APPENDIX A
CHART ASSESSMENT FOR THE LOWER COLUMBIA RIVER COHO SALMON DPS

CHART Participants

The CHART for this DPS consisted of the following NMFS biologists: Mischa Connine, Michelle Day, Patty Dornbusch, Gayle Kreitman, Ben Meyer, Tim Rymer, and Rich Turner.

DPS Description

The lower Columbia River coho salmon DPS includes all naturally spawned populations of coho in the Columbia River and its tributaries in Washington and Oregon, from the mouth of the Columbia River upstream to and including the Big White Salmon and Hood Rivers, and including the lower Willamette River up to Willamette Falls, Oregon, as well as coho from twenty-five artificial propagation programs located in numerous watersheds throughout the range of the DPS (70 FR 37160, June 28, 2005). We recently conducted a review of the DPS's status and concluded that it should remain listed as a threatened species under the ESA (76 FR 50448, August 15, 2011).

Coho salmon populations in this DPS display one of two major life history types based on when and where adults migrate from the Pacific Ocean to spawn in fresh water. Early returning coho (Type S) typically forage in marine waters south of the Columbia River and return beginning in mid-August, while late returning coho (Type N) generally forage to the north and return to the Columbia River from late September through December (Oregon Department of Fish and Wildlife (ODFW), 2010a). It is thought that early returning coho migrate to headwater areas and late returning fish migrate to the lower reaches of larger rivers or into smaller streams and creeks along the Columbia River. Although there is some level of reproductive isolation and ecological specialization between early and late types, there is some uncertainty regarding the importance of these differences (Myers et al., 2006). Some tributaries historically supported spawning by both run types.

Mature coho of both types typically enter fresh water to spawn from late summer to late autumn. Spawning typically occurs between November and January. Migration and spawning timing of specific local populations may be mediated by factors such as latitude, migration distance, flows, water temperature, maturity, or migration obstacles. Coho generally occupy intermediate positions in tributaries, typically further upstream than chum salmon or fall-run Chinook salmon, but often downstream of steelhead or spring-run Chinook salmon (ODFW, 2010b). Typical coho spawning habitat includes pea to orange-size spawning gravel in small, relatively low-gradient tributaries (ODFW, 2010b). Egg incubation can take from 45 to 140 days, depending on water temperature, with longer incubation in colder water. Fry may thus emerge from early spring to early summer. Juveniles prefer complex instream structure

(primarily large and small woody debris) and shaded streams with tree-lined banks for rearing; they often overwinter in off-channel alcoves and beaver ponds (where available) (ODFW, 2010b). Freshwater rearing lasts until the following spring when the juveniles undergo physiological changes (smoltification) and migrate to salt water. Juvenile coho are present in the Columbia River estuary from March to August (Washington Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan, 2010). Coho grow relatively quickly in the ocean, reaching up to six kilograms after about 16 months of ocean rearing. Most coho are sexually mature at age three, except for a small percentage of males (jacks) who return to natal waters after only a few months of ocean residency. All coho die after spawning.

The lower Columbia River coho salmon DPS is comprised of 24 populations distributed among three ecological zones or ‘‘strata’’—the Coast, Cascade, and Gorge strata (Myers *et al.*, 2006 – see Figure A1). McElhany *et al.* (2007) assessed the viability of lower Columbia River coho populations and determined that only one —the Clackamas River—is approaching viability. They also observed that, with the exception of the Clackamas and Sandy populations, it is likely that most of the wild lower Columbia River coho populations were effectively extirpated in the 1990s and that no viable populations appear to exist in either the Coast or Gorge stratum. Although recently there is evidence of some natural production in this DPS, the majority of populations remain dominated by hatchery origin spawners, and there is little data to indicate they would naturally persist in the long term (NMFS, 2003). Approximately 40 percent of historical habitat is currently inaccessible, which restricts the number of areas that might support natural production, and further increases the DPS’s vulnerability to environmental variability and catastrophic events (NMFS, 2003). The extreme loss of naturally spawning populations, the low abundance of extant populations, diminished diversity, and fragmentation and isolation of the remaining naturally produced fish confer considerable risks to lower Columbia River coho.

Major habitat factors limiting recovery in fresh water include floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream substrate, stream flow, and water quality (Pacific Coast Salmon Restoration Funds, 2007). In addition to impacts of the Federal Columbia River Hydropower System (especially Bonneville Dam on the mainstem Columbia River), numerous other populations are affected by upstream and tributary dams in the White Salmon, Hood, Lewis, Cowlitz, Sandy, and Clackamas basins although many of those effects are being addressed as a result of recent Federal Energy Regulatory Commission re-licensing and associated ESA consultations. For example, the removal of Marmot and Little Sandy dams in the Sandy River basin has improved passage for the coho population into the upper watershed, and the removal of Condit Dam is expected to support restoration of the White Salmon River portion of the Washington Upper Gorge coho population.

The ocean survival of juvenile lower Columbia River coho can be affected by estuary factors such as changes in food availability and the presence of contaminants. Characteristics of the

Columbia River plume are also thought to be significant to lower Columbia River coho migrants during transition to the ocean phase of their lifecycle, because yearling migrants appear to use the plume as habitat, in contrast to other species whose sub-yearling juveniles stay closer to shore (Fresh *et al.*, 2005). Predation and growth during the first marine summer appear to be important components determining coho broodyear strength (Beamish *et al.*, 2001).

Existing Salmon/Steelhead Critical Habitat Designations

Critical habitat is currently designated for three DPSs of salmon and steelhead that use lower Columbia tributary watersheds for spawning and rearing: lower Columbia River Chinook salmon and steelhead, and Columbia River chum salmon (70 FR 52630, September 2, 2005). In addition, several listed DPSs that spawn outside this range (e.g., Snake River fall Chinook salmon) have rearing and migration areas designated as critical habitat in areas occupied by lower Columbia River coho in the Columbia River mainstem and estuary. These existing designations have extensive overlap with areas under consideration as critical habitat for coho. While the essential physical and biological features are identical for the various DPSs, watershed conservation values for coho may differ due to species-specific differences in population structure and habitat utilization.

Recovery Planning Status

Recovery planning for coho and other ESA-listed salmon and steelhead in the lower Columbia River is underway, and a proposed recovery plan was made available for public comment in May 2012 (NMFS 2012). The proposed recovery plan includes three "management unit" plans, or plans addressing geographic areas smaller than the entire range of the DPS: (1) a Washington Lower Columbia management unit plan overseen and coordinated by the Lower Columbia Fish Recovery Board (LCFRB); (2) a White Salmon management unit plan overseen by NMFS and addressing the White Salmon River basin in Washington; and (3) an Oregon Lower Columbia management unit plan led by the ODFW with participation by the Oregon Governor's Natural Resources Office, NMFS, and the Oregon Lower Columbia River Stakeholder Team. Two other documents – an estuary module and a hydropower module – are key components of this recovery plan. These documents, which address regional-scale issues affecting lower Columbia River salmon and steelhead and other listed Columbia River DPSs, provide a consistent set of assumptions and recovery actions that were incorporated into each management unit plan. The plans also are all consistent with work by the Willamette/Lower Columbia Technical\Recovery Team, which was formed by NMFS to assess the population structure and develop viability criteria for listed lower Columbia River salmon and steelhead (see McElhany *et al.*, 2003; McElhany *et al.*, 2006; Myers *et al.*, 2006; and McElhany *et al.*, 2007). Because the ESA requires that recovery plans address the entire listed entity/DPS, we synthesized these management unit

plans and modules into a single recovery plan that also underscores interdependencies and issues of regional scope, and ensures that the entire salmon life cycle is addressed.

The CHART took advantage of the recent and significant progress made in recovery planning for lower Columbia River coho (NMFS 2012) and, as much as possible, incorporated that planning guidance in assessing the conservation value of occupied watersheds. Of particular value were the target statuses and recovery scenarios that served as the basis by which recovery planners could calculate numerical abundance and productivity goals for each coho population. Under this recovery scenario not all populations are targeted for a high degree of improvement, but all of them will need recovery actions—even so-called "stabilizing" populations. These are populations that are expected to remain at or near their current status (usually low or very low) because the feasibility of restoration is low and the uncertainty of success is high. "Primary" populations, on the other hand, are targeted for viability, meaning high or very high persistence probability. "Contributing" populations fall in the middle; they are targeted for some improvement in status. The actual definitions for these are:

- **Primary population**: A population that is targeted for restoration to high or very high persistence probability.
- **Contributing population**: A population for which some restoration will be needed to achieve the stratum-wide average viability recommended by the Washington-Lower Columbia Technical Recovery Team.
- **Stabilizing population**: A population that is targeted for maintenance at its baseline persistence probability, which is likely to be low or very low.

Another related parameter that was useful during the CHART's review was the recovery plan's population status index. This index allowed each population to be assigned a viability rating as portrayed in Table 1 which in turn informed the conservation value assessment for each watershed.

Table 1. Population-level Probability* of Persistence, Extinction Risk, and Status (from NMFS 2012)

Probability of Persistence	Probability of Extinction	Extinction Risk	Population Status
0 – 40%	60 – 100%	Extinct or at very high risk of extinction (VH)	Very low (VL)
40 – 75%	25 – 60%	Relatively high risk of extinction (H)	Low (L)
75 – 95%	5 – 25%	Moderate risk of extinction (M)	Medium (M)
95 – 99%	1 – 5%	Low/negligible risk of extinction (L)	High (H)
> 99%	< 1%	Very low risk of extinction (VL)	Very high (VH)

+ Probability over a 100-year time frame.
Shading indicates levels at which a population is considered viable.

CHART Area Assessments

The CHART assessment for this DPS addressed 10 subbasins containing 55 occupied watersheds, as well as the lower Columbia River and estuary rearing/migration corridor. As part of its assessment the CHART considered the conservation value of each watershed in the context of the populations within the strata identified by the TRT (Myers *et al.*, 2006). Information is presented below by USGS subbasin because they present a convenient and systematic way to organize the CHART's watershed assessments for this DPS and their names are generally more recognizable because they typically identify major river systems.

Middle Columbia/Hood Subbasin (HUC4# 17070105)

The Middle Columbia/Hood subbasin is located in the eastern portion of the Columbia River gorge of Oregon and Washington. Occupied watersheds in this subbasin are contained in Hood River, Multnomah, and Wasco counties in Oregon, and Klickitat and Skamania counties in Washington. The subbasin contains 13 watersheds, 8 of which are occupied by this DPS. Occupied watersheds encompass approximately 1,370 mi^2 (3,548 km^2). Fish distribution and habitat use data from the Oregon Department of Fish and Wildlife (ODFW) and the Washington Department of Fish and Wildlife (WDFW) identify approximately 212 miles (341 km) of occupied riverine habitat in the watersheds, including a 23-mile (37-km) segment of the Columbia River (ODFW 2010; WDFW 2010). Myers *et al.* (2006) identified a single ecological zone (Columbia Gorge) containing three populations: Upper Gorge Tributaries, Big White Salmon River, and Hood River. The recent recovery plan (NMFS 2012) identifies just two populations: Upper Gorge/Hood and Upper Gorge/White Salmon.

After reviewing the best available scientific data for this subbasin, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this DPS. Table A1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map A1 depicts the specific areas in this subbasin occupied by the DPS and under consideration for critical habitat designation. The CHART also determined that the occupied HUC5 watersheds in this subbasin were of either high or medium conservation value to the DPS. Of the eight HUC5s reviewed, five were rated as having high and three were rated as having medium conservation value. The CHART noted that two HUC5s (Middle Columbia/Eagle Creek and Middle Columbia/Grays Creek) contain a high value rearing and migration corridor in the Columbia River connecting high value upstream watersheds with downstream reaches and the ocean. Table A2 summarizes the CHART's PCE/watershed scores and conservation value ratings, and Figure A2 shows the overall distribution of ratings by HUC5 watershed.

The CHART also considered whether blocked historical habitat above Condit Dam (on the White Salmon River) may be essential for conservation of the DPS. The decommissioning of this 100-year-old dam occurred in the summer of 2011 and will allow coho and other salmonids access to at least 26 miles of habitat in the 380 mi^2 basin upstream (PacifiCorp 2011a,b). The Team determined that accessing this habitat would likely provide a benefit to the DPS. However, the CHART concluded that it was unclear whether the areas above Condit Dam are essential for conservation of the entire DPS, especially in comparison to other, more extensive, historical habitats where coho are actively being reintroduced and that may be of greater potential benefit to the DPS (e.g., areas in the Upper Lewis River).

Lower Columbia/Sandy Subbasin (HUC4# 17080001)

The Lower Columbia/Sandy subbasin is located in the western portion of the Columbia River gorge of Oregon and Washington. Occupied watersheds in this subbasin are contained in Clackamas, Columbia, and Multnomah counties in Oregon, and Clark and Skamania counties in Washington. The subbasin contains nine watersheds, all of which are occupied by this DPS. Occupied watersheds encompass approximately 1,076 mi^2 (2,787 km^2). Fish distribution and habitat use data from the ODFW and WDFW identify approximately 453 miles (729 km) of occupied riverine habitat in the watersheds, including a 26-mile (42-km) segment of the Columbia River (ODFW 2010; WDFW 2010). Myers *et al.* (2003) identified two ecological zones associated with this subbasin (Western Cascade Range aka "Cascade Stratum" and Columbia Gorge aka "Gorge Stratum") containing four populations (Lower Gorge tributaries, Sandy River, Washougal River, and Salmon Creek). The recent recovery plan (NMFS 2012) identifies the same populations.

After reviewing the best available scientific data for this subbasin, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this DPS. Table A1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map A2 depicts the specific areas in this subbasin occupied by the DPS and under consideration for critical habitat designation. The CHART also determined that the occupied HUC5 watersheds in this subbasin were of high or medium conservation value to the DPS. Of the nine HUC5s reviewed, four were rated as having high and five were rated as having medium conservation value. The CHART also noted that one HUC5 (Columbia Gorge Tributaries) contains a high value rearing and migration corridor in the Columbia River connecting high value upstream watersheds with downstream reaches and the ocean. Table A2 summarizes the CHART's PCE/watershed scores and conservation value ratings, and Figure A2 shows the overall distribution of ratings by HUC5 watershed.

Lewis Subbasin (HUC4# 17080002)

The Lewis subbasin is located in southwest Washington and contained in Clark, Cowlitz, and Skamania counties (a very small and unoccupied portion in the uppermost watershed is

contained in Yakima County). The subbasin contains six watersheds, all of which are currently occupied by this DPS (including four watersheds above Merwin Dam now accessible to coho via trap and haul operations in the Upper Lewis River (PacifiCorp *et al.* 2004) Occupied watersheds encompass approximately 456 mi^2 (1,181 km^2) Fish distribution and habitat use data from the WDFW identify approximately 299 miles (481 km) of occupied riverine habitat in the watersheds (WDFW 2010). Myers *et al.* (2003) identified one ecological zone associated with this subbasin (Western Cascade Range aka "Cascade Stratum") containing two populations – one in the East Fork Lewis River and another in the North Fork Lewis River. The recent recovery plan (NMFS 2012) identifies the same populations.

After reviewing the best available scientific data for this subbasin, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this DPS. Table A1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map A3 depicts the specific areas in this subbasin occupied by the DPS and under consideration for critical habitat designation. The CHART also determined that the occupied HUC5 watersheds in this subbasin ranged from high to low conservation value to the DPS. Of the six HUC5s reviewed, three were rated as having high, two were rated as having medium conservation value, and one was rated as having low conservation value to the DPS. Table A2 summarizes the CHART's PCE/watershed scores and conservation value ratings, and Figure A2 shows the overall distribution of ratings by HUC5 watershed.

Lower Columbia/Clatskanie Subbasin (HUC4# 17080003)

The Lower Columbia/Clatskanie subbasin is located in southwest Washington and northwest Oregon. Occupied watersheds in this subbasin are contained in Clatsop and Columbia counties in Oregon, and Cowlitz, Lewis, Skamania, and Wahkiakum counties in Washington. The subbasin contains six watersheds, all of which are occupied by this DPS. Occupied watersheds encompass approximately 841 mi^2 (2,178 km^2) Fish distribution and habitat use data from ODFW and WDFW identify approximately 387 miles (623 km) of occupied riverine habitat in the watersheds (ODFW 2010; WDFW 2010). Myers *et al.* (2003) identified two ecological zones (Coast Range aka "Coast Stratum" and Western Cascade Range aka "Cascade Stratum") containing four populations (Kalama River, Clatskanie River, Elochoman River, and Scappoose Creek) in this subbasin. The recent recovery plan (NMFS 2012) identifies the same populations.

After reviewing the best available scientific data for this subbasin, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this DPS. Table A1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map A4 depicts the specific areas in this subbasin

occupied by the DPS and under consideration for critical habitat designation. The CHART also determined that the occupied HUC5 watersheds in this subbasin were of high or medium conservation value to the DPS. Of the six HUC5s reviewed, three were rated as having high and three were rated as having medium conservation value to the DPS. Table A2 summarizes the CHART's PCE/watershed scores and conservation value ratings, and Figure A2 shows the overall distribution of ratings by HUC5 watershed.

Upper Cowlitz Subbasin (HUC4# 17080004)

The Upper Cowlitz subbasin is located in southwest Washington and contained in Lewis, Pierce, Skamania, and Yakima counties. The subbasin contains five watersheds, all of which are occupied by this DPS. Occupied watersheds encompass approximately 1,030 mi^2 (2,668 km^2) Fish distribution and habitat use data from WDFW identify approximately 181 miles (291 km) of occupied riverine habitat in the watersheds (WDFW 2010). All of this habitat is located upstream of impassable dams (Mayfield and Mossyrock) and only accessible to anadromous fish via trap and haul operations. Myers *et al.* (2003) identified one ecological zone (Western Cascade Range aka "Cascade Stratum") containing two populations (Upper Cowlitz River and Cispus River) in this subbasin. The recent recovery plan (NMFS 2012) identifies the same populations.

After reviewing the best available scientific data for this subbasin, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this DPS. Table A1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map A5 depicts the specific areas in this subbasin occupied by the DPS and under consideration for critical habitat designation. The CHART also determined that four of the occupied HUC5 watersheds in this subbasin were of high conservation value and one was of medium conservation value to the DPS. Table A2 summarizes the CHART's PCE/watershed scores and conservation value ratings, and Figure A2 shows the overall distribution of ratings by HUC5 watershed.

Lower Cowlitz Subbasin (HUC4# 17080005)

The Lower Cowlitz subbasin is located in southwest Washington and contained in Cowlitz, Lewis, and Skamania counties. The subbasin contains eight watersheds, all of which are occupied by this DPS. Occupied watersheds encompass approximately 1,460 mi^2 (3,781 km^2). Fish distribution and habitat use data from WDFW identify approximately 791 miles (1,273 km) of occupied riverine habitat in the (WDFW 2010). Habitat in two HUC5 watersheds – Tilton River and Riffe Reservoir – is located upstream of impassable dams (Mayfield Dam and Mossyrock Dam) and only accessible to anadromous fish via trap and haul operations. Myers *et al.* (2003) identified one ecological zone (Western Cascade Range aka "Cascade Stratum") containing six populations (Upper Cowlitz River, Lower Cowlitz River, Tilton River, Coweeman River, North Fork Toutle River, and South Fork Toutle

River) in this subbasin. The recent recovery plan (NMFS 2012) identifies the same populations.

After reviewing the best available scientific data for this subbasin, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this DPS. Table A1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map A6 depicts the specific areas in this subbasin occupied by the DPS and under consideration for critical habitat designation. The CHART determined that the occupied HUC5 watersheds in this subbasin ranged from high to low conservation value to the DPS. Of the eight HUC5s reviewed, six were rated as having high, one was rated as having medium conservation value, and one was rated as having low conservation value to the DPS. The CHART also noted that four HUC5s (Riffe Reservoir, Jackson Prairie, East Willapa, and Coweeman River) contained high value rearing and migration corridors connecting high value upstream watersheds with downstream reaches and the ocean. Table A2 summarizes the CHART's PCE/watershed scores and conservation value ratings, and Figure A2 shows the overall distribution of ratings by HUC5 watershed.

Lower Columbia Subbasin (HUC4# 17080006)

The Lower Columbia subbasin is located at the mouth of the Columbia River in southwest Washington and Northwest Oregon. Occupied watersheds in this subbasin are contained in Clatsop County, Oregon, and Lewis, Pacific, and Wahkiakum counties in Washington. The subbasin contains three watersheds, all of which are occupied by this DPS. Occupied watersheds encompass approximately 515 mi^2 (1,334 km^2). Fish distribution and habitat use data from the ODFW and WDFW identify approximately 370 miles (595 km) of occupied riverine habitat in the watersheds (ODFW 2010; WDFW 2010). Myers *et al.* (2003) identified one ecological zone (Coast Range aka "Coast Stratum") containing three populations (Grays/Chinook Rivers, Big Creek, and Youngs Bay) in this subbasin. The recent recovery plan (NMFS 2012) identifies the same populations.

After reviewing the best available scientific data for this subbasin, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this DPS. Table A1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map A7 depicts the specific areas in this subbasin occupied by the DPS and under consideration for critical habitat designation. The CHART also determined that the occupied HUC5 watersheds in this subbasin were of either high (Grays Bay) or medium (Big Creek and Youngs River) conservation value to the DPS. Table A2 summarizes the CHART's PCE/watershed scores and conservation value ratings, and Figure A2 shows the overall distribution of ratings by HUC5 watershed.

Middle Willamette Subbasin (HUC4# 17090007)

The portion of the Middle Willamette River subbasin occupied by this DPS is downstream of Willamette Falls and includes a single HUC5 watershed (Abernethy Creek) as well as a short segment (approximately 1 mile (1.6 km)) of the Willamette River downstream of Willamette Falls. Occupied portions of this subbasin within the DPS's range are contained in Clackamas County, Oregon. The Abernethy Creek watershed encompasses approximately 134 mi^2 (347 km^2). Fish distribution and habitat use data from the ODFW identify approximately 27 miles (43 km) of occupied riverine habitat in the subbasin (ODFW 2010). Myers *et al.* (2003) identified one ecological zone (Western Cascade Range aka "Cascade Stratum") containing one population (Clackamas River) in this subbasin. The recent recovery plan (NMFS 2012) identifies the same population.

After reviewing the best available scientific data for this subbasin, the CHART concluded that all of the occupied areas in the Abernethy Creek watershed contain one or more PCEs for this DPS. Table A1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map A8 depicts the specific areas in this subbasin occupied by the DPS and under consideration for critical habitat designation. The CHART also determined that the Abernethy Creek HUC5 watershed was of low conservation value to the DPS. Table A2 summarizes the CHART's PCE/watershed scores and conservation value ratings, and Figure A2 shows the overall distribution of ratings by HUC5 watershed.

Clackamas Subbasin (HUC4# 17090011)

The Clackamas subbasin is a Cascade Range drainage of the lower Willamette River and is contained in Clackamas and Marion counties, Oregon. The subbasin contains six watersheds, all of which are occupied by this DPS. Occupied watersheds encompass approximately 270 mi^2 (699 km^2). Fish distribution and habitat use data from ODFW identify approximately 253 miles (407 km) of occupied riverine habitat in the watersheds (ODFW 2010). Myers *et al.* (2003) identified one ecological zone (Western Cascade Range aka "Cascade Stratum") containing one population (Clackamas River) in this subbasin. The recent recovery plan (NMFS 2012) identifies the same population.

After reviewing the best available scientific data for this subbasin, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this DPS. Table A1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map A9 depicts the specific areas in this subbasin occupied by the DPS and under consideration for critical habitat designation. The CHART also determined that all of the occupied HUC5 watersheds in this subbasin were of high conservation value to the DPS. Table A2 summarizes the CHART's PCE/watershed scores

and conservation value ratings, and Figure A2 shows the overall distribution of ratings by HUC5 watershed.

Lower Willamette Subbasin (HUC4# 17090012)

The Lower Willamette subbasin is located at the confluence of the Willamette and Columbia rivers in Northwest Oregon. Occupied watersheds in this subbasin are contained in Clackamas, Multnomah, and Washington counties, Oregon. The subbasin contains three watersheds, all of which are occupied by this DPS. Occupied watersheds encompass approximately 407 mi^2 (1,054 km^2). Fish distribution and habitat use data from the ODFW identify approximately 163 miles (262 km) of occupied riverine habitat in the watersheds (ODFW 2010). Myers *et al.* (2003) identified two ecological zones (Coast Range aka "Coast Stratum") and Western Cascade Range aka "Cascade Stratum") containing two populations (Clackamas River and Scappoose Creek) in this subbasin. The recent recovery plan (NMFS 2012) identifies the same populations.

After reviewing the best available scientific data for this subbasin, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this DPS. Table A1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map A10 depicts the specific areas in this subbasin occupied by the DPS and under consideration for critical habitat designation. The CHART also determined that the occupied HUC5 watersheds in this subbasin were of either high (Scappoose Creek and Johnson Creek) or medium (Columbia Slough/Willamette) conservation value to the DPS. The CHART also noted that Columbia Slough and Smith and Bybee Lakes may provide important rearing habitat for juvenile coho salmon. Table A2 summarizes the CHART's PCE/watershed scores and conservation value ratings, and Figure A2 shows the overall distribution of ratings by HUC5 watershed.

Lower Columbia River Corridor

The lower Columbia River rearing and migration corridor consists of that segment of the Columbia River from the confluences of the Sandy River (Oregon) and Washougal River (Washington) to the Pacific Ocean. This corridor overlaps with the following counties: Clatsop, Columbia, and Multnomah counties in Oregon, and Clark, Cowlitz, Pacific, and Wahkiakum counties in Washington. Fish distribution and habitat use data from ODFW and WDFW identify approximately 118 miles (190 km) of occupied riverine and estuarine habitat in this corridor (ODFW 2010; WDFW 2010). Table A1 summarizes the total number of occupied reaches in this corridor containing rearing or migration PCEs, as well as management activities that may affect the PCEs.

After reviewing the best available scientific data for this subbasin, the CHART concluded that the lower Columbia River corridor was of high conservation value to the DPS. Other upstream reaches of the Columbia River corridor (within the Middle Columbia/Hood and

Lower Columbia/Sandy Subbasin subbasins above) are also high value for rearing/migration. The CHART noted that the lower Columbia River corridor connects every watershed and population in this DPS with the ocean and is used by rearing/migrating juveniles and migrating adults. The Columbia River estuary is a particularly important area for this DPS as both juveniles and adult salmon make the critical physiological transition between life in freshwater and marine habitats (ISAB 2000, Marriott *et al.* 2002).

References and Sources of Information

References cited above as well as key reports and data sets reviewed by the CHART include the following:

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Table A1. Summary of Occupied Areas, PCEs, and Management Activities Affecting PCEs for the Lower Columbia River Coho Salmon DPS

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Primary Constituent Elements (PCEs)			Management Activities**
			Spawning/ Rearing PCEs (mi)	Rearing/ Migration PCEs (mi)	Migration/ Presence PCEs (mi)*	
Middle Columbia/ Hood	East Fork Hood River	1707010506	47.9			A, C, F, I, R
Middle Columbia/ Hood	West Fork Hood River	1707010507	18.3			A, F, R
Middle Columbia/ Hood	Hood River	1707010508	20.7		0.7	A, C, D, F, R, I, U
Middle Columbia/ Hood	White Salmon River	1707010509			3.7	A, C, D, F, R, U
Middle Columbia/ Hood	Little White Salmon River	1707010510			1.7	D, F, R
Middle Columbia/ Hood	Wind River	1707010511	0.8		75.3	F, R, U
Middle Columbia/ Hood	Middle Columbia/ Grays Creek	1707010512	0.7		21.3	R, U
Middle Columbia/ Hood	Middle Columbia/ Eagle Creek	1707010513	5.6	1.9	12.9	D, R, U
Lower Columbia/ Sandy	Salmon River	1708000101	22.1	0.5		F, C, R
Lower Columbia/ Sandy	Zigzag River	1708000102	22.9	0.5		F, C, R
Lower Columbia/ Sandy	Upper Sandy River	1708000103	21.9	0.2		F, R
Lower Columbia/ Sandy	Middle Sandy River	1708000104	32.6	0.4		D, R, U

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Primary Constituent Elements (PCEs)			Management Activities**
			Spawning/ Rearing PCEs (mi)	Rearing/ Migration PCEs (mi)	Migration/ Presence PCEs (mi)*	
Lower Columbia/ Sandy	Bull Run River	1708000105	12.1			D, F, R
Lower Columbia/ Sandy	Washougal River	1708000106	1.8		81.9	C, F, R, S, U, W
Lower Columbia/ Sandy	Columbia Gorge Tributaries	1708000107	9.1	7.1	81.7	C, D, F, R, U, W
Lower Columbia/ Sandy	Lower Sandy River	1708000108	27.1	6.7	1.3	A, C, F, R, U
Lower Columbia/ Sandy	Salmon Creek	1708000109	7.8		111.9	A, C, F, R, U, W
Lewis	Upper Lewis River	1708000201			18.5	D, F, R, W
Lewis	Muddy River	1708000202			28.1	D, F, R, W
Lewis	Swift Reservoir	1708000203			37.0	D, F, R, W
Lewis	Yale Reservoir	1708000204			32.6	D, F, R, W
Lewis	East Fork Lewis River	1708000205	7.3		76.0	A, C, F, R, S, U, W
Lewis	Lower Lewis River	1708000206	16.1		83.3	A, C, D, F, R, U, W
Lower Columbia/ Clatskanie	Kalama River	1708000301	8.8		18.1	C, F, R, U, W
Lower Columbia/ Clatskanie	Beaver Creek/ Columbia River	1708000302	36.2	19.4		A, C, F, R, U, W

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Primary Constituent Elements (PCEs)			Management Activities**
			Spawning/ Rearing PCEs (mi)	Rearing/ Migration PCEs (mi)	Migration/ Presence PCEs (mi)*	
Lower Columbia/ Clatskanie	Clatskanie River	1708000303	54.0	6.5		A, C, F, R, U, W
Lower Columbia/ Clatskanie	Germany/ Abernathy	1708000304	9.7		81.5	A, C, F, R, U, W
Lower Columbia/ Clatskanie	Skamokawa/ Elochoman	1708000305	11.7		107.3	A, C, F, R, W
Lower Columbia/ Clatskanie	Plympton Creek	1708000306	8.2	23.0		A, C, F, R, W
Upper Cowlitz	Headwaters Cowlitz River	1708000401			8.3	C, F, R
Upper Cowlitz	Upper Cowlitz River	1708000402			38.0	C, F, R
Upper Cowlitz	Cowlitz Valley Frontal	1708000403			67.5	A, F, R, U
Upper Cowlitz	Upper Cispus River	1708000404			21.1	C, F, R
Upper Cowlitz	Lower Cispus River	1708000405			46.1	C, F, R
Lower Cowlitz	Tilton River	1708000501			65.6	C, D, F, R, U
Lower Cowlitz	Riffe Reservoir	1708000502			43.8	A, C, D, F, R
Lower Cowlitz	Jackson Prairie	1708000503	16.8		130.4	A, C, D, F, R

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Primary Constituent Elements (PCEs)			Management Activities**
			Spawning/ Rearing PCEs (mi)	Rearing/ Migration PCEs (mi)	Migration/ Presence PCEs (mi)*	
Lower Cowlitz	North Fork Toutle River	1708000504	2.4	0.4	26.8	F, R
Lower Cowlitz	Green River	1708000505	19.3	21.1	28.8	F, R
Lower Cowlitz	South Fork Toutle River	1708000506	7.8	49.0	33.8	F, R
Lower Cowlitz	East Willapa	1708000507	46.6	47.3	120.9	A, C, F, R, U, W
Lower Cowlitz	Coweeman	1708000508	8.7		121.6	A, C, F, R, U, W
Lower Columbia	Youngs River	1708000601	64.1	66.3		A, C, F, I, R, U, W
Lower Columbia	Big Creek	1708000602	50.1	28.3		A, C, F, I, R, W
Lower Columbia	Grays Bay	1708000603	4.5	0.3	159.7	C, F, R, W
Middle Willamette	Abernethy Creek	1709000704	20.1	5.2	1.8	A, C, D, R, U
Clackamas	Collawash River	1709001101	16.8			F, R
Clackamas	Upper Clackamas River	1709001102	49.1			F, R
Clackamas	Oak Grove Fork Clackamas River	1709001103	4.3			D, F, G, R
Clackamas	Middle Clackamas River	1709001104	41.0	3.9		D, F, R

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Primary Constituent Elements (PCEs)			Management Activities**
			Spawning/ Rearing PCEs (mi)	Rearing/ Migration PCEs (mi)	Migration/ Presence PCEs (mi)*	
Clackamas	Eagle Creek	1709001105	39.6			A, F, R
Clackamas	Lower Clackamas River	1709001106	74.4	6.4	17.4	A, C, D, I, R, U, W
Lower Willamette	Johnson Creek	1709001201	31.5	9.3		A, C, I, R, U, W
Lower Willamette	Scappoose Creek	1709001202	47.9	49.3		A, C, F, I, R, U, W
Lower Willamette	Columbia Slough/ Willamette River	1709001203		25.0		A, C, R, U, W
Multiple	Lower Columbia Corridor (Sandy/ Washougal to Ocean)	NA			131.5***	C, D, I, R, T, U, W

* Some streams classified as "Migration/Presence PCEs" may also include rearing or spawning PCEs, but the GIS data are still undergoing review to confirm additional habitat use types.

** This list is not exhaustive. It is intended to highlight key management activities affecting PCEs in each watershed. Activities identified are based on the general categories described by Spence *et al.* (1996) and summarized previously in the "Special Management Considerations or Protection" section of this report. Coding is as follows: F= forestry, G = grazing, A = agriculture, C = channel modifications/diking, R = road building/maintenance, U = urbanization, S = sand and gravel mining, M = mineral mining, D = dams, I = irrigation impoundments and withdrawals, T = river, estuary, and ocean traffic, W = wetland loss/removal, B = beaver removal, X = exotic/invasive species introductions, H = forage fish/species harvest. Primary sources for this information were the CHART and reports by LCFRB (2003), Subbasin Summary Reports of the NWPPC, and land use/land cover GIS layers from the U.S. Geological Survey.

*** The Lower Columbia River from the ocean upstream approximately 46.5 miles is considered to contain estuarine PCEs, in addition to migration and rearing (ISAB 2000).

Table A2. Summary of CHART Scores and Ratings of Conservation Value for Habitat Areas Occupied by the Lower Columbia River Coho Salmon DPS

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Scoring System (factors)						Total HUC5 Score (0-18)	Comments/Other Considerations	CHART Rating of HUC5 Conservation Value	Rating of Connect-ivity Corridor
			1	2	3	4	5	6				
Middle Columbia/ Hood	East Fork Hood River	1707010506	2	2	1	1	1	2	9	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. One of three HUC5s supporting Hood River coho, each with a substantial amount of available habitat relative to other watersheds in the Gorge Stratum.	High	
Middle Columbia/ Hood	West Fork Hood River	1707010507	2	2	1	1	1	2	9	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. One of three HUC5s supporting Hood River coho, each with a substantial amount of available habitat relative to other watersheds in the Gorge Stratum.	High	
Middle Columbia/ Hood	Hood River	1707010508	2	1	2	1	1	2	9	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. One of three HUC5s supporting Hood River coho, each with a substantial amount of available habitat relative to other watersheds in the Gorge Stratum.	High	High

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Scoring System (factors)						Total HUC5 Score (0-18)	Comments/Other Considerations	CHART Rating of HUC5 Conservation Value	Rating of Connect-ivity Corridor
			1	2	3	4	5	6				
Middle Columbia/ Hood	White Salmon River	1707010509	1	2	2	1	1	1	8	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. The CHART noted that reaches above the recently-removed Condit Dam may be essential for conservation, especially given the limited number of watersheds in the Gorge Stratum and the good potential for additional coho production at the boundary of this DPS.	High	
Middle Columbia/ Hood	Little White Salmon River	1707010510	1	2	0	1	1	2	7	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. Although PCEs are limited in this HUC5, it may be important as coldwater refugia for coho from the White Salmon and Hood River basins.	High	
Middle Columbia/ Hood	Wind River	1707010511	3	2	2	1	1	2	11	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. However, steeper terrain in this watershed likely makes it of lower conservation value to coho than other HUC5s in the Gorge Stratum. The CHART did not identify any low-value watersheds in the Gorge Stratum due to the limited number of HUC5s supporting coho here.	Medium	

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Scoring System (factors)						Total HUC5 Score (0-18)	Comments/Other Considerations	CHART Rating of HUC5 Conservation Value	Rating of Connect-ivity Corridor
			1	2	3	4	5	6				
Middle Columbia/ Hood	Middle Columbia/ Grays Creek	1707010512	1	2	2	1	1	3	10	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. However, the limited amount of tributary habitat in this watershed likely makes it of lower conservation value to coho than other HUC5s in the Gorge Stratum. The CHART did not identify any low-value watersheds in the Gorge Stratum due to the limited number of HUC5s supporting coho here.	Medium	High
Middle Columbia/ Hood	Middle Columbia/ Eagle Creek	1707010513	1	2	2	1	1	3	10	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. However, the limited amount of tributary habitat in this watershed likely makes it of lower conservation value to coho than other HUC5s in the Gorge Stratum. The CHART did not identify any low-value watersheds in the Gorge Stratum due to the limited number of HUC5s supporting coho here.	Medium	High
Lower Columbia/ Sandy	Salmon River	1708000101	2	2	2	3	2	2	13	High HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. The Sandy River population is second only to the Clackamas in recent wild spawner abundance, and the Salmon River formerly supported the largest coho run in the Sandy River system.	High	

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Scoring System (factors)						Total HUC5 Score (0-18)	Comments/Other Considerations	CHART Rating of HUC5 Conservation Value	Rating of Connect-ivity Corridor
			1	2	3	4	5	6				
Lower Columbia/ Sandy	Zigzag River	1708000102	3	2	2	3	2	2	14	High HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. The Sandy River population is second only to the Clackamas in recent wild spawner abundance. Tributary spawning PCEs are still extensive in this HUC5.	High	
Lower Columbia/ Sandy	Upper Sandy River	1708000103	3	2	2	3	2	2	14	High HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. The Sandy River population is second only to the Clackamas in recent wild spawner abundance. Tributary spawning PCEs are still extensive in this HUC5.	High	
Lower Columbia/ Sandy	Middle Sandy River	1708000104	1	1	2	3	2	2	11	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. Tributary PCEs are more limited in this HUC5 relative to upstream/headwater HUC5s that the CHART determined had a higher conservation value.	Medium	High
Lower Columbia/ Sandy	Bull Run River	1708000105	1	1	2	3	2	2	11	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. Tributary PCEs are more limited in this HUC5 relative to other headwater HUC5s that the CHART determined had a higher conservation value.	Medium	

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Scoring System (factors)						Total HUC5 Score (0-18)	Comments/Other Considerations	CHART Rating of HUC5 Conservation Value	Rating of Connect-ivity Corridor
			1	2	3	4	5	6				
Lower Columbia/ Sandy	Washougal River	1708000106	2	1	2	1	2	2	10	Moderate HUC5 score. PCEs support a population that is expected to play a lesser, contributing role in recovery with only a moderate level of viability. The CHART noted that although PCEs are still fairly extensive in this HUC5, historical coho production was some of the lowest in the DPS.	Medium	
Lower Columbia/ Sandy	Columbia Gorge Tributaries	1708000107	2	2	2	2	1	3	12	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. A substantial amount of tributary habitat in this watershed relative to the two other Columbia corridor HUC5s upstream. This is the only HUC5 with spawning habitat supporting the Lower Gorge Tributaries population. Also, there are significant restoration efforts underway here, and regular high concentrations of spawners.	High	High
Lower Columbia/ Sandy	Lower Sandy River	1708000108	1	1	2	3	2	2	11	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. Tributary PCEs are more limited in this HUC5 relative to upstream/headwater HUC5s that the CHART determined had a higher conservation value.	Medium	High
Lower Columbia/ Sandy	Salmon Creek	1708000109	2	1	2	1	2	3	11	Moderate HUC5 score. PCEs support a population that is expected to play a lesser stabilizing role in recovery with only a very low level of viability. Although this watershed is highly urbanized, the CHART noted that there is still a significant amount of habitat available in this HUC5, especially in the upper reaches of Salmon Creek.	Medium	

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Scoring System (factors)						Total HUC5 Score (0-18)	Comments/Other Considerations	CHART Rating of HUC5 Conservation Value	Rating of Connect-ivity Corridor
			1	2	3	4	5	6				
Lewis	Upper Lewis River	1708000201	2	3	3	2	2	2	14	High HUC5 score. PCEs support a population that is expected to play a lesser, contributing role in recovery with only a low level of viability. This HUC5 contains important mid- to high-elevation forested habitats for spawning. Coho access this watershed via a trap and haul program , and the CHART noted important re-introduction programs underway for this area. The CHART also noted that PCEs are still fairly extensive in this HUC5 and the historical production from this population was considerable.	High	
Lewis	Muddy River	1708000202	2	3	3	2	2	2	14	High HUC5 score. PCEs support a population that is expected to play a lesser, contributing role in recovery with only a low level of viability. This HUC5 contains important mid- to high-elevation forested habitats for spawning. Coho access this watershed via a trap and haul program , and the CHART noted important re-introduction programs underway for this area. The CHART also noted that PCEs are still fairly extensive in this HUC5 and the historical production from this population was considerable.	High	
Lewis	Swift Reservoir	1708000203	1	1	1	2	2	2	9	Moderate HUC5 score. PCEs support a population that is expected to play a lesser, contributing role in recovery with only a low level of viability. Coho access this watershed via a trap and haul program. Tributary PCEs are significantly degraded due to inundation by Swift reservoir. This HUC5 is important primarily as a rearing/migration corridor for juveniles from upstream spawning areas.	Medium	High

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Scoring System (factors)						Total HUC5 Score (0-18)	Comments/Other Considerations	CHART Rating of HUC5 Conservation Value	Rating of Connect-ivity Corridor
			1	2	3	4	5	6				
Lewis	Yale Reservoir	1708000204	1	1	1	2	2	2	9	Moderate HUC5 score. PCEs support a population that is expected to play a lesser, contributing role in recovery with only a low level of viability. Coho access this watershed via a trap and haul program. Tributary PCEs are significantly limited and degraded due to inundation by Yale reservoir. This HUC5 is important primarily as a rearing/migration corridor for juveniles from upstream spawning areas.	Low	High
Lewis	East Fork Lewis River	1708000205	2	1	2	2	2	3	12	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. The CHART noted that, in addition to the recovery planning emphasis in this HUC5, the East Fork Lewis River is the only major undammed stream within the Washington side of the Columbia River basin.	High	
Lewis	Lower Lewis River	1708000206	2	1	2	2	2	2	11	Moderate HUC5 score. Most PCEs in this HUC5 support a population that is expected to play a lesser, contributing role in recovery with only a low level of viability. The lowermost section of the Lewis River also supports the East Fork Lewis population (see above). Coho access the upper portion of this watershed via a trap and haul program. Tributary PCEs are significantly limited and degraded due to inundation by Merwin reservoir. This HUC5 is important primarily as a rearing/migration corridor for juveniles from upstream spawning areas but does contain substantial tributary habitat as well.	Medium	High

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Scoring System (factors)						Total HUC5 Score (0-18)	Comments/Other Considerations	CHART Rating of HUC5 Conservation Value	Rating of Connect-ivity Corridor
			1	2	3	4	5	6				
Lower Columbia/ Clatskanie	Kalama River	1708000301	1	2	2	1	1	3	10	Moderate HUC5 score. PCEs support a population that is expected to play a lesser, contributing role in recovery with only a moderate level of viability. The CHART noted that PCEs are not extensive here and historical coho production was some of the lowest in the DPS.	Medium	
Lower Columbia/ Clatskanie	Beaver Creek/ Columbia River	1708000302	1	1	1	1	0	3	7	Moderate HUC5 score. PCEs support portions of two populations that are expected to play a primary role in recovery with a very high level of viability. However, the PCEs are much more limited in this HUC5 relative to the adjacent watersheds supporting these populations. The CHART did not identify any low-value watersheds in the Coast Stratum due to the limited number of HUC5s supporting coho here.	Medium	
Lower Columbia/ Clatskanie	Clatskanie River	1708000303	3	1	2	1	1	2	10	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with very a high level of viability. PCEs are extensive in this HUC5 and the majority of habitat supporting this population is located here and in the adjacent Plympton Creek HUC5.	High	
Lower Columbia/ Clatskanie	Germany/ Abernathy	1708000304	3	1	2	1	2	3	12	Moderate HUC5 score. PCEs support a population that is expected to play a lesser, contributing role in recovery with a medium level of viability. Therefore the CHART determined that the conservation value of this HUC5 was lower than others in the Coast Stratum. The CHART did not identify any low-value watersheds in the Coast Stratum due to the limited number of HUC5s supporting coho here.	Medium	

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Scoring System (factors)						Total HUC5 Score (0-18)	Comments/Other Considerations	CHART Rating of HUC5 Conservation Value	Rating of Connect-ivity Corridor
			1	2	3	4	5	6				
Lower Columbia/ Clatskanie	Skamokawa/ Elochoman	1708000305	3	2	2	1	2	3	13	High HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. PCEs are extensive in this HUC5, which is the only watershed supporting this population.	High	
Lower Columbia/ Clatskanie	Plympton Creek	1708000306	2	2	2	1	1	2	10	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a very high level of viability. PCEs are extensive in this HUC5 and the majority of habitat supporting this population is located here and in the adjacent Clatskanie River HUC5.	High	
Upper Cowlitz	Headwaters Cowlitz River	1708000401	1	2	1	1	1	2	8	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. PCEs are very limited in this HUC5 compared to other watersheds downstream.	Medium	
Upper Cowlitz	Upper Cowlitz River	1708000402	2	1	2	1	2	2	10	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. Coho access this watershed via a trap and haul program. The CHART noted that PCEs are still fairly extensive in this HUC5 and the historical production from this population was some of the highest in the DPS.	High	High

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Scoring System (factors)						Total HUC5 Score (0-18)	Comments/Other Considerations	CHART Rating of HUC5 Conservation Value	Rating of Connect-ivity Corridor
			1	2	3	4	5	6				
Upper Cowlitz	Cowlitz Valley Frontal	1708000403	2	1	2	1	2	2	10	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. Coho access this watershed via a trap and haul program. The CHART noted that PCEs are still fairly extensive in this HUC5 and the historical production from this population was some of the highest in the DPS.	High	High
Upper Cowlitz	Upper Cispus River	1708000404	2	2	2	1	2	2	11	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. Coho access this watershed via a trap and haul program. The CHART noted that PCEs are still fairly extensive in this HUC5 and the historical production from this population was considerable.	High	
Upper Cowlitz	Lower Cispus River	1708000405	2	2	2	1	2	2	11	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. Coho access this watershed via a trap and haul program. The CHART noted that PCEs are still fairly extensive in this HUC5 and the historical production from this population was considerable.	High	High
Lower Cowlitz	Tilton River	1708000501	2	1	2	1	1	2	9	Moderate HUC5 score. PCEs support a population that is expected to play a lesser, stabilizing role in recovery with a only a very low level of viability. Coho access this watershed via a trap and haul program. PCEs are more degraded here than in other adjacent watersheds in the upper Cowlitz River basin.	Medium	

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Scoring System (factors)						Total HUC5 Score (0-18)	Comments/Other Considerations	CHART Rating of HUC5 Conservation Value	Rating of Connect-ivity Corridor
			1	2	3	4	5	6				
Lower Cowlitz	Riffe Reservoir	1708000502	1	1	1	1	1	2	7	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. Coho access this watershed via a trap and haul program. Tributary PCEs are significantly degraded due to inundation by the reservoir. This HUC5 is important primarily as a rearing/migration corridor for juveniles from upstream spawning areas for the Cispus River and Upper Cowlitz River populations.	Low	High
Lower Cowlitz	Jackson Prairie	1708000503	3	1	2	3	2	2	13	High HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. Tributary PCEs, although degraded, are still very extensive in this HUC5. The CHART noted that this population could be considered an archetype for the late-run (Type N) coho stock.	High	High
Lower Cowlitz	North Fork Toutle River	1708000504	1	1	2	3	2	2	11	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. The CHART noted that this population (North Fork Toutle) could be considered an archetype for the early-run (Type S) coho stock, and may show some resilience to catastrophic/volcanic sediment loads. The CHART also noted that historical production from this population was considerable.	High	

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Scoring System (factors)						Total HUC5 Score (0-18)	Comments/Other Considerations	CHART Rating of HUC5 Conservation Value	Rating of Connect-ivity Corridor
			1	2	3	4	5	6				
Lower Cowlitz	Green River	1708000505	2	1	2	3	2	2	12	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. The CHART noted that this population (North Fork Toutle) could be considered an archetype for the early-run (Type S) coho stock, and may show some resilience to catastrophic/volcanic sediment loads. The CHART also noted that PCEs are still fairly extensive in this HUC5 and the historical production from this population was considerable.	High	
Lower Cowlitz	South Fork Toutle River	1708000506	2	1	2	3	2	3	13	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. The CHART noted that this population (South Fork Toutle) could be considered an archetype for the early-run (Type S) coho stock, and may show some resilience to catastrophic/volcanic sediment loads. The CHART also noted that PCEs are still fairly extensive in this HUC5 and the historical production from this population was considerable.	High	
Lower Cowlitz	East Willapa	1708000507	3	1	2	3	3	3	15	High HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. Tributary PCEs, although degraded, are still very extensive in this HUC5. The CHART noted that this population (Lower Cowlitz River) could be considered an archetype for the late-run (Type N) coho stock.	High	High

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Scoring System (factors)						Total HUC5 Score (0-18)	Comments/Other Considerations	CHART Rating of HUC5 Conservation Value	Rating of Connect-ivity Corridor
			1	2	3	4	5	6				
Lower Cowlitz	Coweeman	1708000508	3	1	2	2	2	3	13	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. Tributary PCEs are still extensive in this HUC5 and the CHART noted that there has been relatively little hatchery fish influence on this population (Coweeman).	High	High
Lower Columbia	Youngs River	1708000601	3	1	2	1	2	3	12	Moderate HUC5 score. PCEs support a population that is expected to play a lesser, stabilizing role in recovery with only a very low level of viability. The CHART did not identify any low-value watersheds in the Coast Stratum due to the limited number of HUC5s supporting coho here.	Medium	
Lower Columbia	Big Creek	1708000602	3	2	2	2	2	3	14	Moderate HUC5 score. PCEs support a population that is expected to play a lesser, stabilizing role in recovery with only a very low level of viability. The CHART did not identify any low-value watersheds in the Coast Stratum due to the limited number of HUC5s supporting coho here.	Medium	
Lower Columbia	Grays Bay	1708000603	3	1	2	1	2	3	12	High HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a high level of viability. PCEs are extensive in this HUC5, which is the only watershed supporting this population.	High	
Middle Willamette	Abernethy Creek	1709000704	1	1	2	3	0	2	9	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a very high level of viability. However, the PCEs are much more limited in this HUC5 relative to the adjacent Clackamas River watersheds supporting this population.	Low	

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Scoring System (factors)						Total HUC5 Score (0-18)	Comments/Other Considerations	CHART Rating of HUC5 Conservation Value	Rating of Connect-ivity Corridor
			1	2	3	4	5	6				
Clackamas	Collawash River	1709001101	1	3	3	3	2	2	14	High HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a very high level of viability. This is one of only two populations in the entire DPS that is not at high risk or possibly extinct.	High	
Clackamas	Upper Clackamas River	1709001102	3	3	3	3	2	2	16	High HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a very high level of viability. This is one of only two populations in the entire DPS that is not at high risk or possibly extinct.	High	
Clackamas	Oak Grove Fork Clackamas River	1709001103	1	2	2	3	2	2	12	High HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a very high level of viability. This is one of only two populations in the entire DPS that is not at high risk or possibly extinct.	High	
Clackamas	Middle Clackamas River	1709001104	2	2	1	3	3	2	13	High HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a very high level of viability. This is one of only two populations in the entire DPS that is not at high risk or possibly extinct.	High	High
Clackamas	Eagle Creek	1709001105	2	2	2	3	1	2	12	High HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a very high level of viability. This is one of only two populations in the entire DPS that is not at high risk or possibly extinct.	High	
Clackamas	Lower Clackamas River	1709001106	3	1	2	3	3	2	14	High HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a very high level of viability. This is one of only two populations in the entire DPS that is not at high risk or possibly extinct.	High	High

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Scoring System (factors)						Total HUC5 Score (0-18)	Comments/Other Considerations	CHART Rating of HUC5 Conservation Value	Rating of Connect-ivity Corridor
			1	2	3	4	5	6				
Lower Willamette	Johnson Creek	1709001201	2	1	2	3	1	2	11	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a very high level of viability. This is one of only two populations in the entire DPS that is not at high risk or possibly extinct. Other HUC5s in the Clackamas River basin contain the majority of spawning habitat for this population. However, the CHART noted that this HUC5 may provide important refuge habitat for Clackamas River coho and it's more urbanized setting may promote unique adaptations.	High	High
Lower Willamette	Scappoose Creek	1709001202	3	1	2	1	2	2	11	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a very high level of viability. This is one of only two populations in the entire DPS that is not at high risk or possibly extinct. Relative to the other HUC5 supporting the Scappoose population (Clatskanie River HUC5), PCEs are more extensive in this watershed and it contains the majority of spawning habitat for this population.	High	High
Lower Willamette	Columbia Slough/ Willamette River	1709001203	1	0	2	3	2	2	10	Moderate HUC5 score. PCEs support a population that is expected to play a primary role in recovery with a very high level of viability. This is one of only two populations in the entire DPS that is not at high risk or possibly extinct. There is likely little or no spawning in the tributaries of this HUC5, however the off-channel habitat is particularly important for rearing and migrating juvenile coho.	Medium	High

Subbasin	Watershed	Area/ Watershed (HUC5) Code	Scoring System (factors)						Total HUC5 Score (0-18)	Comments/Other Considerations	CHART Rating of HUC5 Conservation Value	Rating of Connect-ivity Corridor
			1	2	3	4	5	6				
Multiple	Lower Columbia Corridor (Sandy/ Washougal to Ocean)	NA	-	-	-	-	-	-	Not scored	Area not scored since many reaches are outside HUC5 boundaries. However, the CHART concluded that rearing and migration PCEs throughout this corridor are highly essential to ESU conservation.		High

Figure A1. Populations and Strata Identified for Lower Columbia River Coho Salmon (see NMFS 2012)

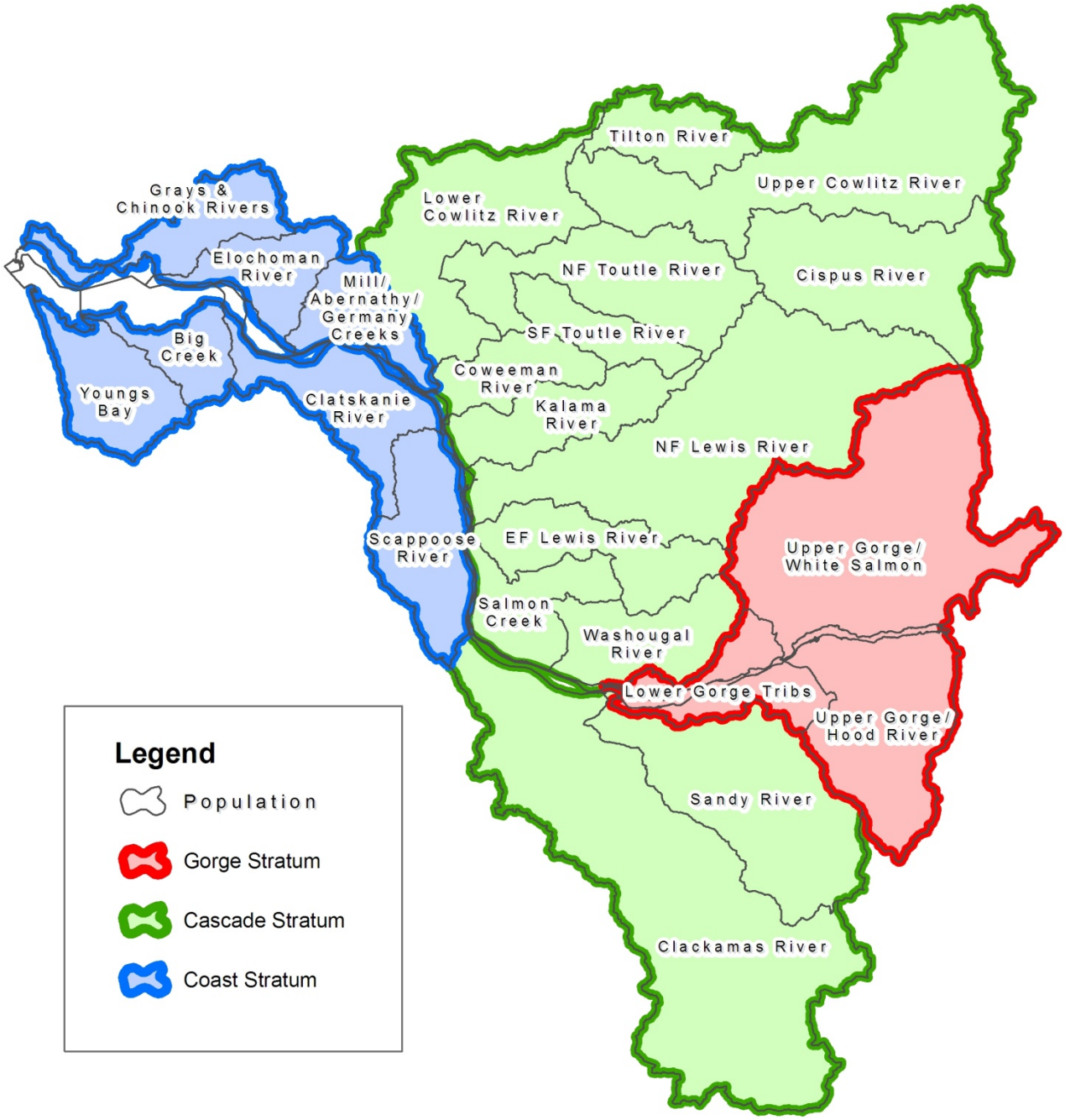
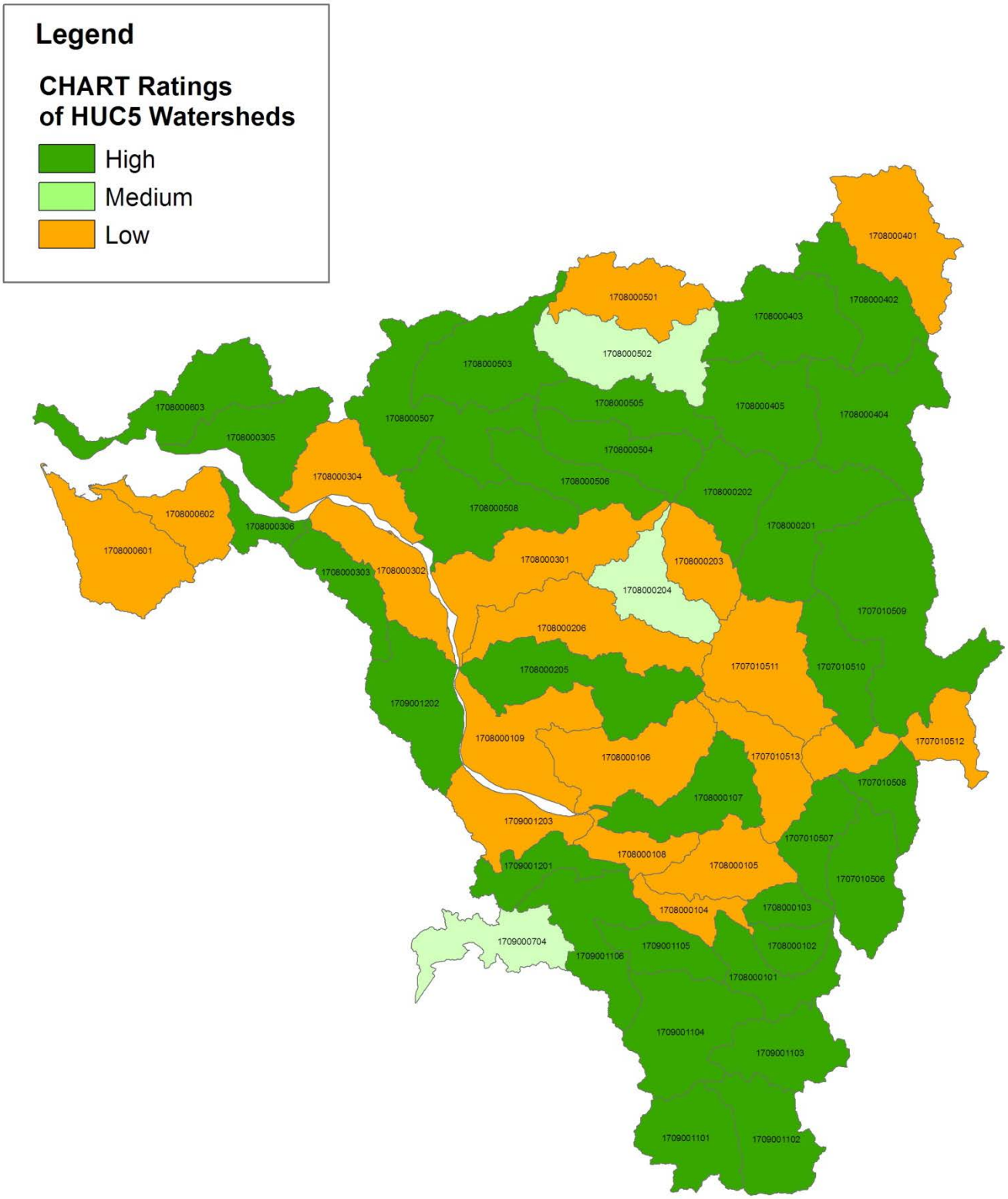
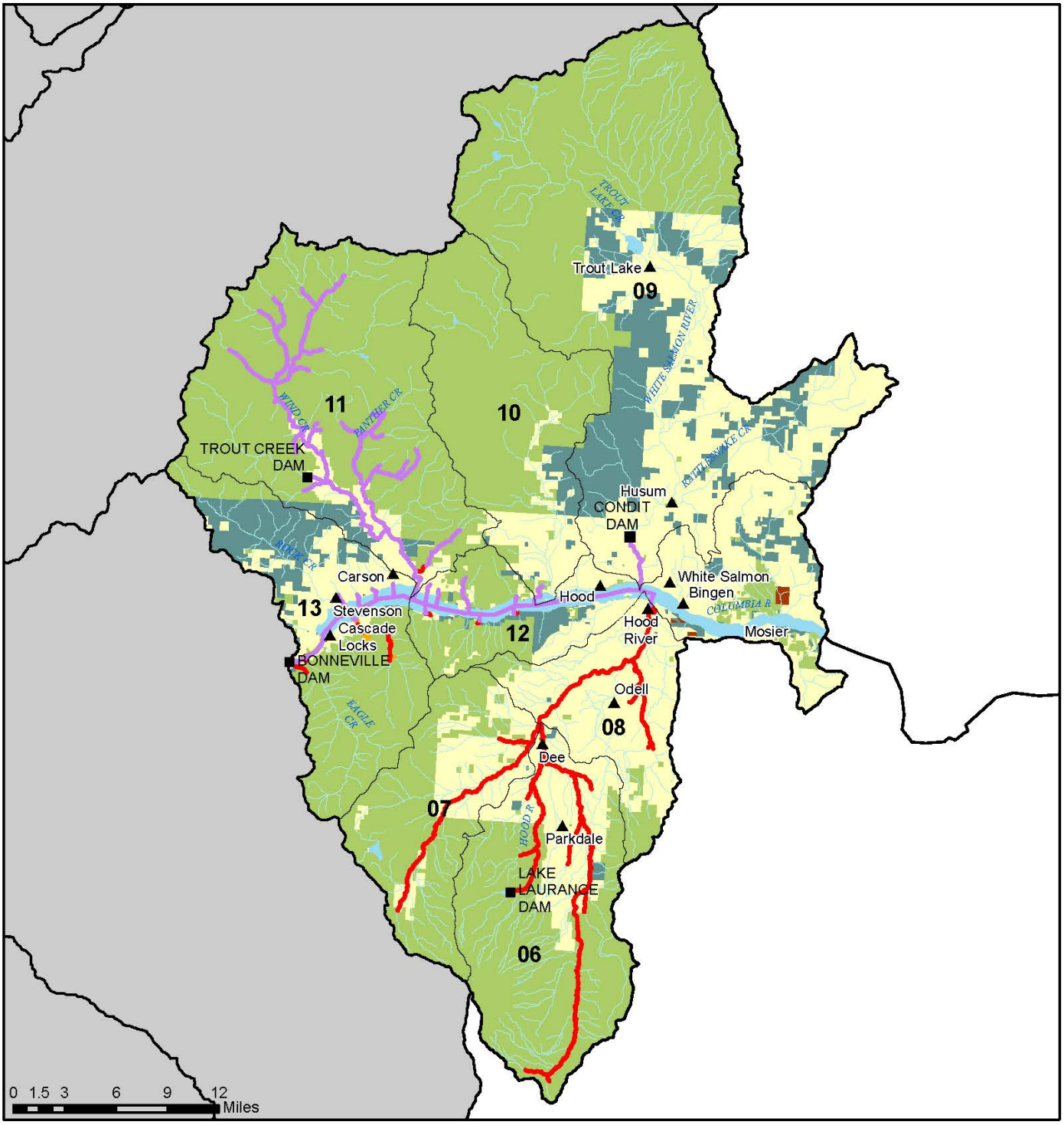


Figure A2. CHART Ratings of Conservation Value for Habitat Areas in HUC5 Watersheds Occupied by the Lower Columbia River Coho Salmon DPS



Maps A1 through A10. Lower Columbia River Coho Salmon DPS – Habitat Areas Under Consideration for Critical Habitat Designation (note: the lower Columbia River corridor is not shown as a separate map but is under consideration as described in the text of Appendix A)



Lower Columbia River Coho Distribution

Middle Columbia-Hood Subbasin 17070105

Map A1

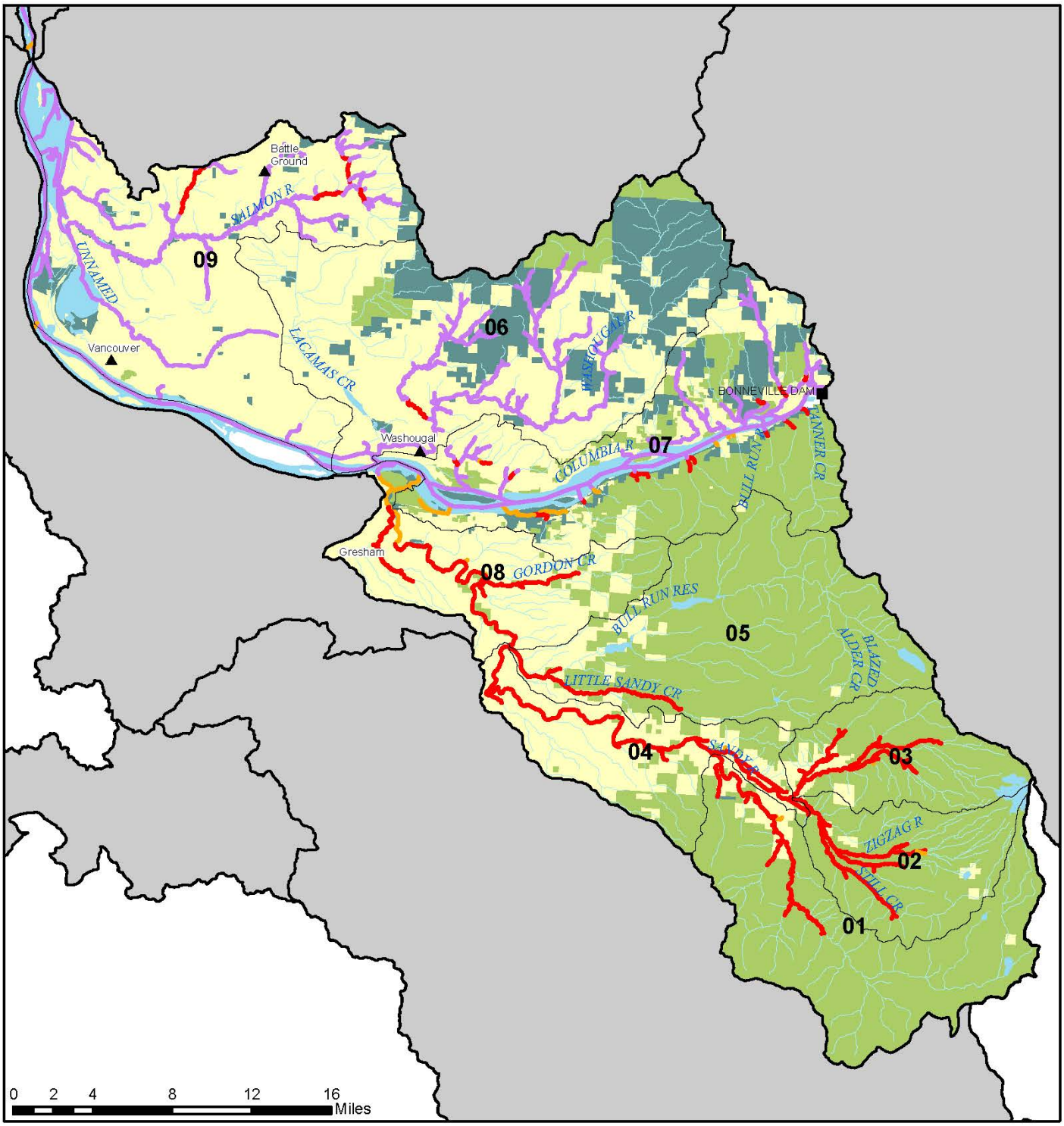
N

The watershed code is the subbasin number with the two digit watershed code appended to the end (i.e., Subbasin = 1711007, watershed = 171100701)

Note: This map is for general reference only

Legend

- Cities
- Dams/Barriers
- Streams (1:100,000)
- Migration/Presence
- Spawning/Rearing
- Rearing/Migration
- Watersheds
- Private
- Federal
- State/Local
- Tribal



Lower Columbia River Coho Distribution

Lower Columbia-Sandy Subbasin 17080001

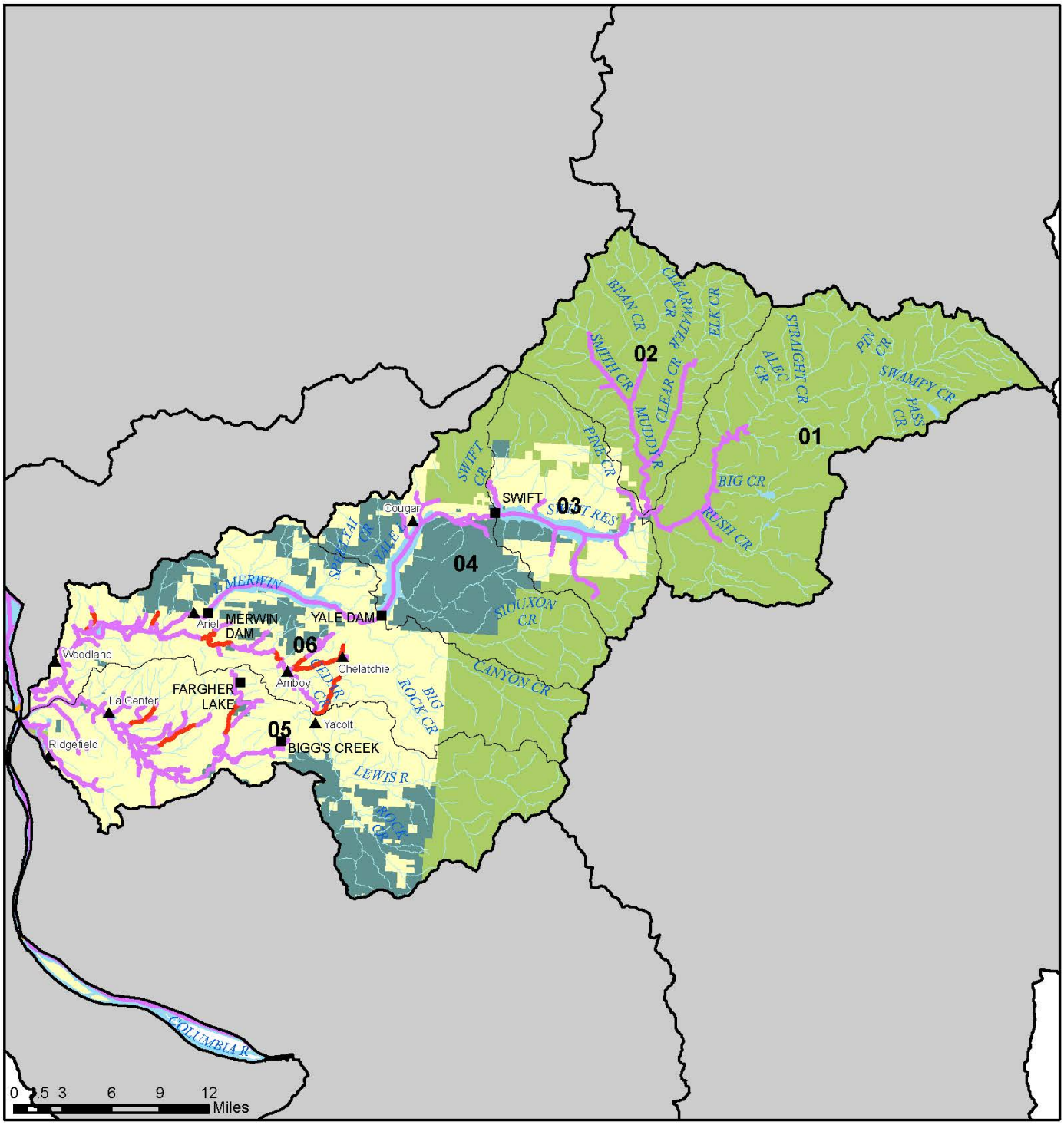
Map A2

The watershed code is the subbasin number with the two digit watershed code appended to the end (i.e., Subbasin = 1711007, watershed = 171100701)

Note: This map is for general reference only

Legend

- Cities
- Dams/Barriers
- Streams (1:100,000)
- Migration/Presence
- Spawning/Rearing
- Rearing/Migration
- Watersheds
- Private
- Federal
- State/Local
- Tribal



Lower Columbia River Coho Distribution

Lewis Subbasin17080002

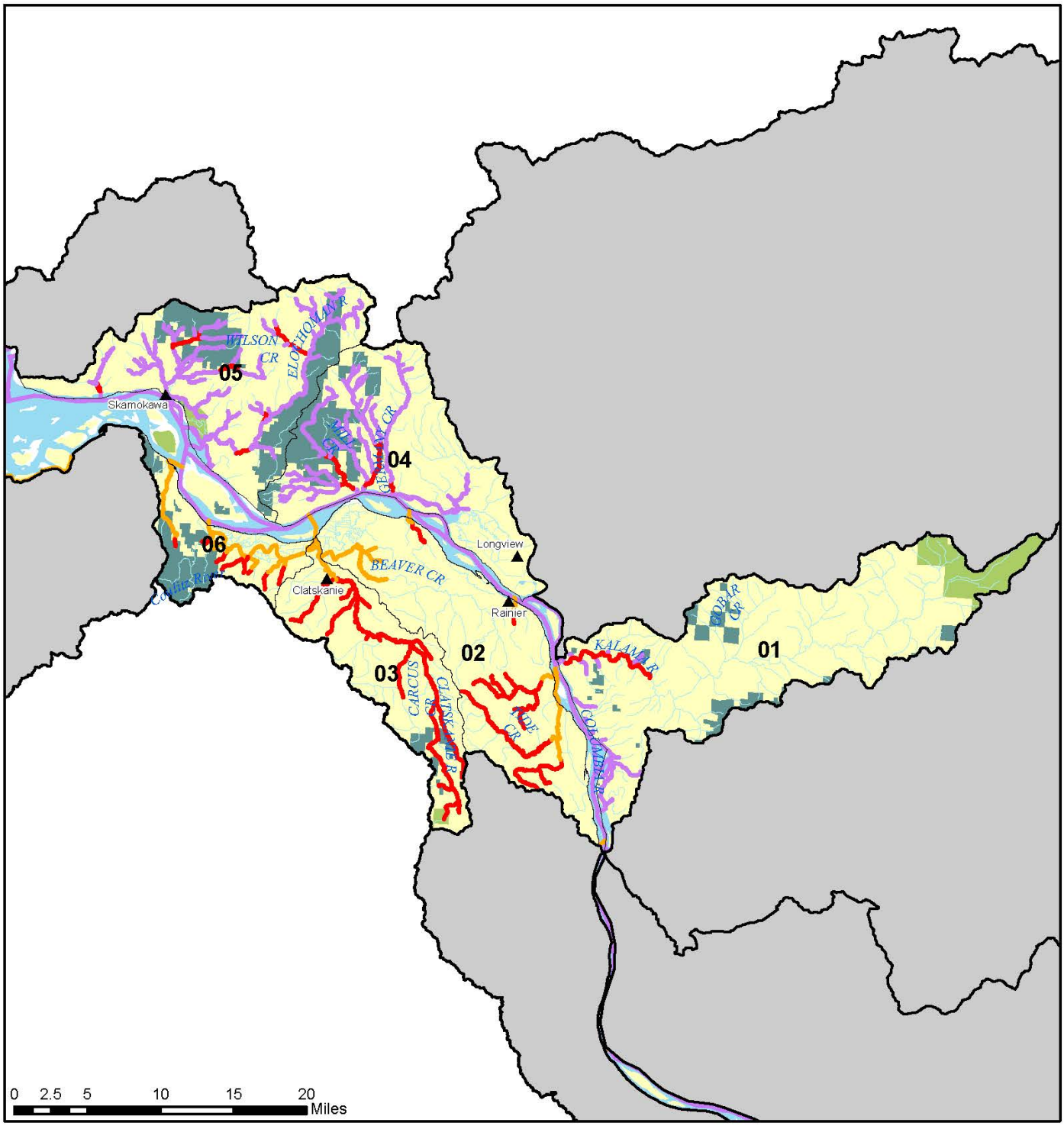
Map A3

The watershed code is the subbasin number with the two digit watershed code appended to the end (i.e., Subbasin = 1711007, watershed = 171100701)

Note: This map is for general reference only

Legend

- Cities
- Streams (1:100,000)
- Migration/Presence
- Spawning/Rearing
- Rearing/Migration
- Watersheds
- Private
- Federal
- State/Local
- Tribal



N

Lower Columbia River Coho Distribution

Lower Columbia-Clatskanie Subbasin 17080003

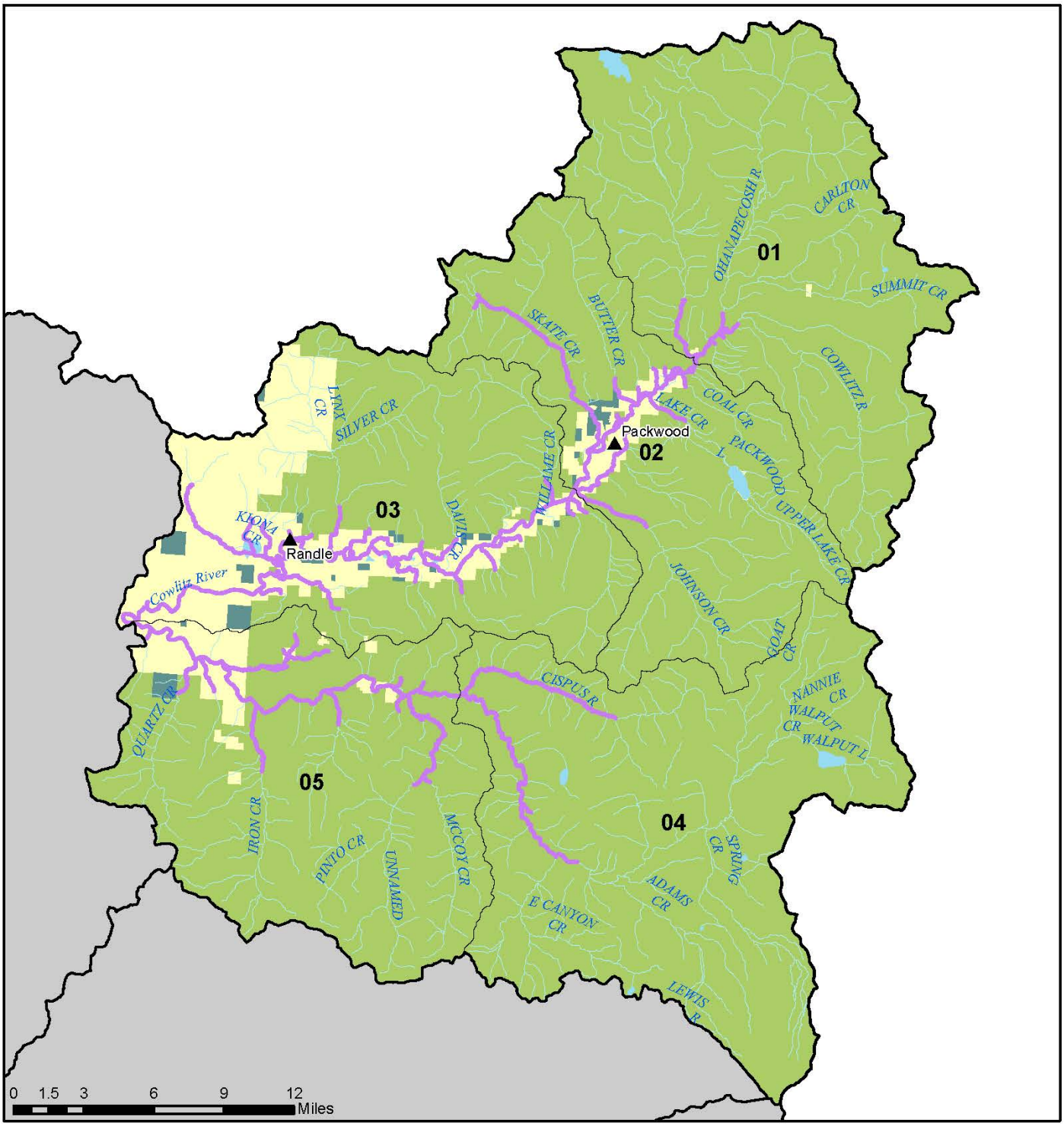
Map A4

The watershed code is the subbasin number with the two digit watershed code appended to the end (i.e., Subbasin = 1711007, watershed = 171100701)

Note: This map is for general reference only

Legend

- Cities
- Dams/Barriers
- Streams (1:100,000)
- Migration/Presence
- Spawning/Rearing
- Rearing/Migration
- Watersheds
- Private
- Federal
- State/Local
- Tribal



Lower Columbia River Coho Distribution

Upper Cowlitz Subbasin 17080004

Map A5

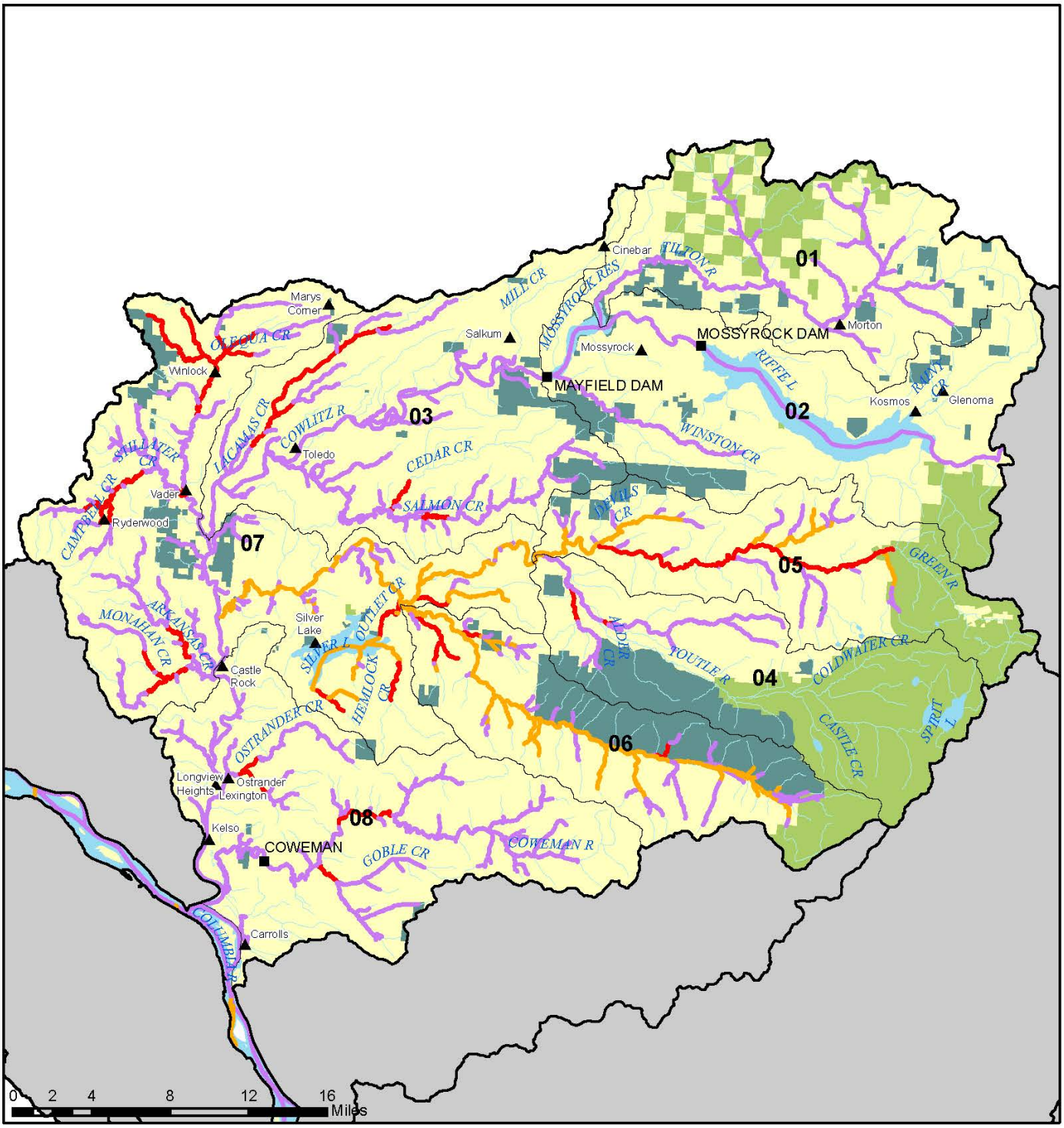
N

The watershed code is the subbasin number with the two digit watershed code appended to the end (i.e., Subbasin = 1711007, watershed = 171100701)

Note: This map is for general reference only

Legend

- Cities
- Dams/Barriers
- Streams (1:100,000)
- Migration/Presence
- Spawning/Rearing
- Rearing/Migration
- Watersheds
- Private
- Federal
- State/Local
- Tribal



Lower Columbia River Coho Distribution

Cowlitz Subbasin 17080005

Map A6

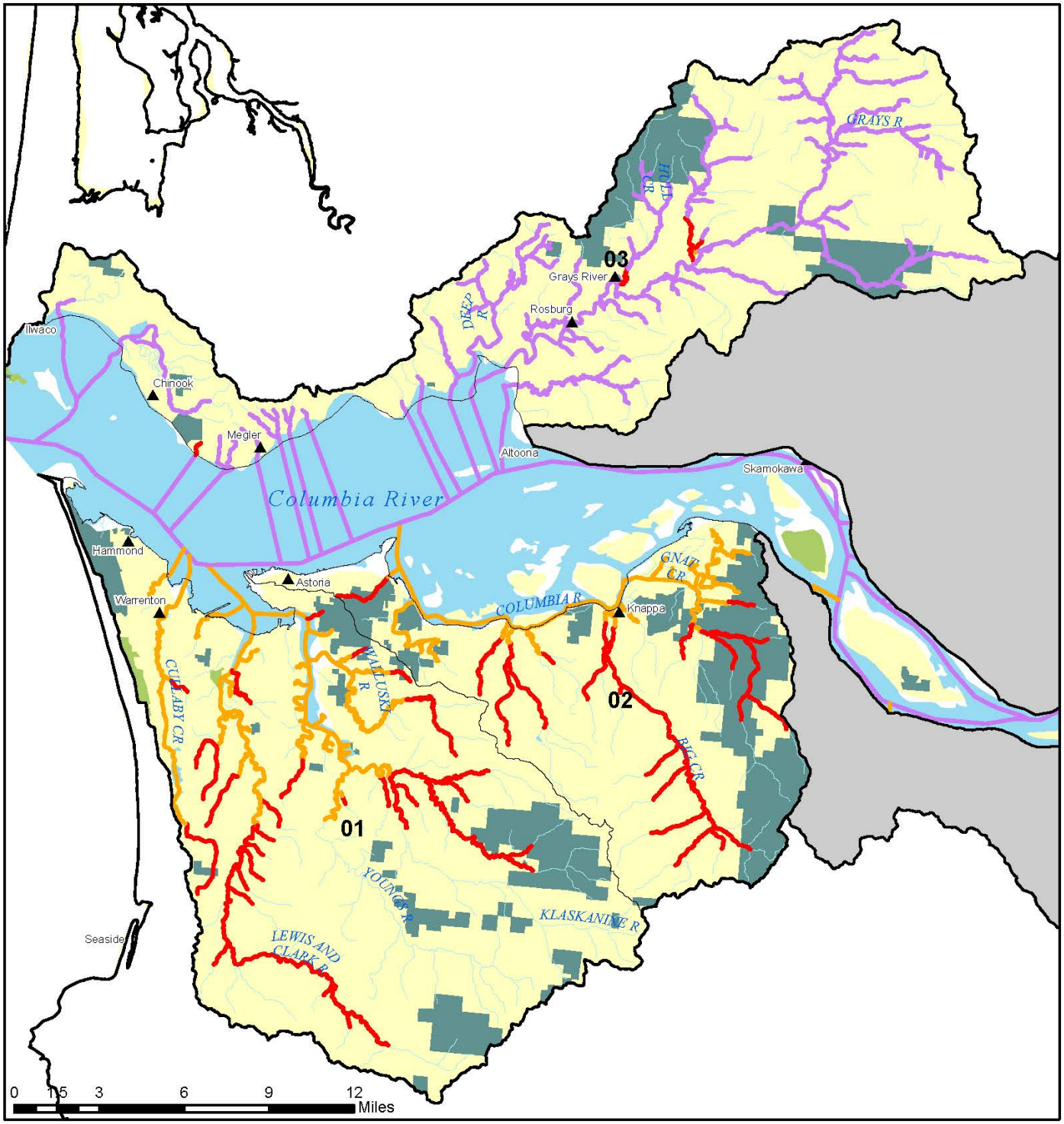
N

The watershed code is the subbasin number with the two digit watershed code appended to the end (i.e., Subbasin = 1711007, watershed = 171100701)

Note: This map is for general reference only

Legend

- Cities
- Streams (1:100,000)
- Migration/Presence
- Spawning/Rearing
- Rearing/Migration
- Watersheds
- Private
- Federal
- State/Local
- Tribal



Lower Columbia River Coho Distribution

Lower Columbia Subbasin 17080006

Map A7

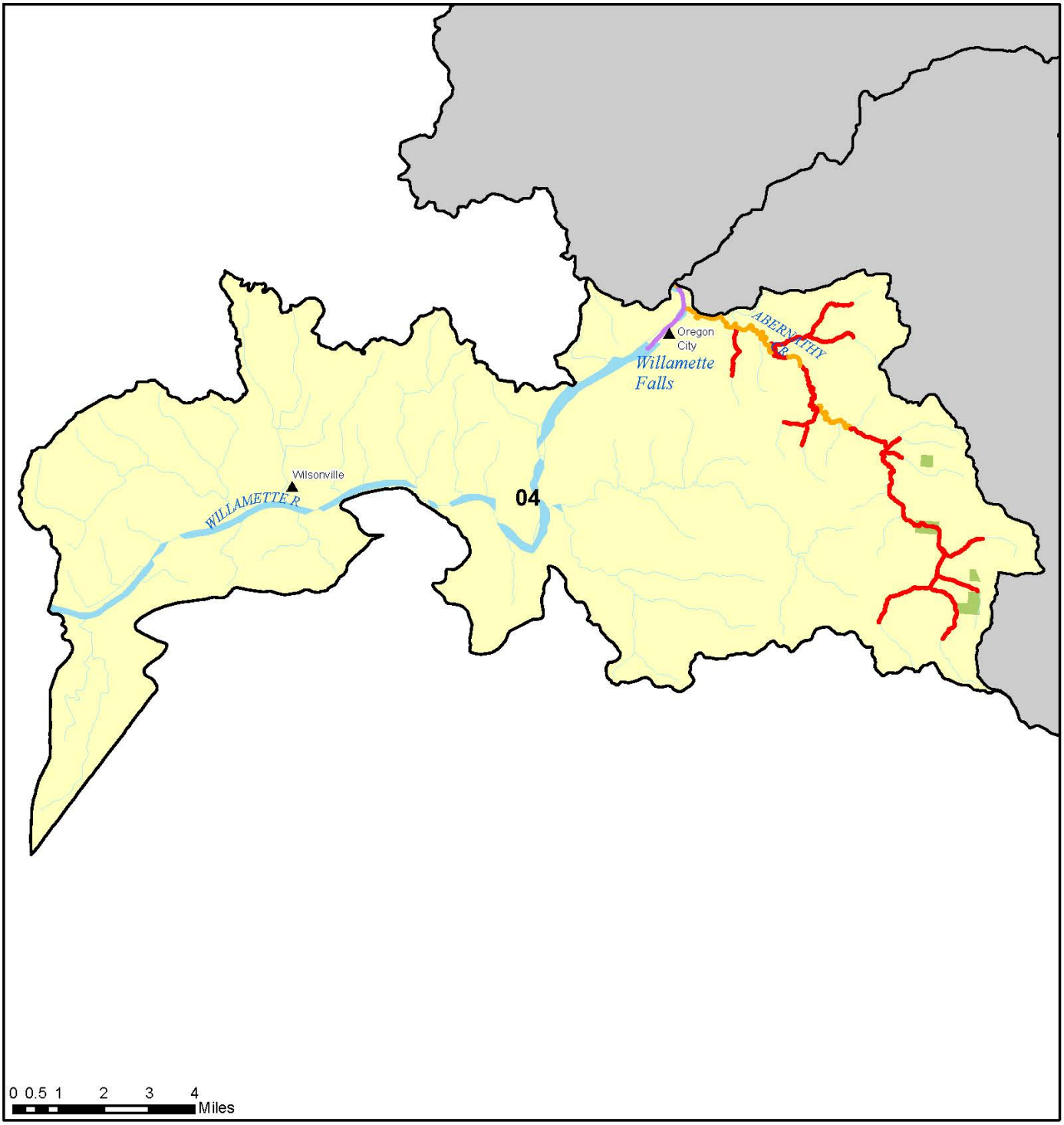
N

The watershed code is the subbasin number with the two digit watershed code appended to the end (i.e., Subbasin = 1711007, watershed = 171100701)

Note: This map is for general reference only

Legend

- Cities
- Dams/Barriers
- Streams (1:100,000)
- Migration/Presence
- Spawning/Rearing
- Rearing/Migration
- Watersheds
- Private
- Federal
- State/Local
- Tribal



Lower Columbia River Coho Distribution

Middle Willamette Subbasin 17090007

Map A8

The watershed code is the subbasin number with the two digit watershed code appended to the end (i.e., Subbasin = 1711007, watershed = 171100701)

Note: This map is for general reference only

Legend

- Cities
- Dams/Barriers
- Streams (1:100,000)
- Migration/Presence
- Spawning/Rearing
- Rearing/Migration
- Watersheds
- Private
- Federal
- State/Local
- Tribal

Lower Columbia River Coho Distribution

Clackamas Subbasin 17090011

Map A9

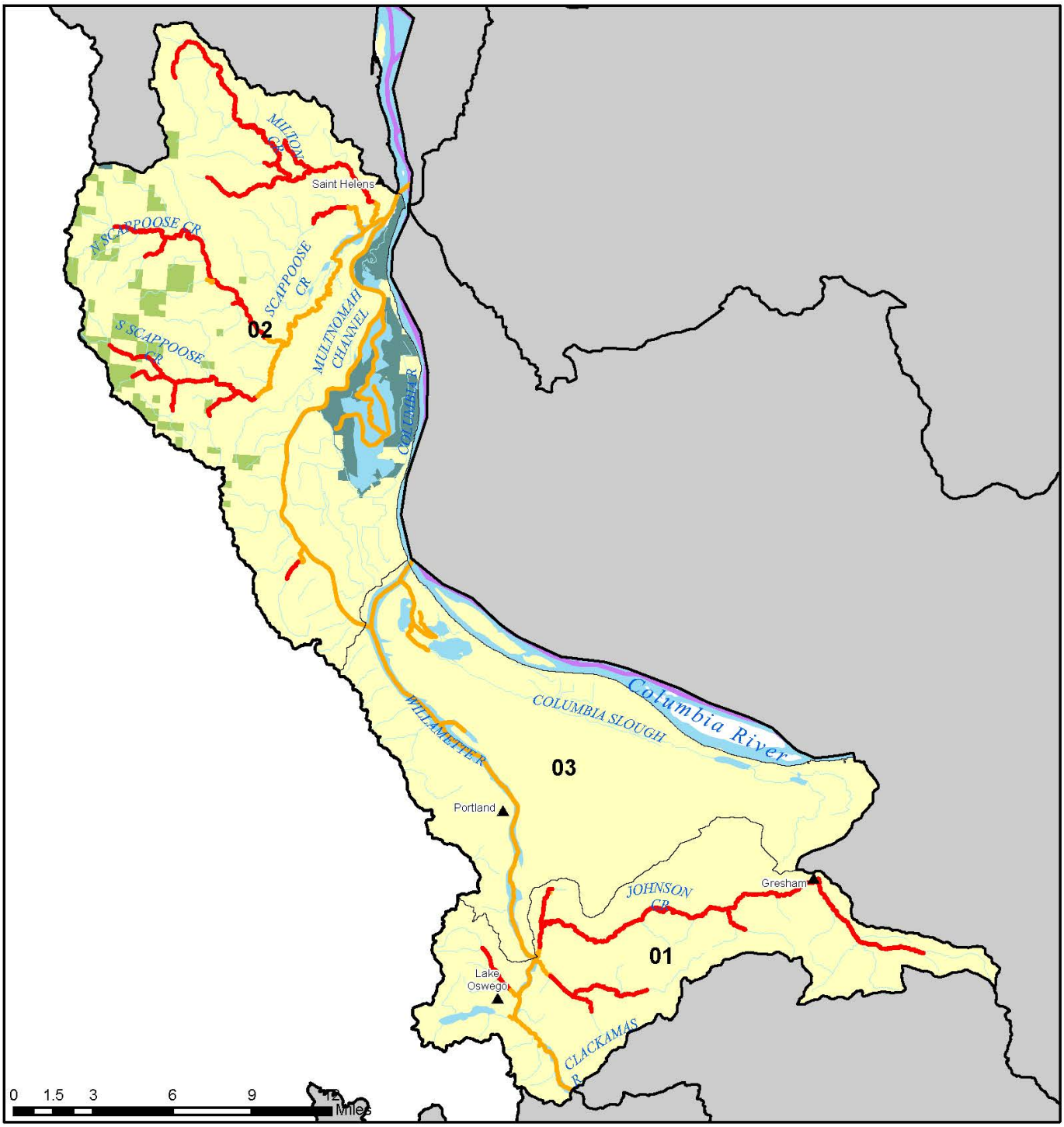
N

The watershed code is the subbasin number with the two digit watershed code appended to the end (i.e., Subbasin = 1711007, watershed = 171100701)

Note: This map is for general reference only

Legend

- Cities
- Dams/Barriers
- Streams (1:100,000)
- Migration/Presence
- Spawning/Rearing
- Rearing/Migration
- Watersheds
- Private
- Federal
- State/Local
- Tribal



N

Lower Columbia River Coho Distribution

Lower Willamette Subbasin 17090012

Map A10

The watershed code is the subbasin number with the two digit watershed code appended to the end (i.e., Subbasin = 1711007, watershed = 171100701)

Note: This map is for general reference only

Legend

- Cities
- Dams/Barriers
- Streams (1:100,000)
- Migration/Presence
- Spawning/Rearing
- Rearing/Migration
- Watersheds
- Private
- Federal
- State/Local
- Tribal