

5.5 Lower Chehalis River Ecological Region

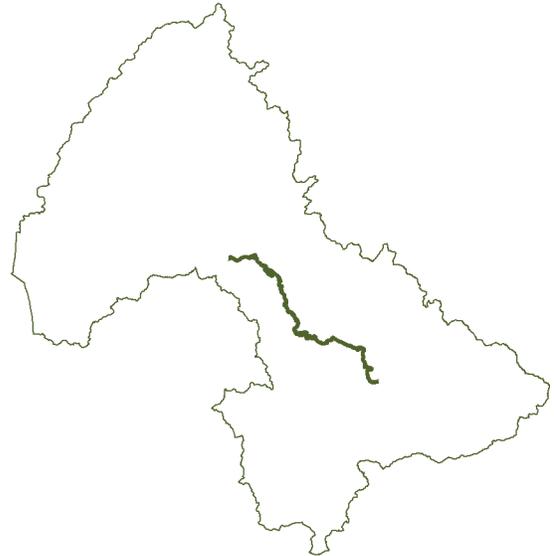
5.5.1 Overview

The Lower Chehalis River Ecological Region encompasses the mainstem Chehalis River and its floodplain from approximately RM 67 (Skookumchuck River confluence) to RM 20 (Satsop River confluence; Figure 5-9). This ecological region encompasses 28 square miles (nearly 18,000 acres) and represents slightly over 1% of the overall Chehalis Basin. The entire ecological region is low-elevation alluvial valley ranging from about 180 feet in elevation in Centralia to about 80 feet in elevation near the Satsop River confluence.

The lower Chehalis River floodplain geology is predominantly recent alluvium; however, there is more influence from the glacial outwash deposits, with coarse-grained deposits from the Skookumchuck River confluence to the Black River confluence (Gendaszek 2011).

Precipitation in this ecological region is dominated by rainfall; average annual precipitation varies from 50 to 75 inches in the Lower Chehalis River Ecological Region down to the town of Elma and up to 100 inches below Elma (Gendaszek 2011).

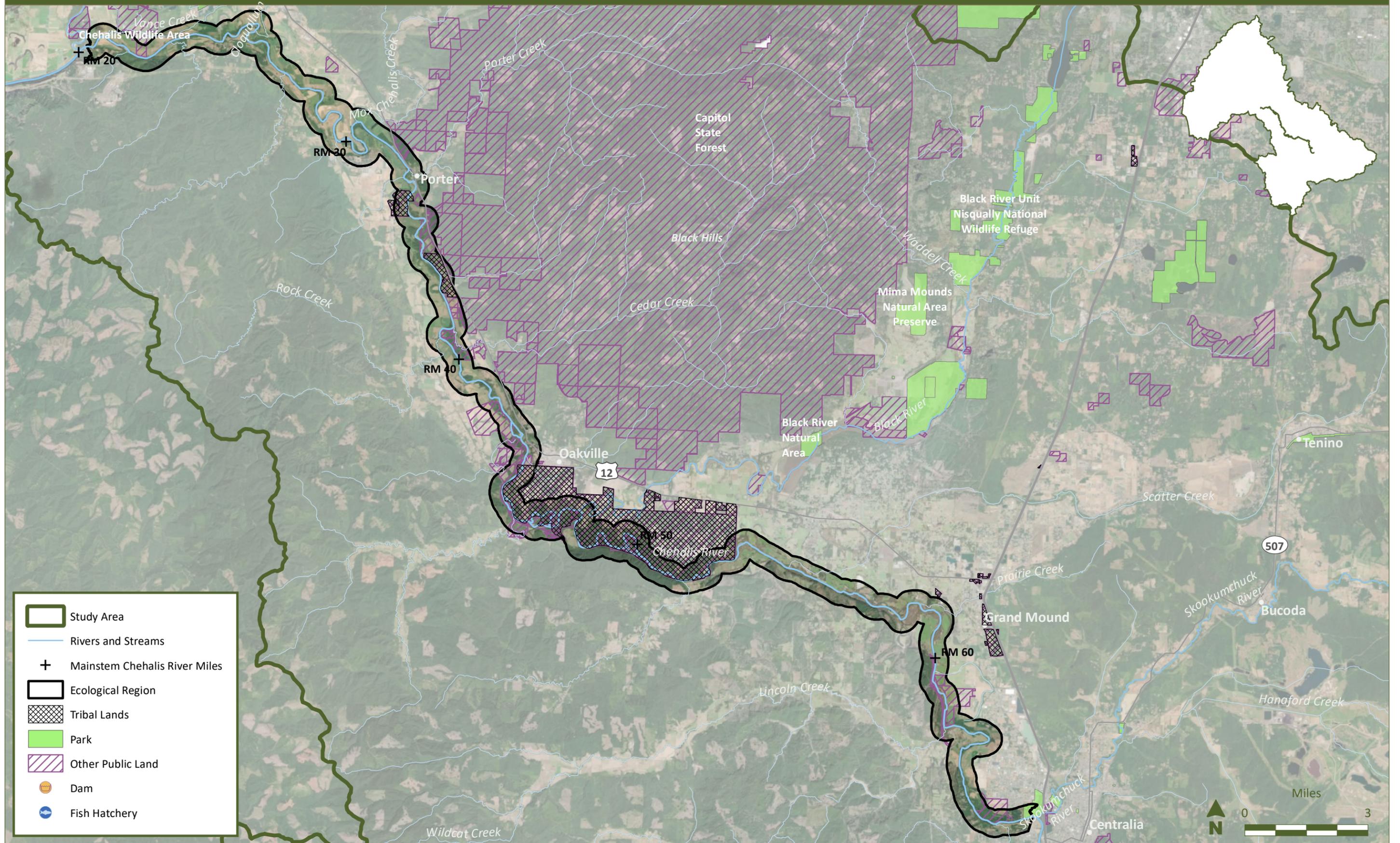
The Lower Chehalis River Ecological Region is primarily within Grays Harbor County (11,906 acres, or 66%), with smaller portions in Thurston County (3,656 acres, or 20%) and Lewis County (2,360 acres, or 13%). This ecological region includes the portion of the Chehalis River between Centralia and just past Elma. The Chehalis Reservation is located along approximately 10 miles of the Lower Chehalis River, and the Chehalis Tribe also owns additional key floodplain and river habitats downstream of the reservation. Cities and towns in this ecological region include Grand Mound, Oakville, Rochester, Porter, and Elma.



Important Features and Functions

- The Chehalis River has the highest densities of coho salmon per area of watershed, which is related to the abundance of overwintering habitat naturally provided in the wide and meandering floodplain. It also has the highest densities of native stillwater-breeding amphibians and native non-salmonid fish.
- Migratory fish from all sub-basins above the tidal areas pass through this region, making its ecological function more impactful to large areas.
- The floodplain is extensive along the river's mainstem through the Lower Chehalis River Ecological Region, which could present numerous opportunities for floodplain reconnection.
- This area has the largest number of diverse off-channel habitats of all the ecological regions.

Figure 5-9
Lower Chehalis River Ecological Region Map



Aerial Photo Source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

5.5.2 Historical Conditions and Changes

Historical records for pre-Euro-American settlement conditions are not available, but available historical records and maps indicate that the Lower Chehalis River Ecological Region below the Skookumchuck River was dominated by wetlands, prairies, brush, and timber. GLO maps show a major channel change of the river downstream of Ford's Prairie and extensive wetlands alongside both the old and new channels. A large sand island was noted adjacent to the Chehalis Reservation, along with numerous sand and gravel bars along the river. A very lengthy disconnected slough was shown in the floodplain in the vicinity of Mox Chehalis Creek, and two large wetland complexes were shown associated with Vance and Newman creeks in the Chehalis River floodplain. This implies frequent connectivity between the river and its floodplain wetlands.

Key changes that occurred in the Lower Chehalis River Ecological Region following Euro-American settlement were timber removal and agricultural development throughout the floodplain and gravel removal in both the channel and floodplain. Most of the agricultural development occurred prior to 1938. The Pierce et al. (2017) study of floodplain land cover changes indicates that agricultural development continued at a slower rate from 1938 through the mid-1970s at a rate of approximately 33 acres per year converted to agriculture and a loss of 67 acres per year of forest canopy. Since the 1970s, there has been a slow decline in agricultural acreage (a loss of 14 acres per year) but an increase in forest canopy (a gain of 19 acres per year). There was limited development in the floodplain during both periods. The modeling conducted by NOAA (Beechie 2018) for the ASRP indicated significant losses in marsh and beaver pond habitats in the lower Chehalis River floodplain from historical conditions to current (losses of about 50% and 60%, respectively).

To support the ASRP analysis and EDT modeling efforts, the SRT developed assumptions of the channel lengths and areas of floodplain habitat that were likely to be present in historical conditions. These assumptions were based on the GLO mapping from the late 1800s, more recent historical aerial photographs, and interpretation of current LiDAR data that show numerous remnant channels and other floodplain features. The lower Chehalis River is unconfined and low gradient within a wide alluvial valley. Compared to historical conditions, the river channel length does not appear to be significantly reduced, but side channels would have historically been far more prevalent, and the river would have had 5 or more times the area of frequently connected floodplain. Large wood has been removed, and the forested riparian zone is very narrow.

5.5.3 Current Conditions

In the Lower Chehalis River Ecological Region, land cover is 34% agriculture, 24% deciduous forest, 8% wetland, 7% developed, 5% prairie oak, 5% shrub, 4% coniferous forest, 3% grassland, and small percentages of other cover¹⁹ (Figure 5-10). Significant areas of forested floodplain are present on the Chehalis Reservation.

Lower Chehalis River Current Snapshot

Condition of Watershed Processes:

Hydrology – impaired
Floodplain connectivity – impaired
Riparian condition – impaired
Water quality – impaired

Restoration Potential: High

Protection Potential: Moderate

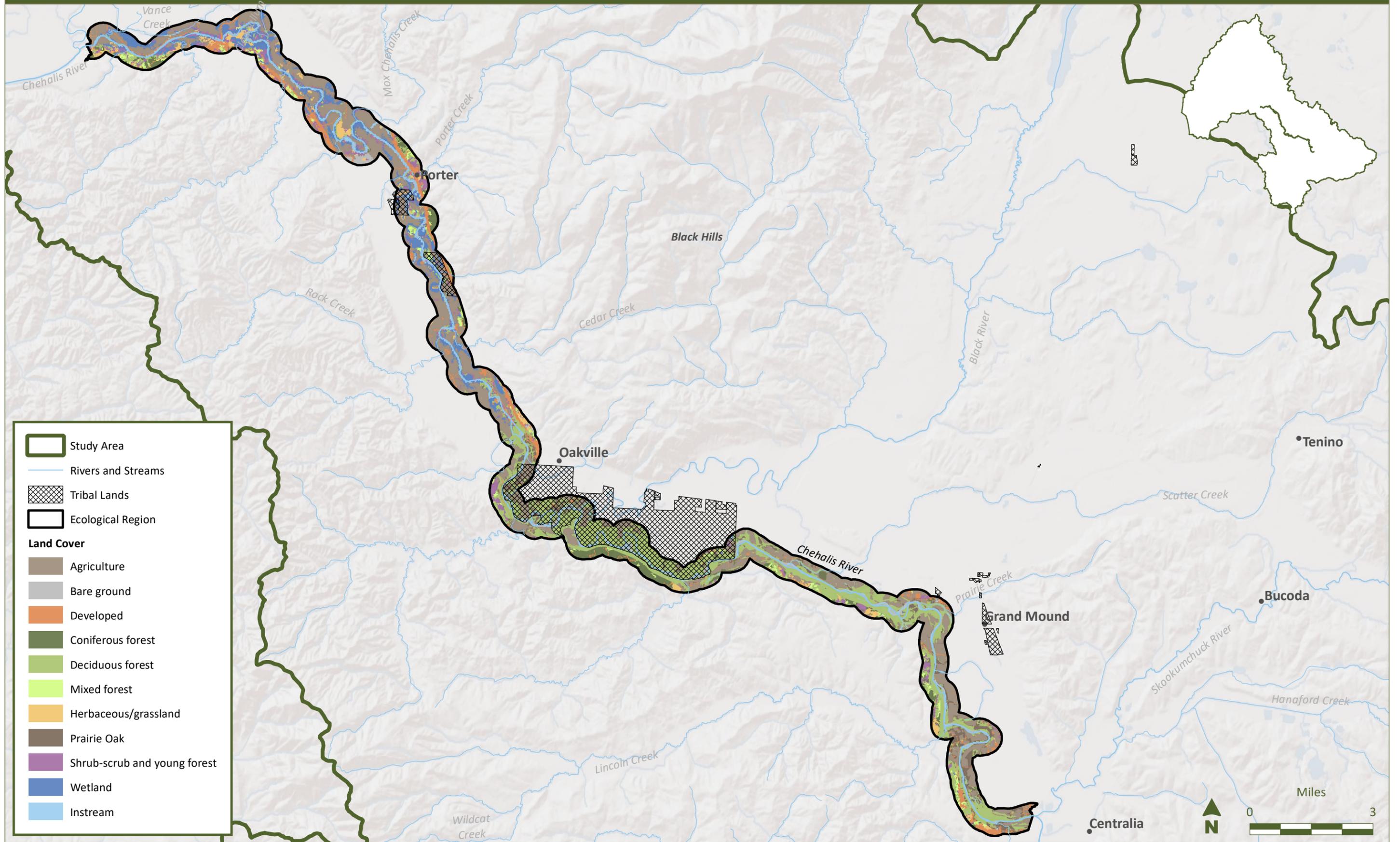
Geographic Spatial Units: Chehalis River
Mainstem Reaches: Skookumchuck River,
Skookumchuck River to Black River, Black River
to Porter, and Porter to Satsop

Salmon Use and Potential: Fall- and spring-run
Chinook salmon, coho salmon, chum salmon,
and steelhead

Non-Salmon Use and Potential: Western toad,
northern red-legged frog, North American
beaver, Olympic mudminnow, largescale sucker,
mountain whitefish, Pacific lamprey, riffle and
reticulate sculpin, speckled dace, Western
ridged mussel, great blue heron, Barrow's
goldeneye, common goldeneye, and wood duck

¹⁹ Land cover data from Multi-Resolution Land Characteristics Consortium, National Land Cover Database 2011, augmented by WDFW Habitat Guild 2015 floodplain data where available.

Figure 5-10
Lower Chehalis River Ecological Region Land Cover



Base flows have been established for the lower Chehalis River (165 cfs at Grand Mound and 260 cfs at Porter from August 15 to September 15; WAC 173-522-020). If base flows drop below the required minimums, junior water rights holders can be required to curtail water withdrawals. In 2007, the first curtailment requests were made by Ecology. Similar requests were made in 2013 and each year between 2015 (Gallagher 2015) and 2019.

Water quality is impaired in in the Lower Chehalis River Ecological Region for temperature, low dissolved oxygen, and bacteria, although dioxins and invasive species are also listed as impairments (Ecology 2018). Recent temperature monitoring at RMs 28.6 and 42.2 by Ecology indicates that temperatures regularly exceed water quality standards (16°C [61°F] core summer salmonid habitat) from May through September and typically exceed the 13°C (55°F) supplemental spawning incubation criterion (September 15 to July 1) in September and May to July (Ecology 2016, 2011a).²⁰ The *Upper Chehalis River Basin Temperature TMDL* (Ecology 2001) has designated a goal of 18°C (64°F) for the Chehalis River (down to RM 30), with the primary goals of increasing shading along the tributaries and mainstem as well as improving low flows.

WDFW's Thermalscape model indicates that from 2013 to 2018, the vast majority of stream reaches within the Lower Chehalis River Ecological Region (ranging from 95% [2018] to 97% [2014 to 2017] of reaches) had mean August temperatures equal to or exceeding 16°C (61°F) and are projected to increase to 99% and 100% of reaches in 2040 and 2080, respectively, without restoration actions (Winkowski and Zimmerman 2019).

The NOAA model that incorporates mature riparian conditions and anticipated climate change shows a likely future increase in summer water temperatures ranging from 0.5°C (0.9°F) to 1.5°C (2.7°F) by 2080, with water temperatures in some reaches increasing up to 2.5°C (4.5°F) (Beechie 2018).



Lower mainstem habitats have degraded riparian conditions, as shown here across from a boat launch near Porter. Substantial recreational river use and sport fishing occur throughout the Lower Chehalis River Ecological Region.



Lower mainstem habitats are limited in diversity and could be enhanced by installing stable wood, riparian restoration, and off-channel reconnection actions.

²⁰ The lower Chehalis River frequently reaches 25°C (77°F) in July and/or August (Ecology gage data).

The lower mainstem Chehalis River is less incised than other areas of the basin and has a large number of remnant oxbows that are frequently connected. Existing mapping of wetlands (Ecology 2011b) shows relatively large wetland areas in the following locations:

- Around the Black River confluence
- In the floodplain around lower Roundtree and Davis creeks
- In much of the floodplain south of the Porter Creek confluence
- In substantial areas of the floodplain south of the Cloquallum Creek confluence
- Around Vance Creek

The Ecology mapping also shows remnants of several meanders near the Prairie Creek confluence and numerous former meanders throughout the floodplain near the lower Black River. Only nine fish passage barriers were incorporated within the EDT model for the Lower Chehalis River Ecological Region, with none on the mainstem river.

The percentage of fine sediment in streams was modeled by NOAA based on the density of roads and land uses; this modeling indicated 17% to 18% fines in the Chehalis River below the Skookumchuck River, which is a substantial increase from modeled historical conditions (Beechie 2018).

There are recent invasive aquatic plant issues, particularly the presence of Brazilian elodea, in the mainstem Chehalis River downstream of the Skookumchuck River. In 1998, Brazilian elodea was observed in the river, and multiple agencies and the Chehalis Tribe have conducted removal efforts since the early 2000s. The area of infestation has been substantially reduced (Thurston County 2019). However, the river is at risk for further invasions by a variety of invasive aquatic plants that tend to reduce dissolved oxygen and trap fine sediments.

All upstream stocks of anadromous salmonids pass through the Lower Chehalis River Ecological Region. All but one of the non-salmon indicator species are present (there is a lack of Western toad). Barrow's goldeneye are also present. Floodplain habitats along the Chehalis River are of particular importance to northern red-legged frog and four other stillwater-breeding amphibian species, as well as at least 27 species of native and non-native fishes.

5.5.4 Limiting Factors

Limiting factors for salmonids have been identified in several assessments of the Chehalis Basin, including EDT (ICF 2019) and NOAA modeling (Beechie 2018) conducted for the ASRP and earlier studies (GHLE 2011; Smith and Wenger 2001). Additional limiting factors and a diagnosis of what is working and what is broken in the ecological region were determined by the SRT, drawing on local basin knowledge and reconnaissance conducted within the region.

The combined results of these assessments indicate that the major issues for salmonids in the region are as follows (in relative order of importance):

- Low habitat diversity (lack of side channels, large wood, floodplain connectivity, and marshes)
- Reduced quantity and quality of instream habitats
- Predation (non-native fish species)
- Sediment conditions (fine sediments)
- High water temperatures (from local conditions and cumulative upstream influences)
- Channel width and length

These identified issues for salmonids are generally consistent with earlier findings from Smith and Wenger (2001) and the Chehalis Basin Lead Entity (GHLE 2011), which indicated that the key limiting factors in this ecological region include riparian conditions, water quality, floodplain conditions, lack of large wood, water quantity, and sediment conditions.

Limiting factors and threats to non-salmon indicator species are not well understood but may include high water temperatures, changes in flow conditions and water level variations, fine sediments, riparian conditions, and non-native predator species (as identified for Pacific lamprey by Clemens et al. [2017]).

Diagnostic Snapshot

- This ecological region is lacking wood nearly everywhere.
- There is limited spawning habitat (identified between Oakville and Porter), and summer temperatures are too high to support juvenile salmonid rearing.
- Non-native species such as bullfrogs and bass (smallmouth and largemouth) are prevalent throughout this ecological region. The timing of introduction of these species is unknown, but most are major piscivores that are known to have or likely to have negative interactions with native fishes and the larval stages of native amphibians.
- Invasive plant species, including reed canarygrass, Himalayan blackberry, Japanese knotweed, tansy ragwort, Scotch broom, and Eurasian milfoil, are present.
- This ecological region has experienced the greatest loss of floodplain wetland habitats.
- The main channel is more connected to its floodplain in this ecological region than in the Middle Chehalis River Ecological Region. Forested riparian zones are narrow to non-existent, there is very little stable large wood (although more present on the Chehalis Reservation), and there are moderate lengths of riprap and channel control.

5.5.5 Strategies and Actions in the Ecological Region

5.5.5.1 Habitat and Process Protection

Some of the protection actions described in Section 4.2.1 are not feasible in the Lower Chehalis River Ecological Region due to the existing level of development; however, particularly in areas less constrained by existing land uses, the following areas and actions are recommended for a protection focus:

- Protect existing off-channel wetlands and wet prairies.
- Protect existing riparian forest.
- Protect cool-water inputs at tributary confluences.

The majority of the Lower Chehalis River Ecological Region is within Grays Harbor County, which has regulations and policies in place to protect wetlands, floodplains, riparian areas, and fish and wildlife habitat conservation areas from degradation and development and manage invasive species. Grays Harbor County's draft SMP that is currently in final review with Ecology contains regulations to protect channel migration zones and riparian vegetation, along with general development regulations related to shoreline areas in the County (Grays Harbor County 2018).

The middle portion of the Lower Chehalis River Ecological Region is in Thurston County, which has regulations in place to protect water quantity and quality; maintain or increase forest cover; establish and protect riparian habitat; protect streams, wetlands, floodplains, and prairies from development; limit impervious surfaces; and allow channel migration.

A smaller upriver portion of this region is in Lewis County, which has regulations and policies in place to maintain forest cover, increase riparian canopy, protect streams from development, and protect surface and groundwater and reduce withdrawals. The Lewis County SMP identifies priority habitat as those habitat types with unique or significant value to one or more species, including fish spawning habitat, and contains regulations that new development should not interfere with the process of channel



Hoxit Pond, which is already protected, is an example of off-channel conditions that could be enhanced or restored in other locations to provide important habitat for amphibians.



Several floodplain areas in the Lower Chehalis River Ecological Region are owned by Washington State or the Chehalis Tribe. This site is seasonal floodplain habitat protected by the Chehalis Tribe, which could be an important location to experiment and learn from restoration techniques to achieve floodplain connectivity (by excavation and/or locally raising water levels).

migration (Lewis County 2017). The County has a policy to support projects from the Lewis County Shoreline Restoration Plan (Lewis County 2016), the ASRP, and the lead entities for salmon recovery.

The Chehalis Tribe has zoned much of the shoreline within its jurisdiction for protection as riparian management zones or floodplain that provides protection for these areas. The Chehalis Tribe has regulations to protect the quantity and quality of groundwater; protect natural resources from degradation; protect and minimize adverse effects on fish, wildlife, water quality, and existing shoreline and stream processes; and avoid adverse effects to ecologically or culturally sensitive lands including all waterbodies, channel migration zones, tribal ceremonial sites, and cemeteries. Tribal zoning policies also address development in the floodplain and encourage planting and maintaining riparian buffers on mainstem and tributary streams.

As part of the community planning strategy (see Section 5.5.5.3), funding support to align the counties' and tribal regulations with the ASRP and conduct enforcement will be considered.

5.5.5.2 Restoration

The restoration actions described in Section 4.2.2 are not all appropriate in the Lower Chehalis River Ecological Region due to the difficulty of reconnecting floodplains in more agriculture-intensive areas and where structures and infrastructure could be threatened by flooding. Based on existing conditions, the following areas and actions are recommended for a restoration focus:

- Focus on restoration of habitat, such as improving connectivity of oxbows and side channels, using a “node” concept, wherein refuge areas would be spaced along the channel length and available to fish as they travel throughout the system.
- Protect existing riparian forest and restore additional areas of riparian forest, particularly where this can be combined with habitat benches and nodes.
- Test restoration of floodplain wetlands that dry out in the summer to minimize habitat for non-native invasive fish species and bullfrog.
- Install large wood to promote pool formation and stability of coarse gravel.



Backwaters and remaining side channels along the mainstem Chehalis River provide opportunities for restoration.



Gravel bars are prevalent in the lower Chehalis River near RM 35. Both in-channel and floodplain habitats could be enhanced with installation of stable wood and riparian restoration.

Priority areas for restoration in the Lower Chehalis River Ecological Region include large oxbows and side channels, floodplain wetlands, and cold-water tributary confluences. Opportunities for restoring nodes of habitat, including oxbows and tributary confluences, by partnering with the Chehalis Tribe are high priority.

5.5.5.3 Community Planning

As noted in Section 4.2.3, community planning actions would be coordinated with state and local governments, landowners, and other stakeholders to ensure the long-term success of the ASRP. Focus programs and policies that could be developed or investigated in the Lower Chehalis River Ecological Region include the following:

- Discuss with Grays Harbor County additional planning measures that could effectively promote and protect the following:
 - Surface and groundwater supplies through reduction of withdrawals
 - Minimization of impervious surfaces
 - Maturation of riparian forest and wood recruitment for retention of spawning gravel and sources
 - Increasing channel migration in some locations
- Discuss with Thurston County additional planning measures that could effectively promote and protect the following:
 - Floodplain connectivity
 - Surface and groundwater supplies through reduction of withdrawals
 - Maturation of riparian forest and wood recruitment for retention of spawning gravel and sources
- As the Chehalis Basin Strategy becomes more integrated, coordinate the ASRP with the CFAR Program to build habitat restoration and protection actions into community flood risk reduction efforts (such as restoring areas where structures and people have been relocated from floodplains).

5.5.5.4 Community Involvement

As noted in Section 4.2.4, community involvement and voluntary landowner participation are essential to the success of the ASRP, and the actions described in that section will be further evaluated for the Lower Chehalis River Ecological Region in Phases 2 and 3 based on the restoration and protection scenario selected. Based on the specific issues in this area, the following actions are recommended for focused community involvement:

- Continue outreach, engagement, and involvement processes to incorporate landowner expertise into ASRP planning and local implementation efforts.
- Partner with and support the efforts of existing local organizations (see Appendix E for a list of potential partner organizations).

5.5.5.5 Institutional Capacity

The institutional capacity strategy is intended to build on and support the work of existing organizations, as well as support creativity in how local organizations approach working toward the goals of the ASRP. The actions described in Section 4.2.5 will be further evaluated for the Lower Chehalis River Ecological Region in Phases 2 and 3 based on the restoration and protection scenario selected. Based on the specific issues in this area, the following focused institutional capacity actions are recommended:

- Provide technical training on process-based restoration practices and principles.
- Provide funding for groups and individuals interested in restoration projects.
- Build on and support the work of existing organizations with missions that overlap with the ASRP vision (see Appendix E for a list of potential groups).