APPENDIX E:
FISH EXCLUSION PROTOCOL

January 2003

INTRODUCTION

Road Maintenance activities frequently require work within streams that contain salmonids. Some of these activities—such as culvert replacements and ditch maintenance within salmonid bearing streams—require a site to be temporarily dewatered. In such cases, BMPs are used to minimize or reduce deleterious impacts to aquatic resources. Fish and other wildlife removal from the work area is allowable under a special collection permit required by the Washington State Department of Fish and Wildlife (WDFW). Fish exclusion from the work site prior to dewatering must be done in accordance with the protocols set forth in this appendix.

ROAD MAINTENANCE ACTIVITIES THAT MAY REQUIRE FISH EXCLUSION

The following are road maintenance activities that may require the use of fish exclusion.

Watercourses and Streams

Repair, replacement, installation and maintenance tasks performed on watercourses or streams may include the following activities: structural repair/replacement, slope stabilization, sediment removal, vegetation management, debris removal, and habitat maintenance or improvements.

Stream Crossings

Repair, maintenance, cleaning, installation or replacement/upgrade of stream-crossing facilities such as pipes, arch pipes, box culverts, fish ladders, weirs, sediment pools, and bridges.

Bridge Maintenance

Bridge maintenance activities include repairing, replacing, maintaining the following bridge components: superstructure, footings, piers, supports, abutments, and ramps.

Emergency Slide/Washout Repair

Slide and washout repair activities include the following: removal of slide/washout material from the ROW, back-filling or stabilizing slope, reestablishment of damaged roadway features, repairing and cleaning drainage system, and re-vegetating or armoring with rock.

ADMINISTRATION

Prior to dewatering the site, aquatic life (vertebrate species) are temporarily excluded and relocated out of the work area. Fish exclusion is done under the supervision of environmental support staff.

PERMITS

As mentioned, fish and other wildlife removal from the work area is allowable under a special collection permit required by WDFW. Those permit conditions must be followed. A copy of all necessary permits must be in the possession of any persons authorized to collect wildlife, food fish, and/or shellfish.

TRAINING

A qualified environmental staff member, trained by WDFW or USFWS staff, will conduct the training program. Training must occur before an inexperienced crew begins fish exclusion techniques, including electrofishing. Training must occur in waters that do not contain ESA-listed fish.

The training program will include the following elements:

1. Fish handling techniques and fish identification.
2. How to monitor and install block nets.
3. A demonstration of the proper use of seines and electrofishing equipment, the role each member of the crew performs, and basic gear maintenance.
4. An explanation of how electrofishing attracts fish.
5. An explanation of how gear can injure fish and how to recognize signs of injury.
6. Definitions of basic terminology: e.g. galvanotaxis and tetany.
7. A review of these guidelines and the equipment manufacturer's recommendations.
8. A field session in which trainees actually perform each role on the netting and electrofishing crew.
9. Field supervision by the environmental staff member during the first few days of electrofishing.
10. Only a backpack electrofisher will be used.

INFORMATION LOGS

Each species and year-class is recorded in bound field notebooks. Year-class designations may be used to allow a rapid estimate of length to minimize fish handling time. Salmonids with fork lengths of approximately 60 millimeters or less will be classified as 0+ age fish; and fish over 60 millimeters will be classified as 1+ age fish. Field notes may also include information such as date, personnel, time, general site conditions, weather, stream temperature, conductivity, length of stream reach, methods used, and any other general comments. Data collected is used for research purposes and clear/concise documentation is important. Any injuries or mortalities during fish exclusion will be documented and reported if it involves an ESA-listed species.

Contact with an ESA-listed species during fish exclusion activities will be documented and reported to the Services. Specific information should include: date of collection; site location; county; Water Resource Inventory Area (WRIA); stream name; section, township, range; common species name; scientific name; length; number of individuals; method of removal; and specimen disposition.

WORKSITE FISH EXCLUSION

Several techniques are used to reduce any impacts to the affected species that are handled during exclusion. Fish exclusion techniques depend on the characteristics of the affected reach. These factors may include, but are not limited to, the following:

- Substrate composition.
- Water depth and velocity.
- Vegetation characteristics.
- Bank conditions.
- Debris or obstructions present within the channel.

The following is the proper sequence for fish exclusion:

- Isolate the area (block nets).
- Dip, seine, or fyke net exclusion.
- Electrofishing (as determined by permit and site conditions)
- Dewatering (and fish exclusion).
- Fish identification and release.
- Remove block nets.

ISOLATE THE AREA

Install block nets at upstream and downstream locations to isolate the entire affected stream reach and prevent fish and other aquatic wildlife from moving into the work area. Block net mesh size, length, type of material, and depth will vary based on site conditions. Generally, block net mesh size is the same as seine material (9.5 millimeters stretched). Block nets are installed securely along both banks and in channel to prevent failure during unforeseen rain events or debris accumulation. Some locations may require additional block net support such as galvanized hardware cloth, additional stakes, or metal fence posts. Block nets are left in place throughout the maintenance activity and may require leaf and debris removal to ensure proper function. Following initial environmental staff oversight, a staff person should be designated to monitor and maintain the nets. Crew supervisors, leads, and/or crewmembers may check these nets. Block nets should be checked regularly for proper performance..

DIP, SEINE OR FYKE NET EXCLUSION

Once the stream reach has been isolated, all attempts to remove fish and other aquatic life are made with the least amount of handling. Aquatic life is captured by hand or with dip nets and immediately put in dark-colored 5-gallon buckets filled with clean stream water.

Net drags or seining through the isolated stream reach may also be used. Depending on the site, various lengths of 9.5 mm stretched nylon mesh minnow seines are used throughout the isolated stream reach. This protocol is summarized as follows:

> The seine is approximately 3 feet wide and of varying lengths with approximately 15 feet of rope attached to either end. Sets are conducted with one person on shore and one to two people working the other end of the net through the isolated stream reach area. Once the net is out and the lead line dropped to the bottom, the other end of the 15-foot line is brought to shore and both ends of the net are pulled in quickly in tandem.

Fyke nets or minnow traps may also be used to exclude fish from the affected reach. Use of the traps depends on reach characteristics mentioned earlier.

ELECTROFISHING GUIDELINES

Electrofishing is employed when other methods prove ineffective. Use of electrofishing may be determined through permit requirements and/or site conditions. It may not be recommended in all situations.

The following guidelines are recommended for all electrofishing sessions.

1. No electrofishing in anadromous waters from October 15th to March 1st. No electrofishing in resident waters from November 1st to May 15th. In order to avoid contact with spawning adults or active redds, environmental staff must conduct a careful visual survey of the area to be sampled before beginning electrofishing. Electrofishing will only be conducted at other times of the year in response to emergency activities. Electrofishing at other times of the year may require mitigation. Specific mitigation requirements recommended by the NMFS, USFWS, and WDFW will be followed.

   Prior to conducting electrofishing activities, a biologist, experienced with the life history timing of local fish species, should be notified to determine possible presence of ESA listed fish.

2. Equipment must be in good working condition and operators should go through the manufacturer's preseason checks, adhere to all provisions, and record major maintenance work in a logbook.

3. Measure conductivity and set voltage as follows:

Conductivity (m**mhos/cm)**	**Voltage**
Less than 100	900 to 1100
100-300	500 to 800
Greater than 300	to 400

   In areas of high turbidity, measure conductivity as conditions change to maximize fishing success.

4. Only Direct Current (DC) or Pulsed Direct Current (PDC) should be used.

5. Each session should begin with pulse width and rate set to the minimum needed to capture fish. These settings should be gradually increased only to the point where fish are immobilized and captured. Start with pulse width of 500ms and do not exceed 5 milliseconds.

Pulse rate should start at 30 Hz and work carefully upwards. In general, exceeding 40 Hz will injure more fish.

6. Fish should not come in contact with the anode. The zone of potential fish injury is 0.5m from the anode. Care should be taken in shallow waters, undercut banks, near structures such as wood, or where fish can be concentrated in high numbers because in such areas the fish are more likely to come into close contact with the anode.

7. Electrofishing should be performed in a manner that minimizes harm to fish. The stream segment should be worked systematically, moving the anode continuously in a herringbone pattern through the water. Do not electrofish one area for an extended period of time. Remove fish from the electrical field immediately; do not hold fish in net while continuing to net additional fish.

8. Crew members should carefully observe the condition of the excluded fish. Dark bands on the body and longer recovery times are signs of injury or handling stress. When such signs are noted, the settings for the electrofishing unit may need adjusting. Each fish should be completely revived before releasing upstream of the block nets. ESA specimens will be released as soon as possible upstream of the block nets in an area that provides refuge.

9. Fish should be handled properly. A healthy environment for the stressed fish must be provided. There should not be overcrowding in the buckets and holding time should be minimized. Large fish should be kept separated from smaller prey-sized fish to avoid predation during containment. Water to water transfers, the use of shaded or dark containers, and supplemental oxygen shall be considered in designing fish handling operations.

DEWATERING

The affected reach shall be dewatered slowly while using dipnets to remove aquatic vertebrates from pools where they may congregate. These pools are frequently located at culvert inlet and outlets. Special attention should be placed at culvert outfalls where fish sheltering in pipes will exit.

Pumps, which are used to temporarily bypass water around work sites, should have their intakes fitted with a smaller mesh screen or put in a slotted bucket to prevent aquatic life from entering the pump hose. The screen or bucket

shall be installed, as a precautionary measure, to prevent any aquatic vertebrates that may have been missed in the exclusion process. The screen or bucket will also prevent fish and other wildlife from entering the pump if a block net should fail.

FISH RELEASE

Aquatic vertebrates shall be released to a location upstream of the activity and block net. They should be released into an area that provides equivalent or better habitat than the location from which they were removed. Aquatic vertebrates may be released downstream of the block nets only if this placement provides better protection and there is no other practical alternative.

If the isolated stream reach is large and many fish are expected, several buckets should be available with clean stream water to hold the fish until counting and measuring can be completed. These buckets should be equipped with air pumps to maintain proper dissolved oxygen levels. Frequent monitoring of bucket temperature and well being of the specimens should be done to assure that all specimens will be released unharmed. Perforated buckets may also be used and placed upstream of the block nets until the fish are counted.

Handle each ESA-listed fish with extreme care and keep them in water during sampling and processing procedures to the maximum extent feasable. The buckets should contain adequate amounts of well-circulated water. When a mixture of species are caught, ESA-listed fish should be processed first to minimize the duration of handling and stress.

REMOVE BLOCK NETS:

Block nets should be removed, following completion of the activity, as soon as the work area is stabilized. Block nets should not be left in place for an extended amount of time. Block nets should be removed with care and checked for aquatic vertebrates.

CITATIONS AND OTHER REFERENCES

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