9. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS as an act which actually kills or injures wildlife and may include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions or omissions which create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The proposed FPHCP and its associated documents clearly identify anticipated adverse effects to covered species likely to result from the proposed action and the measures that are necessary and appropriate to minimize those adverse effects. All conservation measures described in the FPHCP, together with the provisions described in the associated Implementation Agreement and section 10(a)(1)(B) Permit, are hereby incorporated by reference as reasonable and prudent measures and terms and conditions within this Incidental Take Statement pursuant to 50 CFR §402.14(i). Such terms and conditions are non-discretionary and must be undertaken for the exemptions under section 10(a)(1)(B) and section 7(o)(2) of the ESA to apply. If the Permittee fails to adhere to the section 10(a)(1)(B) permit conditions, the protective coverage of the Permit and section 7(o)(2) may lapse. The amount or extent of incidental take anticipated under the proposed FPHCP and associated reporting requirements are as described in the FPHCP and its accompanying section 10(a)(1)(B) permit.

Note that 47 of the species addressed in this Biological/Conference Opinion are not currently listed or proposed. Therefore, no take prohibition is in place for these species as of the date of this Opinion. The incidental take statements below, and the section 10(a)(1)(B) Permit as it pertains to these species, do not become effective unless (and until) the currently unlisted species are listed under the ESA.

The FWS anticipates that the proposed action is likely to result in the incidental take of covered species in the form of capture, harm, and harass. We anticipate incidental take of individuals of these species would typically be difficult to detect for the following reasons: (1) there is a low likelihood of finding injured or dead individuals of affected species due to one or more of the following factors: relatively low population density, secretive behavior (such as fossorial or log-dwelling species), concealing habitat (e.g., aquatic species), small size, and sporadic distribution; (2) the large area associated with implementation of the proposed activities covered by the FPHCP Permit; (3) the delayed effects of many of the activities that could take species; (4) the rapid rate of decomposition of some of the species after death; (5) the high probability of scavenging of dead individuals by predators; and (6) the transport of affected individuals to downstream areas. For these reasons, we have used the amount of habitat destroyed or degraded as a surrogate for expressing the anticipated amount of incidental take in the form of harm or harass. Changes in habitat conditions are a reasonably good indicator of those forms of take because impacts to habitat occupied by covered species from permit-related activities are the cause of the incidental take.

Most take of all covered species is expected to be in the form of harass as a result of habitat degradation caused by permit-covered activities that create the likelihood of sub-lethal injury by significantly disrupting their breeding, feeding, or sheltering behavior. A lesser amount of take of all covered species is expected to be in the form of sub-lethal harm as a result of habitat degradation caused by permit-covered activities that actually injures covered species by significantly disrupting their breeding, feeding, or sheltering behavior. The least amount of take is expected to be in the form of harm as a result of habitat degradation caused by permit-covered activities that actually kills covered species by significantly disrupting their breeding, feeding, or sheltering behavior. Direct take from capture, dewatering, instream large wood placement, and instream use of heavy equipment related to culvert and bridge repair, maintenance, and installation is expected to be in the form of sub-lethal or lethal “harm” take.

We estimate that about 2.5 percent of all habitat degradation in riparian management areas caused by permit-covered activities is expected to occur in association with 20-acre exempt parcels (Appendix F). This degradation is expected to cause incidental take of covered species in the form of harm.

9.1 INDIVIDUAL SPECIES INCIDENTAL TAKE STATEMENTS

9.1.1 Amphibians

9.1.1.1 Cascade Torrent Salamander

Amount and Extent of Take

The Cascade torrent salamander is known to occur in parts or all of the following Water Resource Inventory Areas (WRIAs): 11, 23, 26, 27, 28, and 29 (USFWS and NMFS 2006; Appendix A Regional Summaries). We anticipate that take of Cascade torrent salamanders would occur within Type Np and Ns streams on covered lands within these WRIAs over the 50-year Permit term. The conservation measures in the FPHCP provide protection for the highest quality habitat for Cascade torrent salamanders. However, up to 50 percent of Type Np streams and up to 100 percent of Type Ns streams may not receive riparian buffers.

Most take of Cascade torrent salamanders would be from habitat degradation from non-buffered stream margin habitat of Type Np and Ns streams that would impair breeding, feeding, and sheltering behaviors. It is estimated that harvest of riparian timber for up to 42,170 acres along Type Np streams and 275,140 acres along Type Ns streams would result in take of Cascade torrent salamanders over the life of the proposed 50-year Permit term.

A limited amount of take from stress, wounding, or actually killing salamanders is expected as a result of: (1) electrofishing related to adaptive management research and stream type model validation, (2) culvert and bridge maintenance and installation, and (3) heavy equipment use related to harvesting timber in riparian areas or emergency road repairs. Take from electrofishing and heavy equipment use is expected to be minimal. However, take from culvert and bridge maintenance and installation is expected to result during and immediately following instream work as sediment from the work site may degrade downstream habitat for Cascade torrent salamanders impairing breeding, feeding, and sheltering behavioral patterns; upstream habitat could also be degraded from erosional-headcutting as the upstream channel adjusts to the new stream crossing. Also, sediment from hydrologically-connected roads would also occur at culvert and bridge crossings on Type Np and Ns streams causing further degradation of habitat. Therefore, it is estimated that culvert and bridge maintenance and installation, and sediment from hydrologically-connected roads, would result in take of Cascade torrent salamanders for up to 2,829 Type Np stream crossings and 41,174 Type Ns stream crossings, and 289 miles of Type Np stream-adjacent roads, over the life of the proposed 50-year Permit term.

Effect of Take

For the reasons discussed in the "conclusion" section of this Opinion, we determined that the level of anticipated take from the action is not likely to result in jeopardy to the Cascade torrent salamander.

9.1.1.2 Columbia Torrent Salamander

Amount and Extent of Take

The Columbia torrent salamander is known to occur in parts or all of the following Water Resource Inventory Areas (WRIAs): 22, 23, 24, 25, and 26 (USFWS and NMFS 2006; Appendix A Regional Summaries). We anticipate that take of Columbia torrent salamanders would occur within Type Np and Ns streams on covered lands within these WRIAs over the 50-year Permit term. The conservation measures in the FPHCP provide protection for the highest-quality habitat for Columbia torrent salamanders. However, up to 50 percent of Type Np streams and up to 100 percent of Type Ns streams may not receive riparian buffers.

Most take of Columbia torrent salamanders would be from habitat degradation from non-buffered stream margin habitat of Type Np and Ns streams that would impair breeding, feeding, and sheltering behaviors. It is estimated that harvest of riparian timber for up to 49,881 acres along Type Np streams and 399,843 acres along Type Ns streams would result in take of Columbia torrent salamanders over the life of the proposed 50-year Permit term.

A limited amount of take from stress, wounding, or actually killing salamanders is expected as a result of: (1) electrofishing related to adaptive management research and stream type model validation, (2) culvert and bridge maintenance and installation, and (3) heavy equipment use related to harvesting timber in riparian areas or emergency road repairs. Take from electrofishing and heavy equipment use is expected to be minimal. However, take from culvert and bridge maintenance and installation is expected to result during and immediately following instream work as sediment from the work site may degrade downstream habitat for Columbia torrent salamanders impairing breeding, feeding, and sheltering behavioral patterns; upstream habitat could also be degraded from erosional-headcutting as the upstream channel adjusts to the new stream crossing. Also, sediment from hydrologically-connected roads would also occur at culvert and bridge crossings on Type Np and Ns streams causing further degradation of habitat. Therefore, it is estimated that culvert and bridge maintenance and installation, and sediment from hydrologically-connected roads, would result in take of Columbia torrent salamanders for up to 2,673 Type Np stream crossings and 44,994 Type Ns stream crossings, and 265 miles of Type Np stream-adjacent roads, over the life of the proposed 50-year Permit term.

Effect of Take

For the reasons discussed in the "conclusion" section of this Opinion, we determined that the level of anticipated take from the action is not likely to result in jeopardy to the Columbia torrent salamander.

9.1.1.3 Olympic Torrent Salamander

Amount and Extent of Take

The Olympic torrent salamander is known to occur in parts or all of the following Water Resource Inventory Areas (WRIAs): 16, 17, 18, 19, 20, 21, 22, 23, and 24 (USFWS and NMFS 2006; Appendix A Regional Summaries). We anticipate that take of Olympic torrent salamanders would occur within Type Np and Ns streams on covered lands within these WRIAs over the 50-year Permit term. The conservation measures in the FPHCP provide protection for the highest quality habitat for Olympic torrent salamanders. However, up to 50 percent of Type Np streams and up to 100 percent of Type Ns streams may not receive riparian buffers.

Most take of Olympic torrent salamanders would be from habitat degradation from non-buffered stream margin habitat of Type Np and Ns streams that would impair breeding, feeding, and sheltering behaviors. It is estimated that harvest of riparian timber for up to 41,002 acres along Type Np streams and 317,720 acres along Type Ns streams would result in take of Olympic torrent salamanders over the life of the proposed 50-year Permit term.

A limited amount of take from stress, wounding, or actually killing salamanders is expected as a result of: (1) electrofishing related to adaptive management research and stream type model validation, (2) culvert and bridge maintenance and installation, and (3) heavy equipment use related to harvesting timber in riparian areas or emergency road repairs. Take from electrofishing and heavy equipment use is expected to be minimal. However, take from culvert and bridge maintenance and installation is expected to result during and immediately following instream work as sediment from the work site may degrade downstream habitat for Olympic torrent salamanders impairing breeding, feeding, and sheltering behavioral patterns; upstream habitat could also be degraded from erosional-headcutting as the upstream channel adjusts to the new stream crossing. Also, sediment from hydrologically-connected roads would also occur at culvert and bridge crossings on Type Np and Ns streams causing further degradation of habitat. Therefore, it is estimated that culvert and bridge maintenance and installation, and sediment from hydrologically-connected roads, would result in take of Olympic torrent salamanders for up to 1,938 Type Np stream crossings and 29,107 Type Ns stream crossings, and 187 miles of Type Np stream-adjacent roads, over the life of the proposed 50-year Permit term.

Effect of Take

For the reasons discussed in the “conclusion” section of this Opinion, we determined that the level of anticipated take from the action is not likely to result in jeopardy to the Olympic torrent salamander.

9.1.1.4 Dunn’s Salamander

Amount and Extent of Take

The Dunn’s salamander is known to occur in parts or all of the following Water Resource Inventory Areas (WRIAs): 22, 23, 24, 25, and 26 (USFWS and NMFS 2006; Appendix A Regional Summaries). We anticipate that take of Dunn’s salamanders would occur adjacent to Type S, F, Np, and Ns streams on covered lands within these WRIAs over the 50-year Permit term. The conservation measures in the FPHCP provide protection for the highest quality habitat for Dunn’s salamanders. However, up to 50 percent of Type Np streams and up to 100 percent of Type Ns streams may not receive riparian buffers.

Most take of Dunn's salamanders would be from habitat degradation from non-buffered riparian habitat of Type Np and Ns streams that would impair breeding, feeding, and sheltering behaviors. Direct mortality take is also possible from heavy equipment operation in these non-buffered areas. Therefore, it is estimated that harvest of riparian timber for up to 49,881 acres along Type Np streams and 399,843 acres along Type Ns streams would result in take of Dunn's salamanders over the life of the proposed 50-year Permit term.

A limited amount of take from stress, wounding, or actually killing salamanders is expected with culvert and bridge maintenance and installation, as these activities can degrade riparian habitat immediately adjacent to work sites during the maintenance and installation operations. Therefore, it is estimated that culvert and bridge maintenance and installation would result in take of Dunn's salamanders for up to 2,673 Type Np stream crossings and 29,107 Type Ns stream crossings over the life of the proposed 50-year Permit term. Because Dunn's salamanders may also occur along Type S or F waters, up to 665 stream crossings on Type S waters and 6,137 stream crossings on Type F waters would also cause a limited amount of take during culvert and bridge maintenance and installation operations. Further, it is estimated that road construction and maintenance would result in take of Dunn's salamanders from up to 552 miles of road along Type S streams, 1,033 miles of road along Type F streams, and 265 miles of road along Type Np streams.

Although riparian prescriptions along Type S and F waters are expected to adequately protect habitat for Dunn's salamanders that may occur within these riparian areas, the operation of heavy equipment to harvest riparian timber may cause a limited amount of take from stress, wounding, or actually killing salamanders. Therefore, up to 55,053 acres of Type S riparian harvest and up to 133,453 acres of Type F riparian harvest may take Dunn's salamanders.

Effect of Take

For the reasons discussed in the "conclusion" section of this Opinion, we determined that the level of anticipated take from the action is not likely to result in jeopardy to the Dunn's salamander.

9.1.1.5 Van Dyke's Salamander

Amount and Extent of Take

The Van Dyke's salamander is known to occur in parts or all of the following Water Resource Inventory Areas (WRIAs): 10, 11, 16, 19, 20, 21, 22, 23, 24, 25, 26, and 27 (USFWS and NMFS 2006; Appendix A Regional Summaries). We anticipate that take of Van Dyke's salamanders would occur adjacent to Type S, F, Np, and Ns streams on covered lands within these WRIAs over the 50-year Permit term. The conservation measures in the FPHCP provide protection for the highest quality habitat for Van Dyke's salamanders. However, up to 50 percent of Type Np streams and up to 100 percent of Type Ns streams may not receive riparian buffers.

Most take of Van Dyke's salamanders would from habitat degradation from non-buffered riparian habitat of Type Np and Ns streams that would impair breeding, feeding, and sheltering behaviors. Direct mortality take is also possible from heavy equipment operation in these non-buffered areas. Therefore, it is estimated that harvest of riparian timber for up to 81,394 acres along Type Np streams and 532,021 acres along Type Ns streams would result in take of Van Dyke's salamanders over the life of the proposed 50-year Permit term.

A limited amount of take from stress, wounding, or actually killing salamanders is expected with culvert and bridge maintenance and installation, as these activities can degrade riparian habitat immediately adjacent to work sites during the maintenance and installation operations. Therefore, it is estimated that culvert and bridge maintenance and installation would result in take of Van Dyke's salamanders for up to 4,794 Type Np stream crossings and 62,693 Type Ns stream crossings over the life of the proposed 50-year Permit term. Because Van Dyke's salamanders may also occur along Type S or F waters, up to 962 stream crossings on Type S waters and 9,283 stream crossings on Type F waters would also cause a limited amount of take during culvert and bridge maintenance and installation operations. Further, it is estimated that road construction and maintenance would result in take of Dunn's salamanders from up to 793 miles of road along Type S streams, 1,507 miles of road along Type F streams, and 468 miles of road along Type Np streams.

Although riparian prescriptions along Type S and F waters are expected to adequately protect habitat for Van Dyke's salamanders that may occur within these riparian areas, the operation of heavy equipment to harvest riparian timber may cause a limited amount of take from stress, wounding, or actually killing salamanders. Therefore, up to 88,519 acres of Type S riparian harvest and up to 193,530 acres of Type F riparian harvest may take Van Dyke's salamanders.

Effect of Take

For the reasons discussed in the "conclusion" section of this Opinion, we determined that the level of anticipated take from the action is not likely to result in jeopardy to the Van Dyke's salamander.

9.1.1.6 Coastal Tailed Frog

Amount and Extent of Take

The Coastal tailed frog is known to occur in parts or all of the following Water Resource Inventory Areas (WRIAs): 1, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 38, 39, 45, 46, 47, and 48 (USFWS and NMFS 2006; Appendix A Regional Summaries). We anticipate that take of Coastal tailed frog would occur within Type Np and Ns streams on covered lands within these WRIAs over the 50-year Permit term. The conservation measures in the FPHCP provide protection for the highest quality habitat for Coastal tailed frogs. However, up to 50 percent of Type Np streams and up to 100 percent of Type Ns streams may not receive riparian buffers.

Most take of Coastal tailed frogs would be from habitat degradation from non-buffered riparian habitat that would impair breeding, feeding, and sheltering behaviors. It is estimated that harvest of riparian timber for up to 132,907 acres along Type Np streams and 717,686 acres along Type Ns streams would result in take of Coastal tailed frogs over the life of the proposed 50-year Permit term.

A limited amount of take from stress, wounding, or actually killing frogs is expected with: (1) electrofishing related to adaptive management research and stream typing; (2) culvert and bridge maintenance and installation; and (3) instream heavy equipment use related to harvesting timber in riparian areas. Take from electrofishing and instream heavy equipment use is expected to be minimal. However, take from culvert and bridge maintenance and installation may also cause take during and immediately following instream work as sediment from the work site may degrade downstream habitat for Coastal tailed frogs impairing essential breeding, feeding, and sheltering behaviors; upstream habitat could also be degraded from erosional-headcutting as the upstream channel adjusts to the new stream crossing. Also, sediment from hydrologically-connected roads could also occur at culvert and bridge crossings on Type Np and Ns streams causing further degradation of habitat. Therefore, it is estimated that culvert and bridge maintenance and installation, and sediment from hydrologically-connected roads, would result in take of Coastal tailed frogs for up to 7,575 Type Np stream crossings and 89,837 Type Ns stream crossings, and 872 miles of Type Np stream-adjacent roads, over the life of the proposed 50-year Permit term.

Effect of Take

For the reasons discussed in the "conclusion" section of this Opinion, we determined that the level of anticipated take from the action is not likely to result in jeopardy to the Coastal tailed frog.

9.1.1.7 Rocky Mountain Tailed Frog

Amount and Extent of Take

The Rocky Mountain tailed frog is known to occur in parts or all of the following Water Resource Inventory Areas (WRIAs): 32 and 35 (USFWS and NMFS 2006; Appendix A Regional Summaries). Additionally, they are suspected to occur in other WRIAs because of their adjacent occupancy in British Columbia and Idaho. Therefore, it is assumed that Rocky Mountain tailed frogs may also occur in WRIAs 51 to 62 (USFWS and NMFS 2006; Appendix A Regional Summaries). The following estimates for take include all known and suspected WRIAs with Rocky Mountain tailed frog occurrence. We anticipate that take of Rocky Mountain tailed frog would occur within Type Np and Ns streams on covered lands within these WRIAs over the 50-year Permit term. The conservation measures in the FPHCP provide protection for the highest quality habitat for Rocky Mountain tailed frogs. However, up to 50 percent of Type Np streams and up to 100 percent of Type Ns streams may not receive riparian buffers.

Most take of Rocky Mountain tailed frogs would be from habitat degradation from non-buffered riparian habitat degrading Type Np and Ns instream habitat that would impair breeding, feeding, and sheltering behaviors. It is estimated that harvest of riparian timber for up to 27,111 acres along Type Np streams and 101,768 acres along Type Ns streams would result in take of Rocky Mountain tailed frogs over the life of the proposed 50-year Permit term.

A limited amount of take from stress, wounding, or actually killing frogs is expected with: (1) electrofishing related to adaptive management research and stream typing; (2) culvert and bridge maintenance and installation; and (3) instream heavy equipment use related to harvesting timber in riparian areas. Take from electrofishing and instream heavy equipment use is expected to be minimal. However, take from culvert and bridge maintenance and installation may also cause take during and immediately following instream work as sediment from the work site may degrade downstream habitat for Rocky Mountain tailed frogs impairing breeding, feeding, and sheltering behaviors; upstream habitat could also be degraded from erosional-headcutting as the upstream channel adjusts to the new stream crossing. Also, sediment from hydrologically-connected roads would also occur at culvert and bridge crossings on Type Np and Ns streams causing further degradation of habitat. Therefore, it is estimated that culvert and bridge maintenance and installation, and sediment from hydrologically-connected roads, would result in take of Rocky Mountain tailed frogs for up to 1,341 Type Np stream crossings and 15,473 Type Ns stream crossings, and 255 miles of Type Np stream-adjacent roads, over the life of the proposed 50-year Permit term.

Effect of Take

For the reasons discussed in the "conclusion" section of this Opinion, we determined that the level of anticipated take from the action is not likely to result in jeopardy to the Rocky Mountain tailed frog.

9.1.2 Native Fish

9.1.2.1 Dolly Varden

Our current understanding of known Dolly Varden occurrence in Washington indicates that the species occupies habitats that are not expected to be affected by the FPHCP because Dolly Varden are upstream of FPHCP lands. However, future stream surveys may determine presence of Dolly Varden in streams associated with the FPHCP. Considering the conservation measures that would be implemented under the FPHCP, we have determined that authorizing a limited amount of take would not affect its habitat, or this species. As such, an analysis of incidental take has been done for Dolly Varden.

There may be minor effects to Dolly Varden, from the FPHCP that would lead to take of Dolly Varden. These affects have been analyzed in three areas of this Opinion: 1) General Effects; 2) Effects to Guilds; 3) and Effects to Species. The effects we have determined that could contribute to take of Dolly Varden are: 1) excessive sediment to fish-bearing streams from roads, riparian timber harvest, and stream crossing projects (culvert, bridge installation, and potentially other approved crossing methods); 2) increases in stream temperature due to riparian tree removal that provides shade; 3) the prevention of riparian trees from growing that could provide shade – primarily by riparian roads; 4) removal of riparian trees that could potentially provide LWD, 5) the prevention of riparian trees from growing that could ultimately provide LWD – primarily by riparian roads; and 6) capture and handling of Dolly Varden for instream projects, primarily road crossings. Dolly Varden that spend the majority of their life in lakes would not be exposed to some of these effects that contribute to take to the degree that some other salmonids may be.

Process for determining Incidental Take of Dolly Varden

We assessed the activities associated with the FPHCP to determine which activities had the highest chance of contributing to take of Dolly Varden. The activities needed to be measurable, have a likelihood of contributing to take, and be an activity directly associated with the FPHCP. The FPHCP activities that best meet these criteria for and Dolly Varden were: 1) riparian timber harvest in Type F, and Np streams, 2) stream crossings of Type F and Np streams, and 3) roads located in Type F, and Np riparian zones. Type S streams were not included in the analysis because of the current understanding of the species habitat association with upper reaches of streams. We determined that these three primary activities could be estimated with available information. See Appendix G for a description of the GIS process for determining these estimates.

Estimates were made of the WRIA's that Dolly Varden occupy in the FPHCP Action Area. The information for determining Dolly Varden occupancy came primarily from the Recovery Plans for Bull Trout in Washington and consultations with FWS bull trout biologists. The several streams where they occur are in the upper portions of their respective watersheds.

As described above, while we can develop quantifiable estimates of take for this Opinion, fish respond to environmental disturbances differently depending upon a variety of factors. Factors that may affect fish response to perturbations are size and species of fish, age of fish, condition of fish, complexity of habitat, season, inter-specific and intra-specific competition, dissolved oxygen and water temperatures, turbidity, and other physical and biological processes. In addition to the various possible responses of fish to disturbances, fish are often distributed in a stream network at different scales. Fish occupy their environment from a small scale such as a pool, to a large scale, such as the watershed. Because of this often patchy fish distribution within a stream, FPHCP activities that have been determined to contribute to take would not always cause the same fish response. An activity that may cause an adverse fish response in one stream, may not have the same result in another stream because the fish are not in proximity to the disturbance. The same activity could influence adult fish substantially differently than juvenile fish. As such, the incidental take estimates are used to judge the negative activities implemented under the FPHCP, but they are not always a reliable tool for accurately measuring incidental take due to the complexity of biological systems.

We estimate a total of 62,414 riparian acres is potentially available to be managed that could contribute to take of Dolly Varden. The actual reduction in recruitable LWD that occurs because of riparian timber harvest over the 50-year permit term is relatively small, but there would be trees that are harvested that would otherwise have recruited to the stream and formed habitat. The reduction of recruitable LWD becomes more noticeable over longer time frames, such as 100 and 250 years. Sediment delivery from riparian harvest is likely to occur in some situations, but is expected to be much less than sediment delivery from roads. However, there would be some circumstances that sediment delivery is a product of riparian harvest. Temperature effects may also result in take of Dolly Varden.

Incidental take of Dolly Varden from riparian timber harvest over the 50-year permit term is estimated in acres as follows:

- Type F riparian management acres: 40,735
- Type Np riparian management acres: 21,679

Road stream crossings are an activity that would be a primary mechanism for sediment delivery to Dolly Varden habitat. A total of 3,578 stream crossing are estimated on FPHCP lands that could take Dolly Varden. These stream crossings would deliver sediment to Dolly Varden habitat. Intensity of road use and road design influence sediment delivery to Dolly Varden habitat. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the riparian zone associated with a crossing is approximately 40 feet. This area could lose the potential to deliver LWD and could also cause increased sunlight to reach the stream.

Incidental take of Dolly Varden is estimated in number of stream crossings, over a 50-year permit term as follows:

- Type F stream crossings: 2,308
- Type Np stream crossings: 1,270

The third activity that can be estimated, and could also cause take, are roads located within the Riparian Zone. Most of these riparian roads have been in place for a considerable time and their presence reduces the effectiveness of the riparian area. Roads within the riparian zone have several effects, most notably reduction of recruitable LWD, reduction in shade (especially if close to the stream), and sediment delivery to Dolly Varden habitats. A total of 457 miles of road occurs within the riparian areas of Type F, and Np streams that could cause take. Approximately 2,215 acres (using a 40’ wide road opening) are reduced in providing full riparian functions. Over time these figures should be reduced due to implementation of the FPHCP.

Incidental take of Dolly Varden is estimated from roads in the Riparian Zone of Type F and Np streams. Estimates are in miles and acres as follows:

- Type F riparian roads: 317 miles (1,536acres)
- Type Np riparian roads: 140 miles (678 acres)

Conclusion

In this Opinion, we have determined that this level of anticipated take is not likely to result in jeopardy to the Dolly Varden. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.2 Westslope Cutthroat Trout & Coastal Cutthroat Trout

We anticipate that take of cutthroat trout would occur within cutthroat habitat adjacent to FPHCP covered lands over the 50-year permit term. The conservation measures in the FPHCP provide riparian protections that address stream shade, LWD recruitment, leaf and needle litter production, microclimate, bank stability, and minimization measures for sediment to aquatic habitats on FPHCP covered lands. Implementation of the FPHCP is expected to provide adequate functionality of these factors that would contribute to cutthroat trout long-term survival.

However, there would be effects from the FPHCP that are expected to take cutthroat trout. These affects have been analyzed in three areas of this Opinion: 1) General Effects; 2) Effects to Guilds; 3) and Effects to Species.

The effects we have determined that could contribute to take to cutthroat trout are: 1) excessive sediment to fish-bearing streams from roads, timber harvest, and stream crossing projects (culvert, bridge installation, and potentially other approved crossing methods); 2) increases in stream temperature due to riparian tree removal that provide shade; 3) the prevention of riparian trees from growing that could provide shade (primarily by riparian roads); 4) removal of riparian trees that could potentially provide LWD; 5) the prevention of riparian trees from growing that could ultimately provide LWD – primarily by riparian roads and 20 acre exemptions; and 6) capture and handling of cutthroat trout for instream projects, primarily road crossing activities.

Process for determining Incidental Take of Cutthroat Trout

We assessed the activities associated with the FPHCP to determine which activities had the highest chance of contributing to take of coastal and westslope cutthroat trout. The activities needed to be measurable, have a likelihood of contributing to take, and be an activity directly associated with the FPHCP. The FPHCP activities that best meet these criteria for westslope and coastal cutthroat trout were: 1) riparian timber harvest in Type S, F, and Np streams, 2) stream crossings of Type S, F and Np streams, and 3) roads located in Type S, F, and Np riparian zones. We determined that these three primary activities could be estimated with available information. See Appendix G for a description of the GIS process for determining these estimates.

Estimates were then made of the WRIA's that coastal and westslope cutthroat trout occupy in the FPHCP Action Area. The information for determining occupancy came primarily from the following two sources: Inland Fishes of Washington, by Wydoski and Whitney, 2003, and the Final Environment Impact Statement for the FPHCP, 2006.

As described above, while we can develop quantifiable estimates of take for this Opinion, fish respond to environmental disturbances differently depending upon a variety of factors. Factors that may affect fish response to perturbations are size and species of fish, age of fish, condition of fish, complexity of habitat, season, inter-specific and intra-specific competition, dissolved oxygen and water temperatures, turbidity, and other physical and biological processes. In addition to the various possible responses of fish to disturbances, fish are often distributed in a stream network at different scales. Fish occupy their environment from a small scale such as a pool, to a large scale, such as the watershed. Because of this often patchy fish distribution within a stream, FPHCP activities that have been determined to contribute to take would not always cause the same fish response. An activity that may cause an adverse fish response in one stream, may not have the same result in another stream because the fish are not in proximity to the disturbance. The same activity could influence adult fish substantially differently than juvenile fish. As such, the incidental take estimates are used to judge the negative activities implemented under the FPHCP, but they are not always a reliable tool for accurately measuring incidental take due to the complexity of biological systems.

Coastal cutthroat trout

We estimate a total of 551,747 riparian acres are potentially available to be managed that could contribute to take of coastal cutthroat trout. The actual reduction in recruitable LWD that occurs because of riparian timber harvest over the 50 year permit term is relatively small, but there would be trees that are harvested that would otherwise have recruited to the stream and formed habitats. The reduction of recruitable LWD becomes more noticeable over longer time frames, such as 100 and 250 years. Sediment delivery from riparian harvest would occur in some situations, but is expected to be much less than sediment delivery from roads. However, there would be some circumstances that sediment delivery is a product of riparian harvest.

Incidental take of coastal cutthroat trout from riparian harvest over the 50 year permit term is estimated in acres as follows:

- Type S riparian management acres: 138,429
- Type F riparian management acres: 286,862
- Type Np riparian management acres: 126,456

Road stream crossings are an activity that would be a primary mechanism for sediment delivery to coastal cutthroat trout habitat. A total of 23,558 stream crossing are estimated on FPHCP lands that could affect coastal cutthroat trout. These stream crossing would deliver sediment to trout habitats that contribute to take. Intensity of road use and road design influence sediment delivery to coastal cutthroat trout habitats. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the riparian zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream.

Incidental take of coastal cutthroat trout is estimated in number of stream crossings over a 50 year permit term as follows:

- Type S stream crossings: 1,462
- Type F stream crossings: 14,970

- Type Np stream crossings: 7,126

The third activity that can be estimated, and could also cause take, are roads located within the Riparian Zone. Most of these riparian roads have been in place for a considerable time and their presence reduces the effectiveness of the riparian area. Roads within the Riparian Zone have several effects, most notably reduction of recruitable LWD, reduction in shade (especially if close to the stream), and sediment delivery to trout habitats. A total of 4,374 miles of road occurs within the riparian areas of Type S, F, and Np streams that could cause take. This equals approximately 21,206 (using a 40' wide road opening) acres not capable of providing full riparian functions. Over time these figures should be reduced due to implementation of the FPHCP.

Incidental take of coastal cutthroat trout is estimated from roads in the Riparian Zone of Type S, F, and Np streams. Estimates are in miles and acres as follows:

- Type S riparian roads: 1,197 miles (5,803 acres)
- Type F riparian roads: 2,400 miles (11,636 acres)
- Type Np riparian roads: 777 miles (3,767 acres)

Westslope Cutthroat Trout

Riparian timber harvest is expected to contribute to take to westslope cutthroat trout in the following two ways: removal of recruitable LWD and increases in sediment that reach trout habitats. A third way that riparian harvest may influence westslope cutthroat trout are in areas outside of the Bull Trout Habitat Overlay. Riparian harvest along these streams may, in some circumstances, allow increased sunlight to increase stream temperatures. A total of 68,343 riparian acres are potentially available to be managed that could contribute to take of westslope cutthroat trout. The actual reduction in recruitable LWD that occurs because of timber harvest over the 50 year permit term is relatively small, but there would be trees that are harvested that would otherwise have recruited to the stream and formed habitats. The reduction of recruitable LWD becomes more noticeable over longer time frames, such as 100 and 250 years. Sediment delivery from riparian harvest would occur in some situations, but is expected to be much less than sediment delivery from roads. However, there would be some circumstances that sediment delivery is a product of riparian harvest. In addition, some site specific conditions of riparian harvest - when outside of the Bull Trout Habitat Overlay - may allow increases in sunlight to streams.

Incidental take of westslope cutthroat trout over the 50 year permit term as estimated in acres of riparian harvest as follows:

- Type S riparian management acres: 17,373
- Type F riparian management acres: 21,590
- Type Np riparian management acres: 29,380

Road stream crossings are an activity that would be a primary mechanism for sediment delivery to westslope cutthroat trout habitats. A total of 2,809 stream crossing on Type S, F and Np are estimated on FPHCP lands that could take westslope cutthroat trout. These stream crossing would deliver sediment to trout habitats that could cause take. Intensity of road use and road design influence sediment delivery to westslope cutthroat trout habitats. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the riparian zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream.

Incidental take of westslope cutthroat trout is estimated in number of stream crossings over a 50 year permit term as follows:

- Type S stream crossings: 240
- Type F stream crossings: 918
- Type Np stream crossings: 1,651

The third activity that can be estimated, and would also contribute to take, are roads located within the Riparian Zone. Most of these riparian roads have been in place for a considerable time and their presence reduces the effectiveness of the Riparian Zone. Roads within the Riparian Zone have several effects, most notably reduction of recruitable LWD, reduction in shade (especially if close to the stream), and sediment delivery to trout habitats. A total of 664 miles of road occurs within the riparian areas of Type S, F, and Np streams that could cause take. This equals approximately 3,226 acres not capable of providing full riparian functions. Over time these figures should be reduced due to implementation of the FPHCP.

Incidental take of westslope cutthroat trout is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres as follows:

- Type S riparian roads: 131 miles (636 acres)
- Type F riparian roads: 252 miles (1,221 acres)
- Type Np riparian roads: 281 miles (1,362 acres)

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the coastal and westslope cutthroat trout. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.3 Coastal Rainbow Trout and Redband Trout

We anticipate that take of rainbow trout would occur within habitat adjacent to covered lands over the 50-year permit term. The conservation measures in the FPHCP provide riparian protections that address stream shade, LWD recruitment, leaf and needle litter production, microclimate, bank stability, and minimization measures for sediment to aquatic habitats on FPHCP lands. Implementation of the FPHCP is expected to provide adequate functionality of these factors that would contribute to the long-term survival of rainbow trout in the FPHCP Action Area.

There would be adverse effects, however, from the FPHCP that would lead to take of redband coastal rainbow trout. These affects have been analyzed in three areas of this Opinion: 1) General Effects, 2) Effects to Guilds, 3) and Effects to Species.

The effects we determined that could contribute to take of rainbow trout are: 1) excessive sediment to fish-bearing streams from roads, timber harvest, and stream crossing projects (culvert, bridge installation, and potentially other approved crossing methods); 2) increases in stream temperature due to riparian tree removal that provide shade; 3) the prevention of riparian trees from growing that could provide shade –

primarily by riparian roads; 4) removal of riparian trees that could potentially provide LWD; 5) the prevention of riparian trees from growing that could ultimately provide LWD – primarily by riparian roads and 20 acre exemptions; and 6) capture and removal of rainbow trout for instream projects, primarily road crossing activities.

Process for determining Incidental Take of Rainbow trout

We assessed the activities associated with the FPHCP to determine which activities had the highest chance of contributing to take of rainbow trout. The activities needed to be measurable, have a likelihood of contributing to take, and be an activity directly associated with the FPHCP. The FPHCP activities that best meet these criteria for rainbow trout were: 1) riparian timber harvest in Type S, F, and Np streams, 2) stream crossings of Type S, F and Np streams, and 3) roads located in Type S, F, and Np riparian zones. We determined that these three primary activities could be estimated with available information. See Appendix G for a description of the GIS process for determining these estimates.

Estimates were made of the WRIA's that rainbow trout occupy in the FPHCP Action Area. The information for determining fish occupancy came primarily from the following two sources: Inland Fishes of Washington, by Wydoski and Whitney, 2003, and the Final Environment Impact Statement for the FPHCP, 2006.

As described above, while we can develop quantifiable estimates of take for this Opinion, fish respond to environmental disturbances differently depending upon a variety of factors. Factors that may affect fish response to perturbations are size and species of fish, age of fish, condition of fish, complexity of habitat, season, inter-specific and intra-specific competition, dissolved oxygen and water temperatures, turbidity, and other physical and biological processes. In addition to the various possible responses of fish to disturbances, fish are often distributed in a stream network at different scales. Fish occupy their environment from a small scale such as a pool, to a large scale, such as the watershed. Because of this often patchy fish distribution within a stream, FPHCP activities that have been determined to contribute to take would not always cause the same fish response. An activity that may cause a harmful fish response in one stream may not have the same result in another stream because the fish are not in proximity to the disturbance. The same activity could influence adult fish substantially different than juvenile fish. As such, the incidental take estimates are used to judge the negative activities implemented under the FPHCP, but they are not always a reliable tool for accurately measuring incidental take due to the complexity of biological systems.

In some circumstances it is important to recognize the temporal nature of incidental take. Replacing a culvert that is currently preventing fish passage with a culvert that allows fish passage, has both short-term consequences and long-term benefits. While there may be some short-term take associated with a culvert replacement, and individual fish may die as a result of the project, over a longer time frame the availability of new habitats would most likely outweigh the take that occurred with the actual installation of the culvert. In a contrasting temporal situation, the removal of trees in the Outer Zone that may have eventually recruited to the stream may not be incidental take in the short-term, but at longer time frames when the chance of tree recruitment increased and the tree was unavailable, take may have been realized. Because of the temporal variability of incidental take, and the diversity of aquatic systems, the relationship between incidental take and fish response is not absolute.

There are two outcomes of measuring incidental take of rainbow trout using the WRIA distribution data and the three activities for measuring take: 1) fish occupancy aligns precisely with the activities identified as contributing to take and fish respond to that take, 2) fish presence not aligned with activities identified as contributing to take and take is an overestimate. For the scale of analysis required for the Opinion, we think that incidental take for most species analyzed under this Opinion is an overestimate. It would not be uncommon for some activities to occur without any contribution to take. In another situation the same activity would contribute to take. We consider this approach for evaluating incidental take appropriate for this Opinion.

Coastal rainbow trout

We estimate a total of 517,462 of Type S, F, and Np riparian acres are potentially available to be managed that could contribute to take of coastal rainbow trout. The actual reduction in recruitable LWD that occurs because of riparian timber harvest over the 50 year permit term is relatively small, but there would be trees that are harvested that would otherwise have recruited to the stream and formed habitats. The reduction of recruitable LWD becomes more noticeable over longer time frames, such as 100 and 250 years. Sediment delivery from riparian harvest would occur in some situations, but is expected to be much less than sediment delivery from roads. However, there would be some circumstances that sediment delivery is a product of riparian harvest.

Incidental take of coastal rainbow trout from riparian harvest over the 50 year permit term is estimated in acres as follows:

- Type S riparian management acres: 129,417
- Type F riparian management acres: 270,542
- Type Np riparian management acres: 117,503

Road stream crossings are an activity that would be a primary mechanism for sediment delivery to coastal rainbow trout habitat. A total of 22,172 stream crossing for Type S, F, and Np streams are estimated on FPHCP lands that could affect coastal rainbow trout. These stream crossing would deliver sediment to habitats that contribute to take. Intensity of road use and road design influence sediment delivery to coastal rainbow trout habitats. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the Riparian Zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream.

Incidental take of coastal rainbow trout is estimated in number of stream crossings, over a 50 year permit term as follows:

- Type S stream crossings: 1,342
- Type F stream crossings: 14,116
- Type Np stream crossings: 6,714

The third activity that can be estimated, and could also take, are roads located within the Riparian Zone. Most of these riparian roads have been in place for a considerable time and their presence reduces the effectiveness of the Riparian Zone. Roads within the Riparian Zone have several effects, most notably reduction of recruitable LWD, reduction in shade (especially if close to the stream), and sediment delivery to habitats. A total of 4,054 miles of road occurs within the riparian areas of Type S, F, and Np streams that could cause take. This equals approximately 19,655 (using a 40’ wide road opening) acres not capable of providing full riparian functions. Over time, these figures may be reduced due to implementation of the FPHCP.

Incidental take of coastal rainbow trout is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres as follows:

- Type S riparian roads: 1,109 miles (5,376 acres)
- Type F riparian roads: 2,233 miles (10,826 acres)
- Type Np riparian roads: 711 miles (3,447 acres)

Redband rainbow trout

A considerable portion of the redband rainbow trout's habitat is influenced by Federal lands and not by the FPHCP. As such, these take estimates are probably higher than what may actually occur. Riparian timber harvest is expected to contribute to take of rainbow trout in the following two ways: removal of recruitable LWD and increases in sediment that reach habitats. A total of 119,706 Type S, F, and Np riparian acres are potentially available to be managed that could contribute to take of rainbow trout. The actual reduction in recruitable LWD that occurs because of timber harvest over the 50 year permit term is relatively small, but there would be trees that are harvested that may have recruited to the stream and formed habitats. The reduction of recruitable LWD becomes more noticeable over longer time frames, such as 100 and 250 years. Sediment delivery from riparian harvest would occur in some situations, but is expected to be much less than sediment delivery from roads. However, there would be some circumstances that sediment delivery is a product of riparian harvest.

Incidental take of redband rainbow trout over the 50 year permit term as estimated in acres of riparian harvest as follows:

- Type S riparian management acres: 27,364
- Type F riparian management acres: 41,608
- Type Np riparian management acres: 50,734

Road stream crossings are an activity that would be a primary mechanism for sediment delivery to redband rainbow trout habitats. A total of 4,921 stream crossing on Type S, F and Np are estimated on FPHCP lands that could take redband rainbow trout. These stream crossing would deliver sediment to habitats that could cause take. Intensity of road use and road design influence sediment delivery to redband rainbow trout habitats. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the riparian zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream.

Incidental take of redband rainbow trout is estimated in number of stream crossings over a 50 year permit term as follows:

- Type S stream crossings: 366
- Type F stream crossings: 1,948
- Type Np stream crossings: 2,607

The third activity that can be estimated, and would also contribute to take, are roads located within the Riparian Zone. Most of these riparian roads have been in place for a considerable time and their presence reduces the effectiveness of the Riparian Zone. Roads within the Riparian Zone have several effects, most notably reduction of recruitable LWD, reduction in shade (especially if close to the stream), and sediment delivery to habitats. A total of 1,182 miles of road occurs within the riparian areas of Type S, F, and Np streams that could cause take. This equals approximately 5,730 acres not capable of providing full riparian functions. Over time these figures may be reduced due to implementation of the FPHCP.

Incidental take of redband rainbow trout is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres as follows:

- Type S riparian roads: 206 miles (998 acres)
- Type F riparian roads: 504 miles (2,443 acres)
- Type Np riparian roads: 471 miles (2,283 acres)

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the coastal rainbow and redband trout. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.4 Mountain Whitefish and Pygmy Whitefish

We anticipate that take of pygmy and mountain whitefish would occur within habitat adjacent to covered lands over the 50-year permit term. The conservation measures in the FPHCP provide riparian protections that address stream shade, LWD recruitment, leaf and needle litter production, microclimate, bank stability, and minimization measures for sediment to aquatic habitats on FPHCP lands. Implementation of the FPHCP is expected to provide adequate functionality of these factors that would contribute to whitefish long-term survival.

There would be effects, however, from the FPHCP that would lead to take of mountain and pygmy whitefish. These affects have been analyzed in three areas of this Opinion: 1) General Effects, 2) Effects to Guilds, 3) and Effects to Species.

The effects we determined could contribute to take of whitefish are: 1) excessive sediment to fish-bearing streams from roads, timber harvest, and stream crossing projects (culvert, bridge installation, and potentially other approved crossing methods), 2) increases in stream temperature due to riparian tree removal that provide shade, 3) the prevention of riparian trees from growing that could provide shade – primarily by riparian roads, 4) removal of riparian trees that could potentially provide LWD, 5) the prevention of riparian trees from growing that could ultimately provide LWD – primarily by riparian roads and 20 acre exemptions, and 6) capture and removal of whitefish for instream projects, primarily road crossing activities.

Process for determining Incidental Take of Whitefish

We assessed the activities associated with the FPHCP to determine which activities had the highest chance of contributing to take of whitefish. The activities needed to be measurable, have a likelihood of contributing to take, and be an activity directly associated with the FPHCP. The FPHCP activities that best meet these criteria for mountain and pygmy whitefish were: 1) riparian timber harvest in Type S, F, and Np streams, 2) stream crossings of Type S, F and Np streams, and 3) roads located in Type S, F, and Np riparian zones. We determined that these three primary activities could be estimated with the available information. See Appendix G for a description of the GIS process for determining these estimates.

Estimates were made of the WRIA's that pygmy and mountain whitefish occupy in the FPHCP Action Area. The information for determining fish occupancy came primarily from the following two sources: Inland Fishes of Washington, by Wydoski and Whitney, 2003, and the Final Environment Impact Statement for the FPHCP, 2006.

As described above, while we can develop quantifiable estimates of take for this Opinion, fish respond to environmental disturbances differently depending upon a variety of factors. Factors that may affect fish response to perturbations are size and species of fish, age of fish, condition of fish, complexity of habitat, season, inter-specific and intra-specific competition, dissolved oxygen and water temperatures, turbidity, and other physical and biological processes. In addition to the various possible responses of fish to disturbances, fish are often distributed in a stream network at different scales. Fish occupy their environment from a small scale such as a pool, to a large scale, such as the watershed. Because of this often patchy fish distribution within a stream, FPHCP activities that have been determined to contribute to take would not always cause the same fish response. An activity that may cause a harmful fish response in one stream, may not have the same result in another stream because the fish are not in proximity to the disturbance. The same activity could influence adult fish substantially different than juvenile fish. As such, the incidental take estimates are used to judge the negative activities implemented under the FPHCP, but they are not always a reliable tool for accurately measuring incidental take due to the complexity of biological systems.

In some circumstances it is important to recognize the temporal nature of incidental take. Replacing a culvert that is currently preventing fish passage with a culvert that allows fish passage, has both short-term consequences and long-term benefits. While there may be some short-term take associated with a culvert replacement, and individual fish may die as a result of the project, over a longer time frame the availability of new habitats would most likely outweigh the take that occurred with the actual installation of the culvert. In a contrasting temporal situation, the removal of trees in the Outer Zone that may have eventually recruited to the stream may not be incidental take in the short-term, but at longer time frames when the chance of tree recruitment increased and the tree was unavailable, take may have been realized. Because of the temporal variability of incidental take, and the diversity of aquatic systems, the relationship between incidental take and fish response is not absolute.

There are two outcomes of measuring incidental take of whitefish using the WRIA distribution data and the three activities for measuring take: 1) fish occupancy aligns precisely with the activities identified as contributing to take and fish respond to that take, 2) fish presence not aligned with activities identified as contributing to take and take is an overestimate. For the scale of analysis required for this Opinion, we think that incidental take for most species analyzed under this Opinion is an overestimate. It would not be uncommon for some activities to occur without any contribution to take. In another situation the same activity would contribute to take. We consider this approach for evaluating incidental take appropriate for this Opinion.

Mountain whitefish

Riparian timber harvest is expected to contribute to take of mountain whitefish in the following two ways: removal of recruitable LWD and increases in sediment that reach habitats. A total of 369,961 Type S, F, and Np riparian acres are potentially available to be managed that could contribute to take of mountain whitefish. The actual reduction in recruitable LWD that occurs because of timber harvest over the 50 year permit term is relatively small, but there would be trees that are harvested that may have recruited to the stream and formed habitats. The reduction of recruitable LWD becomes more noticeable over longer time frames, such as 100 and 250 years. Sediment delivery from riparian harvest would occur in some situations, but is expected to be much less than sediment delivery from roads. However, there would be some circumstances that sediment delivery is a product of riparian harvest.

Incidental take of mountain whitefish from riparian harvest over the 50 year permit term is estimated in acres as follows:

- Type S riparian management acres: 97,582
- Type F riparian management acres: 173,745
- Type Np riparian management acres: 98,634

Road stream crossings are an activity that would be a primary mechanism for sediment delivery to mountain whitefish habitats. A total of 16,399 stream crossing for Type S, F, and Np streams are estimated on FPHCP lands that could affect mountain whitefish. These stream crossing would deliver sediment to habitats that contribute to take. Intensity of road use and road design influence sediment delivery to coastal whitefish habitats. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the Riparian Zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream.

Incidental take of mountain whitefish is estimated in number of stream crossings over a 50 year permit term as follows:

- Type S stream crossings: 988
- Type F stream crossings: 8,786
- Type Np stream crossings: 6,625

The third activity that can be estimated, and could also cause take, are roads located within the Riparian Zone. Most of these riparian roads have been in place for a considerable time and their presence reduces the effectiveness of the Riparian Zone. Roads within the Riparian Zone have several effects, most notably reduction of recruitable LWD, reduction in shade (especially if close to the stream), and sediment delivery to habitats. A total of 3,127 miles of road occurs within the riparian areas of Type S, F, and Np streams that could cause take. This equals approximately 15,161 (using a 40' wide road opening) acres not capable of providing full riparian functions. Over time, these figures should be reduced due to implementation of the FPHCP.

Incidental take of mountain whitefish is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres as follows:

- Type S riparian roads: 713 miles (3,456 acres)
- Type F riparian roads: 1,548 miles (7,505 acres)
- Type Np riparian roads: 866 miles (4,198 acres)

Pygmy whitefish

A considerable portion of the pygmy whitefish's habitat is influenced by Federal lands and not by the FPHCP. As such, these take estimates are probably higher than what may actually occur. Riparian timber harvest is expected to contribute to take of pygmy whitefish in the following two ways: removal of recruitable LWD and increases in sediment that reach habitats. A total of 27,068 riparian acres are potentially available to be managed that could contribute to take. The actual reduction in recruitable LWD that occurs because of timber harvest over the 50 year permit term is relatively small, but there would be trees that are harvested that may have recruited to the stream and formed habitats. The reduction of recruitable LWD becomes more noticeable over longer time frames, such as 100 and 250 years. Sediment delivery from riparian harvest would occur in some situations, but is expected to be much less than sediment delivery from roads. However, there would be some circumstances that sediment delivery is a product of riparian harvest.

Incidental take of pygmy whitefish over the 50 year permit term as estimated in acres of riparian harvest as follows:

- Type S riparian management acres: 11,222
- Type F riparian management acres: 3,574
- Type Np riparian management acres: 12,272

Road stream crossings are an activity that would be a primary mechanism for sediment delivery to pygmy whitefish habitats. A total of 1,643 stream crossing on Type S, F and Np are estimated on FPHCP lands that could take pygmy whitefish. These stream crossing would deliver sediment to habitats that could cause take. Intensity of road use and road design influence sediment delivery to pygmy whitefish habitats. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the riparian zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream.

Incidental take of pygmy whitefish is estimated in number of stream crossings, over a 50 year permit term as follows:

- Type S stream crossings: 127
- Type F stream crossings: 843
- Type Np stream crossings: 673

The third activity that can be estimated, and would also contribute to take, are roads located within the Riparian Zone. Most of these riparian roads have been in place for a considerable time and their presence reduces the effectiveness of the Riparian Zone. Roads within the Riparian Zone have several effects, most notably reduction of recruitable LWD, reduction in shade (especially if close to the stream), and sediment delivery to habitats. A total of 360 miles of road occurs within the riparian areas of Type S, F, and Np streams that could cause take. This equals approximately 1,745 acres not capable of providing full riparian functions. Over time these figures should be reduced due to implementation of the FPHCP.

Incidental take of pygmy whitefish is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres as follows:

- Type S riparian roads: 88 miles (426 acres)
- Type F riparian roads: 169 miles (819 acres)
- Type Np riparian roads: 103 miles (499 acres)

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the mountain and pygmy whitefish. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.5 Western Brook Lamprey, River Lamprey and Pacific Lamprey

Riparian timber harvest is expected to contribute to take of Pacific, river, and western brook lamprey in the following two ways: removal of recruitable LWD and increases in sediment that reach lamprey habitats. The total Type S, F, and Np riparian harvest that may lead to take are as follows: Pacific lamprey – 518,475 acres, river lamprey – 320,429 acres, and western brook lamprey – 513,097 acres. The actual reduction in recruitable LWD that occurs because of timber harvest over the 50 year permit term is relatively small, but there would be trees that are harvested that may have recruited to the stream and formed habitats. The reduction of recruitable LWD becomes more noticeable over longer time frames, such as 100 and 250 years. Sediment delivery from riparian harvest would occur in some situations, but is expected to be much less than sediment delivery from roads. However, there would be some circumstances that sediment delivery is a product of riparian harvest.

Road stream crossings are an activity that would be a primary mechanism for sediment delivery to lamprey habitats. The total Type S, F, and Np stream crossings that may lead to take are as follows: Pacific lamprey – 22,150, river lamprey 13,437, and western brook lamprey – 21, 841. These stream crossing would deliver sediment to lamprey habitats that contribute to take. Intensity of road use and road design influence sediment delivery to lamprey habitats. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the Riparian Zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream.

The third activity that can be estimated, and could also cause take, are roads located within the Riparian Zone. Most of these riparian roads have been in place for a considerable time and their presence reduces the effectiveness of the Riparian Zone. Roads within the Riparian Zone have several effects, most notably reduction of recruitable LWD, reduction in shade (especially if close to the stream), and sediment delivery to lamprey habitats. The total of riparian roads in Type S, F, and Np as measured in miles and acres (using a 40' wide road opening) that would contribute to take are as follows: Pacific lamprey – 4,166 miles (20,247 acres), river lamprey – 2,468 miles (11,964 acre), and western brook lamprey – 4,069 miles (19,727 acres). Over time these figures should be reduced due to implementation of the FPHCP.

Incidental take of Pacific lamprey from riparian harvest over the 50 year permit term is estimated in acres as follows:

- Type S riparian management acres: 128,055
- Type F riparian management acres: 268,585
- Type Np riparian management acres: 121,835

Incidental take of Pacific lamprey is estimated in number of stream crossings, over a 50 year permit term as follows:

- Type S stream crossings: 1,469
- Type F stream crossings: 13,818

- Type Np stream crossings: 6,863

Incidental take of Pacific lamprey is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres as follows:

- Type S riparian roads: 1,124 miles (5,449 acres)
- Type F riparian roads: 2,267 miles (10,991 acres)
- Type Np riparian roads: 775 miles (3,757 acres)

Incidental take of river lamprey from riparian harvest over the 50 year permit term is estimated in acres as follows:

- Type S riparian management acres: 85,624
- Type F riparian management acres: 155,353
- Type Np riparian management acres: 79,452

Incidental take of river lamprey is estimated in number of stream crossings, over a 50 year permit term as follows:

- Type S stream crossings: 804
- Type F stream crossings: 8,036
- Type Np stream crossings: 4,597

Incidental take of river lamprey is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres as follows:

- Type S riparian roads: 628 miles (3,044 acres)
- Type F riparian roads: 1,304 miles (6,322 acres)
- Type Np riparian roads: 536 miles (2,598 acres)

Incidental take of western brook lamprey from riparian harvest over the 50 year permit term is estimated in acres as follows:

- Type S riparian management acres: 128,532
- Type F riparian management acres: 265,246
- Type Np riparian management acres: 119,309

Incidental take of western brook lamprey is estimated in number of stream crossings, over a 50 year permit term as follows:

- Type S stream crossings: 1,365
- Type F stream crossings: 13,702
- Type Np stream crossings: 6,774

Incidental take of western brook lamprey is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres as follows:

- Type S riparian roads: 1,079 miles (5,231 acres)

- Type F riparian roads: 2,224 miles (10,783 acres)
- Type Np riparian roads: 766 miles (3,713 acres)

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the Pacific, river, and western brook lamprey. The effects to these three species are not at a scale or magnitude that would affect the overall abundance or distribution of these species in the FPHCP Action Area.

9.1.2.6 Kokanee

We anticipate that take of kokanee would occur within habitat adjacent to covered lands over the 50-year permit term. The conservation measures in the FPHCP provide riparian protections that address stream shade, LWD recruitment, leaf and needle liter production, microclimate, bank stability, and minimization measures for sediment to aquatic habitats on FPHCP lands. Implementation of the FPHCP is expected to provide adequate functionality of these factors that would contribute to kokanee long-term survival.

There would be effects, however, from the FPHCP that would lead to take of kokanee. These affects have been analyzed in three areas of this Opinion: 1) General Effects, 2) Effects to Guilds, 3) and Effects to Species. The effects that we have determined could contribute to take of kokanee are: 1) excessive sediment to fish-bearing streams from roads, timber harvest, and stream crossing projects (culvert, bridge installation, and potentially other approved crossing methods), 2) increases in stream temperature due to riparian tree removal that provide shade, 3) preventing riparian trees from growing that could provide shade – primarily by riparian roads, 4) removal of riparian trees that could potentially provide LWD, 5) preventing riparian trees from growing that could ultimately provide LWD – primarily by riparian roads and 20 acre exemptions, and 6) capture and removal of kokanee for instream projects, primarily road crossings. Kokanee spend the majority of their life in lakes and would not be exposed to some of these effects that contribute to take to the degree that some other salmonids may be.

Process for determining Incidental Take of Kokanee

We assessed the activities associated with the FPHCP to determine which activities had the highest chance of contributing to take of kokanee. The activities needed to be measurable, have a likelihood of contributing to take, and be an activity directly associated with the FPHCP. The FPHCP activities that best meet these criteria for kokanee were: 1) riparian timber harvest in Type S, F, and Np streams, 2) stream crossings of Type S, F and Np streams, and 3) roads located in Type S, F, and Np riparian zones. We determined that these three primary activities could be estimated with the currently available information. See Appendix G for a description of the GIS process for determining these estimates.

Estimates were made of the WRIA's that kokanee occupy in the FPHCP Action Area. The information for determining occupancy came primarily from the following two sources: Inland Fishes of Washington, by Wydoski and Whitney, 2003, and the Final Environment Impact Statement for the FPHCP, 2006.

As described above, while we can develop quantifiable estimates of take for this Opinion, fish respond to environmental disturbances differently depending upon a variety of factors. Factors that may affect fish response to perturbations are size and species of fish, age of fish, condition of fish, complexity of habitat, season, inter-specific and intra-specific competition, dissolved oxygen and water temperatures, turbidity, and other physical and biological processes. In addition to the various possible responses of fish to disturbances, fish are often distributed in a stream network at different scales. For kokanee, lakes are important also. Fish occupy their environment from a small scale such as a pool, to a large scale, such as the watershed. Because of this often patchy fish distribution within a stream, FPHCP activities that have been determined to contribute to take would not always cause the same fish response. An activity that may cause a harmful fish response in one stream, may not have the same result in another stream because the fish are not in proximity to the disturbance. The same activity could influence adult fish substantially differently than juvenile fish. As such, the incidental take estimates are used to judge the negative activities implemented under the FPHCP, but they are not always a reliable tool for accurately measuring incidental take due to the complexity of biological systems.

Riparian timber harvest is expected to contribute to take of kokanee in the following two ways: removal of recruitable LWD and increases in sediment that reach kokanee habitats. We estimate a total of 266,513 riparian acres are potentially available to be managed that could contribute to take of kokanee. The actual reduction in recruitable LWD that occurs because of riparian timber harvest over the 50 year permit term is relatively small, but there would be trees that are harvested that would otherwise have recruited to the stream and formed habitats. The reduction of recruitable LWD becomes more noticeable over longer time frames, such as 100 and 250 years. Sediment delivery from riparian harvest would occur in some situations, but is expected to be much less than sediment delivery from roads. However, there would be some circumstances that sediment delivery is a product of riparian harvest.

Incidental take of kokanee from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 69,162
- Type F riparian management acres: 124,916
- Type Np riparian management acres: 72,435

Road stream crossings are an activity that would be a primary mechanism for sediment delivery to kokanee habitat. A total of 10,750 stream crossing are estimated on FPHCP lands that could take kokanee. These stream crossings would deliver sediment to kokanee habitat that contribute to take. Intensity of road use and road design influence sediment delivery to kokanee habitat. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. Stream temperatures could be increased in some cases. An average width of opening through the riparian zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream.

Kokanee spend a relatively short time of their life in streams, they normally reside in lakes. As such, they would not be exposed to some of the effects of road crossings that some other salmonids are. However, road crossing still have the ability to contribute to take of kokanee.

Incidental take of kokanee is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 729
- Type F stream crossings: 5,880
- Type Np stream crossings: 4,144

The third activity that can be estimated, and would also cause take, are roads located within the Riparian Zone. Most of these riparian roads have been in place for a considerable time and their presence reduces the effectiveness of the riparian area. Roads within the riparian zone have several effects, most notably reduction of recruitable LWD, reduction in shade (especially if close to the stream), and sediment delivery to kokanee habitats. A total of 2,085 miles of road occurs within the riparian areas of Type S, F, and Np streams that could cause take. This equals approximately 10,109 (using a 40' wide road opening) acres not capable of providing full riparian functions. Over time these figures should be reduced due to implementation of the FPHCP.

Kokanee spend a relatively short time of their life in streams, they normally reside in lakes. As such, they would not be exposed to some of the effects of stream adjacent roads that some other salmonids are. However, stream adjacent roads still have the ability to contribute to take of kokanee.

Incidental take of kokanee is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 484 (2,346 acres)
- Type F riparian roads: 1,041 miles (5,047 acres)
- Type Np riparian roads: 560 miles (2,715 acres)

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to kokanee. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.7 Olympic Mudminnow

Process for determining Incidental Take of Olympic Mudminnow

We assessed the activities associated with the FPHCP to determine which activities had the highest chance of contributing to take of Olympic mudminnow. The activities needed to be measurable, have a likelihood of contributing to take, and be an activity directly associated with the FPHCP. The FPHCP activities that best meet these criteria for Olympic mudminnow were: 1) stream crossings of Type S, F and Np streams, and 2) roads located in Type S, F, and Np riparian zones. The FWS determined that these two primary activities could be estimated with the currently available information. See Appendix G for a description of the GIS process for determining these estimates.

Incidental Take of Olympic mudminnow is estimated in number of stream crossings over a 50 year permit term. Additionally, removal of cover (primarily aquatic vegetation) in association with stream crossing projects, would contribute to take as follows.

- Type S stream crossings: 357
- Type F stream crossings: 4,268
- Type Np stream crossings: 1,283

Incidental take of Olympic mudminnow is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres as follows.

- Type S riparian roads: 300 miles (1,454 acres)
- Type F riparian roads: 686 miles (3,326 acres)
- Type Np riparian roads: 135 miles (654 acres)

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to Olympic mudminnow. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.8 Chiselmouth

Road stream crossings are an activity that would likely be a mechanism for sediment delivery to chiselmouth habitats. A total of 8,777 stream crossings on Type S, F, and Np streams are estimated on FPHCP lands that could affect chiselmouth. These stream crossings would deliver sediment to habitats that contribute to take. Intensity of road use and road design would influence sediment delivery to chiselmouth habitats. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the riparian zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream.

Incidental take of chiselmouth is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 542
- Type F stream crossings: 3,869
- Type Np stream crossings: 4,366

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to chiselmouth. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.9 Redside shiner

Incidental take of redside shiner is estimated in number of stream crossings over a 50 year permit term. Take is primarily from increase in sediment, and secondarily, from reduction in LWD and shade. Mortality of fish may occur during culvert replacement/installation projects.

Incidental take of redside shiner from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 134,772
- Type F riparian management acres: 248,698
- Type Np riparian management acres: 148,675

Additionally, removal of cover in association with stream crossing projects, primarily aquatic vegetation for redside shiner, would cause take.

- Type S stream crossings: 1,530
- Type F stream crossings: 12,987
- Type Np stream crossings: 8,500

Incidental take of redside shiner is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres. Roads in riparian areas would contribute to take from reduced riparian effectiveness, primarily reduction in LWD, shade, and increases in sediment to habitats.

- Type S riparian roads: 1,179 miles (5,716 acres)
- Type F riparian roads: 2,280 miles (11,054 acres)
- Type Np riparian roads: 1,079 miles (5,231 acres)

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to redsided shiner. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.10   Speckled Dace

Riparian timber harvest is expected to contribute to take of speckled dace in the following two ways: removal of recruitable LWD and increases in sediment that reach habitats. A total of 534,534 of Type S, F, and Np riparian acres are potentially available to be managed that could contribute to take of speckled dace. The actual reduction in recruitable LWD that occurs because of riparian timber harvest over the 50 year permit term is relatively small, but there would be trees that are harvested that would otherwise have recruited to the stream and formed habitats. The reduction of recruitable LWD becomes more noticeable over longer time frames, such as 100 and 250 years. Sediment delivery from riparian harvest would occur in some situations, but is expected to be much less than sediment delivery from roads. However, there would be some circumstances that sediment delivery is a product of riparian harvest.

Incidental take of speckled dace from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 128,300
- Type F riparian management acres: 266,179
- Type Np riparian management acres: 140,055

Road stream crossings are an activity that would be a primary mechanism for sediment delivery to speckled dace habitats. A total of 22,253 stream crossings for Type S, F, and Np streams are estimated on FPHCP lands that could contribute to take of speckled dace. Intensity of road use and road design influence sediment delivery to speckled dace habitats. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the Riparian Zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream.

Incidental take of speckled dace as estimated in number of stream crossings, over a 50 year permit term.

- Type S stream crossings: 1,474
- Type F stream crossings: 13,074
- Type Np stream crossings: 7,705

The third activity that can be estimated, and would contribute to take, are roads located within the riparian management zone. Most of these riparian roads have been in place for a considerable time and their presence reduces the effectiveness of the riparian area. Roads within the riparian zone have several effects, most notably reduction of recruitable LWD, reduction in shade (especially if close to the stream), and sediment delivery to habitats. A total of 4,409 miles of road occurs within the riparian areas of Type S, F, and Np streams that could cause take. This equals approximately 21,376 (using a 40' wide road opening) acres not capable of providing full riparian functions. Over time, these figures may be reduced due to implementation of the FPHCP.

Incidental take of speckled dace is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 1,121 miles (5,435 acres)
- Type F riparian roads: 2,298 miles (11,141 acres)
- Type Np riparian roads: 989 miles (4,795 acres)

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to speckled dace. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.11 Longnose/Nooksack Dace

Riparian timber harvest is expected to contribute to take of longnose/Nooksack dace in the following two ways: removal of recruitable LWD and increases in sediment that reach dace habitats. A total of 533,052 riparian acres are potentially available to be managed that could contribute to take of dace. The actual reduction in recruitable LWD that occurs because of riparian timber harvest over the 50 year permit term is relatively small, but there would be trees that are harvested that would otherwise have recruited to the stream and formed habitats. The reduction of recruitable LWD becomes more noticeable over longer time frames, such as 100 and 250 years. Sediment delivery from riparian harvest would occur in some situations, but is expected to be much less than sediment delivery from roads. However, there would be some circumstances that sediment delivery is a product of riparian harvest.

Incidental take of longnose/Nooksack dace from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 133,392
- Type F riparian management acres: 258,204
- Type Np riparian management acres: 141,456

Road stream crossings are an activity that would be a primary mechanism for sediment delivery to dace habitats. A total of 22,106 stream crossings on Type S, F, and Np streams are estimated on FPHCP lands that could affect longnose/Nooksack dace. These stream crossings would deliver sediment to dace habitats that contribute to take. Intensity of road use and road design influence sediment delivery to dace habitats. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the Riparian Zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream.

Incidental take of longnose/Nooksack dace, is estimated in number of stream crossings, over a 50 year permit term.

- Type S stream crossings: 1,496
- Type F stream crossings: 12,833
- Type Np stream crossings: 7,777

The third activity that can be estimated, and would also contribute to take, are roads located within the Riparian Zone. Most of these riparian roads have been in place for a considerable time and their presence reduces the effectiveness of the riparian area. Roads within the Riparian Zone have several effects, most notably reduction of recruitable LWD, reduction in shade (especially if close to the stream), and sediment delivery to dace habitats. There are an estimated 4,419 miles of riparian roads in Type S, F, and Np streams affecting these species on FPHCP lands. This equals approximately 21,425 riparian acres (using a 40' wide road opening) not capable of providing full riparian functions for dace. Over time, these figures should be reduced due to implementation of the FPHCP.

Incidental take of longnose/Nooksack dace, is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 1,164 (5,643 acres)
- Type F riparian roads: 2,283 miles (11,064 acres)
- Type Np riparian roads: 972 miles (4,712 acres)

<u>Conclusion</u>

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the longnose/Nooksack dace. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.12 Leopard and Umatilla Dace

Riparian timber harvest is expected to contribute to take to leopard and Umatilla dace in the following two ways: removal of recruitable LWD and increases in sediment that reach habitats. A total of 118,770 and 32,471 of Type S, F, and Np riparian acres are potentially available to be managed that could contribute to take of leopard and Umatilla dace, respectively. The actual reduction in recruitable LWD that occurs because of timber harvest over the 50 year permit term is relatively small, but there would be trees that are harvested that would otherwise have recruited to the stream and formed habitats. The reduction of recruitable LWD becomes more noticeable over longer time frames, such as 100 and 250 years. Sediment delivery from riparian harvest would occur in some situations, but is expected to be much less than sediment delivery from roads. However, there would be some circumstances that sediment delivery is a product of riparian harvest.

Road stream crossings are an activity that would be a primary mechanism for sediment delivery to leopard and Umatilla dace habitats. A total of 5,971 and 1,568 stream crossings for Type S, F, and Np streams are estimated on FPHCP lands that could affect leopard and Umatilla dace, respectively. These stream crossing would deliver sediment to habitats that contribute to take. Intensity of road use and road design influence sediment delivery to dace habitats. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the riparian zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream.

The third activity that can be estimated, and would also cause take, are roads located within the Riparian Zone. Most of these riparian roads have been in place for a considerable time and their presence reduces the effectiveness of the riparian area. Roads within the Riparian Zone have several effects, most notably reduction of recruitable LWD, reduction in shade (especially if close to the stream), and sediment delivery to habitats. A total of 1,123 and 351 miles of road occurs within the riparian areas of Type S, F, and Np streams that could cause take to leopard and Umatilla dace, respectively. This equals approximately 5,489 and 1,701 acres (using a 40' wide road opening) not capable of providing full riparian functions for leopard and Umatilla dace, respectively. Over time, these figures may be reduced due to implementation of the FPHCP.

Leopard dace

Incidental take of leopard dace from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 29,774
- Type F riparian management acres: 53,584
- Type Np riparian management acres: 35,412

Incidental take of leopard dace is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 364
- Type F stream crossings: 3,123
- Type Np stream crossings: 2,484

Incidental take of leopard dace is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 281 miles (1,362 acres)
- Type F riparian roads: 567 miles (2,794 acres)
- Type Np riparian roads: 275 miles (1,333 acres)

Umatilla Dace

Incidental take of Umatilla dace over the 50 year permit term as estimated in acres of riparian harvest.

- Type S riparian management acres: 1,483 acres
- Type F riparian management acres: 13,022
- Type Np riparian management acres: 17,966

Incidental take of Umatilla dace is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 96
- Type F stream crossings: 502
- Type Np stream crossings: 970

Incidental take of Umatilla dace is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 56 miles (271 acres)

- Type F riparian roads: 143 miles (693 acres)
- Type Np riparian roads: 152 miles (736 acres)

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the leopard and Umatilla dace. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.13 Northern pikeminnow

Riparian timber harvest is expected to cause take to northern pikeminnow in the following two ways: removal of recruitable LWD and increases in sediment that reach habitats. A total of 339,850 riparian acres (of Type S, F, and Np) are potentially available to be managed that could contribute to take. The actual reduction in recruitable LWD that occurs because of timber harvest over the 50 year permit term is relatively small, but there would be trees that are harvested that would otherwise have recruited to the stream and formed habitats. The reduction of recruitable LWD becomes more noticeable over longer time frames, such as 100 and 250 years. Sediment delivery from riparian harvest would occur, but is expected to be much smaller than sediment delivery from roads. However, there would be some circumstances that sediment delivery is a product of riparian harvest.

Incidental take of northern pikeminnow from riparian harvest over the 50 year permit term as estimated in acres.

- Type S riparian management acres: 84,009
- Type F riparian management acres: 162,919
- Type Np riparian management acres: 92,922

Road stream crossings are an activity that would be a primary mechanism for sediment delivery to northern pikeminnow habitats. A total of 14,069 stream crossing on Type S, F, and Np streams are estimated on FPHCP lands that could effect the species. These stream crossing would deliver sediment to habitats that contribute to take. Intensity of road use and road design influence sediment delivery to pikeminnow habitats. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the Riparian Zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream.

Incidental take of northern pikeminnow is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 933
- Type F stream crossings: 7,922
- Type Np stream crossings: 5,214

The third activity that can be estimated, and would also cause take, are roads located within the Riparian Zone. Roads within the riparian zone have several effects, most notably reduction of recruitable LWD, reduction in shade (especially if close to the stream), and sediment delivery to northern pikeminnow habitats. A total of 2,868 miles of road occurs within the riparian areas of Type S, F, and Np streams that could cause take to pikeminnow. This equals approximately 13,899 acres not capable of providing full riparian functions for the species. Over time, these figures should be reduced due to implementation of the FPHCP.

Incidental take of northern pikeminnow is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 702 (3,403 acres)
- Type F riparian roads: 1,458 (7,069 acres)
- Type Np riparian roads: 707 (3,427 acres)

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the northern pikeminnow. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.14 Lake and Tui Chub

With our current understanding of the Tui Chub's habitat associations and its distribution in Washington, the likelihood of incidental take from activities with the FPHCP to this species is extremely low. The species occupies habitats that are not expected to be affected by the FPHCP. However, the WDNR requested incidental take coverage under the ESA. Considering the WDNR request in combination with the conservation measures that would be implemented under the FPHCP, we determined that authorizing a limited amount of take would not affect its habitat, or this species. Further stream surveys may document the species in some habitats associated with FPHCP lands. We determined that stream crossings of Type S and F streams had the highest chance of contributing to incidental take of these species.

Incidental take of tui chub is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 5
- Type F stream crossings: 5

Incidental take of lake chub is estimated in number of stream crossings over a 50 year permit term. Take is primarily from increases in sediment, and secondarily, from reduction in LWD and shade.

- Type S stream crossings: 64
- Type F stream crossings: 630

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the tui or lake chub. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.15 Peamouth

Road stream crossings are an activity that may be a mechanism for sediment delivery to peamouth habitats. A total of 15,121 stream crossings on Type S, F, and Np streams are estimated on FPHCP lands that could affect peamouth. These stream crossings would deliver sediment to peamouth habitats that contribute to take. Intensity of road use and road design influence sediment delivery to peamouth habitats. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the riparian zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream. We determined that stream crossings of Type S, F, and Np had the highest chance of contributing to incidental take of peamouth. In addition, instream work associated with culvert and other road crossing projects may cause mortality with capture and re-location efforts.

Incidental take of peamouth is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 956
- Type F stream crossings: 8,359
- Type Np stream crossings: 5,806

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to peamouth. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.16 Largescale Sucker

Road stream crossings are an activity that would be a mechanism for sediment delivery to sucker habitats. A total of 22,534 stream crossings on Type S, F, and Np streams are estimated on FPHCP lands that could affect largescale sucker. These stream crossings would deliver sediment to sucker habitats that contribute to take. Intensity of road use and road design influence sediment delivery to sucker habitats. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the riparian zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight to reach the stream.

Incidental take of largescale sucker is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 1,531
- Type F stream crossings: 13,145
- Type Np stream crossings: 7,858

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to largescale sucker. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.17 Salish and Longnose Sucker

Riparian timber harvest is expected to contribute to incidental take of Salish and longnose and sucker in the following two ways: removal of recruitable LWD and increases in sediment that reach Sucker habitats. A total of 155,883 and 118,546 riparian acres are potentially available to be managed that could contribute incidental take of Salish and longnose sucker, respectively. The actual reduction in recruitable

LWD that occurs because of timber harvest over the 50 year permit term is relatively small, but there would be trees that are harvested that would otherwise have recruited to the stream and formed habitats. The reduction of recruitable LWD becomes more noticeable over longer time frames, such as 100 and 250 years. Sediment delivery from riparian harvest would occur in some situations, but is expected to be much less than sediment delivery from roads. However, there would be some circumstances that sediment delivery is a product of riparian harvest.

Road stream crossings are an activity that would be a primary mechanism for sediment delivery to Salish and longnose and sucker habitats. A total of 6,769 and 3,193 stream crossings on Type S, F, and Np streams are estimated on FPHCP lands that could lead to incidental take of Salish and longnose Sucker, respectively. These stream crossings would deliver sediment to sucker habitats that contribute to take. Intensity of road use and road design influence sediment delivery to sucker habitats. In addition to sediment delivery from road crossings, loss of LWD, and reduced shading can occur at road crossings. An average width of opening through the riparian zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream.

The third activity that can be estimated, and may lead to incidental take, are roads located within the Riparian Zone. Most of these riparian roads have been in place for a considerable time and their presence reduces the effectiveness of the riparian area. Roads within the Riparian Zone have several effects, most notably reduction of recruitable LWD, reduction in shade (especially if close to the stream), and sediment delivery to Sucker habitats. There are an estimated 1,243 and 731 miles of riparian roads in Type S, F, and Np streams for Salish and longnose sucker on FPHCP lands. This equals approximately 6,025 and 3,543 riparian acres (using a 40’ wide road opening) not capable of providing full riparian functions for Salish and longnose sucker, respectively. Over time these figures should be reduced due to implementation of the FPHCP.

Incidental take of Salish sucker from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 46,778
- Type F riparian management acres: 65,919
- Type Np riparian management acres: 43,106

Incidental take of Salish sucker is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 401
- Type F stream crossings: 3,945
- Type Np stream crossings: 2,423

Incidental take of Salish sucker is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 347 (1,682 acres)
- Type F riparian roads: 610 miles (2,957acres)
- Type Np riparian roads: 286 miles (1,386 acres)

Incidental take of longnose sucker from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 17,333
- Type F riparian management acres: 62,340
- Type Np riparian management acres: 38,873

Incidental take of longnose sucker is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 200
- Type F stream crossings: 1,164
- Type Np stream crossings: 1,829

Incidental take of longnose sucker is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 117 (567 acres)
- Type F riparian roads: 295 miles (1,430acres)
- Type Np riparian roads: 319 miles (1,546 acres)

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the Salish and longnose sucker. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area. The FPHCP is expected to support the long-term survival of these species in the FPHCP Action Area.

9.1.2.18   Bridgelip and Mountain Sucker

We anticipate that take of bridgelip and mountain sucker would occur within habitat adjacent to covered lands over the 50-year permit term. The conservation measures in the FPHCP provide riparian protections that address stream shade, LWD recruitment, leaf and needle liter production, microclimate, bank stability and minimization measures for sediment to aquatic habitats on FPHCP lands. Implementation of the FPHCP is expected to provide adequate functionality of these factors that would contribute to sucker long-term survival.

There would be some effects, however, from the FPHCP that would contribute to incidental take of bridgelip and mountain sucker. These affects have been analyzed in three areas of this Opinion: 1) General Effects, 2) Effects to Guilds, 3) and Effects to Species. While a quantitative estimate of individual sucker taken is not possible with this Opinion, effects that could cause take can be estimated from specific elements of the FPHCP. The effects we have determined could lead to take to bridgelip and mountain sucker are: 1) excessive sediment to fish-bearing streams from roads, timber harvest, and stream crossing projects (culvert, bridge installation, and potentially other approved crossing methods), 2) increases in stream temperature due to tree removal that provide shade, 3) preventing trees from growing that could provide shade – primarily by riparian roads, 4) removal of trees that could potentially provide LWD, 5) preventing trees from growing that could ultimately provide LWD – primarily by riparian roads and 20 acre exemptions, and 6) capture and removal of mountain and bridgelip sucker for instream projects, primarily road crossings.

Estimates were made of the WRIA's that bridgelip and mountain sucker occupy. This information for determining occupancy came primarily from the following two sources: Inland Fishes of Washington, by

Wydoski and Whitney, 2003, and the Final Environment Impact Statement for the FPHCP, 2006. To determine the FPHCP activities that had the highest chance of causing take to and bridgelip and mountain sucker, we identified the following three activities for estimating take for these two species: 1) riparian timber harvest in Type S, F, and Np streams, 2) stream crossings of Type S, F and Np streams, and 3) roads located in Type S, F, and Np riparian zones. We determined that these three primary activities could be estimated with the currently available information. See Appendix G for a description of the GIS process for determining these estimates.

Riparian timber harvest is expected to contribute to take of bridgelip sucker in the following two ways: removal of recruitable LWD and increases in sediment that reach habitats. A total of 321,106 and 123,116 riparian acres (of Type S, F, and Np) are potentially available to be managed that could cause take of bridgelip and mountain sucker, respectively. The actual reduction in recruitable LWD that occurs because of timber harvest over the 50 year permit term is relatively small, but there would be trees that are harvested that may have recruited to the stream and formed habitats. The reduction of recruitable LWD becomes more noticeable over longer time frames, such as 100 and 250 years. Sediment delivery from riparian harvest would occur, but is expected to be much smaller than sediment delivery from roads. However, there would be some circumstances that sediment delivery is a product of riparian harvest.

Road stream crossings are an activity that would be a primary mechanism for sediment delivery to bridgelip sucker habitats. A total of 13,053 and 6,244 stream crossing are estimated on FPHCP lands that could affect bridgelip and mountain sucker, respectively. These stream crossing would deliver sediment to habitats that cause take. Intensity of road use and road design influence sediment delivery to bridgelip sucker habitats. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the riparian zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream.

The third activity that can be estimated, and would also cause take, are roads located within the riparian management zone. Roads within the riparian zone have several effects, most notably reduction of recruitable LWD, reduction in shade (especially if close to the stream), and sediment delivery to bridgelip sucker habitats. A total of 2,657 and 1,174 miles of road occurs within the riparian areas of Type S, F, and Np streams that could cause take of bridgelip and mountain sucker, respectively. This equals approximately 12,912 and 5,692 acres not capable of providing full riparian functions for bridgelip and mountain sucker, respectively. Over time these figures should be reduced due to implementation of the FPHCP.

Bridgelip Sucker

Incidental take, to bridgelip sucker from riparian harvest over the 50 year permit term as estimated in acres.

- Type S riparian management acres: 76,553
- Type F riparian management acres: 159,439
- Type Np riparian management acres: 85,114

Incidental to bridgelip sucker is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 947

- Type F stream crossings: 7,417
- Type Np stream crossings: 4,689

Incidental take of bridgelip sucker is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 721 (3,503 acres)
- Type F riparian roads: 1,342 (6,521)
- Type Np riparian roads: 594 (2,866 acres)

<u>Mountain sucker</u>

Incidental take of mountain sucker from riparian harvest over the 50 year permit term as estimated in acres.

- Type S riparian management acres: 30,914
- Type F riparian management acres: 50,499
- Type Np riparian management acres: 41,703

Incidental take of mountain sucker is estimated in number of stream crossings over a 50-year permit term.

- Type S stream crossings: 399
- Type F stream crossings: 3,004
- Type Np stream crossings: 2,841

Incidental take of mountain sucker is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 289 (1,401 acres)
- Type F riparian roads: 533 (2,584 acres)
- Type Np riparian roads: 352 (1,706 acres)

9.1.2.19   Three-spine Stickleback

Estimates were made of the WRIA's that three-spine stickleback occupy. This information for determining occupancy came primarily from the following two sources: Inland Fishes of Washington, by Wydoski and Whitney, 2003, and the Final Environment Impact Statement for the FPHCP, 2006. We identified the following three activities for estimating take for this species: 1) riparian timber harvest in Type S, F, and Np streams; 2) stream crossings of Type S, F and Np streams; and 3) roads located in Type S, F, and Np riparian zones. We determined that these two primary activities could be estimated with the currently available information. These two activities also had the highest chance of contributing to take of three-spine stickleback. See Appendix G for a description of the GIS process for determining these estimates.

Incidental take of three-spine stickleback from riparian harvest over the 50 year permit term as estimated in acres.

- Type S riparian management acres: 126,353

- Type F riparian management acres: 265,989
- Type Np riparian management acres: 120,238

Incidental Take of three-spine stickleback is estimated in number of stream crossings over a 50 year permit term. Take is primarily from increases in sediment, and secondarily, from reduction in LWD and shade. Three-spine stickleback mortality may also occur from culvert installation/replacement projects.

- Type S stream crossings: 1,387
- Type F stream crossings: 13,665
- Type Np stream crossings: 6,679

Incidental Take of three-spine stickleback is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres. Roads in riparian areas would contribute to take from reduced riparian effectiveness, primarily reduction in LWD, shade, and increases in sediment to habitats.

- Type S riparian roads: 1,137 miles (5,512 acres)
- Type F riparian roads: 2,248 miles (10,899 acres)
- Type Np riparian roads: 740 miles (3,587 acres)

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to three-spine stickle back. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.20   Sandroller

Estimates were made of the WRIA's that sandroller occupy. This information for determining occupancy came primarily from the following two sources: Inland Fishes of Washington, by Wydoski and Whitney, 2003, and the Final Environment Impact Statement for the FPHCP, 2006. We identified the following three activities for estimating take for this species: 1) riparian timber harvest in Type S, F, and Np streams; 2) stream crossings of Type S, F and Np streams; and 3) roads located in Type S, F, and Np riparian zones. We determined that these three primary activities could be estimated with the currently available information and had the highest chance of contributing to take for this species. See Appendix G for a description of the GIS process for determining these estimates.

Incidental take of sandroller from riparian harvest over the 50 year permit term is estimated in acres. Take is from loss of potential LWD and potential increases in sediment.

- Type S riparian management acres: 35,374
- Type F riparian management acres: 70,463
- Type Np riparian management acres: 41,836

Incidental take of sandroller is estimated in number of stream crossings over a 50 year permit term. Take is primarily from increases in sediment, and secondarily, from reduction in LWD and shade. Sandroller mortality may occur from in-stream projects, primarily from culvert replacement and installations.

- Type S stream crossings: 446

- Type F stream crossings: 4,048
- Type Np stream crossings: 2,744

Incidental take of sandroller is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 364 miles (1,764 acres)
- Type F riparian roads: 714 miles (3,461 acres)
- Type Np riparian roads: 297 miles (1,440 acres)

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to sandroller. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.21 Sculpin: Paiute Sculpin; Prickly Sculpin; Coastrange Sculpin; Torrent Sculpin; Reticulate Sculpin; Riffle Sculpin; Shorthead Sculpin; Mottled Sculpin; Slimy Sculpin; Margined Sculpin

We assessed the activities associated with the FPHCP to determine which activities had the highest chance of contributing to take of the 10 species of sculpins. The activities needed to be measurable, have a likelihood of contributing to take, and be an activity directly associated with the FPHCP. Activities not meeting these criteria were not considered for estimating incidental take. The FPHCP activities that best meet these criteria for sculpins were: 1) riparian timber harvest in Type S, F, and Np streams, 2) stream crossings of Type S, F and Np streams, and 3) roads located in Type S, F, and Np riparian zones. The FWS determined that these three primary activities could be estimated with the currently available information and had the highest chance of contributing to take. FPHCP activities and the watershed processes that contribute to take have been analyzed in detail in other sections of the Opinion. See Appendix G for a description of the GIS process for determining these estimates.

Following the process for determining what activities would be most likely to contribute to incidental take, an estimate needed to be made on watersheds that the 10 species of sculpin occurred. Estimates were made of the WRIA's that the species occupy in the FPHCP Action Area. The information for determining occupancy came primarily from the following two sources: Inland Fishes of Washington, by Wydoski and Whitney, 2003, and the Final Environment Impact Statement for the FPHCP, 2006.

Riparian timber harvest is expected to contribute to take of sculpins in the following two ways: removal of recruitable LWD which reduces stream complexity, and increases in sediment that reach sculpin habitats. The actual reduction in recruitable LWD that occurs because of timber harvest over the 50 year permit term is relatively small, but there would be trees that are harvested that would otherwise have recruited to the stream and formed habitats. The reduction of recruitable LWD becomes more noticeable over longer time frames, such as 100 and 250 years. Sediment delivery from riparian harvest would occur in some situations, but is expected to be much less than sediment delivery from roads. However, there would be some circumstances that sediment delivery is a product of riparian harvest.

Road stream crossings are an activity that would be a primary mechanism for sediment delivery to sculpin habitats. These stream crossing would deliver sediment to sculpin habitats that contribute to take. Intensity of road use and road design influence sediment delivery to habitats. In addition to sediment delivery from road crossings, loss of LWD and reduced shading can occur at road crossings. An average width of opening through the riparian zone associated with a crossing is approximately 40 feet. This area would lose the potential to deliver LWD and would also increase sunlight reaching the stream. In addition, some sculpin mortality is expected during road crossing structure (most frequently, culverts) installations/replacements. Sculpins are benthic fish, and capturing all sculpins during the construction phase of these projects is difficult. As such, some limited mortality is expected from these types of in-stream projects.

The third activity that can be estimated, and would also cause take, are roads located within the Riparian Zone. Most of these riparian roads have been in place for a considerable time and their presence reduces the effectiveness of the riparian area. Roads within the Riparian Zone have several effects, most notably reduction of recruitable LWD, reduction in shade (especially if close to the stream), and sediment delivery to sculpin habitats. Over time, these figures should be reduced due to implementation of the FPHCP.

Incidental take for the 10 species follows:

Shorthead sculpin

Incidental take of shorthead sculpin from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 107,875
- Type F riparian management acres: 212,696
- Type Np riparian management acres: 101,481

Incidental take of shorthead sculpin is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 1,160
- Type F stream crossings: 11,101
- Type Np stream crossings: 6,064

Incidental take of shorthead sculpin is estimated from roads in the Riparian Zones of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 930 miles (4,509 acres)
- Type F riparian roads: 1,818 miles (8,814 acres)
- Type Np riparian roads: 704 miles (3,413 acres)

Riffle Sculpin

Incidental take of riffle sculpin from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 91,220
- Type F riparian management acres: 207,671
- Type Np riparian management acres: 81,175

Incidental take of riffle sculpin is estimated in number of stream crossings, over a 50 year permit term.

- Type S stream crossings: 981
- Type F stream crossings: 10,100
- Type Np stream crossings: 4,498

Incidental take of riffle sculpin is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 139 miles (673 acres)
- Type F riparian roads: 276 miles (1,338 acres)
- Type Np riparian roads: 459 miles (2,225 acres)

Paiute Sculpin

Incidental Take of Paiute sculpin from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 6,928
- Type F riparian management acres: 6,885
- Type Np riparian management acres: 10,860

Incidental take of Paiute sculpin is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 123
- Type F stream crossings: 427
- Type Np stream crossings: 592

Incidental take of Paiute sculpin is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 52 miles (252 acres)
- Type F riparian roads: 120 miles (581 acres)
- Type Np riparian roads: 127 miles (615 acres)

Prickly Sculpin

Incidental take of prickly sculpin from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 126,735
- Type F riparian management acres: 255,648
- Type Np riparian management acres: 121,361

Incidental take of prickly sculpin is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 1,361
- Type F stream crossings: 13,184
- Type Np stream crossings: 6,745

Incidental take of prickly sculpin is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 1,096 miles (5,313 acres)
- Type F riparian roads: 2,185 miles (10,593 acres)
- Type Np riparian roads: 764 miles (3,704 acres)

Coastrange Sculpin

Incidental take of coastrange sculpin from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 133,404
- Type F riparian management acres: 274,768
- Type Np riparian management acres: 118,710

Incidental take of coastrange sculpin is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 1,395
- Type F stream crossings: 14,312
- Type Np stream crossings: 6,757

Incidental take of coastrange sculpin is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 1,147 miles (5,561 acres)
- Type F riparian roads: 2,269 miles (11,001 acres)
- Type Np riparian roads: 718 miles (3,481 acres)

Torrent Sculpin

Incidental take of torrent sculpin from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 127,061
- Type F riparian management acres: 258,504
- Type Np riparian management acres: 132,377

Incidental take of torrent sculpin is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 1,346
- Type F stream crossings: 12,870
- Type Np stream crossings: 7,416

Incidental take of torrent sculpin is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 1,067 miles (5,713 acres)
- Type F riparian roads: 2,182 miles (10,579 acres)
- Type Np riparian roads: 893 miles (4,329 acres)

Mottled Sculpin

Incidental take of mottled sculpin from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 11,674
- Type F riparian management acres: 12,877
- Type Np riparian management acres: 20,435

Incidental take of mottled sculpin is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 165
- Type F stream crossings: 593
- Type Np stream crossings: 1,068

Incidental take of mottled sculpin is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 75 miles (363 acres)
- Type F riparian roads: 156 miles (756 acres)
- Type Np riparian roads: 212 miles (1,027 acres)

Slimy Sculpin

Incidental take of slimy sculpin from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 6,901
- Type F riparian management acres: 9,412
- Type Np riparian management acres: 10,841

Incidental take of slimy sculpin is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 67
- Type F stream crossings: 418
- Type Np stream crossings: 609

Incidental take of slimy sculpin is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 41 miles (198 acres)
- Type F riparian roads: 112 miles (543 acres)
- Type Np riparian roads: 102 miles (494 acres)

Margined Sculpin

Incidental take of margined sculpin from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 687
- Type F riparian management acres: 2,106

- Type Np riparian management acres: 2,293

Incidental take of margined sculpin is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 15
- Type F stream crossings: 133
- Type Np stream crossings: 75

Incidental take of margined sculpin is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 6 miles (29 acres)
- Type F riparian roads: 50 miles (242 acres)
- Type Np riparian roads: 23 miles (111 acres)

Reticulate Sculpin

Incidental take of reticulated sculpin from riparian harvest over the 50 year permit term is estimated in acres.

- Type S riparian management acres: 101,082
- Type F riparian management acres: 216,295
- Type Np riparian management acres: 87,623

Incidental take of reticulated sculpin is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 1,112
- Type F stream crossings: 10,601
- Type Np stream crossings: 5,095

Incidental take of reticulate sculpin is estimated from roads in the riparian areas of Type S, F, and Np streams. Estimates are in miles and acres.

- Type S riparian roads: 907 miles (4,397 acres)
- Type F riparian roads: 1,737 miles (8,412 acres)
- Type Np riparian roads: 507 miles (2,458 acres)

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the 10 species of sculpin. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.22   Longfin Smelt

With our current understanding of landlocked longfin smelt habitat, the likelihood of incidental take from FPHCP activities to this species is relatively low. The species in Lake Washington, and its associated habitats, are not expected to be substantially influenced by the FPHCP. However, the WDNR requested incidental take coverage under the ESA for this species. Considering the WDNR request, in combination with the conservation measures that would be implemented under the FPHCP, we determined that authorizing a limited amount of take would have little to no consequences to the species.

Some sediment may be delivered to longfin smelt habitat as a result of the FPHCP that may contribute to take. We determined that stream crossings likely had the highest chance of contributing to incidental take.

Incidental take of longfin smelt is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 19
- Type F stream crossings: 259
- Type Np stream crossings: 27

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the landlocked longfin smelt. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.23 Burbot

With our current understanding of lakes occupied by burbot, the likelihood of incidental take from activities with the FPHCP to this species is low. The species generally occupies habitats that are not expected to be substantially influenced by the FPHCP. However, the WDNR requested incidental take coverage under the ESA for this species. Considering the WDNR request, in combination with the conservation measures that would be implemented under the FPHCP, we determined that authorizing a limited amount of take would have little to no consequences to the species. However, future surveys may document the species in some habitats associated with FPHCP lands. If that occurs, it is expected that the conservation measures implemented under the FPHCP would provide adequate conservation. Incidental take is authorized under these assumptions.

Road stream crossings are an activity that would be a potential mechanism for sediment delivery to burbot habitats. A total of 267 stream crossing for Type S, and F streams are estimated on FPHCP lands that could affect burbot. These stream crossings may deliver sediment to habitats that contribute to incidental take. Intensity of road use and road design influence sediment delivery to burbot habitats.

Incidental take of burbot is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 42
- Type F stream crossings: 225

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the burbot. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.24 White Sturgeon

With our current understanding of white sturgeon habitat, the likelihood of incidental take from FPHCP activities to this species is extremely low. The species generally occupies habitats that are not expected to be substantially influenced by the FPHCP. However, the WDNR requested incidental take coverage under the ESA for this species. Considering the WDNR request, in combination with the conservation measures that would be implemented under the FPHCP, we determined that authorizing a limited amount of incidental take would have little to no consequences to the species.

Road stream crossings are an activity that may be a mechanism for sediment delivery to white sturgeon habitats. A total of 856 Type S stream crossings are estimated on FPHCP lands that could affect white sturgeon.

Incidental take of white sturgeon is estimated in number of stream crossings over a 50 year permit term.

- Type S stream crossings: 856

Conclusion

In this Opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the white sturgeon. The effects to the species are not at a scale or magnitude that would affect the overall abundance or distribution of the species in the FPHCP Action Area.

9.1.2.25 Bull Trout

Amount or Extent of Take

We anticipate that take of bull trout may occur within spawning and rearing streams and foraging, migrating, and overwintering (FMO) habitat adjacent to FPHCP covered lands over the 50-year permit term. The conservation measures in the FPHCP provide riparian protections to minimize temperature and sediment-related effects from timber-harvest activities, and erosion-control measures to minimize sediment delivery to bull trout streams via roads and stream crossings. However, these effects would not be completely eliminated as it is expected that up to 50 percent of Type Np streams and up to 100 percent of Type Ns streams may not receive riparian buffers; that all stream crossings may be replaced during the permit term; and that some amount of sediment may still come from timber-harvest activities in and adjacent to riparian areas as well as the construction, maintenance, use, and decommissioning of roads including the replacement of road crossings.

The direct take of or injury to bull trout may occur as a result of CMER research and capture and handling activities which may include the use of seines, dipnets, blocknets, electrofishing or other similar methods. In addition, the direct and indirect take of bull trout from capture and handling associated with fish salvage is being addressed by this Opinion because these activities are interrelated to the proposed action and support the conservation measures in the FPHCP. We expect fish salvage would minimize the level of incidental take that would otherwise occur if bull trout were not salvaged prior to stream channels being dewatered and stream crossing structures replaced. We also expect that take of bull trout through CMER research may be necessary for the purposes of adaptive management.

We expect incidental take of bull trout may be difficult to detect because the presence and number of bull trout is difficult to determine within the FPHCP Action Area and detecting a dead or impaired specimen is unlikely. While bull trout may be taken as a result of the previously described effects, accurately quantifying these effects is difficult. Therefore, even though we expect incidental take to occur, data are not available and are not sufficient to enable us to estimate an exact number of individuals which are incidentally taken. However, a quantitative estimate of the anticipated take of bull trout may be made based on habitat surrogates such as stream miles, acres of riparian habitat that influence the aquatic environment, and/or acres of marine nearshore habitat. We expect three types of effects that may result in take due to the implementation of FPHCP over the 50-year Permit term. The types of effects and the authorized take anticipated are related to increases in sediment, increases in water temperature, and decreases in large wood. The direct take of bull trout would occur as a result of capture and handling and the implementation of CMER research. Take associated with capture and handling of bull trout is necessary to further reduce the level of incidental take that would otherwise occur during in-water construction. Take associated with CMER research may be necessary for the purposes of adaptive management. The amount of take associated with CMER research is expected to be minimal. An action may result in more than one type of effect, with the potential for take of individual bull trout for each type of effect.

1. Take of bull trout may occur through the impairment of essential foraging, rearing, and spawning behaviors associated with the direct and indirect effects of sediment in spawning and rearing streams and FMO habitat. Covered activities that are likely to generate sediment include: timber harvest and harvest-related activities adjacent to fish- and nonfish-bearing streams; and construction, maintenance, decommissioning, and use of roads (especially stream-adjacent roads) including the replacement of stream crossing structures. Cumulatively, these covered activities may result in the take of bull trout via sediment inputs to spawning and rearing streams and FMO habitat. Adverse effects from sediment that may lead to the take of bull trout are not anticipated to occur in all streams that support bull trout spawning and rearing. Life-history forms that may be taken by elevated sediment levels in spawning and rearing streams as a result of the implementation of the FPHCP are primarily eggs and alevins, but may also include fry, juveniles and, in some instances, subadult and adult bull trout. Adverse effects from sediment that may lead to the take of bull trout are not anticipated to occur in all streams that support foraging, migrating, and overwintering. Life-history forms that may be taken by elevated sediment levels in FMO habitat as a result of the implementation of the FPHCP consist of only adult and subadult bull trout.

2. Take may occur through the impairment of foraging, rearing, and spawning behaviors associated with increases in stream temperatures. Covered activities that are likely to lead to temperature increases include: timber harvest adjacent to fish- and nonfish-bearing streams (potential increases in sediment and decreases in shade and large wood); and the construction, maintenance, decommissioning, and use of stream-adjacent roads including the replacement of stream crossing structures (potential sediment inputs and reduction of shade due to limited tree clearing). Cumulatively, these covered activities may result in the take of bull trout by increasing stream temperatures via the loss of shade or the delivery of sediment to spawning and rearing habitat. Adverse effects from temperature that may lead to the take of bull trout are not anticipated to occur in all streams that support bull trout spawning and rearing. Life-history forms that may be taken by elevated stream temperatures are expected to be primarily eggs and alevins, but may also include fry and juveniles. Subadult and adult bull trout are less likely to be taken as they are more mobile and have the ability to avoid areas of warm water. Although we anticipate some take, temperature increases s a result of implementation of the FPHCP are not expected to affect bull trout in FMO habitat to the same degree as bull trout in spawning and rearing habitat. This is because FMO habitats are typically larger bodies of water, generally contain streams with warmer

water temperatures, and are used seasonally by bull trout life stages (adult and subadult) that have less sensitive or less restrictive habitat requirements. Life-history forms that may be taken by elevated temperature levels in FMO habitat as a result of the implementation of the FPHCP consist of only adult and subadult bull trout.

3. Take of bull trout may occur through the impairment of foraging, rearing, and spawning behaviors associated with the loss of large wood recruitment potential. Riparian harvest adjacent to fish- and nonfish-bearing streams has the potential to reduce the amount of large wood available over the 50-year permit term. A reduction in large wood in bull trout streams has the potential to result in reduced pool formation, increased sediment loads, the loss of cover, and a reduction in stream diversity and complexity. Take associated with the reduction of large wood would be more acute in headwater (Np and Ns) streams with steep hill slopes adjacent to or immediately upstream of bull trout spawning and rearing habitat. Adverse effects from the reduction of large wood that may lead to the take of bull trout are not anticipated to occur in all streams that support bull trout spawning and rearing, especially streams that derive most of their large wood from near-stream sources. Life-history forms that may be taken by the reduction of large wood are primarily eggs and alevins, but may also include fry, juveniles, and, in some instances, subadult and adult bull trout. Although we anticipate some take, the reduction of large wood as a result of implementation of the FPHCP is not expected to affect bull trout in FMO habitat to the same degree as bull trout in spawning and rearing habitat. Life-history forms that may be taken by reduction in large wood in FMO habitat as a result of the implementation of the FPHPC consist of only adult and subadult bull trout.

   Spawning and rearing streams in Core Areas, FMO habitat within Core Areas and FMO habitat outside of Core Areas vary in the amount of stream-adjacent road miles and adjacent FPHCP covered lands. These stream miles would be subject to adverse effects from covered activities and some of these adverse effects could result in the take of bull trout. Take associated with increases in temperature and sediment, and decreases in amounts of large wood may occur on portions of the 295.7 stream miles of spawning and rearing habitat adjacent to FPHCP covered lands, but we do not expect such take to occur on all 295.7 stream miles. Take associated with effects to FMO habitats both inside and outside of Core Areas is even more difficult to ascertain as FMO habitats typically consist of larger bodies of water; generally contain streams with warmer water temperatures; and are typically used seasonally by bull trout life stages that are more mobile, less sensitive to changes in habitat parameters, and have less restrictive habitat requirements. Twenty Core Areas have some amount of stream-adjacent roads or FPHCP covered lands that are adjacent to spawning and rearing habitat (Table 9-1). All Core Areas expect Chester Morse contain some FMO habitat adjacent to FPHCP covered lands or stream-adjacent roads (Table 9-2). In addition, FPHCP lands and FPHCP stream-adjacent roads are found adjacent to FMO areas outside of Core Areas (Table 9-3).

4. Direct take of bull trout may occur as a result CMER research and fish capture and handling activities including the use of seines, dipnets, blocknets, electrofishing or other methods used to capture bull trout. However, fish-salvage operations (as authorized through future section 10(a)(1)(A) permits or equivalent process), if necessary, would minimize the stranding of fish prior to stream channels being dewatered and stream crossing structures replaced. The capture of bull trout is expected to be minimized by avoiding periods of the year when bull trout are present in significant numbers. While it is possible that adverse effects may be avoided in some instances

Table 9-1. Quantification of take in bull trout core areas.

Core Area	Number of Stream Crossings	Miles of Stream Adjacent Roads Type S Streams	Miles of Stream Adjacent Roads Type F Streams	Miles of Stream Adjacent Roads Type Np Streams	Spawning and Rearing Stream Miles Adjacent to FPHCP Lands (equivalent acres of RMZs)
Columbia River DPS					
Asotin Creek	0	.10	.06	.92	0.8 (11.64)
Entiat	2	.56	1.56	2.48	7.3 (106.18)
Grande Ronde	0	0	0	0	0
Klickitat	0	0	0	0	0
Lewis	15	.60	4.75	4.39	15.4 (326.67)
Methow	0	1.07	.30	0	0
Pend Oreille	26	1.87	3.13	1.16	35.5 (516.36)
Priest Lakes	0	0	0	.10	0.9 (14.18)
Tucannon	1	0	.34	.06	1.5 (21.82)
Walla Walla	20	2.55	10.8	4.07	19.8 (288.00)
Wenatchee	7	8.99	6.63	5.22	12.9 (187.64)
Yakima	36	10.28	23.98	20.21	55.2 (802.91)
Coastal-Puget Sound DPS					
Chester Morse	0	0	0	0	0
Chilliwack	0	0	0	0	0
Dungeness	0	0	.81	.07	1.6 (33.94)
Elwha	3	0	0	0	0
Hoh	1	.86	0	0	2.7 (57.27)
Lower Skagit	5	1.19	1.42	4.72	7.7 (163.33)
Nooksack	44	16.84	14.41	25.46	57.1 (1211.21)
Puyallup	14	8.84	8.66	13.18	40 (848.49)
Queets	0	0	0	0	0
Quinault	0	0	0	0	0
Skokomish	0	0	.05	0	0.3 (6.36)
Snohomish/Skykomish	5	4.25	3.56	2.19	8.3 (176.01)
Stillaguamish	12	5.74	3.45	1.95	22.2 (470.91)
Upper Skagit	0	0	0.55	0	0.5 (10.61)

due to the low likelihood of the species being present during project implementation, bull trout are still being discovered at times and locations where they were not expected to occur. If bull trout are present in the reach of stream being dewatered, they would be captured using the methods described above and placed back into the flowing stream. The actual numbers of fish taken by capture and handling methods is difficult to estimate because bull trout may not be present when the work occurs and most bull trout would not likely be injured and would be released. It is anticipated that less lethal methods of capture would be used first, and if necessary, other methods such as electro fishing may be used. The take authorized by this incidental take statement is for an undeterminable, but small number of bull trout captured during fish-salvage operations prior to the replacement of a stream-crossing structure. Life-history forms that may be directly taken include alevins, fry, juveniles, and, in some instances, subadult and adult bull trout. Fourteen Core Areas have at least one stream crossing structure that crosses known spawning and rearing habitat (Table 9-1). We also expect that

Table 9-2. Quantification of take inside bull trout FMO habitat.

FMO inside of Core Area	Number of Stream Crossings of FMO	Miles of Stream Adjacent Roads Type S and F Streams	Miles of Stream Adjacent Roads Type F Streams	Miles of Stream Adjacent Roads Type Np Streams	Acres of RMZs adjacent to FMO habitat
Columbia River DPS					
Asotin Creek	0	0.53	1.25	1.09	878.00
Entiat	4	7.26	1.11	5.39	1807.42
Grande Ronde	0	.07	1.87	1.53	524.80
Klicitat	2	18.01	21.60	44.28	13996.80
Lewis	2	17.76	55.22	18.86	16351.73
Methow	7	4.38	4.00	3.68	2502.4
Pend Oreille	3	9.18	26.01	17.27	12078.84
Priest Lakes	0	0.0	0.0	0	197.02
Tucannon	0	0.17	9.23	1.40	502.98
Walla Walla	29	2.29	26.70	13.70	4601.6
Wenatchee	17	9.96	12.46	28.35	2749.96
Yakima	22	28.58	38.88	63.77	22569.89
Coastal-Puget Sound DPS					
Chester Morse	0	0	0	0	0
Chilliwack	5	3.06	6.19	2.25	2323.20
Dungeness	10	4.8	5.25	0.11	1553.26
Elwha	5	3.24	2.73	1.03	1273.60
Hoh	18	5.83	13.54	6.2	8441.93
Lower Skagit	42	40.57	90.53	43.1	32252.67
Nooksack	23	8.00	23.23	6.88	20471.99
Puyallup	22	35.6	58.92	35.48	33026.71
Queets	2	3.19	7.82	1.10	4716.80
Quinault	3	0.35	4.38	0.57	1958.40
Skokomish	4	2.45	5.25	0.18	1913.64
Snohomish/Skykomish	44	80.02	142.35	58.11	52534.39
Stillaguamish	22	21.13	50.86	18.92	21890.69
Upper Skagit	1	0.16	54.5	0.0	277.39

direct and indirect take of bull trout through CMER research may be necessary for the purposes of adaptive management. The direct take of bull trout would be permitted only in association with CMER research, monitoring, and model validation. All other direct take of bull trout would need to be authorized through the issuance of a section 10(a)(1)(A) permit or equivalent process by the FWS including capture and handling of bull trout during fish salvage operations associated with stream-crossing replacements, and operational fish presence/absence surveys.

Table 9-3. Quantification of take outside bull trout FMO habitat.

FMO outside of Core Areas	Number of Stream crossing	Miles of Stream Adjacent Roads Type S Streams	Miles of Stream Adjacent Roads Type F Streams	Miles of Stream Adjacent Roads Type Np Streams	Acres of RMZ adjacent to FMO habitat
Bell	1	0.0	4.9	179.24	512
Cedar/Steamboat	9	0.01	2.53	1.71	957.2
Chehalis	0	29.95	85.56	7.71	8249.6
Goodman	5	2.02	7.63	1.11	3136
Humtulips	8	9.97	26.41	4.40	6675.2
Kalalock	3	0.80	3.20	0.56	1075.20
Moclips/Copalis	13	5.47	20.03	2.85	8332.8
Morse	6	1.88	8.81	1.85	3667.20
Satsop	1	9.74	15.32	2.53	4051.20
Wishkah	9	7.73	113.09	3.60	4902.40
Wynoochee	2	9.29	8.85	1.58	3264.00
Lake Washington	4	23.09	55.05	6.98	11430.40
Lower Green	3	22.32	22.02	5.83	7571.20
Lower Nisqually	3	28.97	43.12	18.74	18745.60
Samamish	23	9.31	15.66	4.80	4563.20

Effect of Take

In this Opinion, we determined that the level of anticipated take is not likely to result in jeopardy to the species. Take associated with sediment generated from timber-harvest activities is likely to be short-term as buffers on all fish-bearing streams and buffers and equipment-limitation zones on non-fish-bearing streams would intercept most sediment from such activities. In addition, sediment associated with road construction, maintenance, and use including the replacement stream crossing structures is expected to also be short-term and reduced in scope over the Permit term. Increases in stream temperatures are expected to be situational and are not likely to occur at all locations where Type Np and Ns streams enter fish-bearing waters. Such increase in temperatures from Type Np and Ns streams are also expected to equilibrate to some degree as affected water flows through buffered sections and/or mixes with fish-bearing streams. Buffers along fish-bearing streams are expected to be adequate to protect against temperature increases. The capture and handling of bull trout associated with stream crossings could result in direct and indirect mortality of bull trout. Direct take other than CMER research, monitoring, and model validation would need to be authorized through the issuance of a section 10(a)(1)(A) permit or equivalent process by the FWS including capture and handling during fish salvage operations associated with stream-crossing replacements.

9.2 REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measure is necessary and appropriate to minimize the impacts of incidental take of covered species:

1. Any incidental take of covered species must comply with all the terms and conditions of the section 10(a)(1)(B) Permit (including the provisions of the Implementation Agreement and the FPHCP).

9.3 TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the FWS must comply with the following terms and conditions, which implement the reasonable and prudent measure described above and outline required reporting and monitoring requirements. These terms and conditions are nondiscretionary:

1. A section 10(a)(1)(B) permit, as evaluated in this Biological Opinion, must be issued by the FWS. The Implementation Agreement for the FPHCP for the section 10(a)(1)(B) Permit must be agreed to by the FWS, and the Permit conditioned upon implementation of the FPHCP and associated Implementation Agreement.

2. The FWS shall condition the section 10(a)(1)(B) Permit to include the following conditions:

   A. The Forest Practices Habitat Conservation Plan (FPHCP) is generally described in Chapter 4 of the document entitled "Washington State Forest Practices Habitat Conservation Plan," and is approved as constituted on the date of permit issuance. Any changes to the FPHCP shall be subject to the provisions of the implementing agreement for the Final FPHCP, section 11.0 on Modifications and Amendments.

   B. The permittee shall maintain sufficient compliance and enforcement personnel whose responsibilities include conducting on-the-ground inspections of forest operations and documenting and reporting violations. The permittee shall ensure that these personnel are trained in forest practices regulations and enforcement procedures, and that they are equipped with vehicles and other necessary facilities and equipment. The permittee shall ensure that effective procedures are in place to identify operators who commit chronic or significant violations of forest practices regulations. The permittee shall take enforcement actions against violators, including but not limited to notices to comply, stop work orders, corrective action orders, civil penalties, disapproval of forest practices applications, financial assurance requirements, and criminal penalties, as appropriate to deter violations of these regulations.

   C. Under the 20-acre exemption provision (FPHCP section 4b-3.1.3 [WAC 222-30-023(1) for western Washington] and FPHCP section 4b-3.2.3 [WAC 222-30023(2) for eastern Washington]), the Permit shall only apply to the following:

      1. Forestlands owned by a person who affirms in writing on a forest practices application of qualifying as an eligible person under the "20-acre exemption" as of and since the date of Permit issuance.

      2. Forestlands that are purchased, inherited, or otherwise lawfully obtained by a person who affirms in writing on a forest practices application of qualifying at the time that person takes possession of the forestlands under the following provisions:

         a. the forestlands have continually been qualified for the "20-acre exemption" since the date of Permit issuance; or,

b. the forestlands have not been subject to commercial harvest under the jurisdiction of the Washington Forest Practices Act since the date of Permit issuance and are being converted to forestland from another land use.

3. Forestlands subject to a Class IV General Forest Practices Application only when the otherwise-qualifying applicant indicates on the application that he or she is not converting those forestlands to another use within three years.

4. Forestlands in any Wastershed Administrative Unit (WAU) for which the permittee has previously established, with the review and approval by the FWS, an estimate of the length of streams on FPHCP Covered Lands. The permittee shall establish, with review and approval of the FWS, a method to reasonably estimate post-harvest the length of classified streams on a 20-acre exempt site and the proportion of riparian function as measured by recruitable LWD from the site when compared to that which would have been provided under the standard riparian strategies. The permittee shall monitor 20-acre exempt timber harvest activities and maintain a reasonable estimate of the cumulative change in riparian function provided by FPHCP Covered Lands as measured by recruitable LWD in each WAU that results from 20-acre exempt forest practices covered by this Permit.

   a. The Permit shall not apply to forestlands subject to subsequent 20-acre exempt forest practices applications when the permittee anticipates that forest practices on those forestlands will result in a cumulative reduction in riparian function as measured by recruitable LWD greater than 10 percent of what would have been provided under the standard riparian strategies.

   b. The Permit shall not apply to forestlands subject to subsequent 20-acre exempt forest practices applications in a WRIA once the WAUs within the WRIA exceeding the "10 percent limit" (above) represent more than 15 percent of the total stream length on FPHCP Covered Lands in the WRIA.

   c. The Permit shall not apply to 20-acre exempt forestlands in any WAU where there is found the spawning and rearing habitat of bull trout populations identified in Table 3-51 of the Opinion until the permittee has established, with review and approval of the FWS, that forest practices under the 20-acre exempt provisions will not measurably diminish the level of riparian function provided by FPHCP Covered Lands in the WAU as measured by recruitable LWD when compared to that which would have been provided under the standard riparian strategies.

D. The permittee shall require trees to be left along Type Np waters under the 20-acre exemption unless it is determined that such leave trees are not necessary to protect covered species and their habitats. Unless determined by WDNR to be unnecessary, leave at least 29 conifer or deciduous trees, 6 inches in diameter or larger, on each side of every 1,000 feet of stream length within 29 feet of the stream. These leave trees may be arranged to accommodate the forest practices operation.

E. Each year, prior to commencement of electrofishing surveys or other activities involving capture and handling of listed species for adaptive-management research and monitoring (including validation of the water-typing model), the permittee shall submit an estimate of the amount of stream surveys or electrofishing activities to be conducted and an estimate of the number of listed fish (or miles of listed-species habitat) to be affected by these activities. The permittee shall also provide the names and qualifications of the staff, contractors, or cooperators who will be supervising the field work. The permittee shall provide the FWS with a copy of the operating protocols designed to reduce effects to listed fish while maintaining the efficiency of the surveys and monitoring. This incidental take permit does not apply to operational water typing by individual landowners or to fish-salvage operations; these activities would need incidental take authorization through other means.

Following the conclusion of the field season and prior to the next field season, the permittee shall provide a report to the Project Leader, U.S. Fish and Wildlife Service, Western Washington Fish and Wildlife Office, 510 Desmond Drive SE, Suite 102, Lacey, Washington 98503, documenting the level of stream-survey and electrofishing activity and describing any listed fish encounters. This report shall document any effects that may rise to the level of incidental take (including mortality) and shall include the apparent condition of all listed fish specimens encountered. Results of surveys and monitoring shall be incorporated into the appropriate FPHCP periodic reports. The permittee shall obtain all needed Federal and State permits and shall abide by the conditions of each. This includes following the guidelines provided by NMFS (NMFS 2000). If the NMFS guidelines are subsequently revised, the permittee shall follow the revised guidelines. The permittee shall follow the guidelines unless proposed operating protocols described above are otherwise approved by FWS and NMFS, or additional restrictions are imposed by the FWS.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The FWS's Western Washington Fish and Wildlife Office must immediately provide an explanation of the causes of the taking and review the need for possible modification of the reasonable and prudent measures.

9.4 CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a)(1) of the ESA direct Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on covered species or critical habitat, to help implement recovery plans, or to develop information. The FWS offers the following conservation recommendations:

1. The FWS should continue to work with WDNR, WDFW, forest landowners, and other TFW/FFR stakeholders to increase awareness regarding listed species associated with forested habitats that are not covered by the FPHCP, and to promote education regarding: (1) recognizing signs of listed species use and important habitat features; (2) utilizing methods to reduce impacts from forest activities; and (3) implementing measures to benefit listed species.

2. The FWS should provide technical assistance, upon request, to WDNR to assist them in working with forest landowners to avoid activities with a high risk of unauthorized take of listed species not covered under the FPHCP.

3. The FWS should provide technical assistance to WDNR, other regulatory agencies, and forest landowners in determining appropriate prescriptions to apply where over-stocking and off-site tree species exist as a result of past management, and where insects, disease, fire, and other stochastic events threaten to reduce the vigor of riparian stands. Large wood recruitment often occurs in an episodic manner, particularly in certain eco-regions; however, catastrophic fires are generally not in the best interest of landowners, wildlife, or the general community. As requested, the FWS should participate in forums focusing on solutions (e.g., working groups developing alternate plan templates) to incorporate sound scientific and ecological principles.

4. When technical assistance is requested from FWS, we should work with WDNR, WDFW, forest landowners, and other TFW/FFR stakeholders in developing guidelines for management of the Core Zone under alternate plans. Where RMZs are composed of overly-stocked, young, dense stands along streams and rivers with substantial flow requiring key piece and functional wood of considerable size, consideration should be given to encouraging the development of alternate plans or guidelines to thin the Core Zone with the objective of hastening the development of large wood that could be recruited to typed waters. We should encourage forest landowners to: (1) retain sub-merchantable trees, shrubs, and other vegetation to provide bank protection, shade, and habitat continuity in situations where riparian buffers are not retained within the equipment-limitation zone (30 feet) of Type Np or Ns streams; and (2) maximize canopy coverage on forested wetlands. Where harvest occurs within forested wetlands, the FWS should encourage landowners to place emphasis on maintaining tree-species composition, but also balance leave tree retention with tree species that are less abundant or of particular wildlife value (e.g., Oregon ash, bitter cherry, hazel nut, cottonwood, aspen, cascara, Pacific yew, western white pine, etc.).

5. The FWS should continue to work with WDNR, WDFW, forest landowners, and other TFW/FFR stakeholders in CMER and the TFW/FFR Policy group. The FWS should provide staff to participate regularly in appropriate Scientific Advisory Groups under CMER.

6. The FWS should continue to work with WDNR, WDFW, forest landowners, and other TFW/FFR stakeholders within CMER to develop and conduct monitoring regarding whether the objectives and rules associated with unstable slopes are being correctly interpreted and implemented in the field.

7. The FWS should work with WDNR, WDFW, forest landowners, and other TFW/FFR stakeholders within CMER to ensure that recharge zones for deep-seated landslides in glacial deposits are consistently and correctly identified, and subsequently protected.

8. The FWS should continue to participate in the development, design, and approval of CMER research. Habitat manipulations and handling of fish and amphibians may be conducted for research purposes and are expected to occur along a very small percentage of streams and have minor impacts at a watershed scale. Localized impacts to listed species (e.g., bull trout spawning and rearing areas) would be further limited due to screening and coordination with the FWS in the site selection process for studies.

9. The FWS should coordinate with WDNR, WDFW, forest landowners, and other TFW/FFR stakeholders to develop local strategies for significant instream work in areas of depressed populations of bull trout. These strategies should ascertain whether multiple repair projects (especially within the same timeframe) could have deleterious effects to depressed local populations, and if so, should address timing and minimization measures.

10. The FWS should continue to work with WDNR, WDFW, forest landowners, and other TFW/FFR stakeholders to inventory and map the presence of brook trout in Washington especially those populations in close proximity to bull trout local populations. Where brook trout are found below passage barriers, and native species such as bull trout are located above such barriers, strategies should be developed to protect native species. Options may include retaining passage barriers, installing precluding devices, or initiating control of brook trout.

11. The FWS should provide technical assistance to WDFW through WDNR on hydraulic project approval (HPA) activities to minimize adverse effects on 18 local populations of bull trout when conducting culvert and bridge repair, maintenance, and installation activities or other instream work.

12. The FWS should participate in CMER to ensure that studies on riparian buffers and roads are prioritized and completed within 10 years to demonstrate the effectiveness of the conservation strategies in the FPHCP to minimize adverse effects on covered species from sediment inputs, loss of wood recruitment, and stream temperature changes.

13. The FWS should participate in the FPHCP compliance monitoring program to prioritize monitoring activities related to riparian buffers and road management.

14. The FWS should prepare a report summarizing the implementation of all conservation recommendations within five years of permit issuance. This report should be made available to affected State and Federal agencies, the Tribes, other TFW/FFR stakeholders, and interested members of the public. This report should also be kept in the implementation file for the FPHCP.

10. REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the actions outlined in this Opinion. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect covered species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the covered species or critical habitat that was not considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

The factors enumerated above could include approved deviations from the proposed FPHCP that result from implementation of the adaptive management program under the FPHCP. Adaptive management changes to benefit covered species may have adverse effects to other covered species (or listed species which are not covered by the FPHCP). Should such adjustments occur to the extent that covered or listed species, or critical habitat, are adversely affected in a manner or to an extent not considered in this Opinion, consultation would be reinitiated.