- If fish handling is required it will be done by either electrofishing or hand-netting after de-watering has occurred. Fish handling will be accomplished utilizing personnel from agencies such as the USFS, IDFG, Tribes, or other qualified personnel with appropriate training and experience.

- If riprap is required to ensure proper bank stabilization, it will be placed in a manner that will not further constrict the stream channel.

- If shrub removal is required, it will be done in such a way that the root mass is left in place for stabilization purposes. An equivalent or greater amount of shrubs and riparian vegetation will be planted after project construction.

- All practicable measures will be taken to prevent bridge debris from entering the stream.

- To minimize the potential for introducing sediment to the aquatic system, sediment fences or other erosion control measures will be placed between ground-disturbing activities and live water. Ground disturbance will not occur during wet conditions (i.e., during or immediately following rain events).

- No machinery or implements will enter the live stream and temporary cofferdams will be constructed, if necessary, to de-water existing pier sites during pier removal.

- All staging, fueling, and storage areas will be located away and adequately buffered from aquatic areas.

1.3.2.20. Culvert Installation (New Culverts and Replacement of Existing Culverts)

Installation of culverts requires consideration for traffic management. Unless a nearby and short alternate route can be used, generally the culvert will need to be replaced in two phases. Each phase, except for short delays, must allow traffic to flow continuously and safely through the project.

Installation or replacement of a culvert involves first excavating in the roadway prism to a sufficient depth to reach the flow line or grade of the waterway being conveyed. The slopes of the excavation need to be laid back such that they will not collapse and close the excavation prior to installation of the new culvert. The amount or slope that the material is laid back is dependent on the material type. For example, sand and gravels require the slope to be laid at a much shallower slope than rocky material does. The shallower the slope, the wider the trench will be at tbe roadway surface. Once the material has been excavated such that personnel can safely work in the trench, the culvert installation/replacement can be conducted.

Culverts will be installed/replaced either in their entirety or one half-length at a time. If replacing a culvert, the area will be excavated, one-half of the old culvert will be removed, the location where the new culvert is to go will be bedded, and half of the new culvert will be installed. Material will be brought in above the culvert and properly compacted to avoid future settlement of the roadway. This process will be repeated on the opposite side of the highway, and the two halves will be connected with a band. Material will again he brought in above the culvert and properly compacted to avoid settlement in the roadway.

Culvert liner installation is another method that can be utilized to refurbish a failing or old culvert. Culvert liners will be installed inside old culverts. These liner are typically constructed of high density polyethylene, and are inserted into the failing culverts. The liners generally come in 10- to 20-foot sections that are connected together using a gasket or an O-ring. As the liners are installed, subsequent liner sections will be added until the old culverts have been completely lined from the inlet to the outlet. The ends are then trimmed to conform to the ends of the old culvert and the slope and banks of the surrounding terrain. Once installed the space between the liners and the old culverts will be filled with grout so that stream water stays in contact with the liner and away from the natural soil adjacent to the older pipe. Once grouting is complete, both inlet and outlet ends will be dressed with riprap, concrete, or other material.

Best Management Practices

- When replacing a culvert in a perennial stream[3], fish passage will be integrated with the project when regulatory agencies (NMFS and IDFG) deem it appropriate.

- Culvert liners shall not he used in fish-bearing streams.

- The IDFG will be consulted for species-specific fish windows. The fish window will be documented under the construction timeframe identified on the project pre-notification form. Fish windows established by IDFG and/or NMFS will be utilized during project construction.

- De-watering may accompany this activity. De-watering of the stream channel is often accomplished using structures such as aqua-barriers, sandbags, concrete barriers, or culverts placed within the active channel. These structures will either divert water to a portion of the channel away from active construction, or dam the channel and completely de-water the work area in order pass all the water through the work site in a culvert or by pump. All instream structures will he temporary and shall be removed once construction is complete.

- If fish handling is required, it will be done by either electrofishing or hand-netting after de-watering has occurred. Fish handling will be accomplished utilizing personnel from agencies such as the USFS, IDFG, Tribes or other qualified personnel with appropriate training and experience.

[3] Or a fish-bearing intermittent stream. See footnote to Table 1 above.

When replacing a culvert in a perennial stream, the culvert will be designed to pass Q50 flows[4].

- When appropriate, ITD will contact the NMFS to determine if fish removal is necessary.

- A cofferdam or other appropriate de-watering device will be implemented where practicable to minimize impacts to aquatic resources when working during dry conditions is not possible.

- At no time shall turbidity exceed Idaho Water Quality Standards when measured 100 feet below the area of impact. Idaho surface water quality criteria for aquatic life use designations require that turbidity not exceed background turbidity by more than 50 nephelometric turbidity units (NTU) instantaneously or more than 25 NTU for more than 10 consecutive days (IDAPA 58.01.02.250.02).

- A rock apron inlet and outlet protection including geotextile separation fabric will be installed on all new culverts and extensions to minimize sediment delivery to the aquatic resource.

- To minimize the potential for introducing hazardous material to the aquatic system, a spill prevention and control countermeasures plan will be prepared by the construction contractor and approved by ITD prior to project implementation.

- All staging, fueling, and storage areas will be located away and adequately buffered from aquatic areas.

1.3.2.21. Culvert Extension

The extension of a culvert is generally less cumbersome in terms of dealing with traffic. The road can be maintained at its current width and traffic can flow uninterrupted for most of the work, except for minor delays such as when crews are working from the roadway. The extension process itself is much the same as the installation/replacement. Depending on the end of the culvert that is being extended, earthen material will most likely need to be removed to accommodate the new length of culvert. Prior to placement, the excavated area will be bedded and the culvert extension will be installed and banded to the existing culvert. Material will then be brought in to cover the culvert, and will be properly compacted to avoid future settlement.

In all installations, care will be taken to properly match the flow line of the waterway to the new culvert or extension. The upstream and downstream ends of the culvert may need to have concrete aprons poured or rock brought in to avoid scour at these locations. Figure 6 is an illustration of a typical culvert extension project.

[4] The BA (p.39) states that: "When replacing a culvert in a perennial stream, the culvert will be designed to pass Q50 flows." Based on discussions with ITD during development of the action, NMFS assumes that this typographical error and should read "the culvert will be designed to pass 50-year flood event flows." The effects analysis in this Opinion makes this assumption.

Best Management Practices

- No culvert that is a barrier to fish passage is eligible for extension.

- A cofferdam or other appropriate de-watering device will be implemented where practicable to minimize impacts to aquatic resources when working during the dry is not possible.

- The IDFG will he consulted for species-specific fish windows. The fish windows will be documented under the Construction Timeframe identified on the Project Pre-notification Forms. Fish windows estahlished by IDFG and/or NMFS will be utilized during project construction.

- De-watering may accompany this activity. De-watering of the stream channel is often accomplished using structures such as aqua-harriers, sandbags, concrete barriers or culverts placed within the active channel. These structures will either divert water to a portion of the channel away from active construction, or dam the channel and completely de-water the work area in order to pass all the water through the work site in a culvert or by pump. All instream structures will be temporary and shall be removed once construction is complete.

- If fish handling is required it will be done by either electrofishing or hand-netting after de-watering has occurred. Fish handling will be accomplished utilizing personnel from agencies such as the USFS, IDFG, Tribes, or other qualified personnel with appropriate training and experience.

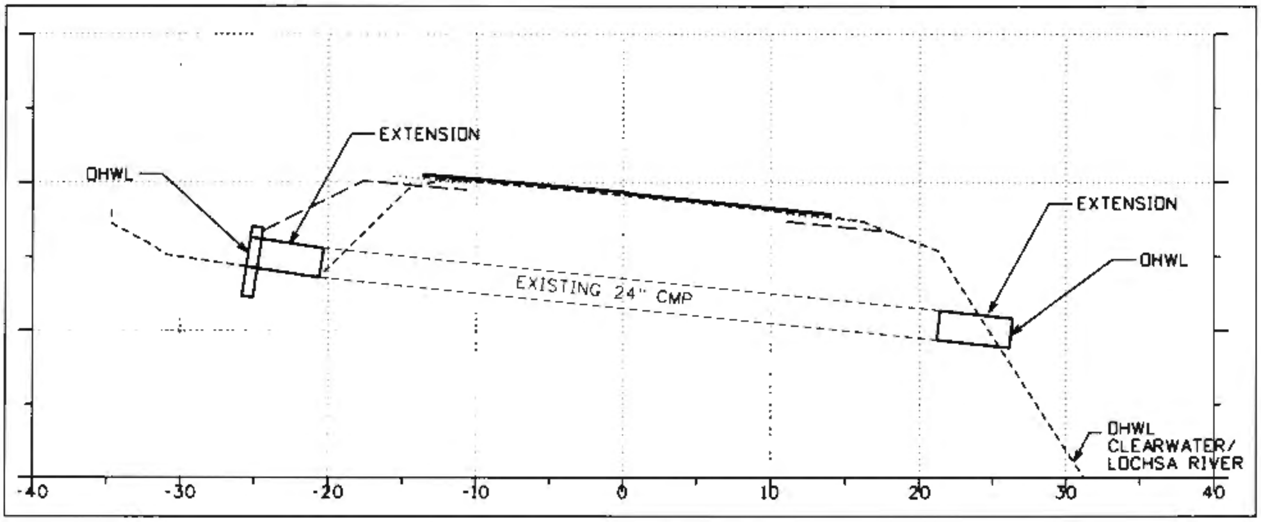
- At no time shall turbidity exceed Idaho Water Quality Standards when measured 100 feet below the area of impact. Idaho surface water quality criteria for aquatic life use designations require that turbidity not exceed background turhidity by more than 50 NTU instantaneously or more than 25 NTU for more than 10 consecutive days (IDAPA 58.01.02.250.02).

- A rock apron inlet and outlet protection, including geotextile separation fabric, will he installed on all new culverts and extensions to minimize sediment delivery to the aquatic resource.

- To minimize the potential for introducing hazardous material to the aquatic system, a spill prevention and control countermeasures plan will be prepared by the construction contractor and approved by ITD prior to project implementation.

- All staging, fueling, and storage areas will be located away and adequately buffered from aquatic areas.

Figure 6. Example diagram of culvert extension.



1.3.2.22. Culvert Maintenance

Drainage culverts periodically become obstructed with dirt, silt rocks, and debris and require cleaning to maintain proper function. To clean culverts several methods will be used depending upon culvert size, the type of obstruction, and the sensitivity of the channel or stream the culvert conveys.

Drag Line. This method will be used for small culverts where adequate room allows for a cable or chain attached to a solid rod to be threaded through the culvert. The cable or chain is then attached to an object smaller than the diameter of the culvert. The cleanout object is then pulled through the culvert mechanically to clear the debris from the pipe. Adequate room needs to exist to allow for the use of an appropriate machine to pull the cleanout object through the pipe.

Hydraulic Pressure. This method is generally used for small culverts that cannot be accessed manually or mechanically. It usually involves the use of a water tank truck, a high pressure pump, and a special rotating hose head, referred to as a "weasel." The hose is fed into the culvert and the pressure causes it to rotate and spray simultaneously loosening and washing the debris out of the culvert. The debris is then removed from the channel and disposed of.

Manual Cleanout. This method will be used when the culvert is of adequate size for access by laborers to remove the debris by hand. It is generally used in sensitive areas where running water is present at the time of the removal. It involves the use of picks, shovels, buckets, and wheelbarrows. Debris is carried to the ends of the culverts where it is then loaded into the scoop of a trackhoe and removed. In some cases the use of cofferdams might be required to divert the water around the work area. The BMPs may be applied to capture sediment.

Mechanical Cleanout. This method will be used on culverts that are large enough to use excavators or backhoes to remove obstructions. In some cases, the excavator will be located in or near the channel and reaches into the culvert from one or both ends to remove the debris. Large rocks that cannot be reached might be removed by use of a cable or could be broken up by drilling and using a low charge explosive, similar to a shotgun shell, and then removed manually. Small excavators such as bobcats, or walk-behind excavators that can enter the culvert may be used. Similar to the manual cleanout method, sediment control BMPs could be required.

Best Management Practices

- The IDFG will be consulted for species-specific fish windows. The fish window will be documented under the Construction Timeframe identified on the Project Pre-notification Form. Fish windows established by IDFG and/or NMFS will be utilized during project construction.

- De-watering may accompany this activity. De-watering of the stream channel is often accomplished using structures such as aqua-barriers, sandhags, concrete barriers, or culverts placed within the active channel. These structures will either divert water to a portion of the channel away from active construction, or dam the channel and completely de-water the work area in order to pass all the water through the work site in a culvert or by pump. All instream structures will be temporary and shall be removed once construction is complete.

- If fish handling is required it will be done by either electrofishing or hand-netting after de-watering has occurred. Fish handling will be accomplished utilizing personnel from agencies such as the USFS, IDFG, Trihes or other qualified personnel with appropriate training and experience.

- Fiber wattles and/or silt fence will be placed adjacent to or below disturbance areas to prevent sediment transport into any waterway.

- Equipment used shall not have damaged hoses, fittings, lines, or tanks that have the potential to release pollutants into any waterway.

- Cofferdams or other isolation methods will be used when practicable to de-water the project area during cleaning operations to minimize sediment delivery to the aquatic system.

- To minimize the potential for introducing hazardous material to the aquatic system, a spill prevention and control countermeasures plan will be prepared by the construction contractor and approved by ITD prior to project implementation.

- All staging, fueling, and storage areas will be located away and adequately buffered from aquatic areas.

1.3.2.23. Guardrail Installation

The purpose of this activity is to restore or replace guardrails that are located adjacent to the highway. This activity is performed by either state forces or by contractors. Traffic is generally maintained on the existing roadways. All work is performed within the ITD right-of-ways.

During guardrail replacement, a grading operation is required prior to installation of concrete or a metal guardrail. These actions commonly require excavation or fill sections to be constructed within the roadway prism during the grading operation for placement of the guardrail. In many sections, the rail may have to be extended to reduce a hazard. Adding or reshaping material adjacent to roadway is common. Borrow material is placed in layers and compacted uniformly and to the desired elevation. A level gravel base is constructed that drains away from roadway. Occasionally, water conditions or soft soil conditions may require a course of aggregate base to be placed under the guardrail.

When using metal guardrail, posts are installed by pounding them into the ground or using posthole diggers. The metal lengths of guardrail are attached to the posts. Elevation of the top of posts shall be uniform, giving a smooth transition into curves and slopes. Posts are tamped to assure vertical alignment as well as safety.

All work will be contained within the existing roadway prism. The ITD will require all contractors to prepare an Erosion and Sediment Control Plan, which will, at a minimum, include a spill prevention plan that is submitted to the department prior to any work being performed.

Best Management Practices

- All work will be contained within the existing roadway prism.
- To minimize the potential for introducing hazardous material to the aquatic system, a spill prevention and control countermeasures plan will be prepared by the construction contractor and approved by ITD prior to project implementation.
- The BMPs shall be employed to control stormwater runoff

1.3.2.24. Striping (methyl methacrylate or paint)

Markings on the highways have important functions in providing driver information and guidance for the road user. Marking types include, but are not limited to, pavement striping, curb coloring, colored pavements, object markers, channelizing devices, delineators, and raised or painted islands. In some cases, markings are used to supplement other traffic control devices such as signs and signals. In other instances, markings are used alone to effectively convey traffic regulations, warnings and/or guidance in ways not obtainable by use of other devices.

Pavement surface markings are generally applied in the form of traffic line paints. In the past, these traffic paints were typically solvent-based with a high solids composition for durability.

Several years ago, the ITD converted its pavement marking program to a water-based paint to minimize environmental impacts and reduce paint handling safety concerns. The waterborne paint striping and pavement markings are normally applied by a truck with a pressurized paint spraying system. The paint normally is delivered in 250-gallon self-contained plastic paint totes that can be transferred by forklift from the supplier's truck to the striping truck. Smaller 50- to 100-gallon containers are provided to the stencil truck for spraying turn lane, crosswalk, and railroad crossing pavement markings.

Traffic marking paints are formulated to dry rapidly (less than a minute) to minimize tracking of the paint by vehicles encountering the striping operation. Any spills from equipment failure or improper handling are normally blotted with sand or floor-dry to contain the undesired marking. Undesired markings are generally ground off the pavement surface with a pavement grinder. More recently, the ITD has been investigating and experimenting with newly manufactured thermoplastic durable pavement products such as extruded methyl methacrylate materials and 3M polymer pavement marking tapes to extend the life of the pavement markings. These products are normally extruded or rolled into a shallow groove ground into the pavement surface and typically last 3 to 5 years before needing to be replaced or covered by paint.

Due to the nature of the work involved for this highway action, no effects on the natural environment are known or expected. All work will he contained within the existing roadway prism. The ITD will require all contractors to prepare an Erosion and Sediment Control Plan which will, at a minimum, include a spill prevention plan that is submitted to the department prior to any work being performed.

Best Management Practices

- Equipment shall not have damaged hoses, fittings, lines, or tanks that have the potential to release pollutants into any waterway.

1.3.2.25. Geotechnical Drilling

Geotechnical investigations are often required on ITD projects. This task commonly consists of geotechnical borings or seismic refraction surveys.

The ITD primarily uses four methods to retrieve soil and rock samples and to perform *in situ* testing. The drill method used is determined by the type of soil and rock to be penetrated, groundwater conditions, and type of samples required. The four basic methods of drilling are hollow-stem augers, rotary drilling, percussive air drilling, and core drilling. For drilling operations, a drill rig is positioned over the boring location, hydraulic rams are used to level the rig, and a derrick is raised.

Hollow-stem Augers. Hollow-stem augers are commonly used in cohesive soils or in granular soil above the groundwater level. Hollow-stem augers consist of the hollow outside section, with a pilot bit and drill rod on the inside. Auger sections are 5 feet in length. Augers are attached to the drive head, which turns the auger to advance it into the soil. At the desired sampling depth, the auger is disconnected from the drive head, the drill rod and pilot bit are hoisted out of the hollow section, a soil sampling device is attached to another section of drill rod, and the sampler is lowered into the hollow auger section. Raising and lowering of the drill rod into and out of the auger sections is accomplished with wire-line hoists that run up and over the derrick and are attached to the base of the drill rig. Modified hollow-stem augers with soil tuhes are capable of continuous soil sampling. Continuous soil sample lengths are 5 feet long with diameters equal to the diameter of the hollow-stem auger.

Soil sampling can also be accomplished using either a Standard Penetration Test split-spoon sampler or California ring sampler. These samplers are driven into the soil at the desired depth using a hydraulically operated free-falling hammer. The tube penetrates to varying depths, depending on the length of the tube and the resistance of the soil. The tube is then retrieved and the ends are sealed for transport.

Once a soil sample is obtained at the desired depth, the drill rod and pilot bit are once again placed inside the hollow auger section, the drive head of the drill rig is reattached to the auger, and the auger is advanced to the next sampling depth. Soil samples will be ohtained at select intervals. This process is repeated until the augers have been advanced and soil samples have heen ohtained to the specified depth of the boring.

Rotary Drilling. Rotary tricone drilling is most commonly used helow the groundwater level or in dense soils, granular soils, or soft weathered rock, that is difficult to penetrate with augers. A drill bit is used to cut the formation, while drilling fluids support the borehole and lift the cuttings to the surface. The boring is advanced sequentially. Casing is advanced after the desired sample depth is reached, or until it reaches a depth where the horehole can no longer be supported with drilling fluids. Casing is advanced by either being driven into the ground or rotated. Sampling is conducted in a similar manner as auger drilling. Once the borehole is cased and the samples retrieved, drilling resumes.

Percussive Air Drilling. Percussive air drilling is similar to rotary tricone drilling but the drill hit cutting action is aided with a down-hole hammer operated by air. Cuttings are blown to the surface by the air. The horehole is supported by advancing casing simultaneous with the drill rod. Percussive air drilling is favored in alluvial gravels.

Core Drilling. Core drilling is primarily used to bore through rock. Diamond bits are rotated through rock while circulating drilling fluids to cool the bit and lift cuttings to the surface. The bits are circular allowing the cut rock to pass into a 5-foot long hollow barrel. After every 5-foot interval is drilled, boring is halted and the barrel holding the rock is retrieved by wire line. Wire line is used to run an empty barrel back down the inside of the drill rod to the bit, where it is latched into place, and drilling resumes until the barrel again becomes full.

Drilling fluids may he water, mud, compressed air, or compressed air with foam additive. Drilling fluids are used to cool the cutting surface of the bit and to lift the rock cuttings to the surface. Drilling liquids help stabilize the horehole wall to prevent collapse and to seal zones to prevent loss of drilling fluids into the formation. Drill mud is water and additives. The additives are not toxic and are commonly betonite clay and polymers. While drilling, fluids are pumped through the drill rod and drill bit, up the annulus, and back to the surface. Drilling fluids can sometimes be discharged onto the ground surface. Water flow over the ground surface is avoided as much as possible. Where discharge on the ground surface is not permitted, drill fluids that reach the surface are contained in tubs where the rock cuttings are removed before being recirculated. While circulating down hole, partial or complete fluids loss can occur. This indicates zones where open joints, fractures, or voids are present in the formation being drilled. When drilling fluids become contaminated with oil or other substances, special handling and precautions may require containment and disposal off-site.

For in-water drilling, the drilling platform is typically placed on a barge or wheeled vehicle which is positioned over the desired location. A casing is lowered to the streambed and set. Drilling takes place inside the casing. Drilling fluids will be non-toxic and recycled in a closed system. There will only be a brief pulse of sediment when the casing is first set; after that, all material is contained within the casing and fluid system.

Best Management Practices

- When appropriate, fiber wattles and/or silt fence will be placed adjacent to or below disturbance areas to prevent sediment transport into any waterway.

- Equipment shall not have damaged hoses, fittings, lines, or tanks that have the potential to release pollutants into any waterway.

- To minimize the potential for introducing hazardous material to the aquatic system, a spill prevention and control countermeasures plan will be prepared by the construction contractor and approved by ITD prior to project implementation.

1.3.3. BMPs and Mitigations Common to all Program Activities

The following BMPs will be used to minimize resource impacts during implementation of Program activities.

- All associated permit conditions (e.g., from the IDWR, or COE 404, etc.) will be met during construction operations.

- Idaho State Water Quality Standards will be met during construction operations. For example, Idaho surface water quality criteria for aquatic life use designations require that, beyond an applicable mixing zone, turbidity must not exceed background turbidity by more than 50 NTU instantaneously or more than 25 NTU for more than 10 consecutive days (IDAPA 58.01.02.250.02).

- The IDFG will be consulted for appropriate fish windows on a project by project basis and prior to all in-water work. The IDFG fish windows will be adhered to during project implementation.

- Fiber wattles and/or silt fence will be placed adjacent to or below disturbance areas to prevent/minimize sediment transport into any waterway.

- Equipment used shall not have damaged hoses, fittings, lines, or tanks that have the potential to release pollutants into any waterway.

- Cofferdams or other isolation methods will be used when practicable to de-water the project area during in water work.

- In order to minimize the potential for direct impacts to ESA-listed fish, when possible, all work will be completed from the existing bridge or roadway shoulder and equipment and/or heavy machinery will not enter the river channel.

- In order to minimize the potential for introducing hazardous material to the aquatic system, a spill prevention and control countermeasures plan will be prepared by the construction contractor and approved by the ITD prior to Project implementation. All staging, fueling, and storage areas will be located away and adequately buffered from riparian zones and aquatic areas.

- When appropriate, the ITD will monitor turbidity. Water quality samples will be collected and NTU measurements will be recorded on the Construction Monitoring Form. Measurements will be taken 100 feet above and below discharge points, or as directed by appropriate resource agency or ITD personnel.

- No bridge rehabilitation activities will occur during wet weather conditions.

- Disturbed areas within riparian zones will be reclaimed with riparian vegetation similar to the existing plant communities.

- Spill kits and cleanup materials shall be available at all locations during operations.

- Equipment that is used adjacent to or over waterbodies shall be kept leak free.

- Equipment will be parked over plastic sheeting or equivalent where possible. Plastic is not a substitute for drip pans or absorbent pads.

- When not in use, construction equipment will be stored away from concentrated flows of stormwater, drainage courses, and inlets.

- Hydraulic equipment will be protected from runon and runoff by placing them on plywood and covering them with plastic or a comparable material prior to the onset of rain.

- Borrow and fill areas shall be located outside of the 100 year floodplain or greater than 300 feet from fish-bearing streams.

- To reduce the potential for the invasion and/or expansion of noxious weeds, all earth-disturbing equipment used on projects with contracts administered by the ITD shall be cleaned of all plant materials, dirt and material that may carry noxious weed seeds prior to use on the project.

- Construction equipment shall be washed and treated to remove seeds, plants, and plant fragments. Use of a high pressure washing system is recommended in order to remove all seeds, plants, plant fragments dirt, and debris from the construction equipment taking care to wash the sides, tops, and undercarriages.

- The Contractor shall provide the Engineer with an opportunity to inspect the equipment prior to unloading the equipment at the construction site. If, upon inspection, dirt, debris, and seeds are visible the equipment shall be immediately removed and rewashed. The equipment shall then be re-inspected at the site to ensure the equipment is clean.

1.3.4. BMPs Associated with the Preservation and Retention of Existing Vegetation

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs and grasses that serve as erosion controls. These techniques are applicahle to all types of sites. Areas where preserving vegetation can be particularly beneficial are floodplains, wetlands, streambanks, steep slopes, and other areas where erosion controls would be difficult to establish, install, or maintain.

For all projects, The ITD or their contractor shall:

- Clearly mark, flag, or fence vegetation or areas where vegetation should be preserved.

- Prepare landscaping plans which include as much existing vegetation as possible and state proper care during and after construction.

- Define and protect with berms, fencing, signs, etc., a setback area from vegetation to be preserved.

- Propose landscaping plans that use native plant species to minimize competition with the existing vegetation.

- Locate construction staging areas, waste areas, etc., in such a way as to avoid adverse impacts on existing vegetation.

- Establish appropriate buffer zones to protect riparian corridors and natural drainage paths, and to maintain and protect dense vegetation in these areas and retain vegetated buffers in tbeir natural state wherever possible.

- Minimize the number and widtb of stream crossings and cross at right angles to the channel rather than at an oblique angle.

- Within project boundaries, disturb then ground and vegetation as little as possible.

- Preserve native site vegetation and plant communities when practicable. Choose native vegetation when applicable for revegetation efforts.

The conservation measures described here and in the consultation initiation package as parts of the proposed action are intended to reduce or avoid adverse effects on ESA-listed species and their habitats. NMFS regards these conservation measures as integral components of the proposed action and expects that all proposed project activities will fully incorporate those measures. Our effects analysis reflects that assumption. Accordingly, any deviation from these conservation measures will be considered beyond the scope of this consultation and will not be exempted from the prohibition against take as described in the attached incidental take statement. Further consultation will be required to determine what effect such a modified action may have on ESA-listed species or their designated critical habitats.

1.4. Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). For this project, the action area includes all subbasins in Idaho that contain both anadromous species and state highways. The action area thus consists of 12 4th field HUCs, encompassing approximately 14,715 square miles (Table 2, Figure 7). Each of these HUCs is located within the Lower Snake subregion (HUC 1706).

Table 2. Subbasins with ESA-listed anadromous fish and state highways.

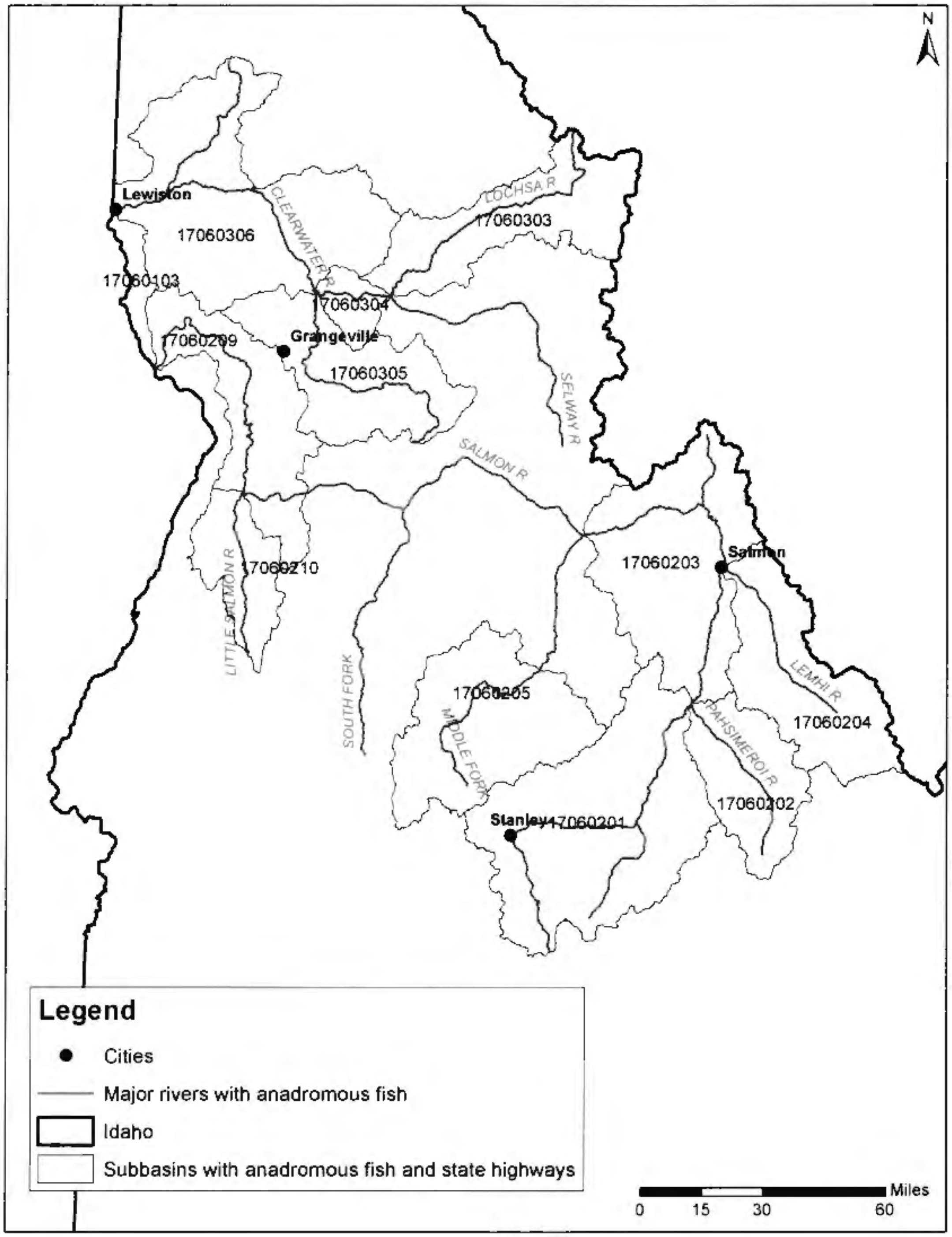
4th-field HUC	HUC Name
17060103	Lower Snake-Asotin
17060201	Upper Salmon
17060202	Pahsimeroi
17060203	Middle Salmon-Panther
17060204	Lemhi
17060205	Upper Middle Fork Salmon
17060209	Lower Salmon
17060210	Little Salmon
17060303	Lochsa
17060304	Middle Fork Clearwater
17060305	South Fork Clearwater
17060306	Lower Clearwater

The action area is used by all the freshwater life history stages (spawning, rearing, and migration) of threatened Snake River spring/summer and fall Chinook salmon, threatened Snake River Basin steelhead, and endangered Snake River sockeye salmon. All four species have designated critical habitat in the action area (Table 3). The action area also contains EFH for Chinook salmon (Pacific Fishery Management Council [PFMC] 1999).

Table 3. Federal Register notices for final rules that list threatened and endangered species, designated critical habitat, or apply protective regulations to ESA-listed species considered in this consultation (Listing status: 'T' means listed as threatened under the ESA; 'E' means listed as endangered).

Species	Listing Status	Critical Habitat	Protective Regulations
Chinook salmon (*Oncorhynchus tshawytscha*)			
Snake River spring/summer run	T 6/28/05; 70 FR 37160	10/25/99; 64 FR 57399	6/28/05; 70 FR 37160
Snake River fall-run	T 6/28/05; 70 FR 37160	12/28/93; 58 FR 68543	6/28/05; 70 FR 37160
Sockeye salmon (*O. nerka*)			
Snake River	E 6/28/05; 70 FR 37160	12/28/93; 58 FR 68543	ESA Section 9 applies
Steelhead (*O. mykiss*)			
Snake River Basin	T 1/05/06; 71 FR 834	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160

Figure 7. Subbasins with ESA-listed anadromous fish and state highways. Each subbasin is labeled with the 8 digits of the 4th-field HUC code.



2. ENDANGERED SPECIES ACT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with the USFWS, NMFS, or both, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitat. Section 7(b)(3) requires that at the conclusion of consultation, NMFS provides an opinion stating how the agencies' actions will affect ESA-listed species or their critical habitat. If incidental take is expected, section 7(b)(4) requires the provision of an incidental take statement (ITS) specifying the impact of any incidental taking, and including reasonable and prudent measures (RPMs) to minimize such impacts.

2.1. Introduction to the Biological Opinion

Section 7(a)(2) of the ESA requires Federal agencies, in consultation with NMFS, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. The jeopardy analysis considers both survival and recovery of the species. The adverse modification analysis considers the impacts to the conservation value of the designated critical habitat.

"To jeopardize the continued existence of an ESA-listed species" means to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a ESA-listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02).

This Opinion does not rely on the regulatory definition of 'destruction or adverse modification' of critical habitat at 50 C.F.R. 402.02. Instead, NMFS has relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.[5]

NMFS uses the following approach to determine if the proposed action described in Section 1.3 is likely to jeopardize ESA-listed species or destroy or adversely modify critical habitat:

- *Identify the rangewide status of the species and critical habitat likely to be adversely affected by the proposed action.* This section describes the current status of each ESA-listed species and its critical habitat relative to the conditions needed for recovery. For listed salmon and steelhead, NMFS has developed specific guidance for analyzing the status of the ESA-listed species' component populations in a "viable salmonid populations" (VSP) paper (McElhany et al. 2000). The VSP approach considers the abundance, productivity, spatial structure, and diversity of each population as part of the overall review of a species' status. For listed salmon and steelhead, the VSP criteria, therefore, encompass the species' "reproduction, numbers, or distribution" (50 CFR

[5] Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS (Application of the "Destruction or Adverse Modification" Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).

402.02). In describing the range-wide status of ESA-listed species, NMFS relies on viability assessments and criteria in technical recovery team documents and recovery plans, where available, that describe how VSP criteria are applied to specific populations, major population groups (MPGs), and species. NMFS determines the rangewide status of critical habitat by examining the condition of its physical or biological features (also called "primary constituent elements" or PCEs in some designations) - which were identified when the critical habitat was designated. Species and critical habitat status are discussed in Section 2.2.

- *Describe the environmental baseline for the proposed action.* The environmental baseline includes the past and present impacts of Federal, state, or private actions and other human activities *in the action area.* It includes the anticipated impacts of proposed Federal projects that have already undergone formal or early section 7 consultation and the impacts of state or private actions that are contemporaneous with the consultation in process. The environmental baseline is discussed in Section 2.3 of this Opinion.

- *Analyze the effects of the proposed actions.* In this step, NMFS considers how the proposed action would affect the species' reproduction, numbers, and distribution or, in the case of salmon and steelhead, their VSP characteristics. NMFS also evaluates the proposed action's effects on critical habitat features. The effects of the action are described in Section 2.4 of this Opinion.

- *Describe any cumulative effects.* Cumulative effects, as defined in NMFS' implementing regulations (50 CFR 402.02), are the effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area. Future Federal actions that are unrelated to the proposed action are not considered because they require separate section 7 consultation. Cumulative effects are considered in Section 2.5 of this Opinion.

- *Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat.* In this step, NMFS adds the effects of the action (Section 2.4) to the environmental baseline (Section 2.3) and the cumulative effects (Section 2.5) to assess if the action could reasonably be expected to: (1) Appreciably reduce the likelihood of both survival and recovery of the species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species. These assessments are made in full consideration of the status of the species and critical habitat (Section 2.2). Integration and synthesis occurs in Section 2.6 of this Opinion.

- *Reach jeopardy and adverse modification conclusions.* Conclusions regarding jeopardy and the destruction or adverse modification of critical habitat are presented in Section 2.7. These conclusions flow from the logic and rationale presented in the Integration and Synthesis Section (2.6).

- *If necessary, define a reasonable and prudent alternative to the proposed action.* If, in completing the last step in the analysis, NMFS determines that the action under consultation is likely to jeopardize the continued existence of ESA-listed species or destroy or adversely modify designated critical habitat, NMFS must identify a reasonable and prudent alternative (RPA) to the action in Section 2.8. The RPA must not be likely to jeopardize the continued existence of ESA-listed species nor adversely modify their designated critical habitat and it must meet other regulatory requirements.

Some categories of activities in the proposed action are NLAA ESA-listed species or their designated critical habitat. These activities are listed in Table 1 above, and will be discussed in *Section 2.11. "Not Likely to Adversely Affect" Determinations* of this Opinion.

2.2. Rangewide Status of the Species and Critical Habitat

The summaries that follow describe the status of the four ESA-listed species and their designated critical habitats within the geographic area of this proposed action. More detailed information on the status and trends of these ESA-listed resources, and their biology and ecology, can be found in the listing regulations and critical habitat designations published in the Federal Register (Table 3). On August 15, 2011, NMFS published the results of the agency's most recent 5-year review of ESA-listed Pacific salmonid species, including the four listed species in Idaho (Ford et al. 2011). NMFS defines the three salmon species as "evolutionarily significant units" (ESUs) and the steelhead species as a "distinct population segment" (DPS).

Climate change is likely to play an increasingly important role in determining the abundance of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest. These changes will not he spatially homogeneous across the Pacific Northwest. Areas with elevations high enough to maintain temperatures well below freezing for most of the winter and early spring will be less affected. Low-elevation areas are likely to be more affected. During the last century, average regional air temperatures increased by 1.5°F, and increased up to 4°F in some areas (USGCRP 2009). Warming is likely to continue during the next century as average temperatures increase another 3°F to 10°F (USGCRP 2009). Overall, about one-third of the current cold-water fish habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (USGCRP 2009).

Precipitation trends during the next century are less certain than for temperature but more precipitation is likely to occur during October through March and less during summer months, and more of the winter precipitation is likely to fall as rain rather than snow (ISAB 2007, USGCRP 2009). Where snow occurs, a warmer climate will cause earlier runoff so stream flows in late spring, summer, and fall will be lower and water temperatures will be warmer (ISAB 2007, USGCRP 2009).

Higher winter stream flows increase the risk that winter floods in sensitive watersheds will damage spawning redds and wash away incubating eggs. Earlier peak stream flows will also flush some young salmon and steelhead from rivers to estuaries before they are physically mature, increasing stress and the risk of predation. Lower stream flows and warmer water temperatures during summer will degrade summer rearing conditions, in part by increasing the prevalence and virulence of fish diseases and parasites (USGCRP 2009). Other adverse effects are likely to include altered migration patterns, accelerated embryo development, premature emergence of fry, variation in quality and quantity of tributary rearing habitat, and increased competition and predation risk from warm-water, non-native species (ISAB 2007).

The earth's oceans are also warming, with considerahle interannual and inter-decadal variability superimposed on the longer-term trend (Bindoff *et al.* 2007). Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmon and steelhead, while cooler ocean periods have coincided with relatively high abundances (Scheuerell and Williams 2005; Zabel *et al.* 2006; USGCRP 2009). Ocean conditions adverse to salmon and steelhead may be more likely under a warming climate (Zabel *et al.* 2006).

2.2.1. Status of Listed Species

When evaluating the status of an ESA-listed species, the parameters considered in recovery plans, status reviews, and listing decisions are relevant. For Pacific salmon and steelhead, viability of the populations that make up the species can be assessed using four parameters: spatial structure, diversity, abundance, and productivity (McElhany et al. 2000). These VSP criteria therefore encompass the species' "reproduction, numbers, or distrihution" as described in 50 CFR 402.02. When these parameters are at appropriate levels, collectively, they maintain a population's capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment. These attributes are influenced by survival, behavior, and experiences throughout the entire life cycle, characteristics that are influenced, in turn, hy habitat and other environmental conditions.

"Spatial structure" refers hoth to the spatial distributions of individuals in the population and the processes that generate that distrihution. A population's spatial structure depends fundamentally on habitat quality and spatial configuration, and the dynamics and dispersal characteristics of individuals in the population. "Diversity" refers to the distribution of traits within and among populations. These range in scale from deoxyribonucleic acid (DNA) sequence variation at single genes to complex life history traits (McElhany et al. 2000). "Abundance" generally refers to the number of naturally-produced adults (i.e., the progeny of naturally-spawning parents) in the natural environment (e.g., on spawning grounds).

"Productivity" as applied to viability factors refers to the entire life cycle (i.e., the number of naturally-spawning adults produced per parent). When progeny replace or exceed the number of parents, a population is stahle or increasing. When progeny fail to replace the number of parents, the population is declining. McElhany et al. (2000) use the terms "population growth rate" and "productivity" interchangeably when referring to production over the entire life cycle. They also refer to "trend in abundance," which is the manifestation of long-term population growth rate.

Once the biological status of a species' populations has been determined, NMFS assesses the status of the entire species using criteria for groups of populations, as described in recovery plans and guidance from technical recovery teams. Considerations for species viahility include having multiple populations that are viable, ensuring that populations with unique life histories and phenotypes are viable, and that some viable populations are both widespread to avoid concurrent extinctions from mass catastrophes and spatially close to allow functioning as metapopulations (McElhany et al. 2000).

The four ESA-listed species in Idaho fall under the Interior Columbia Recovery Domain. Recovery domains are geographically-based areas that NMFS is using to prepare multi-species recovery plans for salmon and steelhead. For each domain, NMFS appointed an interagency team of scientists to provide a scientific foundation for recovery plans. The Interior Columbia Technical Recovery Team (ICTRT) has delineated populations for each species in its domain, assessed the current viability of each population, and made recommendations for recovery of the species based on viability goals for the species' component populations. The rangewide species status summaries in this Opinion rely on several ICTRT reports, such as population status assessments and viability criteria. These reports can be found at http://www.nwfsc.noaa.gov/trt/pubs.cfm, or by contacting the NMFS Boise office.

NMFS and the State of Idaho are currently developing a recovery plan for the four Snake River species, based on the recommendations of the ICTRT. The recovery plan will describe the status of the species and their component populations, limiting factors, recovery goals, and actions to address limiting factors. The most recent working drafts of the Idaho Snake River recovery plan are posted at http://www.idahosalmonrecovery.net/.

2.2.1.1. Snake River Spring/Summer Chinook Salmon

The Snake River spring/summer Chinook salmon ESU was listed as threatened on April 22, 1992 (57 FR 14653). This ESU occupies the Snake River basin, which drains portions of southeastern Washington, northeastern Oregon, and north/central Idaho. Several factors led to NMFS' conclusion that Snake River spring/summer Chinook were threatened: (1) Abundance of naturally produced Snake River spring and summer Chinook runs had dropped to a small fraction of historical levels; (2) short-term projections were for a continued downward trend in abundance; (3) hydroelectric development on the Snake and Columbia Rivers continued to disrupt Chinook runs through altered flow regimes and impacts on estuarine habitats; and (4) habitat degradation existed throughout the region, along with risks associated with the use of outside hatchery stocks in particular areas (Good et al 2005). On August 15, 2011, in the agency's most recent 5-year review for the Snake River ESU, NMFS concluded that the species should remain listed as threatened (76 FR 50448).

Adult spring and summer Chinook destined for the Snake River enter the Columbia River on their upstream spawning migration from February through March and arrive at their natal tributaries between June and August. Spawning occurs in August and September. Eggs incubate over the winter and hatch in late winter and early spring of the following year. Juveniles exhibit a river-type life history strategy, rearing in tributary streams during their first year of life before migrating to the ocean the following spring. Depending on the tributary and the specific habitat conditions, juveniles may migrate extensively from natal reaches into alternative summer-rearing or overwintering areas. After reaching the ocean as smolts, the fish typically spend 2 to 3 years in the ocean before beginning their migration back to their natal freshwater streams.

Spatial Structure and Diversity. The Snake River ESU includes all naturally spawning populations of spring/summer Chinook in the mainstem Snake River (below Hells Canyon Dam) and in the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River subbasins (57 FR 23458), as well as the progeny of 15 artificial propagation programs (70 FR 37160). The hatchery programs include the South Fork Salmon River (McCall Hatchery), Johnson Creek, Lemhi River, Pahsimeroi River, East Fork Salmon River, West Fork Yankee Fork Salmon River, and Upper Salmon River (Sawtooth Hatchery) programs in Idaho; and the Tucannon River (conventional and captive broodstock programs), Lostine River, Catherine Creek, Lookingglass Creek, Upper Grande Ronde River, Imnaha River, and Big Sheep Creek programs in Oregon. The historical Snake River spring/summer Chinook ESU likely also included populations in the Clearwater River drainage and extended above the Hells Canyon Dam complex.

Within the Snake River ESU, the ICTRT identified 28 extant and 4 extirpated or functionally extirpated populations of spring/summer-run Chinook salmon, listed in Table 4 (ICTRT 2003; McClure et al. 2005). The ICTRT aggregated these populations into five MPGs, of which the South Fork Salmon, Middle Fork Salmon, and Upper Salmon River MPGs are in central Idaho. All populations in Idaho are extant with the exception of Panther Creek, which the ICTRT classified as functionally extirpated due to severe water quality and habitat degradation in Lower Panther Creek during the 1950s and 1960s from Blackbird Mine operations (ICTRT 2003). For each population, Table 4 shows the current risk ratings that the ICTRT assigned to the four parameters of a viable salmonid population (spatial structure, diversity, abundance, and productivity).

In general, current spatial structure risk is low in this ESU and is not preventing the recovery of the species. Spring/summer Chinook spawners are distributed throughout the ESU albeit at very low numbers. Diversity risk, on the other hand, is somewhat higher, driving the moderate and high combined spatial structure/diversity risks shown in Table 4 for some populations. In the Upper Salmon, high diversity risks are caused by chronically high proportions of hatchery spawners in natural areas, and by loss of access to tributary spawning and rearing habitats and the associated reduction in life history diversity (Ford et al. 2011). Diversity risk will need to be lowered in multiple populations in order for the ESU to recover (NMFS 2011b).

Abundance and Productivity. Historically, the Snake River drainage is thought to have produced more than 1.5 million adult spring/ summer Chinook salmon in some years (Matthews and Waples 1991), yet by the mid-1990s counts of wild fish passing Lower Granite Dam dropped to less than 10,000 (IDFG 2007). Wild returns have since increased somewhat but remain highly variable and a fraction of historic estimates (Ford et al. 2011). For individual populations, abundance remains below viability thresholds for all populations, reflected in the ICTRT's high risk rating for abundance/productivity for each population listed in Table 4 (Ford et al. 2011). For some populations, mean abundance from 2000 to 2009 is extremely low, such as for the Yankee Fork and Camas Creek populations, which have recent mean abundances of just 21 and 30 natural spawners, respectively, compared to minimum viability targets of at least 500 spawners (Ford et al. 2011). Relatively low natural production rates and spawning levels remain a major concern across the ESU, and each population in the ESU currently faces a high risk of extinction over the next 100 years (Table 4).

Table 4. Summary of viable salmonid population (VSP) parameter risks and overall current status for each population in the Snake River spring/summer Chinook salmon ESU (Ford et al. 2011; ICTRT 2010a; 2010b; 2010c).

MPG	Population	VSP Parameter Risk		Overall Viability Rating
		Abundance/ Productivity	Spatial Structure/ Diversity	
South Fork Salmon River (Idaho)	*Little Salmon River*	High	High	High Risk
	South Fork Salmon River mainstem	High	Moderate	High Risk
	Secesh River	High	Low	High Risk
	East Fork South Fork Salmon River	High	Low	High Risk
Middle Fork Salmon River (Idaho)	Chamberlain Creek	High	Low	High Risk
	Middle Fk. Salmon River below Indian Ck.	High	Moderate	High Risk
	Big Creek	High	Moderate	High Risk
	Camas Creek	High	Moderate	High Risk
	Loon Creek	High	Moderate	High Risk
	Middle Fk. Salmon River above Indian Ck.	High	Moderate	High Risk
	Sulphur Creek	High	Moderate	High Risk
	Bear Valley Creek	High	Low	High Risk
	Marsh Creek	High	Low	High Risk
Upper Salmon River (Idaho)	*North Fork Salmon River*	High	Low	High Risk
	Lemhi River	High	High	High Risk
	Salmon River Lower Mainstem	High	Low	High Risk
	Pahsimeroi River	High	High	High Risk
	East Fork Salmon River	High	High	High Risk
	Yankee Fork Salmon River	High	High	High Risk
	Valley Creek	High	Moderate	High Risk
	Salmon River Upper Mainstem	High	Moderate	High Risk
	Panther Creek			Extirpated
Lower Snake (Washington)	Tucannon River	High	Moderate	High Risk
	Asotin River			Extirpated
Grande Ronde and Imnaha Rivers (Oregon/ Washington)	Wenaha River	High	Moderate	High Risk
	Lostine/Wallowa River	High	Moderate	High Risk
	Minam River	High	Moderate	High Risk
	Catherine Creek	High	Moderate	High Risk
	Upper Grande Ronde R.	High	High	High Risk
	Imnaha River	High	Moderate	High Risk
	Big Sheep Creek			Extirpated
	Lookingglass Creek			Extirpated

Note: The 10 populations in italics are those with state highways within the population boundaries, all within the Salmon River Basin.

Limiting Factors. Limiting factors and threats to the Snake River spring/summer-run Chinook salmon ESU include the following (NOAA Fisheries 2011, NMFS 2011a):

- Mainstem Columbia River and Snake River hydropower impacts;

- Degraded freshwater habitat: Floodplain connectivity and function, channel structure and complexity, riparian areas and large wood supply, stream substrate, elevated water temperature, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, mining, forestry, road-building, and development;

- Hatchery impacts;

- Predation by pinnipeds, birds, and piscivorous fish in the mainstem river and estuary migration corridor; and,

- Harvest-related effects.

2.2.1.2. Snake River Basin Steelhead

The Snake River steelhead was listed as a threatened ESU on August 18, 1997 (62 FR 43937), with a revised listing as a DPS on January 5, 2006 (71 FR 834). This DPS occupies the Snake River basin, which drains portions of southeastern Washington, northeastern Oregon, and north/central Idaho. Reasons for the decline of this species include substantial modification of the seaward migration corridor by hydroelectric power development on the Snake and mainstem Columbia Rivers, and widespread habitat degradation and reduced streamflows throughout the Snake River basin (Good et al. 2005). Another major concern for the species is the threat to genetic integrity from past and present hatchery practices, and the high proportion of hatchery fish in aggregate run of Snake River Basin steelhead over Lower Granite Dam (Good et al. 2005; Ford et al. 2011). On August 15, 2011, in the agency's most recent 5-year review for the Snake River DPS, NMFS concluded that the species should remain listed as threatened (76 FR 50448).

Adult Snake River Basin steelhead enter the Columbia River from late June to October to begin their migration inland. After holding over the winter in larger rivers in the Snake River basin, steelhead disperse into smaller tributaries to spawn from March through May. Earlier dispersal occurs at lower elevations and later dispersal occurs at higher elevations. Juveniles emerge from the gravels in 4 to 8 weeks, and move into shallow, low-velocity areas in side channels and along channel margins to escape high velocities and predators (Everest and Chapman 1972). Juvenile steelhead then progressively move toward deeper water as they grow in size (Bjornn and Rieser 1991). Juveniles typically reside in fresh water for 1 to 3 years, although this species displays a wide diversity of life histories. Smolts migrate downstream during spring runoff, which occurs from March to mid-June depending on elevation, and typically spend 1 to 2 years in the ocean.

Spatial Structure and Diversity. This species includes all naturally-spawning steelhead populations below natural and manmade impassable barriers in streams in the Snake River Basin of southeast Washington, northeast Oregon, and Idaho, as well as the progeny of six artificial propagation programs (71FR834). The hatchery programs include Dworshak National Fish Hatchery, Lolo Creek, North Fork Clearwater River, East Fork Salmon River, Tucannon River, and the Little Sheep Creek/Imnaha River steelhead hatchery programs. The Snake River Basin steelhead listing does not include resident forms of *O. mykiss* (rainbow trout) co-occurring with steelhead.

The ICTRT identified 24 extant populations within this DPS, organized into 5 MPGs (ICTRT 2003). The ICTRT also identified a number of potential historical populations associated with watersheds above the Hells Canyon Dam complex on the mainstem Snake River, a barrier to anadromous migration. Two of the five MPGs with extant populations are in Idaho: the Clearwater River MPG (5 extant populations, 1 extirpated); and the Salmon River MPG (12 populations). In the Clearwater River, the historic North Fork population was blocked from accessing spawning and rearing habitat by Dworshak Dam. Current steelhead distribution extends throughout the DPS, such that spatial structure risk is generally low. For each population in the DPS, Table 5 shows the current risk ratings that the ICTRT assigned to the four parameters of a viable salmonid population (spatial structure, diversity, abundance, and productivity).

The Snake River Basin steelhead DPS exhibit a diversity of life-history strategies, including variations in fresh water and ocean residence times. Traditionally, fisheries managers have classified Snake River Basin steelhead into two groups, A-run and B-run, based on ocean age at return, adult size at return, and migration timing. A-run steelhead predominantly spend 1 year at sea and are assumed to be associated with low to mid-elevation streams in the Snake River Basin. B-run steelhead are larger with most individuals returning after 2 years in the ocean. The ICTRT has identified each population in the DPS as either A-run or B-run. Recent research, however, suggests that some populations may support multiple life history strategies. Within one population in the Clearwater River, IDFG reports at least nine different phenotypes, with steelhead spending 1, 2, or 3 years in the ocean (Bowersox 2011). Maintaining life history diversity is important for the recovery of the species.

Diversity risk for the DPS is low to moderate, and drives the moderate combined spatial structure/diversity risks shown in Table 5 for some populations. Moderate diversity risks for some populations are caused by the high proportion of hatchery fish on natural spawning grounds. The current moderate diversity risks for populations in Idaho do not preclude those populations from achieving viability goals under the draft recovery plan for Idaho's salmon and steelhead (NMFS 2011c, 2011d).

Abundance and Productivity. Historical estimates of steelhead production for the entire Snake River basin are not available, but the basin is believed to have supported more than half the total steelhead production from the Columbia River basin (Mallet 1974, as cited in Good et al. 2005). Historical estimates do exist for portions of the basin. Estimates of steelhead passing Lewiston Dam (removed in 1973) on the lower Clearwater River were 40,000 to 60,000 adults (Ecovista et al. 2003). Based on relative drainage areas, the Salmon River basin likely supported substantial production as well (Good et al. 2005). In contrast, at the time of listing, the 5-year (1991-996) mean abundance for natural-origin steelhead passing Lower Granite Dam was 11,462 adults

(Ford et al. 2011). Steelhead passing Lower Granite Dam include those returning to: (1) The Grande Ronde and Imnaha Rivers in Oregon; (2) Asotin Creek in Washington; and (3) the Clearwater and Salmon Rivers in Idaho. The most recent 5-year (2003-2008) mean abundance passing Lower Granite Dam was substantially larger at 18,847 natural-origin fish (Ford et al. 2011). These natural-origin fish represent just 10% of the total steelhead run over Lower Granite Dam of 162,323 adults for the same time period. However, a large proportion of the hatchery run returns to hatchery racks or is removed by hatchery selective harvest and therefore does not contribute to natural production in most Snake River tributaries (Ford et al. 2011).

Despite recent increases in steelhead abundance, population-level natural origin abundance and productivity inferred from aggregate data indicate that many populations in the DPS are likely below the viability targets necessary for species recovery (ICTRT 2010d). Population-specific abundance estimates are not available for most Snake River steelhead populations, including all populations in Idaho. Instead, the ICTRT estimated average population abundance and productivity using annual counts of wild steelhead passing Lower Granite Dam, generating separate estimates for a surrogate A-run and B-run population. Most population abundance/productivity risks shown in Table 5 are based on a comparison of the surrogate population current abundance and productivity estimates to a population viability threshold of 1,000 natural-origin spawners and a productivity of 1.14 recruits per spawner. The surrogate A-run population has a mean abundance of 556 spawners and productivity of 1.86, indicating a moderate abundance/productivity risk. The surrogate B-run population has a mean abundance of 345 spawners and productivity of 1.09, indicating a high abundance/productivity risk (NMFS 2011c). Based on these tentative risk ratings, all populations in Idaho are currently at either high or moderate risk of extinction over the next 100 years. Joseph Creek in Oregon, for which population-specific abundance information is available, is the only population in the DPS currently rated as viable (Ford et al. 2011).

Limiting Factors. Limiting factors and threats to the Snake River Basin steelhead DPS include the following (NOAA Fisheries 2011; NMFS 2011e):

- Mainstem Columbia River and Snake River hydropower impacts;
- Degraded freshwater habitat: Floodplain connectivity and function, channel structure and complexity, riparian areas and large wood supply, stream substrate, elevated water temperature, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, mining, forestry, road-building, and development;
- Impaired tributary fish passage;
- Harvest impacts, particularly for B-run steelhead;
- Predation by pinnipeds, birds, and piscivorous fish in the mainstem river and estuary migration corridor; and,
- Genetic diversity effects from out-of-population hatchery releases.

Table 5. Summary of viable salmonid population (VSP) parameter risks and overall current status for each population in the Snake River Basin steelhead DPS (Ford et al. 2011; ICTRT 2010d).

MPG	Population	VSP Parameter Risk		Overall Viability Rating
		Abundance/ Productivity	Spatial Structure/ Diversity	
Lower Snake River	Tucannon River	High	Moderate	High Risk?
	Asotin Creek	Moderate	Moderate	High/Moderate Risk?
Grande Ronde River	*Lower Grande Ronde*		Moderate	Moderate Risk?
	Joseph Creek	Very Low	Low	Highly Viable
	Wallowa River	High	Low	High Risk?
	Upper Grande Ronde	Moderate	Moderate	Moderate Risk
Imnaha River	Imnaha River	Moderate	Moderate	Moderate Risk
Clearwater River (Idaho)	*Lower Mainstem Clearwater River*	Moderate	Low	Moderate Risk?
	South Fork Clearwater River	High	Moderate	High Risk?
	Lolo Creek	High	Moderate	High Risk?
	Selway River	High	Low	High Risk?
	Lochsa River	High	Low	High Risk?
	North Fork Clearwater River			Extirpated
Salmon River (Idaho)	*Little Salmon River*	Moderate	Moderate	Moderate Risk?
	South Fork Salmon River	High	Low	High Risk?
	Secesh River	High	Low	High Risk?
	Chamberlain Creek	Moderate	Low	Moderate Risk?
	Lower Middle Fork Salmon River	High	Low	High Risk?
	Upper Middle Fork Salmon River	High	Low	High Risk?
	Panther Creek	Moderate	High	Moderate Risk?
	North Fork Salmon River	Moderate	Moderate	Moderate Risk?
	Lemhi River	Moderate	Moderate	Moderate Risk?
	Pahsimeroi River	Moderate	Moderate	Moderate Risk?
	East Fork Salmon River	Moderate	Moderate	Moderate Risk?
	Upper Mainstem Salmon River	Moderate	Moderate	Moderate Risk?
Hells Canyon	Hells Canyon Tributaries			Extirpated

Note: The 12 populations in italics are those with state highways within the population boundaries, all but one in the Salmon River Basin or the Clearwater River Basin. The Lower Grande Ronde River steelhead population, predominantly located in Oregon, also includes the mainstem Snake River from the Grande Ronde River to the Clearwater River, and encompasses a stretch of Idaho state highway in the city of Lewiston.

2.2.1.3. Snake River Fall Chinook Salmon

The Snake River fall Chinook salmon ESU was listed as threatened on April 22, 1992 (57 FR 14653). This ESU occupies the Snake River basin, which drains portions of southeastern Washington, northeastern Oregon, and north/central Idaho. Snake River fall Chinook salmon have substantially declined in abundance from historic levels, primarily due to the loss of primary spawning and rearing areas upstream of the Hells Canyon Dam complex (57 FR 14653). Additional concerns for the species have been the high percentage of hatchery fish returning to natural spawning grounds and the relatively high aggregate harvest impacts by ocean and in-river fisheries (Good et al. 2005). On August 15, 2011, NMFS completed a 5-year review for the Snake River fall Chinook salmon ESU and concluded that the species should remain listed as threatened (76 FR 50448).

Fall Chinook salmon are larger on average than spring/summer Chinook salmon and spawn in larger, mainstem river reaches and the lower sections of larger tributaries (e.g. the Snake, Clearwater, and Salmon River mainstems in Idaho). Adults typically return to fresh water beginning in July, migrate past the lower Snake River dams from August through November, and spawn from October through early December. Juveniles emerge from the gravels in March and April the following spring. Snake River fall Chinook salmon generally exhibit an ocean-type life history. Parr undergo a smolt transformation usually as subyearlings in the spring and summer, at which time they migrate to the ocean. However, in recent years many Snake River fall Chinook juveniles have been overwintering in the reservoirs upstream of the Columbia River and Snake River dams and migrating to the ocean as yearlings the following year (ICTRT 2010e). Adult Snake River fall Chinook return from the ocean to spawn when they are between 2 and 5 years of age, with 4 years being the most common.

Spatial Structure and Diversity. The Snake River fall Chinook salmon ESU includes one extant population of fish spawning in the lower mainstem of the Snake River and the lower reaches of several of the associated major tributaries including the Tucannon, Grande Ronde, Clearwater, Salmon, and Imnaha Rivers. The ESU also includes four artificial propagation programs: the Lyons Ferry Hatchery and the Fall Chinook Acclimation Ponds Program in Washington; the Nez Perce Tribal Hatchery in Idaho; and the Oxbow Hatchery in Oregon and Idaho (70 FR 37160). Historically, this ESU included two large additional populations spawning in the mainstem of the Snake River upstream of the Hells Canyon Dam complex, an impassable migration barrier. The spawning and rearing habitat associated with the current extant population represents approximately 15% of the total historical habitat available to the ESU (ICTRT 2010e). Although most current spawning is concentrated in a relatively small section of the Snake River upstream from Asotin Creek, spawner surveys in recent years have documented spawning across almost the entire population (ICTRT 2010e). Therefore, spatial structure risk for the existing ESU is low and is not precluding recovery of the species.

There are several diversity concerns for Snake River fall Chinook. The hydropower system and associated reservoirs on the Snake and Columbia Rivers appear to impose some selection on juvenile downstream and adult return migration timing (ICTRT 2010e). Additionally, the natural run of Snake River fall Chinook salmon was historically predominated by a subyearling ocean-migration life history, but currently half of the adult returns have overwintered in freshwater reservoirs as juveniles (yearling migration life history). This change in life history strategy may be due to mainstem river flow and temperature conditions, which have been altered from historic conditions by the hydropower system, and may ultimately reduce the ESU's extinction risk (ICTRT 2010e). On the other hand, substantial diversity risk is generated by the high proportion of hatchery fish spawning naturally. For the 5-year period ending in 2008, 78% of the estimated total spawners were of hatchery origin (Ford et al. 2011). Based on these factors, the ICTRT gave the one extant population a moderate diversity risk, which leads to a moderate cumulative spatial structure/diversity risk. Diversity risk will need to be reduced to low in order for this population to be considered highly viable, a requirement for recovery of the species (ICTRT 2007).

Abundance and Productivity. Historical abundance of Snake River fall Chinook salmon is estimated to have been 416,000 to 650,000 fish (NMFS 2006a), but numbers declined drastically over the 20th century to natural returns of less than 100 fish in 1978 (ICTRT 2010e). The first hatchery-reared Snake River fall Chinook salmon returned to the Snake River in 1981, and since then the number of hatchery returns has increased steadily, such that hatchery fish dominate the Snake River fall Chinook run. However, natural returns have also increased. The most recent 10-year (1998-2008) mean abundance of natural-origin fall Chinook passing Lower Granite Dam was 2,200 adults, and the most recent short-term trend in natural-origin spawners was strongly positive, with the population increasing at an average rate of 16% per year (Ford et al. 2011). However, current abundance remains below the ICTRT's recovery goal of a minimum mean of 3,000 natural-origin spawners for the species' single extant population (Ford et al. 2011). Therefore, the ICTRT assigned the population an abundance/productivity risk of moderate. The cumulative moderate risks for both abundance/productivity and spatial structure/diversity put this population at moderate risk of extinction over the next 100 years (ICTRT 2010e).

Limiting Factors. Limiting factors and threats to Snake River fall-run Chinook salmon include the following (NOAA Fisheries 2011; NMFS 2006b):

- Lost access to historic spawning and rearing habitat above the Hells Canyon Dam complex;
- Mainstem Columbia River and Snake River hydropower impacts to spawning, rearing, and migration habitat;
- Alteration to freshwater habitat caused by upriver dams and water management. Major effects include changes in river flows, temperature regime, dissolved oxygen, substrate condition, and riparian vegetation;
- Hatchery-related effects;
- Harvest-related effects; and,
- Degraded estuarine and nearshore habitat.

2.2.1.4. Snake River Sockeye Salmon

This ESU includes all anadromous and residual sockeye salmon from the Snake River Basin, Idaho, as well as artificially propagated sockeye salmon from the Redfish Lake captive propagation program. The ESU was first listed as endangered under the ESA in 1991, the listing was reaffirmed in 2005 (70 FR 37160 & 37204). Reasons for the decline of this species include high levels of historic harvest, dam construction including hydropower development on the Snake and Columbia Rivers, water diversions and water storage, predation on juvenile salmon in the mainstem river migration corridor, and active eradication of sockeye from some lakes in the 1950s and 1960s (56 FR 58619; ICTRT 2003). On August 15, 2011, NMFS completed a 5-year review for the Snake River sockeye salmon ESU and concluded that the species should remain listed as endangered (76 FR 50448).

Snake River sockeye salmon adults enter the Columbia River primarily during June and July, and arrive in the Sawtooth Valley peaking in August. The Sawtooth Valley supports the only remaining run of Snake River sockeye salmon. The adults spawn in lakeshore gravels, primarily in October (Bjornn *et al.* 1968). Eggs hatch in the spring between 80 and 140 days after spawning. Fry remain in the gravel for 3 to 5 weeks, emerge from April through May, and move immediately into the lake. Once there, juveniles feed on plankton for 1 to 3 years before they migrate to the ocean, leaving their natal lake in the spring from late April through May (Bjornn *et al.* 1968). Snake River sockeye salmon usually spend 2 to 3 years in the Pacific Ocean and return to Idaho in their 4^{th} or 5^{th} year of life.

Spatial Structure and Diversity. Within the Snake River ESU, the ICTRT identified historical sockeye salmon production in five Sawtooth Valley lakes, in addition to Warm Lake and the Payette Lakes in Idaho and Wallowa Lake in Oregon (ICTRT 2003). The sockeye runs to Warm, Payette, and Wallowa Lakes are now extinct, and the ICTRT identified the Sawtooth Valley lakes as a single MPG for this ESU. The MPG consists of the Redfish, Alturas, Stanley, Yellowbelly, and Pettit Lake populations (ICTRT 2007). The only extant population is Redfish Lake, supported by a captive broodstock program. Hatchery fish from the Redfish Lake captive propagation program have also been outplanted in Alturas and Pettit Lakes since the mid-1990s in an attempt to reestablish those populations (Ford et al. 2011). With such a small number of populations in this MPG, increasing the number of populations would substantially reduce the risk faced by the ESU (ICTRT 2007).

Currently, the Snake River sockeye salmon run is highly dependent on a captive broodstock program operated at the Sawtooth Hatchery and Eagle Hatchery. Although the captive brood program rescued the ESU from the brink of extinction, diversity risk remains high without sustainable natural production (Ford et al. 2011).

Abundance and Productivity. Prior to the turn of the 20^{th} century (ca. 1880), around 150,000 sockeye salmon ascended the Snake River to the Wallowa, Payette, and Salmon River basins to spawn in natural lakes (Evermann 1896, as cited in Chapman et al. 1990). The Wallowa River sockeye run was considered extinct by 1905, the Payette River run was blocked by Black Canyon Dam on the Payette River in 1924, and anadromous Warm Lake sockeye may have been trapped in Warm Lake by a land upheaval in the early 20^{th} century (ICTRT 2003). In the Sawtooth Valley, the IDFG eradicated sockeye from Yellowbelly, Pettit, and Stanley Lakes in favor of other species in the 1950s and 1960s, and irrigation diversions led to the extirpation of sockeye in Alturas Lake in the early 1900s (ICTRT 2003) leaving only the Redfish Lake sockeye. From 1991 to 1998, a total of just 16 wild adult anadromous sockeye salmon returned to Redfish Lake. These 16 wild fish were incorporated into a captive broodstock program that began in 1992 and has since expanded so that the program currently releases hundreds of thousands of juvenile fish each year in the Sawtooth Valley (Ford et al. 2011). With the increase in hatchery production, adult returns to Sawtooth Valley have increased in past few years to 605 adults in 2008, 833 adults in 2009, and 1,355 adults in 2010 (IDFG 2011). The increased abundance of hatchery reared Snake River sockeye reduces the risk of immediate loss, yet levels of naturally produced sockeye returns remain extremely low (Ford et al. 2011). The ICTRT's viability target is at least 1,000 naturally produced spawners per year in each of Redfish and Alturas Lakes and at least 500 in Pettit Lake (ICTRT 2007).

The species remains at high risk across all four risk parameters (spatial structure, diversity, abundance, and productivity). Although the captive brood program has been highly successful in producing hatchery *O. nerka*, substantial increases in survival rates across all life history stages must occur in order to reestablish sustainable natural production (Ford et al. 2011).

Limiting Factors. Low survival rates outside of the Sawtooth Valley are limiting the recovery of the species (NOAA Fisheries 2011):

- Migrating juvenile sockeye are impacted by the hydrosystem on the mainstem Snake and Columbia Rivers;

- Predation on juvenile sockeye in the migration corridor is assumed to be high; piscivorous fish consume an estimated 8% of migrating juvenile salmon and terns and cormorants consume 12% of all salmon smolts reaching the estuary (NOAA Fisheries 2011);

- For returning adults, portions of the migration corridor in the Salmon River are impeded by water quality and high temperature (IDEQ 2011). The natural hydrological regime in the upper mainstem Salmon River Basin has been altered by water withdrawals, which can lead to elevated summer water temperatures. In many years, sockeye adult returns to Lower Granite Dam suffer relatively high losses before reaching the Sawtooth Valley, perhaps due to high migration corridor water temperatures and poor initial fish condition or parasite loads (Ford et al. 2011).

2.2.2. Status of Critical Habitat

NMFS reviews the status of designated critical habitat affected by the proposed action by examining the condition and trends of essential physical and biological features throughout the designated area. These features are essential to the conservation of the listed species because they support one or more life stages of the species. NMFS refers to these features as the PCEs of critical habitat. Since the ESA-listed species addressed in this Opinion occupy many of the same geographic areas and have similar life history characteristics, PCEs are also similar (Table 6). In general, these PCEs include sites essential to support one or more life stages of the ESA-listed species (e.g., spawning, rearing, or migration), and contain physical or biological features essential to the conservation of the listed species (e.g., spawning gravels, water quality and quantity, side channels, or food).

Table 6. Types of sites and essential physical and biological features designated as PCEs, and the species life stage each PCE supports (70 FR 52630 and 58 FR 68543).

Site Type	Essential Physical and Biological Features	Species Life Stage
Snake River Steelhead[a]		
Freshwater spawning	Water quality, water quantity, and substrate	Adult spawning, embryo incubation, and larval development
Freshwater rearing	Floodplain connectivity, forage[b], natural cover[c], water quality, and water quantity	Fry emergence from gravel, juvenile growth and development
Freshwater migration	Free of artificial obstructions, water quality and quantity, and natural cover[c]	Juvenile migration, adult migration and holding
Snake River Spring/Summer Chinook, Fall Chinook, & Sockeye Salmon		
Spawning and juvenile rearing	Spawning gravel, water quality and quantity, cover/shelter, food, riparian vegetation, space (sockeye and Chinook); water temperature and access (sockeye only)	Adult spawning, embryo incubation, and juvenile growth and development
Migration	Substrate, water quality and quantity, water temperature, water velocity, cover/shelter, food[d], riparian vegetation, space, safe passage (sockeye and Chinook)	Juvenile migration, adult migration and holding

a Additional PCEs pertaining to estuarine, nearshore, and offshore marine areas have also been described for Snake River steelhead. These PCEs will not be affected by the proposed action and have therefore not been described in this Opinion.

b Forage includes aquatic invertebrate and fish species that support growth and maturation.

c Natural cover includes shade, large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

d Food applies to juvenile migration only.

Table 7 describes the geographical extent within Idaho of critical habitat for each of the four ESA-listed species. Critical habitat includes the stream channel and water column with the lateral extent defined by the ordinary high-water line, or the bankfull elevation where the ordinary high-water line is not defined. In addition, critical habitat for the three salmon species includes the adjacent riparian zone, which is defined as the area within 300 feet of the line of high water of a stream channel or from the shoreline of standing body of water (58 FR 68543). The riparian zone is critical because it provides shade, streambank stability, organic matter input, and regulation of sediment, nutrients, and chemicals.

Table 7. Geographical extent of designated critical habitat in Idaho for ESA-listed species considered in this Opinion.

ESU/DPS	Designation	Geographical Extent of Critical Habitat in Idaho
Snake River sockeye salmon	58 FR 68543; December 28, 1993	Snake and Salmon Rivers; Alturas Lake Creek; Valley Creek, Stanley Lake, Redfish Lake, Yellowbelly Lake, Pettit Lake, Alturas Lake; all inlet/outlet creeks to those lakes
Snake River spring/summer Chinook salmon	58 FR 68543; December 28, 1993. 64 FR 57399; October 25, 1999.	All river reaches presently or historically accessible, except river reaches above impassable natural falls and Dworshak and Hells Canyon Dams
Snake River fall Chinook salmon	58 FR 68543; December 28, 1993	Snake River to Hells Canyon Dam, Clearwater River from its confluence with the Snake River upstream to Lolo Creek, North Fork Clearwater River from its confluence with the Clearwater River upstream to Dworshak Dam, and all other river reaches presently or historically accessible within the Clearwater, Lower Clearwater, Lower Snake Asotin, Hells Canyon and Lower Salmon subbasins
Snake River Basin steelhead	70 FR 52630; September 2, 2005	Specific stream reaches are designated within the Snake, Salmon, and Clearwater River basins. Table 21 in the Federal Register details habitat areas within the DPS's geographical range that are excluded from critical habitat designation.

Spawning and rearing habitat quality in tributary streams in the Snake River varies from excellent in wilderness and roadless areas to poor in areas subject to intensive human land uses (NMFS 2011d). Critical habitat throughout much of the Snake River basin has been degraded by intensive agriculture, alteration of stream morphology (*i.e.*, channel modifications and diking), riparian vegetation disturbance, wetland draining and conversion, livestock grazing, dredging, road construction and maintenance, logging, mining, and urbanization. Reduced summer stream flows, impaired water quality, and reduction of habitat complexity are common problems for critical habitat in non-wilderness areas. Human land use practices throughout the basin have caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations.

In many stream reaches designated as critical habitat in the Snake River basin, stream flows are substantially reduced by water diversions (NMFS 2011d). Withdrawal of water, particularly during low-flow periods that commonly overlap with agricultural withdrawals, often increases summer stream temperatures, blocks fish migration, strands fish, and alters sediment transport (Spence *et al.* 1996). Reduced tributary stream flow has been identified as a major limiting factor for Snake River spring/summer Chinook and Snake River Basin steelhead in particular (NOAA Fisheries 2011; NMFS 2011b; NMFS 2011d).

Many stream reaches designated as critical habitat are listed on the state of Idaho's CWA section 303(d) list for impaired water quality, such as elevated water temperature (IDEQ 2011). Many areas that were historically suitable rearing and spawning habitat are now unsuitable due to high summer stream temperatures. Removal of riparian vegetation, alteration of natural stream morphology, and withdrawal of water for agricultural or municipal use all contribute to elevated stream temperatures. Water quality in spawning and rearing areas has also been impaired by high levels of sedimentation and by heavy metal contamination from mine waste (e.g., IDEQ and USEPA 2003; IDEQ 2001).

Migration habitat quality for Snake River salmon and steelhead has also been severely degraded, primarily by the development and operation of dams and reservoirs on the mainstem Columbia and Snake Rivers (NMFS 2008b). Hydroelectric development has modified natural flow regimes in the migration corridor—causing in higher water temperatures and changes in fish community structure that have led to increased rates of piscivorous and avian predation on juvenile salmon and steelhead, and delayed migration for both adult and juveniles. Physical features of dams such as turbines also kill migrating fish.

For many ESA-listed species of salmon and steelhead in the Pacific Northwest, NMFS convened a critical habitat analytical review team (CHART) to assess the conservation value of each watershed with designated critical habitat (NOAA Fisheries 2005). Of the four Snake River species, a CHART assessment has only been completed for Snake River Basin steelhead. However, the essential physical and biological features of critical habitat for each Snake River species are similar, and there is considerable overlap in the geographic extent of critical habitat areas. The CHART results presented below for steelhead therefore give an approximation of the conservation value of each watershed for other listed species, keeping in mind that fall Chinook and sockeye salmon do not occupy many of the smaller tributaries occupied by steelhead.

For Snake River Basin steelhead, NMFS ranked watersheds within designated critical habitat at the scale of the fifth-field hydrologic unit code (HUC5) as to the conservation value they provide to the species[6]; conservation rankings are high, medium, or low. To determine the conservation value of each watershed to the species viability, the CHART for Snake River Basin steelhead evaluated the quantity and quality of habitat features (e.g., spawning gravels, wood and water condition, side channels), the relationship of the area compared to other areas within the species' range, and the significance to the species of the population occupying that area (NOAA Fisheries 2005). Thus, even a location that has poor quality of habitat could be ranked at high conservation value if that location was essential due to factors such as limited availability (e.g., one of a very few spawning areas), the unique contribution of the population it served (e.g., a population at the extreme end of geographic distribution), or other important role (e.g., obligate area for migration to upstream spawning areas).

Table 8 shows the CHART's conservation ranking for watersheds (HUC5s) in the Snake River basin. The CHART determined that relatively few watersheds have PCEs in good to excellent condition (score 3), with no potential for additional improvement for steelhead habitat (also score 3). In Idaho, many of those watersheds are located in the Middle Fork Salmon River, Selway River, and Lochsa River drainages. Far more HUC5 watersheds in the Snake River basin are in fair-to-poor (score 1) or fair-to-good (score 2) condition, with some potential for improvement.

[6] The conservation value of a site depends upon "(1) the importance of the populations associated with a site to the ESU [or DPS] conservation, and (2) the contribution of that site to the conservation of the population through demonstrated or potential productivity of the area" (NOAA Fisheries 2005).

Table 8. Current and potential quality of PCEs, by watershed, for Snake River Basin steelhead (NOAA Fisheries 2005).

Geographic Regions and HUC4s	Watershed Name and HUC5 Code(s)	Current Quality	Potential Quality
Lower Snake River #1706010xxx	Snake River/Granite (101), Getta (102), & Divide (104) Creeks; Upper (201) & Lower (205) Imnaha River; Snake River/Rogersburg (301); Minam (505) & Wenaha (603) Rivers	3	3
	Grande Ronde River/Rondowa (601)	3	2
	Big (203) & Little (204) Sheep Creeks; Asotin River (302); Catherine Creek (405); Lostine River (502); Bear Creek (504); & Upper (706) & Lower (707) Tucannon River	2	3
	Middle Imnaha River (202); Snake River/Captain John Creek (303); Upper Grande Ronde River (401); Meadow (402); Beaver (403); Indian (409), Lookingglass (410) & Cabin (411) Creeks; Lower Wallowa River (506); Mud (602), Chesnimnus (604) & Upper Joseph (605) Creeks	2	2
	Ladd Creek (406); Phillips/Willow Creek (408); Upper (501) & Middle (503) Wallowa rivers; & Lower Grande Ronde River/Menatche Creek (607)	1	3
	Five Points (404); Lower Joseph (606) & Deadman (703) Creeks	1	2
	Tucannon/Alpowa Creek (701)	1	1
	Mill Creek (407)	0	3
	Pataha Creek (705)	0	2
	Snake River/Steptoe Canyon (702) & Penawawa Creek (708)	0	1
	Flat Creek (704) & Lower Palouse River (808)	0	0
Upper Salmon & Pahsimeroi #1706020xxx	Germania (111) & Warm Springs (114) Creeks; Lower Pahsimeroi River (201); Alturas Lake (120), Redfish Lake (121), Upper Valley (123) & West Fork Yankee (126) Creeks	3	3
	Basin Creek (124)	3	2
	Salmon River/Challis (101); East Fork Salmon River/McDonald Creek (105); Herd Creek (108); Upper East Fork Salmon River (110); Salmon River/Big Casino (115), Fisher (117) & Fourth of July (118) Creeks; Upper Salmon River (119); Valley Creek/Iron Creek (122); & Morgan Creek (132)	2	3
	Salmon River/Bayhorse Creek (104); Salmon River/Slate Creek (113); Upper Yankee Fork (127) & Squaw Creek (128); Pahsimeroi River/Falls Creek (202)	2	2
	Yankee Fork/Jordan Creek (125)	1	3
	Salmon River/Kinnikinnick Creek (112); Garden Creek (129); Challis Creek/Mill Creek (130); & Patterson Creek (203)	1	2
	Road Creek (107)	1	1
	Unoccupied habitat in Hawley (410), Eighteenmile (411) & Big Timber (413) Creeks	Conservation Value for ST "Possibly High"	
Middle Salmon, Panther & Lemhi #1706020xxx	Salmon River/Colson (301), Pine (303) & Moose (305) Creeks; Indian (304) & Carmen (308) Creeks, North Fork Salmon River (306); & Texas Creek (412)	3	3
	Deep Creek (318)	3	2
	Salmon River/Cow Creek (312) & Hat (313), Iron (314), Upper Panther (315), Moyer (316) & Woodtick (317) Creeks; Lemhi River/Whimpey Creek (402); Hayden (414), Big Eight Mile (408), & Canyon (408) Creeks	2	3
	Salmon River/Tower (307) & Twelvemile (311) Creeks; Lemhi River/Kenney Creek (403); Lemhi River/McDevitt (405), Lemhi River/Yearian Creek (406); & Peterson Creek (407)	2	2

Geo-graphic Regions and HUC4s	Watershed Name and HUC5 Code(s)	Current Quality	Potential Quality
	Owl (302) & Napias (319) Creeks	2	1
	Salmon River/Jesse Creek (309); Panther Creek/Trail Creek (322); & Lemhi River/Bohannon Creek (401)	1	3
	Salmon River/Williams Creek (310)	1	2
	Agency Creek (404)	1	1
	Panther Creek/Spring Creek (320) & Clear Creek (323)	0	3
	Big Deer Creek (321)	0	1
Mid-Salmon-Chamberlain, South Fork, Lower, & Middle Fork Salmon #1706020xxx	Lower (501), Upper (503) & Little (504) Loon Creeks; Warm Springs (502); Rapid River (505); Middle Fork Salmon River/Soldier (507) & Lower Marble Creek (513); & Sulphur (509), Pistol (510), Indian (511) & Upper Marble (512) Creeks; Lower Middle Fork Salmon River (601); Wilson (602), Upper Camas (604), Rush (610), Monumental (611), Beaver (614), Big Ramey (615) & Lower Big (617) Creeks; Middle Fork Salmon River/Brush (603) & Sheep (609) Creeks; Big Creek/Little Marble (612); Crooked (616), Sheep (704), Bargamin (709), Sabe (711), Horse (714), Cottonwood (716) & Upper Chamberlain Creek (718); Salmon River/Hot Springs (712); Salmon River/Kitchen Creek (715); Lower Chamberlain/McCalla Creek (717); & Slate Creek (911)	3	3
	Marsh (506); Bear Valley (508) Yellow Jacket (604); West Fork Camas (607) & Lower Camas (608) Creeks; & Salmon River/Disappointment Creek (713) & White Bird Creek (908)	2	3
	Upper Big Creek (613); Salmon River/Fall (701), California (703), Trout (708), Crooked (705) & Warren (719) Creeks; Lower South Fork Salmon River (801); South Fork Salmon River/Cabin (809), Blackmare (810) & Fitsum (812) Creeks; Lower Johnson Creek (805); & Lower (813), Middle (814) & Upper Secesh (815) rivers; Salmon River/China (901), Cottonwood (904), McKenzie (909), John Day (912) & Lake (913) Creeks; Eagle (902), Deer (903), Skookumchuck (910), French (915) & Partridge (916) Creeks	2	2
	Wind River (702), Salmon River/Rabbit (706) & Rattlesnake (710) Creeks; & Big Mallard Creek (707); Burnt Log (806), Upper Johnson (807) & Buckhorn (811) Creeks; Salmon River/Deep (905), Hammer (907) & Van (914) Creeks	2	1
	Silver Creek (605)	1	3
	Lower (803) & Upper (804) East Fork South Fork Salmon River; Rock (906) & Rice (917) Creeks	1	2
Little Salmon #176021xxx	Rapid River (005)	3	3
	Hazard Creek (003	3	2
	Boulder Creek (004)	2	3
	Lower Little Salmon River (001) & Little Salmon River/Hard Creek (002)	2	2
Selway, Lochsa & Clearwater #1706030xxx	Selway River/Pettibone (101) & Gardner (103) Creeks; Bear (102), White Cap (104), Indian (105), Burnt Knob (107), Running (108) & Goat (109) Creeks; & Upper Selway River (106); Gedney (202), Upper Three Links (204), Rhoda (205), North Fork Moose (207), Upper East Fork Moose (209) & Martin (210) Creeks; Upper (211), Middle (212) & Lower Meadow (213) Creeks; Selway River/Three Links Creek (203); & East Fork Moose Creek/Trout Creek (208); Fish (302), Storm (309), Warm Springs (311), Fish Lake (312), Boulder (313) & Old Man (314) Creeks; Lochsa River/Stanley (303) & Squaw (304) Creeks; Lower Crooked (305), Upper Crooked (306) & Brushy (307) forks; Lower (308), Upper (310) White Sands, Ten Mile (509) & John's (510) Creeks	3	3

Geo-graphic Regions and HUC4s	Watershed Name and HUC5 Code(s)	Current Quality	Potential Quality
	Selway River/Goddard Creek (201); O'Hara Creek (214) Newsome (505) Creeks; American (506), Red (507) & Crooked (508) rivers	2	3
	Lower Lochsa River (301); Middle Fork Clearwater River/Maggie Creek (401); South Fork Clearwater River/Meadow (502) & Leggett Creeks; Mill (511), Big Bear (604), Upper Big Bear (605), Musselshell (617), Eldorado (619) & Mission (629) Creeks, Potlatch River/Pine Creek (606); & Upper Potlatch River (607); Lower (615), Middle (616) & Upper (618) Lolo Creeks	2	2
	South Fork Clearwater River/Peasley Creek (502)	2	1
	Upper Orofino Creek (613)	2	0
	Clear Creek (402)	1	3
	Three Mile (512), Cottonwood (513), Big Canyon (610), Little Canyon (611) & Jim Ford (614) Creeks; Potlatch River/Middle Potlatch Creek (603); Clearwater River/Bedrock (608), Jack's (609) Lower Lawyer (623), Middle Lawyer (624), Cottonwood (627) & Upper Lapwai (628) Creeks; & Upper (630) & Lower (631) Sweetwater Creeks	1	2
	Lower Clearwater River (601) & Clearwater River/Lower Potlatch River (602), Fivemile Creek (620), Sixmile Creek (621) and Tom Taha (622) Creeks	1	1

Note: Current conditions are ranked as either poor (score 0), fair-to-poor (score 1), fair-to-good (score 2), or good-to-excellent (score 3). Potential conditions are ranked as having little or no improvement potential (score 0), some improvement potential (score 1), high improvement potential (score 2), or are highly functioning and are at their historic potential (score 3).

2.3. Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

2.3.1. Biological Requirements of Salmon and Steelhead

The biological requirements of salmon and steelhead in the action area vary depending on the life history stage and natural range of variation present within that system. Generally, during spawning migrations, adult salmon require clean water with cool temperatures and access to thermal refugia, dissolved oxygen near 100% saturation, low turbidity, adequate flows and depths to allow passage over barriers to reach spawning sites, and sufficient holding and resting sites. Anadromous fish select spawning areas that are based on species-specific requirements of flow, water quality, substrate size, and groundwater upwelling. Embryo survival and fry emergence depend on substrate conditions (e.g., gravel size, porosity, permeability, and oxygen concentrations), substrate stability during high flows, and, for most species, water temperatures of 55.4°F or less. Habitat requirements for juvenile rearing include seasonally suitable microhabitats for holding, feeding, and resting. Migration of juveniles to rearing areas - whether the ocean, lakes, or other stream reaches - requires access to these habitats. Physical, chemical, and thermal conditions may all impede movements of adult or juvenile fish.

Each ESA-listed fish species considered here resides in or migrates through the action area. Thus, for this action area, the biological requirements for salmon and steelhead are the habitat characteristics that would support those species' successful spawning, rearing, and migration (i.e., the PCEs for freshwater spawning sites, rearing sites, and freshwater migration corridors associated with those species).

2.3.2. Effects of Land Management and Development

In general, the environment for ESA-listed species in the referenced basins has been dramatically affected by the development and operation of the Federal Columbia River Power System (FCRPS). Storage dams have eliminated mainstem spawning and rearing habitat, and have altered the natural flow regime of the Snake and Columbia Rivers, decreasing spring and summer flows, increasing fall and winter flow, and altering natural thermal patterns. The FCRPS kills or injures a portion (approximately 46%) of the smolts passing through the system (NMFS 2004). Slowed water velocity and increased temperatures in reservoirs delays smolt migration timing and increases predation in the migratory corridor (NMFS 2004; Independent Scientific Group 2000; National Research Council 1996). Formerly complex mainstem habitats have been reduced to predominantly single channels, with reduced floodplains and off-channel habitats eliminated or disconnected from the main channel (Sedell and Froggatt 2000; Independent Science Group 2000; Coutant 1999). The amount of large woody debris in these rivers has declined, reducing habitat complexity and altering the rivers' food webs (Maser and Sedell 1994).

Other anthropogenic activities that have degraded aquatic habitats or affected native fish populations in the Snake River Basin include stream channelization, elimination of wetlands, construction of flood-control dams and levees, construction of roads (many with impassable culverts), timber harvest, splash dams, mining, water withdrawals, unscreened water diversions, agriculture, livestock grazing, urbanization, outdoor recreation, fire exclusion/suppression, artificial fish propagation, fish harvest, and introduction of non-native species (Henjum et al. 1994; Rhodes et al. 1994; National Research Council 1996; Spence et al. 1996; Lee et al. 1997; NMFS 2004). In many watersheds, land management and development activities have:

- Reduced connectivity (i.e., the flow of energy, organisms, and materials) between streams, riparian areas, floodplains, and uplands;
- Elevated fine sediment yields, degrading spawning and rearing habitat;
- Reduced large woody material that traps sediment, stabilizes stream banks, and helps form pools;
- Reduced vegetative canopy that minimizes solar heating of streams;

- Caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations;

- Altered peak flow volume and timing, leading to channel changes and potentially altering fish migration behavior; and,

- Altered floodplain function, water tables and base flows (Henjum et al. 1994; McIntosh et al. 1994; Rhodes et al. 1994; Wissmar et al. 1994; National Research Council 1996; Spence et al. 1996; and Lee et al. 1997).

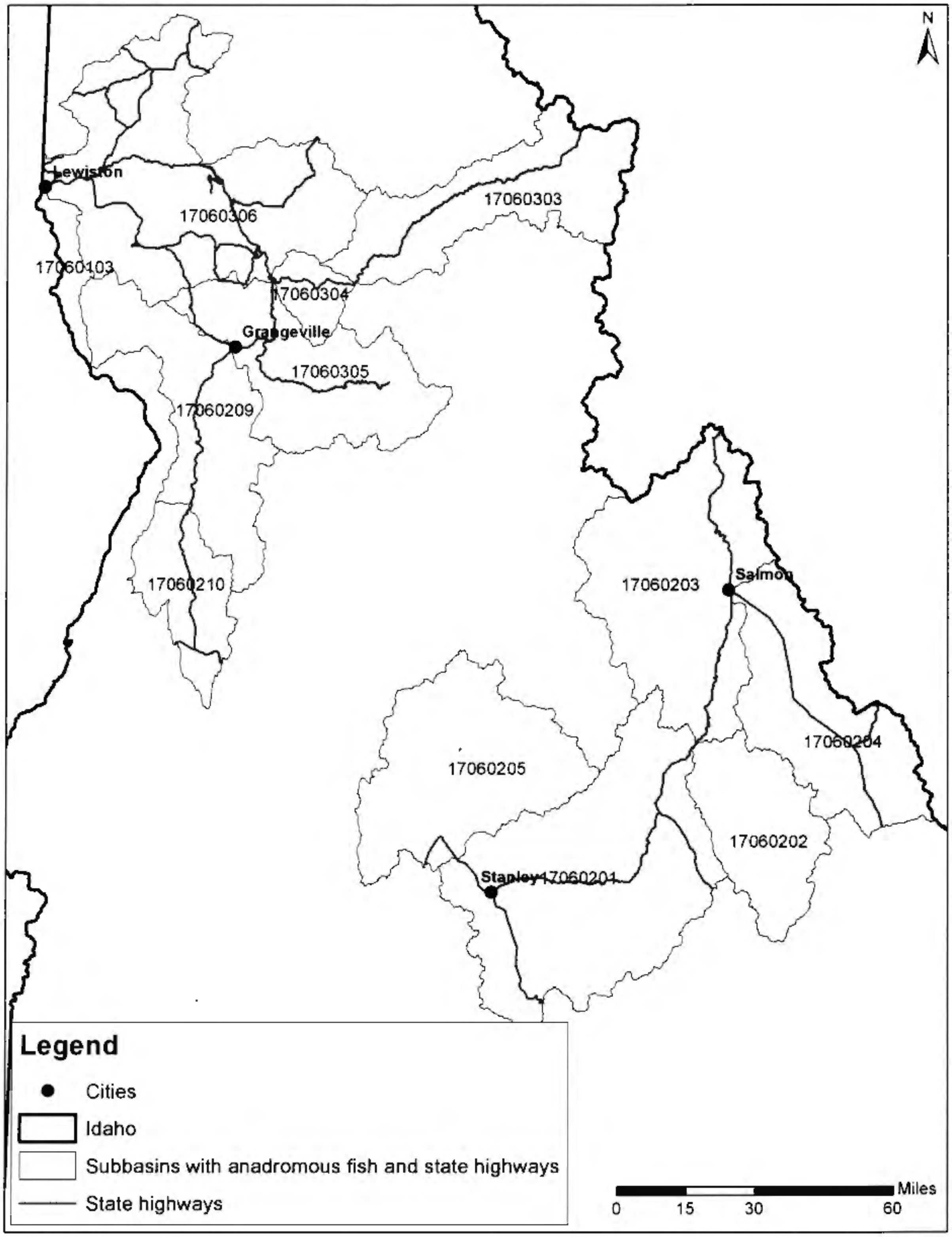
2.3.3. Basins in Action Area

The action area includes 12 subbasins (4th-field HUCs), encompassing all areas potentially affected directly or indirectly by this programmatic consultation. Because of the potential for downstream effects and additive effects within watersheds, the action area encompasses entire subbasins where ESA-listed species (and/or designated critical habitat) and state highways occur. Some subbasins include considerably more miles of state highway than others, as shown in Table 9 and Figure 8.

Table 9. Miles of state highway occurring within each action area subbasin (subbasins with both ESA-listed species and state highways).

4^{th}-field HUC	HUC Name	Miles of State Highway
17060103	Lower Snake-Asotin	0.9
17060201	Upper Salmon	139.9
17060202	Pahsimeroi	0.04
17060203	Middle Salmon-Panther	88.2
17060204	Lemhi	77.8
17060205	Upper Middle Fork Salmon	13.4
17060209	Lower Salmon	47.4
17060210	Little Salmon	47.9
17060303	Lochsa	77.7
17060304	Middle Fork Clearwater	24.0
17060305	South Fork Clearwater	99.1
17060306	Lower Clearwater	341.8

Figure 8. State highways in Idaho subbasins with ESA-listed salmon and steelhead.



A general review of the environmental baseline has been divided up into the two major basins within the action area, which encompass all subbasins in Table 9 except for Lower Snake-Asotin:

- Clearwater River Basin
- Salmon River Basin

The Lower Snake-Asotin subbasin falls in the Lower Snake River Basin. The 0.9 miles of state highway in this subbasin are in the city of Lewiston near the confluence of the Clearwater River with the Snake River, which is in the backwater behind Lower Granite Dam. The environmental baseline for habitat on the Snake River side of the confluence is similar to that of the Clearwater River side of the confluence, described below.

Clearwater River Basin. The Clearwater River Basin is located in north-central Idaho between the 46th and 47th latitudes in the northwestern portion of the continental United States. It is a region of mountains, plateaus, and deep canyons within the Northern Rocky Mountain geographic province. The basin is bracketed by the Salmon River Basin to the south and St. Joe River subbasin to the north. Within the Clearwater River Basin, there are 543 miles of state highway in four subbasins: Lochsa River, Middle Fork Clearwater River, South Fork Clearwater River, and the Lower Clearwater River (Table 9). No state highways fall within the other major drainages, the Lochsa River, Selway River, and North Fork Clearwater River.

The Clearwater River drains approximately a 9,645-mi^2 area. The basin extends approximately 100 miles north to south and 120 miles east to west. There are four major tributaries that drain into the mainstem of the Clearwater River: the Lochsa, Selway, South Fork Clearwater, and North Fork Clearwater Rivers. The Idaho-Montana border follows the upper watershed boundaries of the Lochsa and Selway Rivers, and the eastern portion of the North Fork Clearwater River in the Bitterroot Mountains. The North Fork Clearwater River then drains the Clearwater Mountains to the north, while the South Fork Clearwater River drains the divide along the Selway and Salmon Rivers. Dworshak Dam, located 2 miles above the mouth of the North Fork Clearwater River, is the only major water regulating facility in the basin. Dworshak Dam was constructed in 1972 and eliminated access to one of the most productive systems for anadromous fish in the basin. The mouth of the Clearwater is located on the Washington-Idaho border at the town of Lewiston, Idaho, where it enters the Snake River 139 river miles upstream of the Columbia River.

More than two-thirds of the total acreage of the Clearwater River Basin is evergreen forests (over 4 million acres), largely in the mountainous eastern portion of the basin. The western third of the basin is part of the Columbia plateau and is composed almost entirely of crop and pastureland. Most of the forested land within the Clearwater Basin is owned by the Federal government and managed by the USFS (over 3.5 million acres), but the State of Idaho and Potlatch Corporation also own extensive forested tracts. The western half of the basin is primarily in the private ownership of small forest landowners and timber companies, as well as farming and ranching families and companies. There are some small private in-holdings within the boundaries of USFS lands in the eastern portion of the basin. Nez Perce Tribe lands are located primarily within or adjacent to Lewis, Nez Perce, and Idaho Counties within the current houndaries of the Nez Perce Indian Reservation. These properties consist of both Fee lands owned and managed by the Nez Perce Tribe, and properties placed in trust status with the Bureau of Indian Affairs. Other agencies managing relatively small land areas in the Clearwater basin include the National Park Service, the Bureau of Land Management (BLM), ITD, and IDFG (Ecovista 2004a).

Water quality limited segments are streams or lakes which are listed under section 303(d) of the CWA for either failing to meet their designated beneficial uses, or for exceeding state water quality criteria. The current list of 303(d) listed segments was compiled hy the IDEQ in 2010, and includes many stream reaches within the Clearwater hasin (IDEQ 2011). Individual stream reaches are often listed for multiple parameters, making tahular summary difficult. However, please refer to the following website for reach-specific 303(d) listed stream segments: http://www.deq.idaho.gov/water-quality/surface-water/monitoring-assessment/integrated-report.aspx.

Small-scale irrigation, primarily using removahle in-stream pumps, is relatively common for hay and pasture lands scattered throughout the lower elevation portions of the subbasin, but the amounts withdrawn have not been quantified. The only large-scale irrigation/diversion system within the Clearwater basin is operated by the Lewiston Orchards Irrigation District within the Lower Clearwater subbasin. Seventy dams currently exist within the boundaries of the Clearwater hasin. The vast majority of existing dams exist within the Lower Clearwater subhasin (56), although dams also currently exist in tbe Lower North Fork (3), Lolo/Middle Fork (5), and South Fork (6) watersheds (Ecovista 2004a).

Agriculture primarily affects the western third of the basin on lands below 2,500 feet elevation, primarily on the Camas Prairie both south and north of the mainstem Clearwater and the Palouse. Additional agriculture is found on benches along the main Clearwater and its lower tributaries such as Lapwai, Potlatch, and Big Canyon Creeks. Hay production in the meadow areas of the Red River and Big Elk Creek in the American River watershed accounts for most of the agriculture in the South Fork Clearwater. Total cropland and pasture in the subbasin exceeds 760,000 acres. Agriculture is a particularly large part of the economy in Nez Perce, Latah, Lewis, and Idaho Counties, which all have large areas of gentle terrain west of the Clearwater Mountains. Small grains are the major crop, primarily wheat and barley. Landscape dynamics, hydrology, and erosion in these areas are primarily determined by agricultural practices (Ecovista 2004a).

Suhwatersheds with the highest proportion of grazeable area within the Clearwater Basin are typically associated with USFS grazing allotments in lower-elevation portions of their ownership areas. However, the majority of lands managed by the USFS within the Clearwater basin are not subjected to grazing by cattle or sheep, including all or nearly all of the Upper Selway, Lochsa, and Upper and Lower North Fork watersheds. Subwatersheds outside of the USFS boundaries typically have less than 25% of the land area defined as grazeable, although this is as mucb as 75% for some. Privately owned property within the basin typically contains a high percentage of agricultural use, with grazeable lands found only in uncultivated areas. In contrast, grazing allotments on USFS lands are typically large, often encompassing multiple HUCs, resulting in higher proportions of grazeable area than those contained in primarily privately owned lands (Ecovista 2004a).

Mines are distributed throughout all eight subbasins in the Clearwater basin, with the fewest being located in the Upper and Lower Selway. Ecological hazard ratings for mines (delineated by the Interior Columbian Basin Ecosystem Management Project) indicate that the vast majority of mines throughout the subbasin pose a low relative degree of environmental risk. However, clusters of mines with relatively high ecological hazard ratings are located in the South Fork Clearwater River and in the Orofino Creek drainage (Ecovista 2004a).

Salmon River Basin. The Salmon River flows 410 miles north and west through central Idaho to join the Snake River. The Salmon River is one of the largest basins in the Columbia River drainage, and has the most stream miles of habitat available to anadromous fish. The total hasin is approximately 14,000 square miles in size, and encompasses 415 miles of state highway in seven subbasins: the Upper Salmon River, Pahsimeroi River, Middle Salmon-Panther Creek, Lemhi River, Upper Middle Fork Salmon River, Lower Salmon River, and Little Salmon River. No state highways fall within the remaining three subbasins, the Lower Middle Fork Salmon River, Middle Salmon-Chamberlain Creek, or South Fork Salmon River.

Public lands account for approximately 91% of the Salmon River basin, with most of this being in Federal ownership and managed by seven National Forests or the BLM. Public lands within the basin are managed to produce wood products, forage for domestic livestock, mineral commodities, and to provide recreation, wilderness, and terrestrial and aquatic habitats. Approximately 9% of the basin land area is privately owned.

Primary land use on private lands is agricultural cultivation, which is concentrated in valley hottom areas within the upper and lower portions of the basin. Other land management practices within the basin vary among landowners. The greatest proportion of National Forest lands are Federally designated wilderness area or are areas with low resource commodity suitability. One-third of the National Forest lands in the basin are managed intensively for forest, mineral, or range resource commodity production. The BLM lands in the basin are managed to provide domestic livestock rangeland and habitats for native species. State of Idaho endowment lands within the basin are managed for forest, mineral, or range resource commodity production.

Since the State Stream Channel Protection Act became law in 1971, the IDWR has issued a total of 1,763 stream alteration permits within the Salmon River basin (IDWR 2001, as cited in Ecovista 2004b). Examination of the geographic distrihution of permitted channel alterations during the past 30 years suggests that the long-term frequency of these activities was relatively consistent across much of the Salmon River basin, but less common in the Upper Middle Fork Salmon, Lower Middle Fork Salmon, Middle Salmon-Chamberlain, and Pahsimeroi watersheds. It is unclear to what degree channel modifying activities completed without permits may have had on the observed pattern. Stream channels in the basin are also altered, albeit on a smaller scale, by recreational dredging activities (Ecovista 2004b).