

APPENDIX B

Supporting Materials for Bull Trout Geographic Risk Analysis

B.1 BULL TROUT EXPOSURE RISK ANALYSIS

Lower Columbia (Klickitat core area), Umatilla/Walla-Walla, Grande Ronde, Snake River, Northeast Washington, Clark Fork, Clearwater, Coeur d'Alene, Upper Columbia, and Middle Columbia Management Units

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Overview

We looked at the percent of bull trout spawning and rearing habitat streams on FPHCP lands in the core areas and developed our first population list to conduct the exposure analysis. Populations that did not have any FPHCP covered lands were not initially included on the list for the exposure analysis. Next we looked at the percent of FPHCP in Spawning and Rearing habitat and developed our next population list. If there were special cases outside of the 10% criteria then it was included for the exposure analysis. If there was >20% FMO it was included for the exposure analysis if it was not already included on the Spawning and Rearing list of populations.

We used GIS, other maps, proposed critical habitat information, and WDFW layers to look at the % exposure or the amount of FFR lands next to or adjacent to spawning, rearing, and FMO habitat.

Methods for Exposure Risk

(Also see "Analysis of Risk to Bull Trout Populations from FPHCP Effects" for detailed writeup about the analysis)

- Estimated by the quantity and location of FPHCP lands
- Risk to local populations (emphasis on spawning and juvenile rearing habitat)
- Modify risk if FMO impacts appear substantial (i.e., >20%)
- Summary of exposure ranking for local populations:
- Low – <10% overlap; typically removed from analysis of baseline habitat and baseline population risk factors (except for some special cases).
- Med – substantial amounts of rearing or small amount of spawning
- High – significant amount of spawning

LOWER COLUMBIA MANAGEMENT UNIT

Klickitat Core Area

The Klickitat core area consists of a single local population, the West Fork Klickitat. It is located entirely on the Yakama Indian Nation, and no known spawning and rearing habitats occur within or adjacent to FPHCP lands.

West Fork Klickitat River Local Population

The West Fork Klickitat River local population is comprised of the West Fork Klickitat, Fish Lake Stream, and Trappers and Little Muddy Creeks. There are no known spawning and rearing habitats on or adjacent to with FPHCP lands, so the exposure risk is low.

Foraging, Migratory, and Overwintering Habitats

About 31 percent of the FMO habitat in the Klickitat Core Area is downstream of the West Fork Klickitat local population and is located on or adjacent to FPHCP lands. This relatively high degree of overlap suggests an elevated risk of exposure for the West Fork Klickitat local population. The exposure risk to the Klickitat FMO habitats is moderate.

UMATILLA/WALLA-WALLA MANAGEMENT UNIT

Walla-Walla Core Area

The Walla-Walla core area is comprised of four local populations; three in the Touchet River and one in Mill Creek. Much of the upper portion of this core area is located within the Umatilla National Forest. About 38 percent of the known spawning and rearing habitats in the core area are located within or adjacent to FPHCP lands.

Mill Creek Local Population

Spawning and rearing in the Mill Creek local population may be restricted to the upper third of the watershed. Although most of this area is managed by the Umatilla National Forest, about 10 percent of known spawning and rearing habitat is located on FPHCP lands. In addition, another 30 percent of known spawning and rearing habitat is located immediately downstream of these FPHCP lands. The substantial amount of spawning and rearing habitat in or within close proximity to FPHCP lands suggests a high exposure risk for this local population.

North Fork Touchet River Local Population

Known spawning and rearing habitat in this local population is primarily in the North Fork, but is also located in Lewis and Spangler Creeks. About 20 of spawning and rearing habitat are located on FPHCP lands, with the remainder upstream on the Umatilla National Forest. This suggests an overall high exposure risk for the North Fork local population.

South Fork Touchet River Local Population

Nearly all known spawning and rearing in the South Fork Touchet River local population is within or adjacent to FPHCP lands. Although the upper portions of the watershed are located on the Umatilla National Forest, the overall exposure risk for the South Fork Touchet River local population is high.

Wolf Fork Touchet River Local Population

About 60 percent of all known spawning and rearing occurs in the Wolf Fork Touchet River on FPHCP lands. The remaining spawning and rearing is located in the uppermost portions of the Wolf Fork on the Umatilla National Forest. The overall exposure risk for the Wolf Fork Touchet River local population is high.

Foraging, Migratory, and Overwintering Habitats

At the core area scale, about 28 percent of the known FMO habitat in the Walla-Walla are within or adjacent to FPHCP lands. Some areas, such as the South Fork Touchet, have substantial overlap with FMO habitat and elevate the overall exposure risk to that local population. This degree of overlap suggests a relatively moderate exposure risk for FMO habitat.

GRANDE RONDE MANAGEMENT UNIT

Grande Ronde River Core Area

The Grande Ronde core area is comprised of three local populations, spanning both Oregon and Washington. These local populations are all tributaries of the Wenaha River, which is located in Oregon, but drain into the Grande Ronde River which occurs in both states. Most of the area occupied by these local populations is on the Umatilla National Forest. Less than 1 percent of the known spawning and rearing habitats in the core area are located within or adjacent to FPHCP lands.

Butte Creek Local Population

The distribution and frequency of spawning and rearing in the Butte Creek local population is unknown, but is suspected in the mainstem and West Fork Butte Creek. About 10 percent of the lower portion of this watershed is in Oregon, but the entire local population is located on the Umatilla National Forest. The lack of FPHCP lands in or adjacent to spawning or rearing habitats suggests a low exposure risk.

Crooked Creek Local Population

The distribution and frequency of spawning and rearing in the Crooked Creek local population is unknown, but is suspected in the mainstem and First Creek. Less than 1 percent of the total area of the local population is comprised of FPHCP lands. These lands are adjacent to the mainstem Crooked Creek near the Oregon/Washington border. The remainder of the local population is within the Umatilla National Forest. The very low amount of FPHCP lands within this local population suggests a low exposure risk.

North Fork Wenaha Local Population

The distribution of spawning and rearing in the North Fork is unknown, but is suspected in the mainstem. The lower half of this watershed is in Oregon, and the upper half is located in Washington. The entire Washington portion of the North Fork is located on the Umatilla National Forest. The lack of FPHCP lands in the Washington portion of this local population suggests a low exposure risk.

Foraging, Migratory, and Overwintering Habitats

Within the Washington portion of the Grande Ronde, less than 1 percent of the FMO habitat is located on FPHCP lands. Almost all of this is located in the mainstem Grande Ronde River, between the confluences of the Wenaha and Snake Rivers. The low degree of overlap suggests a low exposure risk for FMO habitat.

SNAKE RIVER BASIN IN WASHINGTON MANAGEMENT UNIT

Asotin River Core Area

The Asotin River Core Area consists of two local populations and one potential local population. Potential local populations are areas that may be occupied by bull trout, but the distribution and occurrence of spawning and rearing is unknown. The upper portion of this core area is located on the Umatilla National Forest. About 2 percent of the suitable spawning and rearing habitats in the core area are located within or adjacent to FPHCP lands.

Charley Creek Local Population

The distribution of spawning and rearing in the Charley Creek local population is unknown, but is suspected in the mainstem and First Creek. The entire Washington portion of the North Fork is located on the Umatilla National Forest. The lack of FPHCP lands within this local population suggests a low exposure risk.

North Fork Asotin River Local Population

Spawning and rearing in the North Fork are known to occur in the upper mainstem and Cougar Creeks on the Umatilla National Forest. FPHCP lands comprise less than 10 percent of this watershed, primarily in the mainstem North Fork, South Fork of the North Fork Asotin, and Lick Creek. The low proportion of FPHCP lands within this local population and lack of overlap with known spawning and rearing habitats suggests a low exposure risk.

Wormell Gulch Potential Local Population

The distribution and occurrence of spawning and rearing is unknown in the Wormell Gulch potential local population, but this area has been identified as important for the species conservation. About 50 percent of this potential local population overlaps with FPHCP lands. Uncertainty in the distribution and occurrence of spawning and rearing, and the high degree of overlap with FPHCP lands, suggests a moderate exposure risk.

Foraging, Migratory, and Overwintering Habitats

No FMO habitats were identified on or adjacent to FPHCP lands in the Asotin Core area. This suggests a low exposure risk.

Tucannon River Core Area

The Tucannon River core area is comprised of four local populations and two potential local populations. Most of the area above the confluence of Cummings Creek is located on the Umatilla National Forest. About 3 percent of the known spawning and rearing habitats in the core area are located within or adjacent to FPHCP lands.

Cummings Creek Local Population

The distribution of spawning and rearing in the Charley Creek local population is unknown, but is suspected in the mainstem. The degree of overlap with FPHCP lands in the Cummings local population is less than 10 percent. Uncertainty in the distribution and occurrence of spawning and rearing, and the low degree of overlap with FPHCP lands, suggests a low exposure risk.

Hixon Creek Potential Local Population

The distribution and occurrence of spawning and rearing is unknown in the Hixon Creek potential local population, but this area has been identified as important for the species conservation. The entire potential local population is located on the Umatilla National Forest. Uncertainty in the distribution and occurrence of spawning and rearing, and the lack of overlap with FPHCP lands, suggests a low exposure risk.

Little Tucannon River Potential Local Population

The distribution and occurrence of spawning and rearing is unknown in the Little Tucannon potential local population, but this area has been identified as important for the species conservation. A lack of FPHCP lands within or immediately adjacent to the Little Tucannon, and uncertainty in the distribution and occurrence of spawning and rearing, suggests a low exposure risk.

Meadow Creek Local Population

Spawning and rearing are known to occur in the mainstem Meadow Creek on the Umatilla National Forest, but no FCHCP lands are within or adjacent to these areas. The lack of FPHCP lands in or adjacent to spawning and rearing habitats suggests a low exposure risk.

Panjab Creek Local Population

This local population is comprised of Panjab, Little Turkey, and Turkey Creeks. Spawning and rearing are known to all three of these creeks, located on the Umatilla National Forest. However, a lack of FPHCP lands in or adjacent to these areas suggests a low exposure risk.

Tucannon River Local Population

Spawning and rearing are known to occur in the mainstem Tucannon, and Cold, Sheep, and Bear Creeks. Less than 10 percent of spawning and rearing habitat is within or adjacent to FPHCP lands, with the remainder of area within the Umatilla National Forest. This minor degree of overlap with spawning and rearing habitats suggests a moderate exposure risk.

Foraging, Migratory, and Overwintering Habitats

Less than 1 percent of FMO habitat in the Tucannon River core area is within or adjacent to FPHCP lands, most of which is located just downstream of the Cummings Creek local population. This minor degree of overlap suggests a low exposure risk.

NORTHEAST WASHINGTON MANAGEMENT UNIT

Pend Oreille Core Area

The Pend Oreille core area is comprised of one local population and ten potential local populations. Much of the upper portion of this core area are located within Colville and Idaho Panhandle National Forests. About 27 percent of the known spawning and rearing habitats in the core area are located within or adjacent to FPHCP lands.

Cedar Creek Potential Local Population

The distribution and occurrence of spawning and rearing is unknown in the Cedar Creek potential local population, but this area has been identified as important for the species conservation. About 30 percent of the suitable spawning and rearing habitat in this potential local population are within or adjacent to FPHCP lands. This suggests a moderate exposure risk.

Harvey Creek Potential Local Population

The distribution and occurrence of spawning and rearing is unknown in the Harvey Creek potential local population, but this area has been identified as important for the species conservation. About 20 percent of the suitable spawning and rearing habitat in this potential local population are within or adjacent to FPHCP lands. This suggests a moderate exposure risk.

Indian Creek Potential Local Populations

The distribution and occurrence of spawning and rearing is unknown in the Indian Creek potential local population, but this area has been identified as important for the species conservation. This area is considered capable of supporting two potential local populations. About 60 percent of the suitable spawning and rearing habitat in this area are within or adjacent to FPHCP lands. This suggests a high exposure risk.

Le Clerc Creek Local Population

The distribution and frequency of spawning is unknown in this local population, although rearing is known to the East and West Branches of Le Clerc Creek. About 40 percent of rearing overlaps or is adjacent to FPHCP lands. The remaining area within the local population is on the Colville National

Forest. Due to the uncertainty in the location used for spawning and the high degree of overlap with known rearing, the sole local population in the Pend Oreille is considered to have a high exposure risk.

Mill Creek Potential Local Population

The distribution and occurrence of spawning and rearing is unknown in the Mill Creek potential local population, but this area has been identified as important for the species conservation. About 10 percent of the suitable spawning and rearing habitat in this potential local population are within or adjacent to FPHCP lands. This suggests a low exposure risk.

Ruby Creek Potential Local Population

The distribution and occurrence of spawning and rearing is unknown in the Ruby Creek potential local population, but this area has been identified as important for the species conservation. This area is considered capable of supporting two potential local populations. About 10 percent of the suitable spawning and rearing habitat in this potential local population are within or adjacent to FPHCP lands. This suggests a low exposure risk.

South Fork Tacoma Creek Potential Local Population

The distribution and occurrence of spawning and rearing is unknown in the South Fork Tacoma Creek potential local population, but this area has been identified as important for the species conservation. About 30 percent of the suitable spawning and rearing habitat in this potential local population are within or adjacent to FPHCP lands. This suggests a moderate exposure risk.

Slate Creek Potential Local Population

The distribution and occurrence of spawning and rearing is unknown in the Slate Creek potential local population, but this area has been identified as important for the species conservation. About 5 percent of the suitable spawning and rearing habitat in this potential local population are within or adjacent to FPHCP lands. This suggests a low exposure risk.

Small Creek Potential Local Population

The distribution and occurrence of spawning and rearing is unknown in the Small Creek potential local population, but this area has been identified as important for the species conservation. About 30 percent of the suitable spawning and rearing habitat in this potential local population are within or adjacent to FPHCP lands. This suggests a moderate exposure risk.

Sullivan Creek Potential Local Population

The distribution and occurrence of spawning and rearing is unknown in the Sullivan Creek potential local population, but this area has been identified as important for the species conservation. About 10 percent of the suitable spawning and rearing habitat in this potential local population are within or adjacent to FPHCP lands. This suggests a low exposure risk.

Tacoma Creek Potential Local Population

The distribution and occurrence of spawning and rearing is unknown in the Tacoma Creek potential local population, but this area has been identified as important for the species conservation. About 20 percent of the suitable spawning and rearing habitat in this potential local population are within or adjacent to FPHCP lands. This suggests a low exposure risk.

Foraging, Migratory, and Overwintering Habitats

About 9 percent of the FMO habitat in the Pend Oreille core area is within or adjacent to FPHCP lands. Most of this is located along the mainstem Pend Oreille River and lower portions of tributaries. This suggests a low exposure risk.

CLARK FORK MANAGEMENT UNIT

Priest Lake Core Area

The Washington portion of the Priest Lake core area is located primarily in the Idaho Panhandle National Forests. Only about 3 percent of the known spawning and rearing habitats in this core area are located in or adjacent to FPHCP lands. About half of the core area is located in Idaho.

Gold Creek Local Population

The distribution and frequency of spawning and rearing in the Gold Creek local population is unknown. The upper half of Gold Creek is in Washington, the lower half in Idaho, and eventually drains into the Hughes Fork and Upper Priest Lake. No FPHCP lands are within or adjacent to the Washington portion of this local population. This suggests a low exposure risk.

Granite Creek Local Population

Spawning and rearing are known to the North and South Forks of Granite Creek, almost all of which is in Washington; approximately 5 percent of known spawning and rearing is located in Idaho. Although only about 5 percent of the local population area is adjacent to or within FPHCP lands, its proximity to known spawning is significant. The juxtaposition and number of intermittent and perennial streams suggests that sediment from adjacent FPHCP lands could be mobilized and deposited downstream into the spawning area. This suggests a moderate exposure risk.

Kalispell Creek Local Population

The distribution and frequency of spawning and rearing in the Kalispell Creek local population is unknown. Less than 5 percent of the suitable spawning and rearing habitats in the local population are adjacent to FPHCP lands. The upper half of Kalispell Creek is in Washington, and it drains into the Upper Priest Lake in Idaho. This suggests a low exposure risk.

Foraging, Migratory, and Overwintering Habitats

Due in part to the high degree of overlap with the Idaho Panhandle National Forests, no FMO habitat is located on FPHCP lands. This suggests a low exposure risk.

CLEARWATER AND COEUR D'ALENE LAKE MANAGEMENT UNITS

Although these management units extend into the state of Washington, most of these areas are centered in Idaho. The distribution of spawning, rearing, and FMO habitats are unknown. In addition, the degree of overlap with Washington is very small, probably less than 1 percent. While the Clearwater Management Unit does not appear to be within or adjacent to FPHCP lands, most of the Coeur d'Alene Management Unit overlaps with FPHCP lands. However, the distribution and occurrence of spawning, rearing, and FMO habitat is unknown. Despite this uncertainty, the low degree of overlap with FPHCP lands suggests a low exposure risk.

MIDDLE COLUMBIA RIVER MANAGEMENT UNIT

Yakima Core Area

Ahtanum Creek local population

The Ahtanum Creek local population includes Ahtanum Creek and its accessible tributaries. Spawning occurs within the N. Fork, Middle Fork and S. Fork Ahtanum Creek. Spawning is also found within Shellneck Creek in the N. Fork. Rearing occurs at least downstream to the confluence of the North and South Forks. FP HCP covered lands completely overlap spawning and rearing habitat. Ahtanum Creek is at High Risk for exposure due to significant overlap of covered lands with spawning and rearing habitat.

The Ahtanum Creek local population uses FMO in Ahtanum Creek mainstem and likely the Columbia River. However there has been a migration barrier until recently blocking the use of the Yakima River and potentially the Columbia by this local population and it is unknown if these fish may use the Columbia. Most of the FMO lands could be considered non-forested in lower Ahtanum Creek. Covered lands are adjacent to minor amounts <10% of FMO in Ahtanum Creek. The lower Yakima River may also provide for the FMO but it is unknown how much. There is 70% of the FMO habitat for the Upper Yakima (upstream of Ahtanum Creek) adjacent to covered lands. There is about 80% of the FMO habitat for the Lower Yakima (downstream of Ahtanum Creek) adjacent to covered lands. Ahtanum Creek is at High exposure due to significant overlap of covered lands with FMO habitat.

American River local population

The American River local population includes the American River and its accessible tributaries. Spawning occurs in Union and Kettle Creeks and in the mainstem American River mainstem. Rearing occurs in the American River downstream to the confluence of the American and Bumping Rivers. FP HCP covered lands are adjacent to 10% of the upper spawning area in the American River, however they are a minor amount but located near tributaries that drain directly into the spawning habitat. The American River is at Moderate Risk for exposure due to overlap of covered lands with minor amounts of spawning and rearing habitat.

FMO habitat exists downstream in the Bumping River and along the Naches River and potentially in the Yakima River mainstem (identified with the WDFW Yakima River Telemetry studies). There is no overlap of covered lands with Bumping River FMO, and 70% of Naches River FMO is adjacent to covered lands. The lower Yakima River may also provide for the FMO but it is unknown how much. There is 70% of the FMO habitat for the Upper Yakima (upstream of Ahtanum Creek) adjacent to covered lands. There is about 80% of the FMO habitat for the Lower Yakima (downstream of Ahtanum Creek) adjacent to covered lands. The American River is at High exposure due to significant overlap of covered lands with FMO.

Box Canyon local population

The Box Canyon Creek includes Box Canyon Creek and its accessible tributaries. Spawning occurs within Box Canyon Creek, tributary to Kachess Lake. There are no FP HCP covered lands adjacent to spawning or rearing habitat. Box Canyon Creek is at no risk for exposure from overlap of covered lands with spawning and rearing habitat.

FMO habitat exists in Kachess Lake and there are covered lands along or adjacent to 90% most of the shoreline of this reservoir. There is a dam and the end of the lake that prevents fish passage. Box Canyon Creek local population is at high risk for exposure from overlap of covered lands with FMO habitat,

however lake habitat is affected differently than stream habitat so this is more likely a Moderate risk for exposure for FMO habitat.

Bumping River local population

The Bumping River local population, tributary to Bumping Lake, includes the Bumping River and its accessible tributaries. Spawning occurs in Deep Creek. But more recently a redd, adults, and juveniles have been located in the upper Bumping R mainstem above the lake indicating spawning and rearing. Deep Creek is discussed separately below. The extent of spawning in the lower Bumping is unknown. There is rearing habitat in the lower Bumping River. FP HCP covered lands occur adjacent to approximately 10% of rearing habitat. The Bumping River is considered at Low Risk of exposure due to the overlap of covered lands with rearing habitat.

FMO habitat exists in Bumping Lake and is 90% surrounded by covered lands along the shoreline. As well, the lower Bumping River is FMO for the American River fish (identified by WDFW using telemetry) and likely others. There is approximately 10% of the FMO in the lower Bumping adjacent to covered lands. The Bumping River local population is at High risk for exposure from overlap of covered lands with FMO habitat, however lake habitat is affected differently than stream habitat so this is more likely a Moderate risk for exposure for FMO habitat.

Cle Elum River local population (includes Waptus River local population)

The Cle Elum River local population, tributary to Cle Elum Lake, has a large area that includes many associated tributaries that qualifies as spawning and rearing habitat. Spawning has not been identified but juveniles have been located upstream of Cle Elum Lake. This local population encompasses Waptus River and Cooper River systems and lakes. Waptus is thought to be possibly its own local population but it will be analyzed together with the Cle Elum local population for this project. FP HCP covered lands are adjacent to some spawning and significant amounts of rearing areas in the Cle Elum River corridor and minimal to none in the Waptus and Cooper systems. The Cle Elum River local population is at Moderate Risk of exposure due to adjacent covered lands overlapping with spawning and rearing habitat.

FMO habitat exists in Cle Elum Lake. There is a fish passage barrier at the dam on the reservoir. There is approximately 90% of FMO adjacent to covered lands. These lands are located along the shoreline of the reservoir and on adjacent slopes next to the lake. The Cle Elum local population is at high risk for exposure from overlap of covered lands with FMO habitat, however lake habitat is affected differently than stream habitat so this is more likely a Moderate risk for exposure for FMO.

Crow Creek local population

The Crow Creek local population includes Crow Creek and its accessible tributaries. Spawning occurs within the mainstem Crow Creek in the Naches River system. FP HCP covered lands are not adjacent to any spawning or rearing habitat in Crow Creek. There is no risk of exposure for spawning and rearing habitat from covered lands.

There is no FMO habitat in Crow Creek. But this local population uses the mainstem Naches River for FMO and potentially the mainstem Yakima River. Approximately 70% of the Naches River is adjacent to covered lands. The lower Yakima River may also provide for the FMO but it is unknown how much. There is 70% of the FMO habitat for the Upper Yakima (upstream of Ahtanum Creek) adjacent to covered lands. There is about 80% of the FMO habitat for the Lower Yakima (downstream of Ahtanum Creek) adjacent to covered lands. The Crow Creek local population is at High exposure of covered lands with FMO habitat.

Deep Creek local population

The Deep Creek local population includes the Deep Creek and its accessible tributaries. Spawning occurs in the Deep Creek mainstem a tributary to the upper Bumping River, above Bumping Lake. FP HCP covered lands are not adjacent to spawning and rearing habitat. The Deep Creek local population spawning and rearing habitat is not at risk of exposure from activities on covered lands.

FMO habitat exists in Bumping Lake and is 90% surrounded by covered lands along the shoreline. The Deep Creek local population is at high risk of exposure due to overlap of covered lands with its FMO habitat, however lake habitat is affected differently than stream habitat so this is more likely a Moderate risk for exposure for FMO.

Gold Creek local population

The Gold Creek local population, tributary to Kecheelus Lake, includes Gold Creek and its accessible tributaries. Spawning occurs within the Gold Creek mainstem. FP HCP lands are adjacent to approximately 75% of the Spawning and rearing habitat. The Gold Creek local population is at High risk of exposure due to the significant amount of covered lands adjacent to spawning and rearing habitat.

The Gold Creek population uses Kecheelus Lake for FMO. There is a dam at the outlet of the Reservoir with out fish passage. There is 80 % of FMO where covered land overlap along the shoreline of the reservoir. The Gold Creek local population is at high exposure of covered lands with FMO habitat, however lake habitat is affected differently, so this more likely a Moderate risk for exposure for FMO.

Indian Creek local population

Indian Creek local population, tributary to Rimrock Lake, includes Indian Creek and its accessible tributaries. Spawning occurs in Indian Creek. FP HCP covered lands adjacent to spawning and rearing habitat are minimal and only occur near the mouth at Rimrock lake and near Clear Lake. The Indian Creek local population is at Low Risk for exposure from covered lands overlapping with spawning and rearing habitat.

FMO habitat exists in Rimrock Lake. There is a dam at the lower end of Rimrock Reservoir with a fish passage barrier. There is about 75% of the FMO habitat adjacent to covered lands along the shoreline of the reservoir. The Indian Creek local population is at High risk of exposure due to covered lands overlapping with FMO habitat.

Kachess River local population

The Kachess River local population, tributary to Kachess Lake, includes the Kachess River and its accessible tributaries. Spawning occurs in Mineral Creek and the Kachess River mainstem. FP HCP covered lands are not located adjacent to spawning habitat and only a minor amount of rearing habitat near the mouth at the Lake. There is a Low risk of exposure due to covered lands overlapping with spawning and rearing habitat.

FMO habitat exists in Kachess Lake and there are covered lands along or adjacent to 90% of the shoreline of this reservoir. There is a dam and the end of the lake that prevents fish passage. The Kachess River local population is at a high risk of exposure due to covered lands overlapping with FMO habitat, however lake habitat is affected differently than stream habitat and this is likely a Moderate risk of exposure for FMO habitat.

NF Teanaway local population

The Teanaway local population includes the Teanaway and its associated tributaries. Spawning and rearing habitat is located in Deroux Creek, the mainstem N. Fork Teanaway, and in Jungle and Jack Creeks. Only two redds have been found recently, in 2005. FP HCP covered lands overlap with significant portions of spawning and rearing habitat in the lower to middle reaches of the N.Fork Teanaway River. The N.Fork Teanaway is at a High risk of exposure due to covered lands overlapping with spawning and rearing habitat.

FMO habitat for the Teanaway exists in the Teanaway mainstem, West Fork Teanaway, Middle Fork Teanaway, and Upper Yakima mainstem. The lower Yakima River may also provide for the FMO but it is unknown how much. There is an 80% overlap with the Teanaway FMO. There is 70% of the FMO habitat for the Upper Yakima (upstream of Ahtanum Creek) adjacent to covered lands. There is about 80% of the FMO habitat for the Lower Yakima (downstream of Ahtanum Creek) adjacent to covered lands. The N.Fork Teanaway is at High risk of exposure due to covered lands overlapping with FMO habitat.

North Fork Tieton River local population

The North Fork Tieton River local population, tributary to Rimrock Lake, includes the N. Fork Tieton River and its accessible tributaries. Spawning and rearing in the mainstem N. Fork Tieton. FP HCP covered lands overlap with minor amounts of rearing habitat. They likely do not overlap with spawning habitat. The North Fork Tieton River local population is at Low risk of exposure due to covered lands overlapping with spawning and rearing habitat.

FMO habitat is downstream in Clear Lake and Rimrock Lake. There is a dam at the lower end of Rimrock Reservoir with a fish passage barrier. There is fish passage between Clear Lake and lower N. Fork Tieton River. There is about 75% of the FMO habitat adjacent to covered lands along the shoreline of the reservoir. The N.Fork Tieton River local population is at a high risk of exposure due to covered lands overlapping with FMO habitat, however lake habitat is affected differently than stream habitat and this is likely a Moderate risk of exposure for FMO habitat.

Rattlesnake Creek local population

The Rattlesnake local population, tributary to the Naches River, includes the Rattlesnake Creek and its accessible tributaries. Spawning includes Rattlesnake Creek mainstem, Wildcat Creek, and the North Fork Rattlesnake Creek mainstem. FP HCP covered lands are adjacent to 30% of the rearing habitat. They do not overlap with known spawning areas. The Rattlesnake local population is at Moderate Risk for exposure due to the overlap of covered lands with rearing habitat.

There is no FMO in Rattlesnake Creek Watershed. FMO for the Rattlesnake local population is in the Naches River and potentially downstream in the Yakima River (identified with the WDFW Yakima River Telemetry studies). But this local population uses the mainstem Naches River for FMO and potentially the mainstem Yakima River. Approximately 70 % of the Naches River is adjacent to covered lands. The lower Yakima River may also provide for the FMO but it is unknown how much. There is 70% of the FMO habitat for the Upper Yakima (upstream of Ahtanum Creek) adjacent to covered lands. There is about 80% of the FMO habitat for the Lower Yakima (downstream of Ahtanum Creek) adjacent to covered lands. Rattlesnake Creek is at High risk of exposure due to significant overlap of covered lands with FMO habitat.

South Fork Tieton local population

The South Fork Tieton local population, tributary to Rimrock Lake, includes the S. Fork Tieton River and its accessible tributaries. Spawning includes areas within Bear, Corral, Grey, and Spruce Creeks and the mainstem S. Fork Tieton R. FP HCP lands exist adjacent to ~30% of the spawning habitat along the mainstem S.Fork Tieton upper reach. The S. Fork local population is at High Risk of exposure due to overlap of covered lands with spawning habitat.

FMO for this local population exists downstream in Rimrock Lake. There is a dam at the lower end of Rimrock Reservoir with a fish passage barrier. There is about 75% of the FMO habitat adjacent to covered lands along the shoreline of the reservoir. The S.Fork Tieton River local population is at a high risk of exposure due to covered lands overlapping with FMO habitat, however Lake habitat is affected differently than stream habitat and this is likely a Moderate risk of exposure for FMO habitat.

Taneum Creek potential local population

The Taneum Creek potential local population includes Taneum Creek and its accessible tributaries. This local population is necessary for recovery in the Yakima Core area. Spawning and rearing habitat conditions exist in the upper reaches, particularly in the North and South Forks. Bull trout have not been located here and spawning areas are not determined at this time. FP HCP lands are adjacent to 10% of the rearing habitat. The Taneum Creek potential local population is at Moderate risk for exposure due to overlap of covered lands on this habitat.

FMO habitat for the Taneum Creek potential local population exists in Taneum Creek and the Upper Yakima mainstem. The lower Yakima River may also provide for the FMO but it is unknown how much. There is a 40% overlap of covered lands with Taneum Creek FMO. There is 70% of the FMO habitat for the Upper Yakima (upstream of Ahtanum Creek) adjacent to covered lands. There is about 80% of the FMO habitat for the Lower Yakima (downstream of Ahtanum Creek) adjacent to covered lands. Taneum Creek is at High exposure due to significant overlap of covered lands with FMO habitat.

Upper Yakima River local population

The Upper Yakima River local population includes the Upper Yakima River and its accessible tributaries. Spawning includes spawning and rearing in the mainstem Yakima River between Kecheelus Dam and the Easton Dam. FP HCP covered lands are adjacent to 50% of the spawning area in the upper Yakima local population. The upper Yakima is at High Risk of exposure due to the overlap of covered lands with spawning and rearing habitat.

FMO habitat for the upper Yakima local population exists in the Upper Yakima mainstem. Likely the lower portions of Cle Elum and Kachess, and the Teanaway River are also FMO habitat. The lower Yakima River may also provide for the FMO but it is unknown how much. There is an 80% overlap of covered lands with Teanaway R. FMO. There is 70% of the FMO habitat for the Upper Yakima (upstream of Ahtanum Creek) adjacent to covered lands. There is about 80% of the FMO habitat for the Lower Yakima (downstream of Ahtanum Creek) adjacent to covered lands. The upper Yakima is at High risk of exposure due to significant overlap of covered lands with FMO habitat.

Overview of FMO exposure

Naches River FMO-90%

Rimrock Lake FMO-75%

Bumping Lake FMO-90%

Lower Yakima River Mainstem FMO-70%

Upper Yakima River Mainstem FMO-80%
Teanaway FMO- 80%
Taneum Creek FMO-40%
Cle Elum Lake FMO
Kachess Lake FMO-90%
Kecheelus Lake FMO-80%

Wenatchee Core Area

Chiwaukum Creek local population

The Chiwaukum Creek local population includes Chiwaukum Creek and its accessible tributaries. Spawning and rearing occur in its mainstem. No other tributaries are known to have spawning. FP HCP lands overlap with spawning and rearing in the lower 1/3 of the habitat. This local population is at High risk of exposure for spawning and rearing due to this significant overlap of covered lands.

There is no FMO mapped in the Chiwaukum Creek watershed. The FMO for this local population is located downstream in the Wenatchee River and in the Columbia River and has been identified with radio telemetry. There is approximately 50% overlap of Wenatchee River FMO with covered lands. These fish could also use the Columbia River mainstem upstream as FMO of which includes approximately 10% of the Columbia River FMO overlaps with covered lands. The Chiwaukum Creek local population is at a High risk of exposure due to the overlap of covered lands with FMO habitat.

Chiwawa River local population

The Chiwawa River local population includes the Chiwawa River and its accessible tributaries. Spawning occurs in the mainstem, Chikamin Creek, Rock Creek, Phelps Creek, and small portions of Buck and Alpine Creeks. FP HCP covered lands overlap with approximately 60% of spawning habitat in Phelps Creek. There is an overlap of about 20% of spawning habitat in Chikamin Creek with the covered lands, however, it is located near the mouth. There are no covered lands adjacent to Rock Creek, Buck Creek, or Alpine Creek. There is an overlap of 15% of the rearing habitat in the Chiwawa River mainstem with the covered lands. The Chiwawa River local population is at High risk of exposure for spawning and rearing due to this significant overlap.

There is no FMO mapped in the Chiwawa local population watershed. The FMO for this local population is located downstream in Lake Wenatchee, the Wenatchee River, and in the Columbia River and has been defined with radio telemetry. There is approximately 30% overlap of Lake Wenatchee FMO with covered lands and approximately 50% overlap of Wenatchee River FMO with covered lands. These fish also use the Columbia River mainstem upstream at least as far as the mouth of the Methow River as FMO habitat of which approximately 10% of the Columbia River FMO overlaps with covered lands. The Chiwawa River local population is at High risk of exposure due to the overlap of covered lands with FMO habitat, particularly in the Wenatchee River.

Icicle Creek local population

The Icicle Creek local population includes the Icicle Creek and its tributaries both above and below the barrier at the Leavenworth National Fish Hatchery. Spawning and rearing habitat occur in the mainstem and associated tributaries. However, there have not been any redd surveys to locate actual spawning areas but habitat exists and different sizes classes of fish have been observed within the habitat. Population surveys have identified migratory sized adults upstream of a boulder cascade near Snow Creek and resident sized fish have been identified, close to spawning time, in Jack Creek, the Upper Icicle mainstem,

and in other time periods, in French Creek and in Leland Lake. There is some overlap (5%) with potential spawning areas in Icicle Creek mainstem near Jack Creek. There is a significant amount of overlap with rearing habitat in lower Icicle Creek. The Icicle Creek local population is at Moderate risk of exposure for rearing habitat due to significant overlap of covered lands.

There is no FMO habitat mapped in the local population watershed. However, there is some spawning and rearing habitat used as FMO by migratory fish (located below a fish passage barrier at the Leavenworth National Fish Hatchery down to the mouth of the Wenatchee River). There is 100% overlap in the lower Icicle with FMO habitat. The other FMO for this local population is located and upstream in the Wenatchee River and in the Columbia River and has been identified with radio telemetry. There is approximately a 50% overlap of Wenatchee River FMO with covered lands. These fish could also use the Columbia River mainstem upstream as FMO of which includes approximately 10% overlaps of covered lands with the Columbia River FMO. The Icicle Creek local population is at High risk of exposure due to the overlap of covered lands and FMO habitat.

Little Wenatchee River local population

The Little Wenatchee River local population includes the Little Wenatchee River and its accessible tributaries and the area above the Little Wenatchee Falls. Bull trout have been located in Rainy Creek above those falls. Spawning occurs in the mainstem of the Little Wenatchee River. FP HCP covered lands do not overlap with spawning habitat. They are adjacent to approximately 25% of the rearing habitat. The Little Wenatchee River local population is at Moderate risk of exposure because the proximity of rearing habitat is significant.

There is no FMO mapped in the local population watershed. The FMO for this local population is located downstream in Lake Wenatchee, the Little Wenatchee River, the upper Wenatchee River, and in the Chiwawa River and has been defined with radio telemetry. Rearing habitat identified in other tributaries also has been identified as FMO for the Little Wenatchee River local population. There is approximately 30% overlap of Lake Wenatchee FMO with covered lands, approximately 25% overlap with the Little Wenatchee River FMO, approximately 15% overlap with the Chiwawa River FMO, and approximately 50% overlap of the Upper Wenatchee River FMO with covered lands. The Little Wenatchee River local population is at High exposure due to the overlap of covered lands with FMO habitat, particularly in the Wenatchee River.

Nason Creek local population

The Nason Creek local population includes Nason Creek and its accessible tributaries. Spawning occurs in Nason Creek mainstem and Mill Creek areas. FP HCP covered lands overlap with significant portions of spawning and rearing habitat. They completely overlap with Mill Creek spawning and rearing habitat which is the main spawning habitat for the local population. There are significant amounts (65%) of covered lands adjacent to the spawning areas within Nason Creek. Portions of rearing habitat in Nason Creek are directly adjacent to these lands between Mill Creek and the mouth. This local population is at High Risk of exposure for Spawning and Rearing due to a significant amount of overlap of covered lands.

There is no FMO mapped in the local population watershed. The FMO for this local population is located downstream in Lake Wenatchee, the Wenatchee River, and in the Columbia River and has been defined with radio telemetry. There is approximately 30% overlap of Lake Wenatchee FMO with covered lands and approximately 50% overlap of Wenatchee River FMO with covered lands. These fish also use the Columbia River mainstem upstream at least as far as the mouth of the Methow River as FMO where covered lands overlap with approximately 10% of the Columbia River FMO habitat. The Nason Creek

local population is at High risk of exposure due to overlap of covered lands with FMO habitat, particularly the Wenatchee River FMO.

Peshastin Creek local population

The Peshastin Creek local population includes Peshastin Creek and its accessible tributaries. Spawning occurs in Ingall's Creek. Juveniles have been located in Peshastin Creek in smolt traps. The FP HCP covered lands overlap with 12% of the spawning and rearing habitat in Ingall's Creek. Most spawning likely occurs upstream of the lowest reach in Wilderness however, spawning can occur downstream of the Wilderness boundary. The lowest reach is also rearing habitat and covered lands overlap it 100%. The Peshastin Creek local population is a Moderate Risk of exposure due to significant overlap of covered lands with rearing habitat.

There is 100% overlap of FMO habitat with covered lands along the Peshastin Creek downstream of Ingall's Creek. The FMO for this local population is also located and upstream and downstream in the Wenatchee River, and in the Columbia River and has been identified with radio telemetry. There is approximately 50% overlap of Wenatchee River FMO with covered lands. These fish could also use the Columbia River mainstem as FMO habitat of which covered lands overlap 100 % of the FMO habitat. The Peshastin Creek local population is at High risk of exposure from the overlap of covered lands with FMO habitat.

White River local population

The White River local population includes the mainstem White River and its accessible tributaries. Spawning is known to occur in Panther Creek and the upper mainstem White River. It is suspected that Canyon Creek and the Nepeequa are other spawning areas. FP HCP covered lands overlap with approximately 15% of the upper White River spawning area and with almost all of the lower reach of the White River below the Napeequa River downstream to the mouth at Lake Wenatchee. There is no overlap with the Panther Creek spawning area. Approximately 60% of rearing habitat is adjacent to covered lands. There is a High Risk of Exposure for both Spawning and Rearing habitat particularly because of the significant amount of overlap with rearing and the lack of spawning area in this local population.

There is no FMO mapped in the local population watershed however, other local populations have been tracking into the lower reaches of the White River using it as FMO. The FMO for this local population is located downstream in Lake Wenatchee, the Little Wenatchee River, the upper Wenatchee River, and in the Chiwawa River and has been defined with radio telemetry. There is approximately a 30% overlap of Lake Wenatchee FMO with covered lands, approximately 25% overlap with the Little Wenatchee FMO, approximately 15% overlap with the Chiwaw River FMO, and approximately 50% overlap of the Upper Wenatchee River FMO with covered lands. The White River local population is at High exposure due to the overlap of covered lands with FMO habitat, particularly in the Wenatchee River.

Overview of FMO

Lake Wenatchee 30%

Wenatchee River FMO 50%

Columbia River FMO 10%

Entiat Core Area

Entiat River

The Entiat local population includes the Entiat River and its accessible tributaries. Spawning occurs in the mainstem Entiat River. FP HCP covered lands overlap with 90% of the spawning and rearing habitat in the mainstem Entiat River, particularly, upstream from the mouth of the Mad River. The Entiat local population is at High risk of exposure due to the overlap of covered lands with spawning and rearing habitat.

FMO for mainstem Entiat occurs in the mainstem Entiat River and the Columbia River and has been identified with radio telemetry. There is approximately a 75% overlap of covered lands with Entiat River FMO habitat and 10% overlap with Columbia River FMO habitat. The Entiat River local population is at High risk of exposure due to the overlap of covered lands with FMO habitat.

Mad River

The Mad River local population includes the Mad River and its accessible tributaries. Spawning occurs in the mainstem Mad River and migratory spawning habitat is currently reduced by a large log jam. FP HCP covered lands overlap with 20% of the spawning and rearing habitat in the mainstem Mad River. The Mad River local population is at High risk of exposure due to the overlap of covered lands with spawning and rearing habitat.

There is no FMO habitat mapped in the Mad River. FMO for mainstem Mad River occurs in the mainstem Entiat River and the Columbia River and has been identified with radio telemetry. There is approximately a 75% overlap of covered lands with the Entiat River FMO habitat and 10% overlap with Columbia River FMO habitat. The Mad River local population is at High risk of exposure due to the overlap of covered lands with FMO habitat.

Overview of FMO

Entiat R.- 75%

Columbia R – 10%

Methow Core Area

Beaver Creek local population

(Blue Buck Creek potential local population is now considered a local population)

The Beaver Creek local population includes the Beaver Creek and its accessible tributaries. Spawning occurs in the Blue Buck Creek. Recently fish barrier culverts have been removed and current spawning is unknown but large migratory adults have been located in the Beaver Creek mainstem. FP HCP covered lands do not overlap with mapped spawning and rearing habitat. Rearing is suspected to be down to the mouth as recently USGS has pit tagged a few juveniles in the lower reaches of Beaver Creek. Currently this area is mapped as FMO. The Beaver Creek local population is at Low risk of exposure due to overlap with rearing habitat.

FMO habitat is located in lower Beaver Creek and likely in the Methow River. It is possible that fish in Beaver Creek used the Columbia River. Radio tagged bull trout in the Columbia River from Wells Dam have been located upstream of Beaver Creek in Wolf Creek. There is approximately a 10% overlap of covered lands with the Beaver Creek FMO habitat, a 90% overlap of covered lands with the Upper Methow FMO (above Chewuch R), a 50% overlap with the Lower Methow FMO (below the Chewuch), a 90% overlap with Twisp River FMO, and 10% overlap with Columbia River FMO habitat. The Beaver Creek local population is at High risk of exposure due to the overlap of covered lands with FMO habitat.

Chewuch River local population (includes Lake Creek)

The Chewuch River local population includes the Chewuch River and its accessible tributaries. Lake Creek is thought that it may be its own local population due to the location of Black Lake in that drainage however, for this project we will cover it as part of the Chewuch local population. Spawning occurs in the mainstem Chewuch River and Lake Creek. FP HCP covered lands do not overlap with any of the spawning habitat and overlap with 15% rearing habitat (downstream of Eightmile Creek). The Chewuch River local population is at Low risk of exposure due to the overlap of covered lands with rearing habitat.

There is FMO habitat in the Chewuch River and in Black Lake. FMO for the Chewuch population likely occurs in the Methow and possibly the Columbia River. There is approximately a 50% overlap of covered lands with the Chewuch River mainstem FMO habitat. There is no overlap with Black Lake FMO habitat. There is approximately a 90% overlap of covered lands with the Upper Methow FMO (above Chewuch R), a 50% overlap with covered lands in the Lower Methow FMO (below the Chewuch), and 10% overlap with Columbia River FMO habitat. The Chewuch local population is at High risk of exposure due to the overlap of covered lands with FMO habitat, particularly in the Chewuch and upper Methow River.

Early Winters Creek local population

The Early Winters Creek local population includes Early Winters Creek, its accessible tributaries, and the area upstream of the falls located adjacent to Highway 20 thought to be a barrier to migratory fish. Spawning occurs in the mainstem Early Winters Creek, both upstream and downstream of the falls, and in Cedar and Huckleberry Creeks. FP HCP covered lands do not overlap with any of the spawning habitat but they do overlap with about 10% of the rearing habitat near the mouth. The Early Winters local population is at Moderate risk of exposure due to the overlap of covered lands with rearing habitat.

There is no FMO habitat mapped in Early Winters Creek. However, it is likely that the Lost River and upper Methow local populations use lower Early Winters as FMO habitat. FMO for the Early Winters population likely occurs in the Methow River and possibly the lower Chewuch and Columbia Rivers. There is approximately a 50% overlap of covered lands with the Chewuch River mainstem FMO habitat. There is approximately a 90% overlap of covered lands with the Upper Methow FMO (above Chewuch R), a 50% overlap with covered lands in the Lower Methow FMO (below the Chewuch), and 10% overlap with Columbia River FMO habitat. The Early Winters local population is at High risk of exposure due to the overlap of covered lands with FMO habitat, particularly in the upper Methow River.

Goat Creek local population

The Goat Creek local population includes Goat Creek, its accessible tributaries. Spawning occurs in the mainstem Goat Creek. FP HCP covered lands do not overlap with any of the spawning habitat but they do overlap with about 20% of the rearing habitat. The Goat Creek local population is at Moderate risk of exposure due to the overlap of covered lands with rearing habitat.

There is no FMO habitat in Goat Creek. FMO for the Goat Creek local population likely occurs in the Methow River and possibly the lower Chewuch and Columbia Rivers. There is approximately a 50% overlap of covered lands with the Chewuch River mainstem FMO habitat. There is approximately a 90% overlap of covered lands with the Upper Methow FMO (above Chewuch R), a 50% overlap with covered lands in the Lower Methow FMO (below the Chewuch), and 10% overlap with Columbia River FMO habitat. The Goat Creek local population is at High risk of exposure due to the overlap of covered lands with FMO habitat, particularly in the upper Methow River.

Gold Creek

The Goat Creek local population includes the Goat Creek and its accessible tributaries. Spawning occurs in Crater Creek. FP HCP covered lands do not overlap with mapped spawning habitat but overlap approximately 30% of the rearing habitat. Rearing is suspected to be down to the mouth as recently USGS has pit tagged a few juveniles in the lower reaches of Gold Creek. The Gold Creek local population is at a Moderate risk of exposure due to overlap with rearing habitat.

There is no FMO habitat mapped in Gold Creek. The Gold Creek local population likely uses FMO habitat in the Methow River and the Twisp River. It is possible that fish in Gold Creek use the Columbia River. Radio tagged bull trout in the Columbia River from Wells Dam have been located upstream of Beaver Creek in Wolf Creek, in the upper Methow, and in the Twisp River. There is approximately a 90% overlap of covered lands with the Upper Methow FMO (above Chewuch R), a 50% overlap with the Lower Methow FMO (below the Chewuch), a 90% overlap with Twisp River FMO, and 10% overlap with Columbia River FMO habitat. The Gold Creek local population is at High risk of exposure due to the overlap of covered lands with FMO habitat.

Lost River local population

The Lost River local population includes the Lost River and its accessible tributaries and all the area within the upper Lost watershed including the Hidden Lakes and Cougar Lake. It is thought that the upper Lost River could be its own local population upstream of a partial barrier in the canyon reach where water goes subsurface and due to the location of lakes within its headwaters. However, for this project we will cover it all as one local population. Spawning occurs in the mainstem Lost River below the canyon reach and upstream of the canyon reach and may occur in the reach of the Hidden Lakes and Ptarmigan Creek. FP HCP covered lands do not overlap with any of the spawning habitat in the upper reaches above the canyon reach and overlaps with 10% of both spawning and rearing habitat in the lower reach. The Lost River local population is at Moderate risk of exposure due to the overlap of covered lands with rearing habitat.

There is FMO habitat in the Lost River, in the upper reach, in the Hidden Lakes and Cougar Lake. FMO for the Lost River population likely occurs in the Methow and possibly the Columbia River. There is no overlap with upper reach FMO in Hidden and Cougar Lakes. There is approximately a 90% overlap of covered lands with the Upper Methow FMO (above Chewuch R), a 50% overlap with covered lands in the Lower Methow FMO (below the Chewuch), and 10% overlap with Columbia River FMO habitat. The Lost River local population is at High risk of exposure due to the overlap of covered lands with FMO habitat, particularly in the upper Methow River.

Twisp River local population

The Twisp River local population includes the Twisp River and its accessible tributaries. Spawning occurs in the Twisp River mainstem, and in North, Buttermilk, Reynolds, and War Creeks. FP HCP covered lands do not overlap with mapped spawning habitat but overlap with approximately 25% of the rearing habitat. The Gold Creek local population is at a Moderate risk of exposure due to overlap with rearing habitat.

There FMO habitat mapped in the Twisp River downstream of Little Bridge Creek. The Twisp River local population is known to also use FMO habitat in the Methow River the Columbia River. Radio tagged bull trout in the Columbia River from Wells Dam have been located upstream of Beaver Creek in Wolf Creek, in the upper Methow, and in the Twisp River. There is approximately a 90% overlap of covered lands with the Upper Methow FMO (above Chewuch R), a 50% overlap with the Lower Methow

FMO (below the Chewuch), a 90% overlap with Twisp River FMO, and 10% overlap with Columbia River FMO habitat. The Twisp River local population is at High risk of exposure due to the overlap of covered lands with Twisp River and Methow River FMO habitat.

Upper Methow River local population (Includes the West.Fork Methow River local population)

The upper Methow local population includes the upper Methow River, its accessible tributaries. Spawning occurs in the mainstem West Fork Methow, Robinson, Rattlesnake, and Trout Creeks. FP HCP covered lands do not overlap with any of the spawning and rearing habitat. The upper Methow River local population is at no risk of exposure due to the overlap of covered lands with spawning and rearing habitat.

There is FMO habitat mapped in the upper Methow. However, it is likely that the upper Methow local populations use the lower reaches of Early Winters and the Lost River spawning and rearing areas as FMO habitat. FMO habitat also occurs in the Methow River and possibly the lower Chewuch and Columbia Rivers. Radio telemetry of bull trout tagged in the Columbia River near Wells Dam has determined they use the upper Methow. There is approximately a 90% overlap of covered lands with the Upper Methow FMO (above Chewuch R), a 50% overlap with covered lands in the Lower Methow FMO (below the Chewuch), a 50% overlap of covered lands with the Chewuch River mainstem FMO habitat, and 10% overlap with Columbia River FMO habitat. The Upper Methow local population is at High risk of exposure due to the overlap of covered lands with FMO habitat, particularly in the upper Methow River.

Wolf Creek local population

The Wolf Creek local population includes Wolf Creek and its accessible tributaries. Spawning occurs in the mainstem Wolf Creek. Bull trout exist above a barrier falls in Wolf Creek. FP HCP covered lands do not overlap with any of the spawning habitat but they do overlap with about 30% of the rearing habitat. The Wolf Creek local population is at Moderate risk of exposure due to the overlap of covered lands with rearing habitat.

There is no FMO habitat mapped in Wolf Creek. FMO for the Wolf Creek local population occurs in the Methow River and possibly the lower Chewuch, Twisp, and Columbia Rivers. There is approximately a 90% overlap of covered lands with the Upper Methow FMO (above Chewuch R), a 50% overlap with covered lands in the Lower Methow FMO (below the Chewuch), a 50% overlap of covered lands with the Chewuch River mainstem FMO habitat, a 90% overlap of covered lands with the Twisp River FMO, and 10% overlap with Columbia River FMO habitat. The Wolf Creek local population is at High risk of exposure due to the overlap of covered lands with FMO habitat, particularly in the upper Methow River

Table B-1. Summary of exposure risk rankings for local populations and FMO habitats.

Core Area or Management Unit	Local Population or FMO	Exposure Risk
Klickitat*	West Fork Klickitat	**
	Klickitat FMO	M
Walla-Walla	Mill Creek	H
	North Fork Touchet	H
	South Fork Touchet	H
	Wolf Fork Touchet	H
	Walla-Walla FMO	M
	Butte Creek	**
Grande Ronde*	Crooked Creek	L
	North Fork Wenaha	**
	Grande Ronde FMO	L
Asotin*	Charley Creek	**
	North Fork Asotin	L
	Wormell Gulch PLP	M
	Asotin FMO	L
Tucannon*	Cummings	L
	Hixon Creek PLP	**
	Little Tucannon PLP	**
	Meadow Creek	**
	Panjab Creek	**
	Turkey Creek	**
	Little Turkey Creek	**
	Tucannon FMO	L
	Cedar Creek PLP	M
Pend Oreille	Harvey Creek PLP	M
	Indian Creek PLP	H
	Le Clerc Creek	H
	Mill Creek PLP	L
	Ruby Creek PLP	L
	South Fork Tacoma Creek PLP	M
	Slate Creek PLP	**
	Small Creek PLP	M
	Sullivan Creek PLP	L
	Tacoma Creek PLP	L
	Pend Oreille FMO	L
Priest Lake*	Gold Creek	L
	Granite Creek	M
	Kalispell Creek	L
	Clark Fork FMO	L
Clearwater MU*	n/a	**
Coeur d'Alene MU*	n/a	**
Yakima	Ahtanum Creek	H

Table B-1. Summary of exposure risk rankings for local populations and FMO habitats. (continued)

Core Area or Management Unit	Local Population or FMO	Exposure Risk
	American River	M
	Box Canyon	**
	Bumping River	L
	Cle Elum River (includes Waptus population)	M
	Crow Creek	**
	Deep Creek	**
	Gold Creek	H
	Indian Creek	**
	Kachess River	L
	Teanaway River (includes N. Fork Teanaway)	H
	N. Fork Tieton	L
	Rattlesnake Creek	M
	S. Fork Tieton	H
	Upper Yakima River	H
	Taneum Creek PLP (Potential local population)	M
	Yakima River Mainstem FMO	H
Wenatchee	Chiwaukum Creek	H
	Chiwawa River	H
	Icicle Creek	M
	Little Wenatchee River	M
	Nason Creek	H
	Peshastin Creek (includes Ingalls Creek)	M
	White River	H
	Wenatchee FMO	H
Entiat	Entiat River	H
	Mad River	H
	Entiat FMO	H
Methow*	Beaver Creek (true local pop)	L
	Chewuch River (includes Lake Creek population)	L
	Early Winters Creek	M
	Goat Creek	M
	Gold Creek	M
	Lost River	M
	Twisp River	M
	Upper Methow River (includes W.Fork Methow local pop)	L
	Wolf Creek	M
	Methow FMO	H

Notes: PLPs are potential local populations. An (*) indicates core areas with less than 10 percent spawning and rearing streams miles on FPHCP covered lands. An (**) indicates local populations (or Management Units with local populations) with no FPHCP lands according to the GIS spatial analysis, and therefore have no direct risk of exposure.

Table B-2. Summary of Moderate and High Exposure Risk Local Populations and FMO habitats.

Core Area	Local Population or FMO	Exposure Risk	
Klickitat	Klickitat FMO	M	
Walla-Walla	Mill Creek	H	
	North Fork Touchet	H	
	South Fork Touchet	H	
	Wolf Fork Touchet	H	
	Walla-Walla FMO	M	
	Pend Oreille	Le Clerc Creek	H
Priest Lake	Granite Creek	M	
Yakima	Ahtanum Creek	H	
	American River	M	
	Cle Elum River (includes Waptus population)	M	
	Deep Creek	M	
	Gold Creek	H	
	Teanaway River (includes N. Fork Teanaway)	H	
	Rattlesnake Creek	M	
	S. Fork Tieton	H	
	Upper Yakima River	H	
	Taneum Creek PLP (Potential local population)	M	
	Yakima River Mainstem FMO	H	
	Wenatchee	Chiwaukum Creek	H
		Chiwawa River	H
		Icicle Creek	M
Little Wenatchee River		M	
Nason Creek		H	
Peshastin Creek (includes Ingalls Creek)		M	
White River		H	
Wenatchee FMO		H	
Entiat	Entiat River	H	
	Mad River	H	
Methow	Entiat FMO	H	
	Early Winters Creek	M	
	Goat Creek	M	
	Gold Creek	M	
	Lost River	M	
	Twisp River	M	
	Wolf Creek	M	
Methow FMO	H		

Table B-3. Summary of Moderate and High Exposure Risk Potential Local Populations.

Core Area	Potential Local Population	Exposure Risk
Asotin	Wormell Gulch PLP	M
Pend Oreille	Cedar Creek PLP	M
	Harvey Creek PLP	M
	Indian Creek PLP	H
	South Fork Tacoma Creek PLP	M
	Small Creek PLP	M
Yakima	Taneum Creek PLP	M

Puget Sound, Olympic Peninsula, and Lower Columbia (Lewis core area) Management Units

Prepared by Jeff Chan and Tim Romanski, WWFVO, 03 Feb 06

*Note that local populations (and in some cases their core areas) with no direct exposure risk (based on Appendix A1 “Summary of Bull Trout Habitat on FPHCP Lands by Bull Trout Core Area or Recovery Planning Unit”) are not included in the following analysis.

PUGET SOUND MANAGEMENT UNIT

Nooksack Core Area

Middle North Fork Nooksack River local population

The Middle North Fork Nooksack River local population includes the mainstem Nooksack River and associated tributaries between Glacier Creek and Canyon Creek. FPHCP covered lands completely overlap the known bull trout spawning stream “Son of Gallop Creek” and spawning reaches in Gallop Creek. FPHCP covered lands encompass all of Hendrick Creek. Although no spawning has been observed in this creek, adult bull trout have been recorded in this system during the spawn period, therefore spawning is presumed (USFWS 2004). In addition, Cornell Creek is completely encompassed by FPHCP covered lands. Cornell Creek does not have recent records of bull trout, however, native char were historically reported to use this stream (Norgore and Anderson 1921).

Glacier Creek local population

The Glacier Creek local population includes Glacier Creek and its accessible tributaries. FPHCP covered lands completely overlap with Little Creek and Davis Creek which are known bull trout spawning streams, and upper portions of the known spawning reach within Thompson Creek (USFWS 2004). Portions of lower Glacier Creek are also immediately adjacent to FPHCP covered lands. Although spawning has not been currently documented within this portion of Glacier Creek, it could occur due to its close proximity to known spawning reaches in Little and Davis Creeks. Juvenile rearing is known to occur within this portion of Glacier Creek.

Lower North Fork Nooksack River local population

The Lower North Fork Nooksack River local population consists of the North Fork Nooksack River and tributaries between Canyon Creek and Maple Creek (USFWS 2004). FPHCP covered lands overlap with the majority of known spawning reaches within Canyon Creek, and significant portions of known

spawning areas within Boulder Creek. Portions of “McDonald Creek” and Wildcat Creek, which provide rearing habitat and potentially spawning habitat, are also encompassed by FPHCP covered lands.

Lower Middle Fork Nooksack River local population

The Lower Middle Fork Nooksack River local population includes the MF Nooksack River and its accessible tributaries between the Bellingham Diversion Dam and the confluence with the NF Nooksack River (USFWS 2004). FPHCP covered lands overlap a small portion of the known spawning distribution within the MF Nooksack River, and areas adjacent to the MF Nooksack River upstream of this spawning reach (within the downstream portion of the Upper Middle Fork Nooksack River local population). Rearing habitats in the mainstem MF Nooksack River and potential spawning and rearing habitats in Canyon Lake Creek and “Peat Bog Creek” are also encompassed by FPHCP covered lands. Although bull trout spawning and rearing have not recently been documented in Canyon Lake Creek, Norgore and Anderson (1921) reported native char use in this system.

Lower South Fork Nooksack River local population

The Lower South Fork Nooksack River local population includes the mainstem and all tributaries downstream of Wanlick Creek to and including Hutchinson Creek (USFWS 2004). FPHCP covered lands completely encompass the known spawning stream Howard Creek, and significant portions of Hutchinson Creek, Skookum Creek, and the mainstem SF Nooksack River. Although spawning has not yet been confirmed within Hutchinson Creek, it is presumed since rearing juveniles have been documented at least 5 miles into the system (USFWS 2004). While spawning has not been confirmed within Skookum Creek, it is presumed since it is utilized by bull trout and has similar water temperature profiles to Hutchinson Creek (USFWS 2004).

Stillaguamish Core Area

North Fork Stillaguamish River local population

The North Fork Stillaguamish River local population includes the mainstem NF Stillaguamish River and accessible tributaries upstream of, and including, the Boulder River (USFWS 2004). FPHCP covered lands encompass no documented spawning reaches within the North Fork Stillaguamish River local population, however, some areas that overlap with FPHCP covered lands are presumed to be spawning reaches. Based on observations of adult bull trout during the spawn period, it is believed that bull trout likely spawn in the upper reaches of the NF Stillaguamish River and accessible reaches of Squire Creek (USFWS 2004). FPHCP covered lands are adjacent to sections of rearing habitat throughout the local population.

Upper Deer Creek local population

The Upper Deer Creek local population includes Little Deer Creek and Higgins Creek upstream and including the confluence with Deer Creek (USFWS 2004). FPHCP covered lands overlap a small portion of the presumed spawning habitat within Little Deer Creek, and a small portion of juvenile rearing habitat on Higgins Creek.

Canyon Creek local population

The Canyon Creek local population includes accessible reaches of the North and South Forks of Canyon Creek, and the Canyon Creek mainstem downstream to confluence of stream #. FPHCP covered lands overlap a moderate portion of the juvenile rearing and potential spawning habitat in the middle to lower reaches of mainstem Canyon Creek.

Snohomish-Skykomish Core Area

North Fork Skykomish River local population

The North Fork Skykomish River local population includes the NF Skykomish River mainstem and all accessible tributaries (excluding Troublesome Creek and Salmon Creek local populations) from the confluence with Salmon Creek upstream to approximately 0.5 mile above confluence with Goblin Creek. FPHCP covered lands encompass a small portion of potential juvenile rearing habitat in the headwaters of Silver Creek and at the confluence with the NF Skykomish River mainstem.

South Fork Skykomish River local population

The South Fork Skykomish River local population includes the SF Skykomish River mainstem and all accessible tributaries upstream of Index Creek. FPHCP covered lands overlap juvenile rearing habitats within the lower Beckler and Foss Rivers. The reaches of the Beckler River encompassed by FPHCP covered lands may also be potential spawning habitat, since this population is expanding. Current documented spawning areas within the Beckler system are immediately upstream of FPHCP covered lands, between rm 2.0 and 5.0 (USFWS 2004).

Puyallup Core Area

Upper White River local population

The Upper White River local population includes the mainstem White River from the confluence with Greenwater River, and all accessible tributaries upstream (excluding the West Fork White River). FPHCP covered lands encompass juvenile rearing habitat in the lower reach of the Upper White River below Huckleberry Creek.

West Fork White River local population

The West Fork White River local population includes the mainstem West Fork White River from the confluence with the White River and all accessible tributaries upstream. FPHCP covered lands encompass juvenile rearing habitat in the lower reach of the West Fork White River below Huckleberry Creek.

Carbon River local population

The Carbon River local population includes the mainstem Carbon River from the top of the canyon reach (RM 15) upstream to accessible reaches, including all accessible tributaries. FPHCP covered lands encompass or are adjacent to portions of the known spawning habitat along the mainstem Carbon River. FPHCP covered lands also encompass a significant amount of juvenile rearing habitat along the mainstem Carbon River.

Upper Puyallup and Mowich Rivers local population

The Upper Puyallup and Mowich Rivers local population includes the mainstem Puyallup River upstream from Electron Dam, Mowich River, accessible reaches of the North and South Forks of the Puyallup River and Mowich Rivers, and all accessible tributaries. FPHCP covered lands encompass all juvenile rearing habitat on the Puyallup River downstream from the confluence of the North and South Forks Puyallup River. Bull trout spawning is also presumed to occur in some portions of this mainstem reach. FPHCP covered lands encompass almost all juvenile rearing habitat on the Mowich River mainstem. Bull trout spawning is also presumed to occur in some portions of this mainstem reach.

Clearwater River PLP

The Clearwater River potential local population includes the mainstem Clearwater River upstream from its confluence with the White River, and its accessible tributaries. Although bull trout spawning and rearing areas have not been specifically identified within this system, FPHCP covered lands encompass nearly all accessible reaches of the Clearwater River, and therefore, nearly all potential spawning and rearing habitat for bull trout.

OLYMPIC PENINSULA MANAGEMENT UNIT

Dungeness Core Area

Dungeness River local population

The Dungeness River local population includes the middle mainstem Dungeness River upstream, from the confluence with and including Canyon Creek and associated tributaries, to the impassable barrier at river mile 19. FPHCP covered lands are adjacent to only a minor portion of juvenile rearing habitat along the lowest portion of the middle mainstem Dungeness River, and lower portion of Canyon Creek.

Elwha Core Area

Little River PLP

The Little River potential local population includes the mainstem Little River upstream from its confluence with the Elwha River to river mile 7. FPHCP covered lands encompass a small portion of the lower Little River, which likely could support only juvenile rearing.

LOWER COLUMBIA MANAGEMENT UNIT

Lewis River Core Area

Cougar Creek local population

Bull trout spawning and rearing occurs in Cougar Creek which flows into Yale Lake. Although most of the land surrounding Cougar Creek is technically considered covered lands under the FPHCP, an agreement with PacifiCorp is being implemented that further restricts land use in the vicinity of Cougar Creek. A 500-foot easement on both sides of Cougar Creek has been purchased by PacifiCorp and managed to protect bull trout spawning and rearing habitat. The upper portion of Cougar Creek is owned and managed by the USFS.

Pine Creek local population

Bull trout in Swift Reservoir spawn and rear in Rush and Pine Creeks. Rush Creek is encompassed by USFS lands, and therefore, not affected by the FPHCP. More than 50 percent of Pine Creek, on the other hand, is encompassed by FPHCP covered lands and the majority of the spawning and rearing reaches fall within this 50 percent.

****Lewis River FMO***

Lewis River FMO contains just under 22 percent FPHCP lands, and therefore would have technically just received a moderate (M) exposure ranking (i.e., contains between 20 and 40 percent FPHCP covered lands). However, because Lewis River FMO primarily consists of the three reservoirs within the Lewis River system (Swift, Yale, and Merwin), the exposure risk is actually believed to be low (L), which is reflected in the final ranking.

Table B-4. Summary of exposure risk rankings for local populations and their core area’s FMO habitat within the Puget Sound, Olympic, and Lower Columbia Management Units. PLPs are potential local populations.

Core Area	Local Population	Exposure Risk (H, M, L)
Nooksack	Middle NF Nooksack River	H
	Glacier Creek	H
	Lower NF Nooksack River	H
	Lower MF Nooksack River	M
	Lower SF Nooksack River	H
	Nooksack FMO	M
Stillaguamish	NF Stillaguamish River	M
	Upper Deer Creek	M
	Canyon Creek	L
	Stillaguamish FMO	H
Snohomish-Skykomish	NF Skykomish River	L
	SF Skykomish River	M
	Snohomish-Skykomish	M
Puyallup	Upper White River	L
	WF White River	L
	Carbon River	H
	Upper Puyallup and Mowich Rivers	H
	Clearwater River PLP	H
	Puyallup FMO	H
Dungeness	Dungeness River	L
	Dungeness FMO	M
Elwha	Little River PLP	L
	Elwha FMO	M
Lewis	Pine Creek	H
	Cougar Creek	L
	Lewis FMO	L ¹

¹ See note in Lower Columbia Management Unit narrative above regarding exposure risk.

B.2 BULL TROUT BASELINE HABITAT RISK ANALYSIS

Spatial and non-spatial information was assessed through the bull trout “Matrix of Pathways and Indicators” (Matrix) (USFWS 1998) to arrive at the baseline habitat risk ranking. Risk categories (i.e., low, medium, high) were essentially equated to the Matrix categories (i.e., functioning appropriately, functioning at risk, functioning at unacceptable risk). The draft Bull Trout Recovery Plan (USFWS 2002 and 2004), Washington State limiting factors analyses, subbasin plans, other biological opinions, and/or a bull trout biologist familiar with the area were consulted in assessing the baseline habitat risk for local populations. For the Coastal-Puget Sound population segment’s local populations, the “watershed conditions” category was rated by integrating road density and road crossing information (Table B-7), while road density as well as other available information was used to rate the watershed conditions for local populations within the Columbia River population segment.

To calculate the overall baseline habitat risk ranking an average of the six habitat pathways in the Matrix was used. It should be noted that this approach may underestimate the actual overall risk ranking. For example, if either flow/hydrology or habitat access is determined to be high risk (i.e., functioning at unacceptable risk), the condition or ranking of the remaining pathways may in reality have only a minor significance to the overall habitat risk ranking. More simply stated, if bull trout access to habitat is significantly impaired or base flows of a stream are extremely low, the pathways of water quality, habitat elements, and/or channel condition are all secondary in significance in this particular case. However, in many cases pathways work synergistically or are ultimately related in some way. To minimize subjectivity and potential rating errors or biases in weighting any particular pathway, “averaging” was ultimately deemed the most appropriate approach for calculating the baseline habitat risk analysis.

The “brook trout presence” category was added to the matrix to indicate what additional level of risk might be faced by bull trout populations, especially where baseline habitat conditions are in a significantly degraded or impaired condition (i.e., rated at high risk). The level of effect from brook trout on bull trout is sight specific and variable depending on a number of factors (e.g., baseline habitat condition, amount of available habitat, bull trout access to refugia, brook trout densities, water temperature). In addition, the presence of brook trout primarily has population effects to bull trout (e.g., hybridization, competition) as opposed to strictly habitat effects. Therefore, we did not integrate it directly into our overall baseline habitat risk ranking. Because brook trout appear to have a competitive advantage over bull trout in degraded habitats, the brook trout presence ranking is most significant for those local populations determined to have a high (H) overall baseline habitat risk.

Table B-5. Baseline habitat risk ranking matrix by local population and FMO habitat for the Columbia River population segment.

Core Area	Local Population/Potential Local Population	FMO	Water Quality	Habitat Access	Habitat Elements	Channel Condition	Flow/Hydrology	Watershed Conditions	Brook Trout Presence	Risk Ranking
Yakima	Ahtanum Creek		H	M	H	H	H	H	H	H
	American River		L	L	M	M	M	L	M	M
	Box Canyon		M	H	M	M	H	M	M	M
	Bumping River		H	H	M	H	H	M	H	H
	Cle Elum River (includes Waptus population)		H	H	M	M	H	H	H	H
	Crow Creek		M	L	M	L	L	M	M	M
	Deep Creek		L	H	L	H	L	M	M	M
	Gold Creek		M	H	M	H	H	L	M	M
	Indian Creek		L	H	M	M	L	L	M	M
	Kachess River		M	H	M	H	M	H	M	M
	Teanaway River (includes N. Fork Teanaway)		H	H	H	H	H	H	M	H
	N. Fork Tieton		M	H	M	M	M	M	H	M
	Rattlesnake Creek		M	M	M	M	M	M	M	M
	S. Fork Tieton		M	H	M	M	M	H	M	M
	Upper Yakima River		H	H	H	H	H	H	H	H
	Taneum Creek (Potential local population)		H	H	M	M	M	H	H	H
	Yakima River		H	M	H	H	H	H	H	H
Wenatchee	Chiwaukum Creek		M	L	M	L	L	M	H	M
	Chiwawa River		M	L	L	L	L	L	M	L
	Icicle Creek		H	H	H	M	H	H	H	H
	Little Wenatchee River		H	M	H	M	M	H	H	H
	Nason Creek		H	M	H	H	H	H	M	H
	Peshastin Creek (includes Ingalls Creek)		H	H	H	H	H	H	H	H
	White River		L	M	M	M	L	M	H	M
		Wenatchee River		H	M	H	H	H	H	H
Entiat	Entiat River		H	M	H	H	H	H	H	H
	Mad River		M	M	M	M	M	M	L	M
		Entiat River		H	M	H	H	H	H	H

Table B-5. Baseline habitat risk ranking matrix by local population and FMO habitat for the Columbia River population segment. (continued)

Core Area	Local Population/Potential Local Population	FMO	Water Quality	Habitat Access	Habitat Elements	Channel Condition	Flow/Hydrology	Watershed Conditions	Brook Trout Presence	Risk Ranking
Methow	Beaver Creek		H	M	H	H	H	H	H	H
	Chewuch R (includes Lake Creek local population)		H	M	M	M	H	H	H	H
	Early Winters Creek		L	L	M	H	H	M	M	M
	Goat Creek		M	M	M	H	H	H	M	H
	Gold Creek		H	H	H	H	H	H	H	H
	Lost River		L	L	M	H	M	M	M	M
	Twisp River		M	M	M	M	H	M	H	M
	Upper Methow River (includes W. Fork Methow River)		L	L	M	H	H	L	M	M
	Wolf Creek		M	M	M	M	H	M	L	M
		Methow River	H	M	H	H	H	H	H	H
Klickitat		Klickitat	H	H	H	H	H	H		H
Walla Walla	Mill Creek		H	H	H	H	H	H	M	H
	North Fork Touchet		M	M	M	H	M	M	M	M
	South Fork Touchet		H	M	H	M	M	H	M	H
	Wolf Fork Touchet		H	M	M	M	M	M	M	M
			Walla Walla	H	H	H	H	H	H	M
Asotin	Wormell Gulch PLP		H	H	H	H	H	H	M	H
Pend Oreille	Cedar Creek PLP		M	H	M	M	M	M	H	M
	Harvey Creek PLP		M	H	M	M	M	M	H	M
	Indian Creek PLP		M	M	M	M	M	M	H	M
	Le Clerc Creek		M	M	H	M	M	H	H	M
	Small Creek PLP		M	M	M	M	M	M	H	M
	South Fork Tacoma Creek PLP		M	M	M	M	M	M	H	M
	Sullivan Creek PLP		M	H	M	M	H	M	H	H
			Pend Oreille	H	H	H	H	H	H	H
Priest Lake	Granite Creek		M	M	M	M	M	M	M	M
			Priest Lake	M	H	M	M	H	H	H

Functioning Appropriately = L; Functioning at Risk = M; Functioning at Unacceptable Risk = H

Table B-6. Baseline habitat risk ranking matrix by local population and FMO habitat for the Coastal-Puget Sound population segment.

Core Area	Local Population/ Potential Local population	FMO	Water Quality	Habitat Access	Habitat Elements	Channel Condition	Flow/ Hydrology	Watershed Conditions	Brook Trout Presence	Risk Ranking	
Nooksack	Middle NF Nooksack River	Nooksack	H	L	M	H	H	M	L	H	
	Glacier Creek		L	M	L	M	L	L	L	L	
	Lower NF Nooksack River		M	L	M	M	H	H	L	M	
	Lower MF Nooksack River		M	L	M	M	M	M	M	M	M
	Lower SF Nooksack River		H	L	H	H	H	H	H	M	H
Stillaguamish	NF Stillaguamish River	Stillaguamish	M	L	M	M	L	M	M	M	
	Upper Deer Creek		H	L	H	H	M	M	M	H	
	SF Skykomish River		M	L	H	M	M	H	M	M	
Snohomish/ Skykomish	SF Skykomish River	Snohomish/ Skykomish	M	L	M	M	L	H	n/a	M	
	Carbon River		L	L	L	L	L	L	H	L	
Puyallup	Upper Puyallup and Mowich Rivers	Puyallup	L	M	H	M	H	H	M	H	
	Clearwater River PLP		H	L	M	M	L	M	L	M	
	Pine Creek		L	L	L	M	L	H	L	L	
Lewis	Pine Creek	Lewis	L	L	L	M	L	H	L	L	
			L	M	L	L	L	M	n/a	L	
Hoh		Hoh	M	L	M	M	M	H	n/a	M	
Elwha		Elwha	M	H	H	H	L	M	n/a	M	
Dungeness		Dungeness	M	L	H	H	M	M	n/a	M	
Skokomish		Skokomish	M	M	H	H	H	H	n/a	H	
Lower Skagit		Lower Skagit	M	L	M	H	M	H	n/a	M	

Functioning Appropriately = L; Functioning at Risk = M; Functioning at Unacceptable Risk = H

Table B-7. Matrix for ranking “watershed conditions” for the Coastal-Puget Sound population segment. Crossing categories ¹ for Road Type = 10 were based on best professional judgment after reviewing the range of the number of crossings among local populations. It should be noted that the resolution of our road crossing data set used in this analysis could not distinguish between crossing types (i.e., bridges versus culverts), nor did we distinguish crossing location (i.e., over fishbearing versus non-fishbearing stream) (see Appendix A3 *Road Density, Stream Crossings, Stream Adjacent Road Summaries by Local Population and Core Area*). Therefore, we believe our crossing categories represent an adequate compromise given the resolution of the data used, even though we acknowledge that there may be some over or underestimate of the impact from crossings given the uncertainties of crossing types and locations. It should also be noted that the watershed condition ranking was often not affected by the road crossing ranking (i.e., it was consistent with the road density ranking), and in those cases where it was different, it could only shift the ranking by one level.

Core Area	Local Population	FMO	Road Density	Road Crossings	Watershed Conditions
Nooksack	Middle NF Nooksack River		H	L	M
	Glacier Creek		L-M	L	L
	Lower NF Nooksack River		H	M	H
	Lower MF Nooksack River		H	L	M
	Lower SF Nooksack River		H	H	H
Stillaguamish		Nooksack	M	n/a	M
	NF Stillaguamish River		M	M	M
	Upper Deer Creek		M	L	M
Snohomish/ Skykomish		Stillaguamish	H	n/a	H
	SF Skykomish River		H	H	H
Puyallup		Snohomish/ Skykomish	H	n/a	H
	Carbon River		L-M	M	L
	Upper Puyallup and Mowich Rivers		M	H	H
	Clearwater River PLP		M-H	L	M
Lewis		Puyallup	H	n/a	H
	Pine Creek		H	M	H
		Lewis	H	n/a	M ²
Hoh		Hoh	H	n/a	H
Elwha		Elwha	M	n/a	M
Dungeness		Dungeness	M	n/a	M
Skokomish		Skokomish	H	n/a	H
Lower Skagit		Lower Skagit	H	n/a	H

Functioning Appropriately = L; Functioning at Risk = M; Functioning at Unacceptable Risk = H

1 >600 crossings = H; 300 to 600 crossing = M; <300 crossings = L for Type 10 (roads)

2 The Lewis was rated "moderate" because the majority of FMO habitat in this core area is represented by lakes and not streams, therefore, road density overestimates the level of impact in this case.