted. Once fish have been relocated, the block net downstream of the culvert should be removed so that fish inside the culvert can volitionally move downstream – or be flushed with the CRS.

## **Electrofishing**

Electrofishing shall be performed only when other methods to move fish have proven impracticable or ineffective at removing all fish. Larger fish (adult and sub-adult fish with longer spine lengths) are more susceptible to electrofishing injury than smaller fish. The Directing Biologist shall confirm that other fish-moving methods have been attempted before using an electrofisher. An electrofisher should not be used in water where visibility less than 0.5 meter.

***The following performance measures shall apply to the use of an electrofisher:***

- (1) Upon request, the WSDOT shall allow the Services, WDFW, and in some cases the Tribes to observe fish capture and removal operations. Work conducted under a declared emergency,

or emergency conditions, shall follow established ESA notification protocols.

(2) **Electrofishing shall only be conducted when a Directing Biologist is present**, possessing the required training and experience (Appendix A).

(3) The Directing Biologist shall ensure that electrofishing is conducted using the **minimum voltage, pulse width, and rate settings necessary** to elicit galvanotaxis. Water conductivity shall be measured prior to work to determine appropriate settings. Electrofishing methods and equipment shall comply with guidelines outlined by the NMFS<sup>4</sup> and USFWS<sup>5</sup> if bull trout may be present.

(4) The **initial and maximum settings** listed in **Table 1** shall serve as guidelines when electrofishing in waters that may support ESA-listed fish. Only DC or pulsed DC current shall be used. Many modern electrofishers are equipped with a setup, or initialization, function. The Directing Biologist shall have the discretion to use this function to identify proper initial settings.

**Electrofishing shall begin with initial settings.** If fish do not exhibit a response, the settings shall be gradually increased until galvanotaxis is achieved. The lowest effective settings shall be used to minimize risks to both personnel and fish. **The Directing Biologist shall ensure the safety of all staff** and provide necessary safety equipment and materials (insulated waders and gloves, first aid/CPR kit, safety plan with emergency contacts and phone numbers, etc.). Only individuals that are trained and familiar with the use of electrofishing equipment should provide direct assistance during work.

**Table 1. Guidelines for initial and maximum settings for backpack electrofishing<sup>6</sup>**

	<b>Initial Settings</b>	<b>Conductivity (µS/cm)</b>	<b>Maximum Settings</b>
<b>Voltage</b>	100 V	≤ 300	800 V
		>300	400 V
<b>Pulse Width</b>	500µs	-----	5 ms
<b>Pulse Rate</b>	15 Hz	-----	60 Hz (>40Hz may injure more fish)

(5) **Electrofishing shall not be conducted** where spawning adults or redds with incubating eggs may be exposed to the electrical current. As a general rule, waters that support anadromous salmon should not be electrofished from **October 15 to May 15**, and non-anadromous waters (resident fish only) from **November 1 to May 15**. If located within waters that may support bull trout, especially waters that support spawning and rearing, seasonal limitations on the use of electrofishing equipment may be more restrictive. If a more restrictive work window is identified during ESA consultation, that window shall apply.

<sup>4</sup> National Marine Fisheries Service. 2000. Guidelines for electrofishing waters containing salmonids listed under the Endangered Species Act.

<sup>5</sup> U.S Fish and Wildlife Service. 2012 Recommended Fish Exclusion, Capture, Handling, and Electroshocking Protocols and Standards

<sup>6</sup> Adapted from NMFS Backpack Electrofishing Guidelines, June 2000, and WDFW Electrofishing Guidelines for Stream

Typing, May 2001.

- (6) **An individual shall be stationed at the DBN** during electrofishing to recover stunned fish in the event they are flushed downstream and impinged against the net.
- (7) The operator of the electrofisher shall use caution to **prevent fish from coming into direct contact with the anode**. Under most conditions, the zone of potential fish injury extends approximately 0.5 meter from the anode. Netting shall not be attached to the anode as this practice presents an increased risk of direct contact and injury. Extra care shall be taken near in-water structures or undercut banks, in shallow waters, or where fish densities are high. Under these conditions fish are more likely to come into close or direct contact with the anode and/or voltage gradients may be intensified. When electrofishing areas near cover, fish that avoid capture may be repeatedly exposed to the electrical current. Repeated or prolonged exposure to electrical current presents a higher risk of injury. As such, the electrofisher settings should be adjusted to accommodate changing conditions in the field.
- (8) **Once galvanotaxis is observed**, the IWA shall be worked systematically. The number of passes shall be kept to a minimum, but, dependent upon the numbers of fish and site characteristics, shall be at the discretion of the Directing Biologist. Electrofishing shall not be conducted unless there are sufficient staff and materials on site. Fish shall be immediately removed from the electrical field to avoid repeat exposure. **Fish shall not be held in dip nets while electrofishing is in progress** (i.e., while continuing to capture additional fish). When flow velocity or turbulence is higher (e.g., within riffles), it may be difficult to see and net fish. In this scenario, fish may evade capture, resulting in repeated exposure, and/or may become impinged on the DBN. A “frame net,” or small portable block net, approximately three feet in width, can be effective under these conditions when immediately downstream of the anode.
- (9) **The condition of captured fish shall be carefully observed and documented**. Dark bands on the body and/or extended recovery times are signs of stress or injury. When such signs are noted, settings for the electrofishing unit may require adjustment. The Directing Biologist should also consider modifications to the way electrofishing is conducted. If adjustments do not lessen the frequency (or severity) of observed stress, the Directing Biologist shall have the authority to postpone work. Each captured fish shall be capable of remaining upright and actively swimming prior to release. If necessary the fish should be revived in aerated holding tanks.
- (10) **Electrofishing shall not be conducted** when aquatic visibility is less than 0.5 meter, water conductivity exceeds 350  $\mu\text{S}/\text{cm}$ , or when water temperature exceeds 18°C (64 F) or is less than 4°C (39 F).

## **Fish Handling, Holding and Release**

- (1) Fish moving shall be conducted such that **handling is minimized**.
- (2) Fish shall **remain in water** during seining/netting, handling, and transfer for release.
- (3) The Directing Biologist shall **document** fish species, number, condition at release, and release location. Fish tissue shall not be sampled, or fish anesthetized, unless allowed under the WSDOT Section 10 scientific collection permit.
- (4) Individuals handling fish shall ensure that their **hands are clean** and free of substances potentially harmful to fish, including, but not limited to, sunscreen, lotion, and insect repellent.
- (5) Water quality shall be maintained in buckets, coolers, or holding tanks that are used to hold and transfer captured fish. Clean water from the natal stream shall be used. Aerators shall be used, as necessary, to provide well-oxygenated water. Holding containers are to be **monitored frequently**, shaded where possible, and work adjusted appropriately, to minimize fish stress. If

fish are held for more than a few minutes prior to release, the Directing Biologist should consider using **dark-colored, lidded containers** only. Fish shall not be held in containers for more than 10 minutes, unless those containers are dark-colored, lidded, and fitted with a portable aerator.

(6) Captured fish shall be held in **low densities** to avoid overcrowding. Large fish shall be separated from smaller fish to **prevent predation**. Water-to-water fish transfer shall be implemented, whenever possible.

(7) **Release sites** shall be determined by the Directing Biologist in consideration of site characteristics (flow, temperature, available refuge and cover, etc.) as well as the class of fish captured (out-migrating smolt, kelt, pre-spawn migrating adult, etc.). More than one site may be selected to provide for varying needs and to separate prey-sized fish from larger fish.

(8) Any **ESA-listed fish incidentally killed** shall be preserved and delivered to the appropriate authority, upon request. Photos are recommended to facilitate later identification if the specimen is lost or deteriorates.

(9) If the limits on take of ESA-listed species are exceeded, or if **incidental take** is approaching and may exceed specified limits, the Directing Biologist shall postpone work and notify the federal agency (or agencies) with jurisdiction. If dewatering or flow diversion is incomplete and still in-progress, WSDOT shall take remedial actions directed at maintaining sufficient quantity and quality of flow to reduce the potential for fish stress and/or injury. If conditions contributing to fish stress and/or injury may worsen before the federal agency with jurisdiction can be contacted, WSDOT should attempt to safely move fish to a suitable location near the capture site.

## **Reintroduction of Flow and Fish to the IWA**

If fish moving involves placement of block nets, the Directing Biologist shall ensure that the nets remain in place until work is complete and conditions are suitable for the reintroduction of fish.

**Flow shall be gradually reintroduced** to the IWA to prevent channel bed or bank instability, excessive scour, or elevated turbidity and sedimentation. The Directing Biologist shall ensure that no fish are stranded during reintroduction of flow. If conditions causing, or contributing to, fish stress and/or injury are observed, WSDOT shall take remedial action, including, but not limited to, a more gradual reintroduction of flow.

Temporary structures and materials (block nets, posts and anchors, bypass flume or culvert, gravel bags, sheet pile or similar cofferdam, etc.) shall be removed at the completion of work. Block net removal is to be overseen by the Directing Biologist.

## **Documentation**

(1) Work area isolation and fish moving shall be documented in a logbook with the following information: project location, date, methods, personnel, water temperature, conductivity, visibility, electrofishing equipment settings, and other comments.

(2) All fish handled shall be documented: number of each species, condition at release, and location of release. Photograph individuals that are not confidently identified.

(3) If fish are observed in distress, a fish kill occurs, or water quality problems develop (including equipment leaks or spills), the Directing Biologist shall immediately notify WSDOT management, who in turn, shall notify the WDFW as required by the HPA. Notification shall consist of a phone call or voice mail message directed to the Area Habitat Biologist.



(4) Any **ESA-listed species incidentally killed** shall be documented and the appropriate authority (USFWS and/or NMFS) notified within two working days. If the Directing Biologist is a consultant, he/she shall immediately notify WSDOT, who will, in turn, notify the Services.

**Initial notification** shall consist of a phone call or voice mail message, directed to the nearest USFWS Law Enforcement Office, the Washington Fish and Wildlife Office at (360) 753-9440, the NMFS Office of Law Enforcement at (800) 853-1964, and the Washington State Habitat Office at (360) 753-9530.

Any **dead specimens** shall be kept whole and preserved on ice or frozen until WSDOT receives a response and further directions from the appropriate authority. If WSDOT receives no response within five working days, the Directing Biologist shall have the discretion to dispose of specimens. Initial notification shall be followed by a second notification in writing. All notifications shall provide, at a minimum, the following: date, time, WSDOT point of contact (the Directing Biologist and/or supervisor), project name (with USFWS and/or NMFS tracking number, if available), precise location of incidentally killed, injured and/or unrecovered fish, number of specimens and species, cause of death or unrecoverable injury, and measures taken to address the cause of mortality. If the limit of authorized incidental take is exceeded, the written notification shall also include an explanation of the circumstances causing or contributing to take.

(5) The final condition of the IWA, including temporary bypass, shall be documented in qualitative terms, including any obvious signs of channel bed or bank instability resulting from work. WSDOT shall document any remedial actions taken to correct channel instability as well as the final condition of the IWA.

## **Safety**

Implementing the FEP must comply with WSDOT safety requirements. In certain circumstances, it may be appropriate to conduct work without an IWA (not move fish) to ensure safety. In-water work at night is generally not permissible. If the Directing Biologist determines that night work is required, it must be pre-approved by WSDOT management, including the safety officer, as well as regulatory agencies with jurisdiction.

## **Equipment Sanitation**

To minimize the risk of spreading invasive species, aquatic parasites, and/or disease, the Directing Biologist shall ensure that all equipment and materials are cleaned and dried per protocol<sup>7</sup> before using them at another aquatic area. It is recommended having two or more outfits for different locations on consecutive days. Once equipment is fully dried, it should remain dry for at least 48 hours before use. Felt-soled shoes are prohibited.

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<sup>7</sup> Need citation here – WSDOT protocol?

## APPENDIX A - TRAINING REQUIREMENTS

### Directing Biologist

1. Completion of a two-day electrofishing class.
2. Training in fish ecology and identification.
3. 100 hours of electrofishing experience in the Pacific Northwest (PNW), at least 20 hours of which should have been in the last 5 years in the PNW.
4. Possession of a current CPR certification.
5. Possession of a current first aid certification.
6. Demonstrated understanding of aquatic invasive species and the appropriate decontamination methods.
7. Demonstrated ability to interpret contract plan sheets/specification, contractor schedule and plans prepared by the contractor.
8. Ability to move fish per the most current version of the “WSDOT Fish Exclusion Protocols and Standards”
9. Must develop and deliver on site field training that includes the following elements:
  - (a) Safety plan.
  - (b) Fish exclusion plan.
  - (c) Role and responsibility of each participant. Assisting staff may include WSDOT and consulting biologists, and non-biologists (contractors) assigned limited responsibilities. The directing biologist will provide constant supervision when assigning responsibilities to contractors.
  - (d) Fish identification and species expected.
  - (e) Fish handling techniques.
  - (f) Seine, net, and electrofisher techniques (and electrofisher settings).
  - (g) Basic terminology (galvanotaxis, narcosis, and tetany).
  - (h) How electrofishing attracts fish.
  - (i) How to recognize signs of fish stress or injury.
  - (j) Sorting fish by size.
  - (k) Proper fish holding in buckets to ensure water quality and address predation
  - (l) Hand cleanliness and gear sanitation protocol.
  - (m) Review of common mistakes.
  - (n) Discuss personal floatation devices, if required.

### Trained Biologists

People without a class or 100 hours – “trained” is a good classification for people that have worked under a directing bio and could operate an electrofisher under direct supervision (have to have 40 hours in USFWS protocol). In other words, people who have the experience but maybe not the time but will get the experience/time to qualify as a directing bio because they are under the direct supervision of the directing bio.

**Assisting Staff**

1. Must possess training, knowledge, skills and ability to ensure proper handling of fish and safety of staff conducting work (see Directing Biologist responsibility #9 above).
2. Possession of a current first aid certification and current CPR certification (this should be a standard for all assisting staff and is typically included in conjunction with first aid certification).