

Stepwise Impact Reduction Plan

The U.S. Fish and Wildlife Service (FWS) developed this Stepwise Impact Reduction Plan (SIRP) in collaboration with the National Marine Fisheries Service (NMFS), as part of our Section 7 consultation process on the reintroduction of bull trout (*Salvelinus confluentus*) to the Clackamas River. The SIRP was submitted to NMFS in May 2011 as an amendment to the FWS' December 10, 2010, biological assessment (BA), and thus as part of the Clackamas bull trout reintroduction project.

The purpose of the SIRP is to outline a sequence of management actions that, if necessary, will be taken to minimize impacts to federally listed salmon (*Oncorhynchus spp.*) and steelhead (*O. mykiss*) from the reintroduction of bull trout in the Clackamas River, and the thresholds that would trigger initiation of these actions. Management actions implemented under the SIRP, and the frequency of those actions, will be driven by the population status of the listed Clackamas anadromous salmonid populations and information gathered through the reintroduction project's monitoring and evaluation program, jointly implemented by the FWS, Oregon Department of Fish and Wildlife (ODFW), and the U.S. Forest Service, Mt. Hood National Forest (USFS).

The SIRP is consistent with the adaptive management approach for the project as described in our BA. For the purposes of the SIRP, impacts (whether they can be directly monitored or not) are generally defined as: 1) direct predation on eggs, fry and juveniles of listed anadromous salmonids by bull trout; 2) competition for food and/or shelter between listed anadromous salmonids and bull trout, which could reduce juvenile salmon and steelhead fitness; and 3) predator avoidance behaviors which could reduce passage efficiencies for juvenile salmon and steelhead migrating through Portland General Electric's (PGE) Clackamas River Hydroelectric Project.

While FWS and NMFS believe the SIRP will provide much of the guidance necessary to address potential impacts to listed salmon and steelhead from the reintroduction project, we acknowledge our inability to predict all likely impact scenarios and appropriate management responses. As a result, we anticipate the SIRP will be modified as necessary, consistent with the overall adaptive management strategy of the project, in consultation and coordination with NMFS and ODFW, and based on both the monitoring and evaluation program and the conservation status of threatened salmon and steelhead populations in the Clackamas River.

Sequence of Management Actions:

Actions one and two (Table 1 below) represent triggers and associated management actions for bull trout relocation or removal based on geographic locations of detections within defined areas of high vulnerability for juvenile anadromous salmonids due to bull trout predation or predator avoidance behavior. These areas of high vulnerability exist due to the presence of PGE's Clackamas River Hydroelectric Project, a system of dams, reservoirs, and fish bypass facilities which concentrate juvenile anadromous salmonids during certain times of the year. Actions one and two can be implemented at any time by ODFW, FWS, USFS or PGE personnel. Additional detail, such as guidance on agency coordination and notification prior to relocating or removing bull trout, agency personnel authorized to carry out actions one and two, locations to release bull trout that are relocated, and a disposition plan for bull trout that are removed from the Clackamas River, will be developed

prior to moving bull trout to the Clackamas River in 2011. This additional information will be added to the SIRP (which will also be appended to the Project's Implementation, Monitoring and Evaluation Plan) and shared with all agencies and partners involved in the implementation and monitoring of the reintroduction project.

In the description of actions three through six, NMFS has established specific critical thresholds relating to the population abundance and productivity of Clackamas populations of coho (*O. kisutch*), spring Chinook (*O. tshawytscha*) and steelhead. We acknowledge that the biological opinion (BO) from NMFS will assume that actions will be taken in accordance with this SIRP, including Table 1 below, if the thresholds (i.e., triggers) are reached. We also acknowledge the need for future coordination between the Service, NMFS, ODFW, and where applicable, other project partners, on implementation of the SIRP actions.

Table 1: Bull Trout and Anadromous Salmonid Thresholds Requiring Management Action

Action #	Bull Trout Threshold	Anadromous Salmonid Thresholds	Management Action
1	Subadult or adult bull trout (> 250mm or 10 inches) at any time are found staging (minimum 3 days) in a high vulnerability zone (HVZs) (as opposed to moving through the hydro project area). HVZs include any fish facility of the Clackamas Hydro Project (traps, pipeline, surface collector, dewatering facility, North Fork forebay from the face of the dam to the log-booms (approximately 1000 upstream of the dam), and the River Mill Dam forebay within 1,000 ft of River Mill Dam.	No anadromous salmonid threshold is involved with this action.	Relocation: Bull trout at any time may be captured and relocated from HVZs to approved locations (TBD) upstream of N. Fork Reservoir. Efforts to track the presence of bull trout in HVZs, and associated relocation efforts if thresholds are exceeded, will be concentrated during critical time periods for anadromous smolt migration (April 15 to June 15 and October 15 to December 15) and opportunistic outside of these timeframes.
2	Any tagged subadult or adult bull trout, as described above, that was previously relocated from a HVZ area during a peak juvenile anadromous salmonid migration time period (April 15 to June 15, and October 15 to December 15) reappears in an HVZ area within seven days or three times during a single peak migration period.	No anadromous salmonid threshold is involved with this action. However, if all three Clackamas populations (coho, spring Chinook and steelhead) exceed the recovery target for abundance threshold (VSP scenario) for 3 consecutive years (see Table 2) then removal of bull trout would not be warranted and would not occur under any scenario and from any location in the Clackamas River.	Removal: Individual bull trout will be removed from the population per the disposition plan (TBD).
3	15 or more subadult or adult bull trout are removed from the population as a result of management action number two above.	Adult returns for coho, spring Chinook or steelhead in the Clackamas River drop below the <u>minimum abundance threshold</u> (MAT) established by LCRTRT (see Table 2) (a single annual occurrence for any population).	Additional Study: If the bull trout threshold and the MAT are reached (for one or more populations annually), initiate a detailed bioenergetics and life cycle modeling analysis to evaluate the potential contribution of bull trout to the observed population trends of listed anadromous salmonids in the Clackamas. This exercise will include an evaluation of other lower Columbia River anadromous salmonid populations and associated hatchery programs to determine the degree to which ocean conditions

			and other factors may be responsible for current population trends in the Clackamas River.
4	Same as #3 above. And, bioenergetics analysis and life cycle modeling indicate that bull trout are likely contributing to the observed population-level trends for anadromous salmonids in the Clackamas River.	<p>For one or more populations, the number of juveniles exiting past North Fork Dam drops below the <u>anadromous salmonid critical threshold</u> (see Table 2)</p> <p style="text-align: center;"><u>and/or</u></p> <p>For one or more populations, the coho, Chinook or steelhead counts at North Fork Dam drop below the <u>smolts per adult critical threshold</u> (see Table 2).</p>	<p><u>Suspension of Subadult and Adult Fish Transfers:</u> If the bull trout threshold and either the <u>anadromous salmonid critical threshold</u> or <u>smolts per adult critical threshold</u> are reached for one or more populations, the transfer of subadult and adult bull trout to the Clackamas will be suspended. Transfers of these life stages may resume in subsequent years if the above thresholds are not triggered for both bull trout and listed anadromous salmonids.</p> <p>If these thresholds are exceeded for two years in a row, a replication and possible expansion of the 2009-2010 baseline foodweb study (Lowery & Beauchamp 2010) may be implemented.</p>
5	Same as #3 above. And, bioenergetics analysis, life cycle modeling, and possibly food web studies indicate that bull trout are likely contributing to the observed population-level trends for anadromous salmonids in the Clackamas River.	Same as #4 above, but either threshold is reached twice for a single population or three times for any combination of populations in four years. (see Table 2)	<p><u>Reduce Bull Trout Abundance & Suspend all Fish Transfers:</u> If the bull trout threshold and either the <u>anadromous salmonid critical threshold</u> or <u>smolts per adult critical thresholds</u> for this action level are reached: 1) suspend transfers of all bull trout to the Clackamas River; and, 2) consult and coordinate with ODFW to allow a limited harvest fishery on bull trout in the Clackamas River to reduce subadult and adult abundance. The number of bull trout targeted for harvest will be determined at a later date in coordination with ODFW and NMFS.</p>
6	Bioenergetics analysis, life cycle modeling, food web studies and direct evidence link bull trout to population level impacts to anadromous salmonids in the Clackamas R. at a level that would prevent recovery of these populations.	Same as #4 and 5 above, but either threshold is reached three times for a single population or five times for any combination of populations in five years. (see Table 2)	<p><u>Removal of Bull Trout from the Clackamas:</u> Active pursuit and removal of all life stages (i.e. reversal of action). This action would require that NMFS, ODFW and FWS complete any required administrative process or rule-making necessary to make the change being proposed.</p>

Rationale for Population Indicator Levels: The rationale and Table 2 below were developed by NMFS with data from ODFW, PGE, and the Lower Columbia River Conservation and Recovery Plan for Oregon. NMFS, FWS, and ODFW acknowledge that these numbers may be modified in the future as new data become available and recovery planning progresses. If and when these numbers change, the SIRP will be modified accordingly in coordination with NMFS and ODFW, with input from other project partners). The indicator levels given below in Table 2, focus on two primary concerns:

1. **Freshwater survival of anadromous salmonids relative to pre-bull trout introduction: smolts per adult.** This threshold, smolts produced per adult, is intended to detect any downturn in freshwater productivity, possibly related to bull trout introduction. We analyzed the smolts produced per adult for each species (coho, Chinook, steelhead) over the last 30 years and established the lower quintile (lowest 20%) of the distribution as a threshold of concern. For example, based on the record for coho salmon, this is reached when smolt outmigration falls below 38.1 smolts per adult. For purposes of this SIRP document, this is referred to as the **smolts per adult critical threshold.**
2. **Minimum abundance levels for population persistence: number of smolts outmigrating.** We established 500 adults as an important inflection point in population demographics – it is well below the minimum abundance thresholds and far below the ESA recovery targets for the Clackamas populations of coho, Chinook and steelhead. We then estimated the number of smolts necessary to produce 500 adults given relatively poor conditions. Recognizing that the smolt-to-adult ratio (SAR) can vary considerably depending on the species and the year, we used the lower quintile (lowest 20%) of SARs to set the **anadromous salmonid critical threshold** in order to ensure that if the numbers fall to this crisis level, the necessary actions can be initiated to protect the anadromous population regardless of the cause.

Table 2: Threshold Levels Referred to in Table 1

Adult counts	Coho	Spring Chinook	Steelhead
<u>Minimum Abundance Threshold</u> ¹ : Anadromous salmonid warning indicator : adults counted at North Fork Dam, three year average for coho, four year average for steelhead and Chinook:	2160	780	600
Recovery Target for adult abundance (VSP Scenario)	Very Low Risk ² 11,232 ²	Very Low Risk ⁶ 2314 ³	Low Risk ⁶ 10,671 ⁴
Juvenile Counts			
A. Anadromous salmonid critical threshold : # of coho, steelhead or spring Chinook juveniles leaving the North Fork Reservoir in any year is at or below the lowest quintile of smolts from the thirty year record.	54,431	6,237	20,374
Smolts per adult critical threshold (based on lowest quintile of smolt to adult survival from the thirty year record)	38.1	3.1 (does not account for smolts spilled)	10.2

¹ LCR Conservation and Recovery Plan for Oregon... August 6, 2010 Table 4-4

² LCR Conservation and Recovery Plan for Oregon... August 6, 2010 Figure 6-1

³ UWR Conservation and Recovery Plan for Oregon... October 2010 Table 6-11

**Table 3:
Additional Data (as of May, 2010) For Reference on Clackamas Anadromous Populations.**

Adult counts	Coho	Spring Chinook	Steelhead
Average of lowest 3 Adult Counts	140	853	420
<u>Minimum Abundance Threshold</u> ⁴ : Anadromous salmonid warning indicator (adults counted at North Fork Dam: three year average for coho, four year average for steelhead and spring Chinook):	2160	780	600
Recent Average Adult Count (Source: PGE 2010)	1935	2,381	2346
“Maintain into future” abundance ⁵	8630 ²	1896 ²	4692 ³
Current Clackamas population status (risk of extinction)	Moderate	Moderate	Low to Moderate
Current species status (risk of extinction) ⁶	Very High	Very High	High
Recovery Target for abundance: (VSP Scenario)	Very Low Risk ⁷ 11,232 ²	Very Low Risk ⁶ 2314 ⁸	Low Risk ⁶ 10,671 ⁴
Historic abundance	52,565 ²	27,000 ³	21000 ⁴
Smolts per Adult (Average)	72.10	8.33	18.39
Smolts per Adult (20%)	38.1	3.1	10.2
Smolts per Adult (Low 3)	26.61	1.00	8.51
Juvenile Counts (based on current methods used by PGE to adjust to account for spill, subject to revision by management committee as appropriate)			
Average Smolt Count	87,523	16,588	32,590
Average Smolt Count (20%)	54,431	6,237	20,374
Average Smolt Count (Low 3)	20,355	1995	8,271
Average Smolt to Adult Survival ⁹	3.1%	27.1%	5.7%
SAR (20%)	0.91%	8.34%	2.79%
SAR (Low 3)	0.26%	5.6%	2.0%
Smolts to produce 500 Adults (based on lowest 3 SAR years)	194,611	8,929	25,176
<u>Anadromous salmonid population critical threshold</u> : # of coho, steelhead or spring Chinook juveniles leaving the North Fork Reservoir in any year is at or below the lowest quintile of smolts from the	54,431	6,237	20,374

⁴ LCR Conservation and Recovery Plan for Oregon... August 6, 2010 Table 4-4

⁵ LCR Conservation and Recovery Plan for Oregon... August 6, 2010 (§ 6.2.2 Population-Specific Scenarios) defines

“maintain into future” as doing the minimum amount necessary to achieve only the 20 percent increase in abundance to meet unknown future threats and maintain the current risk class

⁶ Ford et al 2010

⁷ LCR Conservation and Recovery Plan for Oregon... August 6, 2010 Figure 6-1

⁸ UWR Conservation and Recovery Plan for Oregon... October 2010 Table 6-11

⁹ SAR for Coho assumed 3 year life cycle, for Steelhead and Chinook salmon a 50:50 split for 4 and 5 year old returning adults.

thirty year record,			
Smolts per adult critical threshold (based on lowest quintile of smolt to adult survival from the thirty year record)	54,945	5,995	17,921