APPENDIX E

DEWATERING AND FISH CAPTURE PROTOCOL

Appendix E: Dewatering And Fish Capture Protocol

Work to facilitate habitat restoration may occur in isolation from flowing waters or in flowing water depending on site conditions to minimize impacts to salmonids.

If bull trout or other listed salmonids could be present in the vicinity of the project use the following dichotomous key to determine which dewatering protocol and timing window you need to implement for your project. This key references information within the *Draft Recovery Plan for the Coastal-Puget Sound Distinct Population Segment of Bull Trout Volumes I and II* (USFWS 2004a; USFWS 2004b), and the *Draft Recovery Plan for the Columbia River Distinct Population Segment of Bull Trout* (USFWS 2002). http://www.fws.gov/pacific/bulltrout/recovery.html. If you have questions, contact the USFWS.

1. Is the project located within a documented or potential bull trout Local Population Area that is excluded from coverage under this programmatic consultation (see Table 11)?
    a. Yes – Dewatering in a documented or potential bull trout Local Population Area in eastern Washington is not covered under this programmatic consultation. Complete an individual section 7 consultation for the project.
    b. No – go to 2

2. Is the project located within a water body where any listed salmonids are likely to be present? For specific bull trout areas where projects are permitted see Table 12.
    a. Yes – go to 3
    b. No - use "Protocol for Dewatering Outside High Likelihood Listed Fish Areas"

3. Is the stream flow at the time of project construction anticipated to be greater than or equal to 5 cubic feet per second **and** is the dewatered stream length (not including the culvert and plunge pool length, if present) greater than or equal to 33 ft?
    a. No - use "Protocol II for Dewatering Outside High Likelihood Listed Fish Areas" (see below);
    b. Yes - use "Protocol I Dewatering Within High Likelihood Listed Fish Areas"; and consult with a USFWS bull trout biologist staff on appropriate timing window.

Table 11: Bull Trout Spawning and Rearing Areas that are Excluded from the Programmatic[8]

(Listed in order of WRIA number)

Management or Recovery Unit	Core Area	Spawning and Rearing Areas Excluded (no in-water work is permitted in these areas)
Umatilla-Walla Walla River Basin	**Walla Walla Core Area WRIA 32**	Mill Creek and tributaries
		Wolf Fork above Coates Creek
		N Fk Touchet and tributaries upstream of Wolf Fk confluence
		S Fk Touchet River and tributaries above Griffin Creek
Snake River Basin	**Asotin Creek**	N Fk Asotin Creek including Charley and Cougar Creeks – above confluence with Charley Cr
	Tucannon River **WRIA 35**	Tucannon River from confluence with Little Tucannon Upper Tucannon River and tributaries above confluence with Hixon Creek Cummings Creek
Middle Columbia River Basin	**Yakima River Core Area**	**WRIA 37** N and MFk Ahtanum Creek - above the confluence of S Fk S Fk Ahtanum Creek – above confluence with N Fk Ahtanum
		WRIA 38 Rattlesnake Creek – upstream of confluence with Naches River
		WRIA 39 Taneum Creek – upstream of Taneum Campground Upper Yakima – upstream of Lake Easton Dam Cle Elum River – upstream of confluence with Yakima River N Fk Teanaway – upstream of confluence with Yakima River
Upper Columbia River Basin	**Wenatchee River Core Area WRIA 45**	Upper Wenatchee and tributaries above confluence with the Chiwawa, including Nason Cr, Little Wenatchee, White and the Chiwawa Rivers
		Chiwaukum Creek and Icicle Creek– upstream from confluence with the Wenatchee River Ingalls Creek- upstream of confluence with Peshastin Creek
	Entiat River Core Area WRIA 46	Entiat River – above confluence with the Mad River
		Mad River – above confluence with Entiat River
	Methow River Core Area WRIA 48	Upper Methow tributaries - Lost River, Early Winters Cr, W Fk Methow, Goat Cr, and Wolf Cr Chewack River – upstream of Twentymile Cr
		Twisp River and tributaries above confluence of, and including, Little Bridge Creek
		Gold Cr – upstream of confluence with Methow River
Northeast	**Pend Oreille River**	Le Clerc Creek – upstream of mouth

[8] Spawning and rearing areas on lands administered by the U.S. Forest Service, National Park Service, or Bureau of Land Management are not listed because these lands are not included in this Programmatic

Management or Recovery Unit	Core Area	Spawning and Rearing Areas Excluded (no in-water work is permitted in these areas)
Washington	**WRIA 62**	

Table 12 List of streams and marine areas that important for bull trout recovery where in-water work is permitted

Management Unit	Bull Trout Areas
Olympic Peninsula - Marine	Hood Canal and independent tributaries Strait of Juan de Fuca and independent tributaries (includes Bell, Morse, Ennis, Siebert Creeks) Pacific Ocean and independent coastal tributaries (includes Goodman, Mosquito, Cedar, Steamboat, Kalaloch and Joe Creeks, Raft, Moclips and Copalis Rivers) Lower Chehalis River/Grays Harbor and independent Tributaries (includes Humptulips, Wishkah, Wynoochee and Satsop Rivers)
Olympic Peninsula - Freshwater	**Dungeness River** – mouth to RM 10 **Skokomish River** – mouth to head of Cushman Reservoir **Hoh River** – mouth to National Park boundary **Queets River** – mouth to National Park boundary **Quinault River** - mouth to National Forest boundary
Puget Sound - Marine	All marine shorelines including North Puget Sound, Main Basin, Whidbey Basin, and South Puget Sound
Puget Sound - Freshwater	Samish River, Whatcom Creek, Squalicum Creek, Duwamish and lower Green River, and Lower Nisqually River including the Nisqually River estuary and McAllister Creek (FMO areas outside of core areas)
	Lake Washington including the following: lower Cedar River; Sammamish River; Lakes Washington, Sammamish, and Union; and Ship Canal
	Nooksack River – mouth to National Forest boundary (North and South Forks) **Skagit River** – mouth to National Forest boundary **Stillaguamish River** – mouth to headwaters of N Fork; Deer Creek – mouth to National Forest boundary; S Fork and Canyon Cr – mouth to National Forest boundary **Snohomish/Skykomish** – mouth to confluence of Skykomish and Snoqualmie Rivers; Pilchuck River; Snoqualmie River to falls; Tolt River; Skykomish River – mouth to National Forest boundary, including Sultan River, Woods Creek and Wallace River; S Fk Skykomish to National Forest boundary **Puyallup River** – mouth, including Mowich River, to National Park boundary; **Carbon River** – mouth to National Forest boundary; **White River** – mouth to National Forest boundary

Management Unit	Bull Trout Areas
Lower Columbia	**Lewis River** – mouth to RM 75 (Upper Falls), including Swift, Yale, and Mervin Reservoirs **Klickitat River** – mouth to confluence of W FK Klickitat
	Mainstems of the Columbia, Snake, Walla Walla, Pend Oreille, and Grande Ronde Rivers
Middle Columbia River Basin	**Ahtanum Creek** – mouth to confluence of N and S Forks **Naches River** – mouth to confluence of Little Naches and Bumping River **Tieton River** – mouth to Rimrock Lake **Yakima River** – mouth to Easton (RM 203) and Teanaway River
Upper Columbia River Basin	**Wenatchee River** – mouth to confluence of the Chiwawa; **Peshastin Cr** – mouth to confluence of Ingalls Cr; **Chewack River** – confluence with Wenatchee to RM 20; **Beaver Cr** – mouth to Blue Buck Cr **Entiat River** – mouth to confluence with Mad River **Methow River** – mouth to confluence of Lost River
Northeast Washington Pend Oreille River	**Pend Oreille River**; **Tacoma Cr** - mouth to Little Tacoma; **Small Creek** – mouth to forks; **Sullivan Creek** to and including Sullivan Lake
Walla Walla River Basin	**Touchet River** – mouth to forks; **S Fk Touchet River** – to confluence of Griffin Cr **N Fk Touchet** to Wolf Fork; **Wolf Fork** to confluence of Coates Cr **Mill Creek** and tributaries
Snake River Basin	Mainstem **Snake and Grande Ronde Rivers**; **Asotin Creek** – mouth to confluence of N Fk Asotin and Charley Cr; **Tucannon River** – mouth to confluence of Hixon Cr

Protocol I - Dewatering Within High Likelihood Listed Fish Areas

A. Fish Capture – General Guidelines

1. Fish Capture Methods
    a. Minnow traps. Optional. Traps may be left in place prior to dewatering and may be used in conjunction with seining. Once dewatering starts, minnow traps should only be used if there is someone present to check the traps every few hours, and remove the traps once the water level becomes too low.
    b. Seining. Required. Use seine with mesh of a size to ensure entrapment of the residing ESA-listed fish and age classes.
    c. Sanctuary dip nets. Required. Use in conjunction with other methods as area is dewatered.

d. Electrofishing. Optional. Use electrofishing only after other means of fish capture have been exhausted or where other means of fish capture are not be feasible. Applicants shall adhere to NMFS Backpack Electrofishing Guidelines (NMFS 2000).

2. Fish capture operations will be conducted by or under the supervision of a fishery biologist experienced in such efforts and all staff working with the capture operation must have the necessary knowledge, skills, and abilities to ensure the safe handling of all ESA-listed fish.

3. The applicant must obtain any other Federal, State and local permits and authorizations necessary for the conduct of fish capture activities.

4. A description of any capture and release effort will be included in a post-project report, including the name and address of the supervisory fish biologist, methods used to isolate the work area and minimize disturbances to ESA-listed species, stream conditions before and following placement and removal of barriers; the means of fish removal; the number and size of fish removed by species and age class; condition upon release of all fish handled; and any incidence of observed injury or mortality.

5. Storage and Release. ESA-listed fish must be handled with extreme care and kept in water at all times during transfer procedures. The transfer of ESA-listed fish must be conducted using a sanctuary net that holds water during transfer, whenever necessary to prevent the added stress of an out-of-water transfer. A healthy environment for non-ESA listed fish shall be provided by large buckets (five gallon minimum to prevent overcrowding) and minimal handling of fish. The water temperature in the transfer buckets shall not exceed the temperature of cold pool water in the subject stream. Retain fish the minimum time possible to ensure that stress is minimized, temperatures do not rise, and dissolved oxygen remains suitable. Release fish as near as possible to the isolated reach in a pool or area that provides cover and flow refuge.

B. Dewater Instream Work Area and Fish Capture

Fish screen. Except for gravity diversions that have gradual and small outfall drops directly into water, all water intake structures must have a fish screen installed, operated, and maintained in accordance with NMFS Guidelines (NMFS 1997; Chapter 11 in NMFS 2008).

The sequence for stream flow diversion will be:
Note: this sequence will take one 24-hour period prior to construction to complete (of which 12 hours are for staged dewatering with 6 hours overnight). We suggest you start in the morning the day before project construction is scheduled and leave the reach dewatered overnight according to instruction below.

1. Install flow conveyance devices (pumps, discharge lines, gravity drain lines, conduits, and channels), but do not divert flow.
2. Install upstream barrier. Allow water to flow over upstream barrier.

3. Install block net at upstream end of work area. Block nets will be checked every 4 hours, 24 hours a day. If any fish are impinged or killed on the nets they will be checked hourly.
4. Reduce flow over upstream barrier by one-third for a minimum of 6 hours.
5. Inspect as discharge is diminishing and in dewatered areas for stranded and trapped fish and remove them with sanctuary dip nets.
6. Reduce flow over upstream barrier by an additional one-third for a minimum of 6 hours.
7. Again, inspect dewatered areas for stranded and trapped fish and remove them with sanctuary dip nets.
8. Leave the project area in a stable, low flow (one third of flow) condition, overnight, allowing fish to leave the area volitionally.
9. In the morning, remove any remaining fish from the area to be dewatered using seines and/or hand held sanctuary dip-nets.
10. Divert upstream flow completely.
11. Install downstream barrier if necessary (only in low gradient, backwatered reaches).
12. If water remains within the work area; seine, dip net, and lastly electrofish (if using this technique), the project area until catch rates have reached no fish for 3 consecutive passes. Move rocks as needed to flush fish and effectively electrofish the work area.
13. If needed, pump water out of isolated pools within the project area to a temporary storage and treatment site or into upland areas and filter through vegetation prior to reentering the stream channel. Continue to seine, dip net and electrofish while pumping.
14. If fish continue to be captured, shut pump off before average water depths reach one foot. Continue to seine, dip net and electrofish until no fish are caught for 3 consecutive passes.
15. Pump dry and check substrate for remaining fish.
16. Continue to pump water from the project area as needed for the duration of the project.

The diversion structure is typically a temporary dam built just upstream of the project site with sand bags that are filled with clean gravel or stream/floodplain rock and covered with plastic sheeting. A portable bladder dam or other non-erosive diversion technologies may be used to contain stream flow. Mining of stream or floodplain rock can be used for diversion dam construction if it does not result in significant additional floodplain or stream disturbance. Often gravel has to be moved to key in logs in which case it makes sense to use this gravel for the diversion structure.

The temporary bypass system must consist of non-erosive techniques, such as a pipe or a plastic-lined channel, both of which must be sized large enough to accommodate the predicted peak flow rate during construction. In cases of channel rerouting, water can be diverted to one side of the existing channel.

Dissipate flow at the outfall of the bypass system to diffuse erosive energy of the flow. Place the outflow in an area that minimizes or prevents damage to riparian vegetation. If the diversion inlet is a gravity diversion and is not screened to allow for downstream passage of fish, place diversion outlet in a location that facilitates gradual and safe reentry of fish into the stream channel.

C. Rewater Instream Work Area

Remove stream diversion and restore stream flow. Heavy machinery operating from the bank may be used to aid in removal of diversion structures. Slowly re-water the construction site to prevent loss of surface water downstream as the construction site streambed absorbs water and to prevent a sudden increase in stream turbidity. Look downstream during re-watering to prevent stranding of aquatic organisms below the construction site.

All stream diversion devices, equipment, pipe, and conduits will be removed and disturbed soil and vegetation will be restored after the diversion is no longer needed.

Protocol II - Dewatering Outside High Likelihood Listed Fish Areas

If bull trout or other listed salmonids are captured at any time during the dewatering process, immediately notify a USFWS bull trout biologist or NMFS biologist and obtain guidance to either continue to dewater and remove fish or stop activities and re-water the project site.

Normal guidance:

1. If you encounter listed fish at or prior to step 3 switch to Protocol I
2. If you encounter listed fish after step 3, continue to dewater and remove fish, paying close attention to presence of additional listed salmonids.

A. Fish Capture – General Guidelines

1. Fish Capture Methods
    a. Minnow traps. Optional. Traps may be left in place prior to dewatering and may be used in conjunction with seining. Once dewatering starts, minnow traps should only be used if there is someone present to check the traps every few hours, and remove the traps once the water level becomes too low.
    b. Seining. Required. Use seine with mesh of such a size to ensure entrapment of the residing ESA-listed fish and age classes.
    c. Sanctuary dip nets. Required. Use in conjunction with other methods as area is dewatered.
    d. Electrofishing. Optional. Use electrofishing only after other means of fish capture have been exhausted or where other means of fish capture are not be feasible. Applicants shall adhere to NMFS Backpack Electrofishing Guidelines.

2. Fish capture operations will be conducted by or under the supervision of a fishery biologist experienced in such efforts and all staff working with the seining operation must have the necessary knowledge, skills, and abilities to ensure the safe handling of all ESA-listed fish.

3. The applicant must obtain any other Federal, State and local permits and authorizations necessary for the conduct of fish capture activities.

4. A description of any seine and release effort will be included in a post-project report, including the name and address of the supervisory fish biologist, methods used to isolate the

work area and minimize disturbances to ESA-listed species, stream conditions before and following placement and removal of barriers; the means of fish removal; the number and size of fish removed by species; conditions upon release of all fish handled; and any incidence of observed injury or mortality.

5. Storage and Release. Fish must be handled with extreme care and kept in water to the maximum extent possible during transfer procedures. A healthy environment for the stressed fish shall be provided by large buckets (five gallon minimum to prevent overcrowding) and minimal handling of fish. The temperature of the water shall not exceed the temperature in large deep holding pools of the subject system. The transfer of any ESA-listed fish must be conducted using a sanctuary net that holds water during transfer, to prevent the added stress of an out-of-water transfer. Retain fish the minimum time possible to ensure that stress is minimized, temperatures do not rise, and dissolved oxygen remains suitable. Release fish as near as possible to the isolated reach in a pool or area that provides cover and flow refuge.

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The sequence for stream flow diversion would be as follows:

1. Install flow conveyance devices (pumps, discharge lines, gravity drain lines, conduits, and channels), but do not divert flow.
2. Install block net at upstream end or work area.
3. Seine and dip net through the entire project area in a downstream direction, starting at the upstream end; thereby moving fish out of the project area. Then, if necessary electrofish.
4. Install upstream barrier and divert upstream flow completely.
5. Capture any remaining fish using hand held dip-nets.
6. Install downstream barrier if necessary (only in low gradient backwatered reaches).
7. If water remains within the work area; seine and dip net, if necessary electrofish the project area until catch rates have reached no fish for 3 consecutive passes.
8. Pump water out of isolated pools within the project area to a temporary storage and treatment site or into upland areas and filter through vegetation prior to re-entering the stream channel. Continue to seine, dip net, or electrofish while pumping.
9. If fish continue to be captured, shut pump off before average water depths reach one foot. Continue to seine, dip net, or electrofish until no fish are caught for 3 consecutive passes.
10. Pump dry and check substrate for remaining fish and remove them.
11. Continue to pump water from the project area as needed for the duration of the project.

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sheeting. A portable bladder dam or other non-erosive diversion technologies may be used to contain stream flow. Mining of stream or floodplain rock can be used for diversion dam construction if it does not result in significant additional floodplain or stream disturbance. Often gravel has to be moved to key in logs in which case it makes sense to use this gravel for the diversion structure.

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All stream diversion devices, equipment, pipe, and conduits will be removed and disturbed soil and vegetation will be restored after the diversion is no longer needed.

Literature Cited

NMFS (National Marine Fisheries Service). 1997. Fish Screening Criteria for Anadromous Salmonids. NMFS Southwest Region, (January 1997). 12 p. http://swr.nmfs.noaa.gov/hcd/fishscrn.pdf

NMFS (National Marine Fisheries Service). 2000. Guidelines for Electrofishing Waters Containing Salmonids Listed Under the ESA. http://www.nwr.noaa.gov/ESA-Salmon-Regulations-Permits/4d-Rules/upload/electro2000.pdf

NMFS (National Marine Fisheries Service). February 2008. Anadromous Salmonid Passage Facility Design. http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish_Passage_Design.pdf

USFWS (USFWS). 2002. Bull trout (*Salvelinus confluentus*) draft recovery plan. Chapter One. Fish and Wildlife Service, Portland, Oregon. 137 pp.

USFWS (USFWS). 2004a. Draft Recovery Plan for the Coastal-Puget Sound Distinct Population Segment of Bull Trout (*Salvelinus confluentus*). Volume I (of II): Puget Sound Management Unit. Portland, Oregon. 389 + xvii pp.

USFWS (USFWS). 2004b. Draft Recovery Plan for the Coastal-Puget Sound Distinct Population Segment of Bull Trout (*Salvelinus confluentus*). Volume II (of II): Olympic Peninsula Management Unit. Portland, Oregon. 277 + xvi pp.