

SHORELINE INVENTORY AND CHARACTERIZATION

SHORELINE MASTER PROGRAM UPDATE – CITY OF MONTESANO, WASHINGTON

Prepared for the
City of Montesano
Community Development Department



Prepared by
Herrera Environmental Consultants, Inc.
and
AHBL, Inc.



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Prepared for the
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GLOSSARY

Anthropogenic - Caused either directly or indirectly by human activity.

Bedrock - Bedrock is a general term that includes any of the generally indurated or crystalline materials that make up the earth's crust.

Channel Migration Zone - The area along a river within which the channel(s) can be reasonably predicted to migrate over time as a result of natural and normally occurring hydrological and related processes when considered with the characteristics of the river and its surroundings.

Ditch - An artificial channel that is designed to convey water and drain perennially or seasonally wet areas.

Ecological functions or shoreline functions – The work performed or role played by the physical, chemical, and biological processes that contribute to the maintenance of the aquatic and terrestrial environments that constitute the shoreline's natural ecosystem.

Ecosystem-wide processes – The suite of naturally occurring physical and geologic processes of erosion, transport, and deposition; and specific chemical processes that shape landforms within a specific shoreline ecosystem and determine both the types of habitat and the associated ecological functions.

Fill - The addition of soil, sand, rock, gravel, sediment, earth-retaining structure, or other material to an area waterward of the OHWM, in wetlands, or on shorelands in a manner that raises the elevation or creates dry land.

Ordinary High Water Mark - On all lakes, streams, and tidal water is that mark that will be found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation as that condition exists on June 1, 1971, as it may naturally change thereafter, or as it may change thereafter in accordance with permits issued by a local government or the department: provided, that in any area where the ordinary high water mark cannot be found, the ordinary high water mark adjoining salt water shall be the line of mean higher high tide and the ordinary high water mark adjoining fresh water shall be the line of mean high water.

Reach - A segment of shoreline that has a similar geomorphic context and/or development pattern used for assessment of ecological conditions. Reaches are smaller units that comprise the shoreline jurisdiction.

Shoreline modifications - Those actions that modify the physical configuration or qualities of the shoreline area, usually through the construction of a physical element such as a dike,

breakwater, pier, weir, dredged basin, fill, bulkhead, or other shoreline structure. They can include other actions, such as clearing, grading, or application of chemicals.

Tidal Surge Plain - A unique area where tidal salt water surges or pushes fresh water out over wetlands.

Udorthent - Soils comprised of fill material or disturbed native soils, typically comprised of sandy and silty material.

Water-dependent use - A use or portion of a use that cannot exist in a location that is not adjacent to the water and that is dependent on the water by reason of the intrinsic nature of its operations.

Water-enjoyment use - A recreational use or other use that facilitates public access to the shoreline as a primary characteristic of the use; or a use that provides for recreational use or aesthetic enjoyment of the shoreline for a substantial number of people as a general characteristic of the use and which, through location, design, and operation, ensures the public's ability to enjoy the physical and aesthetic qualities of the shoreline. In order to qualify as a water-enjoyment use, the use must be open to the general public, and the shoreline-oriented space within the project must be devoted to the specific aspects of the use that fosters shoreline enjoyment.

Water-oriented use - A use that is water-dependent, water-related, or water-enjoyment, or a combination of such uses.

Woody Wetlands - A land cover classification in the National Land Cover Database defined as "Areas where forest or shrubland vegetation accounts for 25 to 100 percent of the cover, and the soil or substrate is periodically saturated with or covered with water."

LIST OF ACRONYMS AND ABBREVIATIONS

BMP	Best Management Practices
CAO	Critical Areas Ordinance
cfs	cubic feet per second
City	City of Montesano
CMZ	Channel Migration Zone
CWA	Clean Water Act
DAHP	Washington State Department of Archeology and Historic Preservation
DPS	Distinct Population Segment
Ecology	Washington State Department of Ecology
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FEMA	Federal Emergency Management Agency
IFH	Industrial Flood Hazard
GIS	Geographic Information Systems
GMA	Growth Management Act
LWD	large woody debris
MMC	Montesano Municipal Code
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OHWM	ordinary high water mark
PHS	Priority Habitats and Species
RCW	Revised Code of Washington
RU	Recovery Unit
SEPA	State Environmental Policy Act
SMA	Shoreline Management Act
SMP	Shoreline Master Program
SSB	Substitute Senate Bill

TMDL	total maximum daily load
UGA	Urban Growth Area
USACE	US Army Corps of Engineers
USDA	US Department of Agriculture
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WDOH	Washington State Department of Health
WRIA	Watershed Resource Inventory Area

INTRODUCTION

Background and Purpose

The City of Montesano (City) is updating its Shoreline Master Program (SMP). According to Substitute Senate Bill (SSB) 6012, passed by the 2003 Washington State Legislature, cities and counties are required to amend their local SMPs consistent with the Shoreline Management Act (SMA), Revised Code of Washington (RCW) 90.58, and the SMA implementing guidelines, Washington Administrative Code (WAC) 173-26.

The goal of the SMA is "... to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines." The SMA protects shoreline resources by regulating development, but is also intended to provide for appropriate shoreline use. The SMA encourages public access and use of the shoreline and provision of water-dependent uses, as well as land uses that enhance and conserve shoreline functions and values. The SMP guidelines (WAC 173-26) establish goals and policies that provide a framework for development standards and use regulations in the shoreline. The SMP is based on state guidelines, but tailored to the specific conditions and needs of the City. The SMP is also meant to be a comprehensive vision of how the City's shoreline area will be managed over time.

The first phase of the City's SMP update was to identify the shoreline jurisdiction and prepare a plan for public participation in SMP update process. The second phase of the City's SMP update requires preparation of a shoreline inventory and characterization report to be used as a foundation for the SMP update process (WAC 173-26-201(3)(c) and (d)). In subsequent phases, the City will conduct restoration planning and update its shoreline management policies and regulations. This document was prepared to fulfill the requirement of the second phase and serves to accomplish the following goals:

- Inform the review of current shoreline regulations required by the update process
- Highlight areas where shoreline resources protection measures and shoreline use designations could be improved to meet shoreline management goals

To achieve these goals there are specific objectives of the City's shoreline inventory and characterization report:

- Provide supporting information for determining updated environmental designations
- Establish the baseline for no net loss of ecological conditions and inform development of protective policies, regulations, and mitigation standards
- Identify opportunities for protection of ecological resources, improving public access, and supporting water-dependent uses
- Identify degraded areas and opportunities for restoration to be incorporated into a restoration plan

The overarching goal of the SMP is that over time, the existing condition of shoreline ecological functions should remain the same as when the SMP is implemented. Simply stated, the no net loss standard is intended to halt the introduction of new impacts on shoreline ecological functions resulting from new or redevelopment. Both protection and restoration are tools to achieve no net loss and can be used to improve shoreline ecological functions.

Regulatory Framework

Shoreline Management Act

To manage the shorelines of the state, the state legislature passed the SMA in 1971 and citizens of the state adopted it by referendum in 1972. The overarching goal of the SMA is "... to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines." There are three basic policy areas comprising the SMA (RCW 90.58.020):

- Accommodation of reasonable and appropriate uses of the shoreline
- Environmental protection of shoreline environmental resources
- Protection of the public's right to access and use the state shorelines

Under the SMA, each city and county with shorelines of the state must adopt an SMP, based on state laws and regulations, but tailored to the specific geographic, economic, and environmental needs of the community. Cities and counties are the primary regulators. The Washington State Department of Ecology (Ecology) has a predominantly support and review role, but is required to approve certain kinds of permits, such as Shoreline Conditional Use Permits and Variances, and must approve new or amended SMPs.

In 2003, the Shoreline Master Program Guidelines were adopted to require that no net loss of shoreline ecological function be the regulatory standard and that mechanisms for restoration of impaired shoreline function are provided. In addition, the guidelines state that when local SMPs are updated, the updated standards, setbacks, and buffers do not apply retroactively to existing agricultural development. Updated SMP requirements will apply, however, to new agricultural activities located in shoreline areas as well as where agricultural activities are converted to other uses. Additionally, the SMP Guidelines allow repair and maintenance of existing structures, subject to requirements imposed by local jurisdictions.

City of Montesano

The City first adopted an SMP in 1992. Four environmental designations were developed for the shorelines of Montesano and include Urban Environment, Rural Environment, Conservancy Environment, and Natural Environment. Each environmental designation was delineated geographically and regulations were outlined for activities and development within each area. The provisions of the Montesano SMP apply to all lands and waters (including submerged lands to the centerline of the Chehalis and Wynoochee Rivers) in the city that have been determined by the State as being under the jurisdiction of the Washington State SMA of 1971, as amended.

Montesano last updated its Comprehensive Plan in 2008 and in 2010 passed a Critical Areas Ordinance (CAO) codified in Chapter 14.30 of the Montesano Municipal Code (MMC). The code states that “flood, erosion, landslide and seismic hazard areas, slopes greater than forty percent and steeper, streams, wetlands and their buffers as defined by the City’s wetlands protection ordinance together constitute sensitive areas that are of special concern to the City.” The purposes of the code include protecting public health, safety, and welfare by “preventing any adverse impacts to water quality, wetlands, and streams (MMC 14.30.010). The code (MMC14.30.070) requires stream buffers that range from 25 feet to 100 feet depending on the Washington State Department of Natural Resources (WDNR) water type. No buffer guidance or wetlands protection provisions are provided for wetlands although wetlands are present within the city. The City has decided it will update its critical area buffer requirements in conjunction with this SMP update.

State Agencies and Regulations

Aside from the SMA, state regulations most pertinent to development in the City’s shorelines of the state include the State Environmental Policy Act (SEPA), Section 401 of the Clean Water Act (CWA), State-Owned Aquatic Lands Act, the Watershed Planning Act, the Hydraulic Code, the Water Pollution Control Act, Salmon Recovery Act, and the Growth Management Act (GMA). A number of state agencies implement these regulations or may own shoreline areas. In addition to Ecology’s oversight of particular aspects of the SMP, other agency reviews of shoreline developments are triggered by in- or over-water work, discharges of fill or pollutants into the water, or substantial land clearing.

Depending on the nature of the proposed development, state regulations can play an important role in the design and implementation of a shoreline project, ensuring that impacts to shoreline functions and values are avoided, minimized, and/or mitigated. During the SMP update, the City will consider other state regulations to ensure consistency as appropriate and feasible with the goal of streamlining the shoreline permitting process. A summary of some of the key state regulations and/or state agency responsibilities follows.

State Environmental Policy Act

SEPA was adopted in 1971 (Chapter 43.21C RCW) to ensure that environmental values were considered during decision-making by state and local agencies. The environmental review process in SEPA is designed to work with other regulations to provide a comprehensive review of a proposal. Most regulations focus on particular aspects of a proposal, while SEPA requires the identification and evaluation of probable impacts to all elements of the built and natural environment. Combining the review processes of SEPA and other laws reduces duplication and delay by combining study needs; combining comment periods and public notices; and allowing agencies, applicants, and the public to consider all aspects of a proposal at the same time.

Section 401 Clean Water Act Water Quality Certification

Section 401 of the federal CWA allows states to review, condition, and approve or deny certain federal permitted actions that result in discharges to state waters, including wetlands. In Washington, Ecology is the state agency responsible for conducting that review, with their primary review criteria of ensuring that state water quality standards are met.

Actions within streams or wetlands within the shoreline jurisdiction that require a Section 404 permit are also typically reviewed by Ecology.

State-Owned Aquatic Lands

The WDNR is responsible for protecting and managing use of state-owned aquatic lands. Toward that end, water-dependent uses waterward of the ordinary high water mark (OHWM) require review by WDNR to establish whether the project is on state-owned aquatic lands. Certain project activities, such as single-family or two-party joint-use residential piers, on state-owned aquatic lands are exempt from these requirements. WDNR recommends that all proponents of a project waterward of the OHWM contact them to determine jurisdiction and requirements. State ownership of aquatic lands are decided by WDNR on a site-by-site basis, and ultimately may need to be determined by the US Supreme Court. WDNR is in the process of assessing and documenting the navigability of the state's lakes, streams, and rivers.

Watershed Planning Act

The Watershed Planning Act (Chapter 90.82 RCW) was passed in 1998 to encourage local planning of local water resources. It recognizes that there are citizens and entities in each watershed that "... have the greatest knowledge of both the resources and the aspirations of those who live and work in the watershed; and who have the greatest stake in the proper, long term management of the resources." The law provides a process to allow citizens in a watershed to join together to assess the status of the water resources in their watershed and determine how best to manage them. The plans must balance competing resource demands. They are required to address water quantity by undertaking an assessment of water supply and use within the watershed. This includes recommending long-term strategies to provide water in sufficient quantities to satisfy minimum stream flows and to provide water for future out-of-stream needs. Optional elements that may be addressed in the plan include stream flow, water quality, and habitat.

Hydraulic Code

The Hydraulic Code (Chapter 77.55 RCW) gives the Washington State Department of Fish and Wildlife (WDFW) the authority to review, condition, and approve or deny "... any construction activity that will use, divert, obstruct, or change the bed or flow of State Waters." These activities may include stream alteration, culvert installation or replacement, pier and bulkhead repair or construction, among others. WDFW can condition projects to avoid, minimize, restore, and compensate adverse impacts though a Hydraulic Project Approval also known as an HPA.

Water Pollution Control Act

The Water Pollution Control Act (Chapter 90.48 RCW) establishes the state's policy "... to maintain the highest possible standards to insure the purity of all waters of the State consistent with public health and public enjoyment thereof, the propagation and protection of wild life, birds, game, fish and other aquatic life, and the industrial development of the State, and to that end require the use of all known available and reasonable methods by industries and others to prevent and control the pollution of the waters of the State of Washington." Ecology is charged with creating and implementing rules and regulations in accordance with this legislation.

Salmon Recovery Act

Repeated attempts to improve salmonid fish runs throughout the state of Washington have failed to avert listings of salmon and steelhead runs as threatened or endangered under the federal Endangered Species Act (ESA) (16 U.S.C. Sec. 1531 et seq.). These listings threaten the sport, commercial, and tribal fishing industries as well as the economic well-being and vitality of vast areas of the state. Therefore, the state legislature decided to begin activities required for the recovery of salmon stocks as soon as possible in the interest of the citizens of the state. The Salmon Recovery Act calls for the state to retain primary responsibility for managing its natural resources, rather than abdicating those responsibilities to the federal government. It calls for the state to integrate local and regional recovery activities into a statewide salmon recovery strategy. The legislation specifically requires that salmon habitat restoration be coordinated within a structure that allows for integrated delivery of federal, state, and local assistance to communities for habitat projects that will assist in the recovery and enhancement of salmon stocks.

Growth Management Act

While the City is not required to plan under GMA, outside of its CAO, the City updated and amended its Comprehensive Plan in 2008 in response to pressures from growth within its boundaries and the effect of growth occurring in urbanized areas of the state. The City's Comprehensive Plan includes the following sections: population trends and characteristics, economy, natural environment, land use, housing, industrial, utilities, transportation, and capital facilities. As part of this update, SMP policies will likely be added to the local Comprehensive Plan.

Federal Regulations

Federal regulations most pertinent to development in the shorelines of the city include the ESA, Section 404 of the CWA, and Section 10 of the Rivers and Harbors Appropriation Act. The ESA is administered by US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). The US Army Corps of Engineers (USACE) administers Section 404 of the CWA and Section 10 of the Rivers and Harbors Appropriation Act. A review of shoreline development by these agencies would be triggered in most cases by in- or over-water work, or excavation or discharges of fill or pollutants into the water.

Depending on the nature of the proposed development, federal regulations can play an important role in the design and implementation of a shoreline project, ensuring that impacts to shoreline functions and values are avoided, minimized, and/or mitigated. During the SMP update, the City will ensure it is consistent with federal regulations as appropriate and feasible with the goal of streamlining the shoreline permitting process. A summary of some of the key federal regulations and/or federal agency responsibilities follows.

Endangered Species Act

The ESA provides for the conservation of species that are endangered or threatened throughout all or a significant portion of their range, and the conservation of the ecosystems on which they depend. Section 9 of the ESA prohibits "take" of listed species. Take has been defined in Section 3 of the ESA as "... harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

The take prohibitions of the ESA apply to everyone, so any action that results in a take of listed fish or wildlife would be a violation of the ESA and is strictly prohibited. Per Section 7 of the ESA, activities with potential to affect federally listed or proposed species and that either require federal approval, receive federal funding, or occur on federal land must be reviewed by the NMFS or USFWS, as applicable, using a process called “consultation.” These interagency consultations, or Section 7 consultations, are designed to assist federal agencies in fulfilling their duty to ensure federal actions do not jeopardize the continued existence of a species or destroy or adversely modify critical habitat.

Section 404 – Clean Water Act

Section 404 of the CWA establishes a program to regulate the discharge of dredge or fill material into waters of the United States, including wetlands. Activities in waters of the United States regulated under this program include fill for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and mining projects. Section 404 requires a permit before dredging or filling within waters of the United States including discharges, unless the activity is exempt from Section 404 regulation, such as certain farming and forestry activities. Key agencies with responsibilities include the USACE and the US Environmental Protection Agency (USEPA).

Rivers and Harbors Appropriation Act Section 10

Section 10 of the Rivers and Harbors Appropriation Act of 1899 provides the USACE with authority to regulate activities that may affect navigation of “navigable” waters. Designated “navigable” waters in the city include the Chehalis River. Proposals to construct new or modify existing over-water structures (including bridges); to excavate or fill, or to “... alter or modify the course, location, condition, or capacity of...” navigable waters must be reviewed and approved by the USACE.

Scope and Organization of Shoreline Inventory and Characterization

The inventory and characterization report documents baseline shoreline conditions, and provides a basis for reviewing and updating SMP goals, policies, and regulations for the City. Information provided includes existing physical conditions as well descriptions of watershed and shoreline attributes that pertain to the City’s shoreline jurisdiction. In addition, existing ecosystem shoreline processes, land uses, and development patterns are characterized. Descriptions of shoreline functions, shoreline use, public access, and opportunities for restoration are also provided. The characterization will help to evaluate and guide revisions to the City’s SMP goals, policies, and regulations based on existing functions and values of shoreline resources, as well as identify opportunities for conservation and restoration of ecological functions.

This report provides information on the City’s shoreline ecosystems, specific discussions on individual shoreline reaches, a use analysis identifying existing uses and potential future uses, recommendations for shoreline management, and data gaps that would be helpful to close for future planning. First, the methods used for the inventory and characterization are described. Second, a general overview profiles larger scale ecosystem characteristics and processes observed in the city. These include physical constraints such as climate, topography, geology, and soils; the key processes underlying shoreline ecosystem functions; and descriptions of City

land use, land cover, historical and cultural resources, public access, shoreline alterations, and key habitats and species. Third, the general overview is followed by a reach analysis.

The reach analysis provides more detailed characterizations of physical and biological conditions within the City's shoreline reaches. These discussions cover existing land uses, future uses based on the City's Comprehensive Plan, shoreline modifications, historic and cultural resources, and public access potential. Included in the reach analysis are tabular data used for characterization and analysis of physical processes and ecological functions. Also included are a functional assessment, identification of potential restoration opportunities, shoreline use analysis, and shoreline management considerations to guide changes or additions to the City's existing SMP.

METHODS

Inventory Data and Information Sources

Available data was compiled and reviewed to provide background information to be used for the inventory and characterization of shorelines in the city. Table 1 provides the geographic information system (GIS) data sets and relevant information compiled and reviewed for this report. Although not all data elements in Table 1 are included in the maps, key spatial data are provided in the Map Folio found in Appendix A.

Additional key reports and information included, but were not limited to, the previous adopted shoreline jurisdiction and environmental designations, Comprehensive Plan, Capital Improvements Plan, Park and Open Space Plan, Development Code, and CAO provided by the City, as well as numerous basin assessments and plans cited throughout this report and included in the *References* section. GIS mapping data for the Shoreline Inventory were collected from a variety of sources, including the City, Grays Harbor County, Grays Harbor Council of Governments, Ecology, WDFW, Federal Emergency Management Administration (FEMA), the USFWS, the US Geological Survey (USGS), and the National Land Cover Database. The available information was used to identify, map, and characterize the preliminary shoreline jurisdiction and specific shoreline reaches described in this report.

Determination of Shoreline Jurisdiction and Reaches

Ecology, the agency responsible for overseeing the regulation of shorelines of the state, has identified the rivers, streams, lakes, and portions thereof, which constitute shorelines of the state. SMA jurisdiction includes all “shorelines of the state” as defined in RCW 90.58.030. Shorelines of the state include the total of all “shorelines of statewide significance” and “shorelines.” Shorelines of statewide significance west of the Cascade crest include natural and artificial lakes with a surface area of 1,000 acres or more, and natural streams downstream of a point where the mean annual flow is measured at 1,000 cubic feet per second (cfs) or more. Shorelines mean all of the water areas of the state, including reservoirs, and their associated shorelands, together with the lands underlying them, *except*:

- Shorelines on segments of streams upstream of a point where the mean annual flow is 20 cfs or less and the wetlands associated with such upstream segments
- Shorelines on lakes less than 20 acres in size and the wetlands associated with such small lakes

The shoreline area to be regulated under the City’s SMP must include all shorelines of statewide significance, shorelines of the state, and their adjacent “shorelands,” defined as the upland area within 200 feet of the OHWM, as well as any “associated wetlands” (RCW 90.58.030). Associated wetlands are those wetlands that are in proximity to and either influence or are influenced by tidal waters or a lake or stream subject to the SMA

Table 1. Summary of Spatial Data Sources for Inventory and Characterization.		
Information Used	Data Source	Maps^a
Current and historical aerial imagery	City Montesano (City) US Geological Survey (USGS) (1990) US Department of Agriculture (USDA) (2006, 2009, 2011, 2012)	All maps show 2012 aerial
Lakes and streams	Washington State Department of Natural Resources (WDNR State Hydrography database and USGS National Hydrography Dataset (water bodies)	Shown on all maps
Shoreline jurisdiction	Developed for this Shoreline Management Program (SMP) update	1.1–1.3
Reach boundaries	Developed for this SMP update	2.1–2.3
City and Urban Growth Area (UGA) boundaries, tax parcels, Comprehensive Land Use Plan: future land use designations and zoning	City	3.1–3.3
Parks and public lands	Grays Harbor County	4.1–4.3
Land cover and impervious surfaces	USGS (2011) National Land Cover Database	5.1–5.3
Wetlands	US Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI), Washington State Department of Ecology (Ecology), City	6.1–6.3
Topography, floodway, floodplain	Federal Emergency Management Administration (FEMA) Preliminary DFIRM 2013 Flood Data, USGS topographic quadrangles	6.1–6.3
Water quality	Ecology (2012) 303(d) list	7.1–7.3
Priority habitat and species (PHS)	WDFW PHS database	8.1–8.3 10.1–10.3
Shoreline modifications (culverts, docks, piers, boat ramps, levees, bank alterations)	Based on 2012 aerial imagery, Ecology (Washington State Levee Inventory) Washington State Department of Fish and Wildlife (WDFW) Fish Barrier Inventory	9.1–9.3
Soils	Natural Resources Conservation Service (NRCS) soil survey	11.1–11.3
Aquifer recharge areas, wellhead protection zones, toxic and hazardous material clean-up sites	Ecology, Washington State Department of Health (2014), USGS	12.1–12.3 and 13.1–13.3
Historical and Cultural Resources	Washington State Department of Archeology and Historic Preservation (DAHP) Washington State Heritage Register and National Register of Historic Places	Not shown in maps
Rights-of-way, utilities, stormwater and sewer facilities, and outfalls	City	Not shown in maps
Geologic and erosion hazard areas	City, WDNR	Not shown in maps

^a Maps may not include all Information Used or Data Sources.

(WAC 173-22-030(1)). These are wetlands that physically extend into the shoreline jurisdiction, or wetlands that are functionally related to the shoreline jurisdiction through surface water connections or other factors. All wetlands located within the 100-year floodplain are considered associated wetlands (WAC 173-22-040(3)(c)).

The City has approximately 5 miles of shoreline associated with streams and lakes (the Chehalis River, the Wynoochee River, Sylvia Creek, and Sylvia Lake), and 352 acres of water and shorelands in its shoreline jurisdiction. In accordance with Ecology guidance, the shoreline assessed in the inventory and characterization may contain a nested system of management areas and reaches. However, since all of the City's shorelines are associated with a single watershed, the lower Chehalis River, it is appropriate to consider the entire city as within or containing a single management area. The management area is broken down into reaches for the purposes of this inventory and characterization.

The city was divided into six reaches shown in Figure 1 and listed below, based on areas having similar physical and ecological characteristics, land use, and development patterns.

1. Sylvia Lake
2. Upper Sylvia Creek
3. Lower Sylvia Creek
4. Wetland Complex
5. Wynoochee River
6. Chehalis River

Specific reaches, which encompass the entire shoreline jurisdiction within the city, are also shown in Figures 2.1 through 2.3 in Appendix A.

Associated wetlands included in the City's shoreline jurisdiction are based on wetlands mapped in the National Wetland Inventory (NWI) database. In addition to mapped wetlands that are associated with the city's shoreline, there are also potentially associated wetlands and unmapped wetlands within the city because the City's wetland mapping is incomplete. Potentially associated wetlands are identified, but will require field survey to fully determine whether they are within the City's shoreline jurisdiction and therefore regulated under the SMP. Associated wetlands and potentially associated wetlands are shown in Appendix A, Figure 1.1.

Local jurisdictions can choose to regulate development under their SMPs for all areas within the 100-year floodplain (see Figures 6.1 through 6.3 in Appendix A), or the smaller area defined by RCW 90.58.030(2)(d). At minimum, the City must include in its SMP, the floodway and that portion of the floodplain extending 200 feet from the floodway. For the purposes of this report, lands extending 200 feet from the OHWM of regulated shorelines, floodways and contiguous floodplain areas landward 200 feet from such floodways, and all associated wetlands are included in the Montesano shoreline jurisdiction, and regulated under the SMP.

The portion of the Chehalis River floodplain that is not within the City's proposed shoreline jurisdiction, but which the City has the option to include, is shown in Figure 6.2 in

Appendix A. The 100-year floodplain area that the City could elect to include in the shoreline jurisdiction consists primarily of upland areas between Highway 12 and the Chehalis River channel, including Mary's River lumberyard, the City's wastewater treatment facility, gravel parking areas along State Route 107, and undeveloped open space. To the extent that this floodplain area contains unmapped associated wetlands, the wetlands are within the City's shoreline jurisdiction and regulated under the SMP. Such wetlands would need to be identified and delineated in the initial review stages of individual land use or development proposals to determine the precise location of the shoreline jurisdiction boundary.

Functional Assessment

The analysis of ecological processes and functions provides the context for management of the City's shoreline. The analysis follows Ecology's *Shoreline Master Program Guidelines* (WAC 173-26) and evaluates the functions of the city shoreline at a reach scale. Conceptually, ecosystem functions are those aspects of the ecosystem that are beneficial, either biologically, economically, or aesthetically. Ecosystem processes are comprised of physical and biological interactions between habitats and species. These processes are interrelated and interactive. Ecosystem functions are dependent on a range of ecosystem processes, which are influenced or determined by the regime of stressors acting on the system. Effectively managing ecosystem stressors is necessary to maintain ecosystem processes that allow nature to sustain a suite of beneficial functions.

Ecosystem processes, defined as "... the suite of naturally occurring physical and geological processes of erosion, transport, and deposition; and specific chemical processes that shape landforms within a specific shoreline ecosystem and determine both the types of habitat and the associated ecological functions" (WAC 173-26-020-12), are dependent on natural and anthropogenic controlling factors or ecosystem stressors. In a properly functioning ecosystem, the controlling factors occur within the naturally occurring range under which the ecosystem evolved, and the ecosystem in turn provides the suite of naturally occurring associated functions. Ecological processes considered in this assessment include, for example:

- Flow and movement of water
- Erosion, and sediment transport and deposition
- Vegetation development and succession
- Energy and nutrient cycling

Those processes and the associated functions can be influenced or impaired by stressors including the following:

- Ground clearing or excavation
- Shoreline filling and armoring
- Channel or bank alteration (e.g., armoring)
- Impervious surface creation

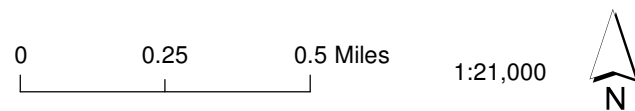
Shoreline Reaches

Figure 1. City of Montesano

Date: 9/9/2014

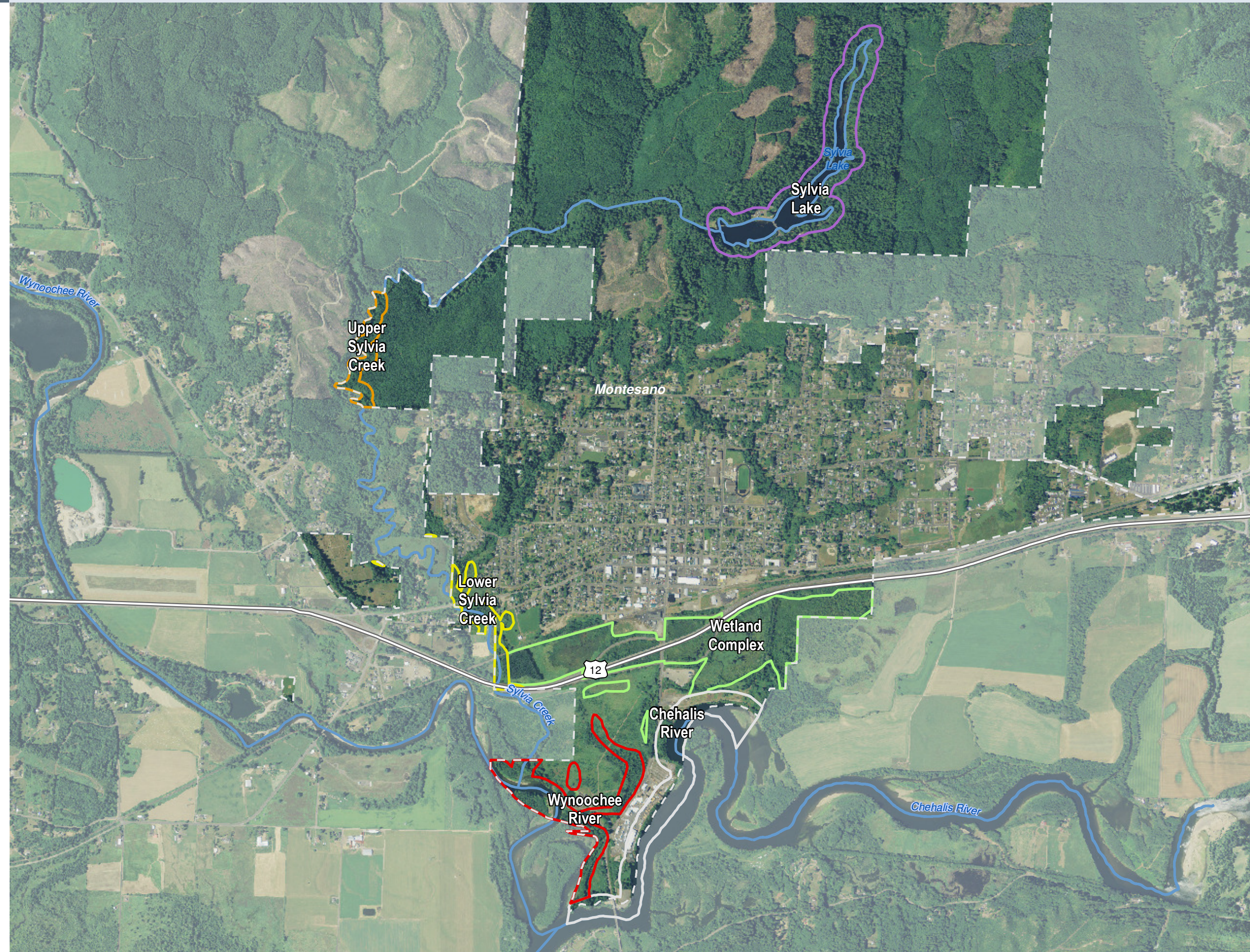
Shoreline Reach

- 1. Sylvia Lake
- 2. Upper Sylvia Creek
- 3. Lower Sylvia Creek
- 4. Wetland Complex
- 5. Wynoochee River
- 6. Chehalis River
- Montesano City Boundary
- ~ SMA Lakes
- ~ SMA Rivers
- ≡ Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)

Shoreline jurisdiction boundaries depicted on this map are approximate. They have not been formally delineated or surveyed and are intended for planning purposes only. Additional site-specific evaluation may be needed to confirm/verify information shown on this map.



- In-water and over-water structures installation
- Point source pollution
- Non-point source pollution
- Riparian vegetation removal
- Invasive species introduction
- Freshwater sources elimination, withdrawal, and flow control

Ecological functions of the city's shoreline are summarized in Tables 2 and 3. The ecological functions of the City's shorelines are organized based upon the functions of those systems described in Ecology's *Comprehensive Process to Prepare or Amend Shoreline Master Programs* (WAC 173-26-201) for rivers, streams, associated floodplains, lakes, and wetlands.

Table 2. Shoreline Functions for Rivers, Streams, Associated Floodplains, and Associated Wetlands.			
Hydrologic/Water Quality Functions	Vegetation Functions	Hyporheic (Groundwater/Surface Water Exchange) Functions	Habitat Functions
<ul style="list-style-type: none"> • Transport of water and sediment across the natural range of flow variability • Attenuating flow energy • Removing excessive nutrients and toxic compounds • Developing pools, riffles, gravel bars, nutrient flux, recruitment and transport of large woody debris and other organic material 	<ul style="list-style-type: none"> • Maintaining temperature • Removing excessive nutrients and toxic compounds • Sediment removal and stabilization • Attenuation of high stream flow energy • Provision of recruitable woody debris and other organic material 	<ul style="list-style-type: none"> • Removing excessive nutrients and toxic compounds • Water storage • Support of vegetation • Sediment storage • Maintenance of base flows 	<ul style="list-style-type: none"> • Physical space and conditions to support aquatic and shoreline-dependent species and life history stages; reproduction; resting, hiding and migration; and food production and delivery

Within the city, wetlands are typically associated with floodplains or stream and lake shorelines, thus they occur in a variety of reaches throughout the shoreline jurisdiction. Wetland presence or absence contributes to the overall functions of each reach; therefore, wetland functions are scored within the context of the specific stream, floodplain, and lake reaches in which they occur. This is to avoid double counting the same functional benefit.

The functional assessment is designed to address the processes and functions summarized in WAC 173 26 201 (3)(d)(i)(C) and outlined in Tables 2 and 3. Tables 2 and 3 include all

functions identified in WAC 173 26 201 (3)(d)(i)(C). In assessing shoreline functions, it is important to consider different processes associated with different types of water bodies. For example, unlike streams, lakes and wetlands tend to store water and sediment instead of transporting them. In addition, shoreline physical structure and vegetation may contribute to attenuation of wave energy in large lakes, but do not generally influence flow energy as they would in streams where flow is a more dominant factor. In contrast, functions related to flow energy such as the transport of nutrients, organic material, woody debris, and sediment would only apply to rivers and streams. These flow related functions lead to channel formation and instream structure such as pools, riffles, and gravel bars that are important to fish and other animals that require diverse and complex habitats.

Table 3. Shoreline Functions for Lakes and Associated Wetlands.			
Hydrologic/Water Quality Functions	Vegetation Functions	Hyporheic (Groundwater/Surface Water Exchange) Functions ^a	Habitat Functions
<ul style="list-style-type: none"> Storing water and sediment Attenuating wave energy Removing excessive nutrients and toxic compounds Recruitment, accumulation, and redistribution of large woody debris and other organic material 	<ul style="list-style-type: none"> Moderating water and ambient temperature Removing excessive nutrients and toxic compounds Sediment removal and stabilization Attenuation of wave energy Provision of recruitable woody debris and other organic material 	<ul style="list-style-type: none"> Removing excessive nutrients and toxic compounds Storing water and maintaining base flows Support of vegetation Sediment storage 	<ul style="list-style-type: none"> Physical space and conditions to support aquatic and shoreline-dependent species and life history stages; reproduction; resting, hiding and migration; and food production and delivery

^a Hyporheic refers to a region beneath some floodplain areas and alongside streambeds, where there is mixing of shallow groundwater and surface water. Hyporheic functions may be associated with wetlands, particularly in floodplains along streams, but are generally not associated with lakes.

Water quality functions for all water bodies include removal of excessive nutrients and toxic compounds. Hydrologic functions are related to water and sediment transport or storage, flow and wave energy attenuation, and distribution of wood and other organic material that may be important habitat features or play a role in food production and delivery for a wide range of species. Vegetation functions to provide habitat structure as well as the space and conditions to support species and food production. Groundwater recharge and moderation of flows between water bodies (from lakes and wetlands into streams) are supported by hyporheic flow. Hyporheic functions also include improving water quality, providing water storage, and supporting vegetation communities, which supports habitat structure. Groundwater and surface water exchange are typical beneficial functions provided by wetlands associated with most water bodies. Water transport and storage, including groundwater and surface water exchange, may support vegetation, which in turn also influences water quality. Vegetation structure influences water quality and habitat functions including sediment removal and stabilization, attenuation of wave energy in lake and

estuarine shorelines, and provision of organic material. Habitat is a function influenced by geomorphic, hydrologic, and vegetation conditions and is valued based on the space and conditions to support aquatic and shoreline-dependent species and life history stages; reproduction; resting, hiding and migration; and food production and delivery.

The physical conditions in each reach were evaluated to determine if the functions they support were present, altered, or impaired and then scored according to the threshold criteria in Table 4. The functional assessment results are included in the *Reach Analysis* section. The functional assessment threshold criteria establish a framework for identifying the conditions of the reaches and their potential for development, restoration, or protection. In general, the higher the conditions score, the more functions the reach supports, and the more likely the site is suitable for protection. In contrast, reaches with low function scores, specifically where there are minimal alterations to the landscape, are suitable for restoration. Development is typically most suited for areas with many alterations and low function scores.

Due to the different functions provided by streams (Table 2) compared to lakes (Table 3), hydrologic functions were assessed using different criteria for streams versus lakes (Table 4). The criteria used to assess vegetation, hyporheic functions (groundwater and surface water exchange), and habitat functions are applicable to both streams and lakes.

Note that many of the functions listed in Tables 2 and 3 cross functional groups. For example, some hyporheic functions are combined within the threshold criteria established in Table 4 because they are measured using the same criteria.

It is important to note that relatively unimpaired or pristine reaches may not receive a high functions score in each category. Even undeveloped reaches can have a relatively low score for certain functions. This is because certain ecological functions may naturally be absent given the landscape characteristics and setting of a reach or reach segment. While a fully functioning shoreline from a physical perspective is possible, and even likely for an ecologically rich reach, owing to the diverse needs of the different priority species, it is not possible for a reach to be scored perfectly for all conditions.

The threshold criteria and ratings are based on conditions (e.g., land cover, vegetation, and shoreline modifications) that are used as surrogate indicators of functions. Shoreline functions are difficult to quantify given the limited data available. Anthropogenic modifications are known to impair certain functions and can be mapped with the existing data. Therefore, anthropogenic modifications represent key parameters in assessing shoreline ecological function. For example, to the extent that armored shorelines lose their natural ability to attenuate flow energy, wind-driven waves, and boat wakes, armoring is used herein as a surrogate for degree of loss of wave attenuation function, which natural shorelines provide.

In addition to the shoreline conditions and geographic position in the landscape influencing shoreline functions, the ecological benefits of a shoreline can be influenced by whether there are stressors present. This is particularly the case for water quality related functions. An overall unaltered or unimpaired reach may score relatively high but have limited opportunity to provide ecological benefit if, for example, there are no existing water quality impairments or development stressors. On the other hand, a reach that scores low due to anthropogenic

modifications, impairments, or stressors may have an important role in providing water-quality functions, for example, if there are sources of pollution. Similarly, a low-scoring reach may retain important habitat functions if it is a migration corridor, contains habitat features, or provides connectivity with other habitats. Recognizing that nearly all shoreline areas, even if substantially developed or degraded, retain important ecological functions, it is important to apply policies and regulations for protecting and restoring functions across all shoreline areas, not just those that remain relatively unaltered.

Table 4. Reach-Scale Functional Assessment Threshold Criteria.

Function Category^a	Function	3 (High)	2 (Moderate)	1 (Low)
Hydrologic/ Water Quality (Streams)	Transport of water and sediment	No significant armoring or dams present in the reach	Steep slopes present, but not developed, and are well vegetated	Steep slopes present with development
		No steep slopes present	Limited armoring present but no steep slopes present	OR
		If present, creek mouths have natural deltas		Heavy armoring is present
	Attenuation of flow energy	Majority of the reach is not armored or protected by levees	Majority of the reach is not armored or protected by levees	Significant armoring or levees present
		Adopted floodway or the flood channel is > 50% of area	Adopted floodway or the flood channel is 20–100% of area	OR
		Large wetlands or backwaters present	Few wetlands or backwaters present	Few wetlands or backwaters present
		Wide floodplain	OR	Adopted floodway or the flood channel is < 20% of area
		Channel and flow configuration is complex	Adopted floodway or the flood channel is < 20% of area but channel is complex and few to moderate wetlands present	Channel and flow configuration is simple
	Removing excessive nutrients and toxic compounds ^b	303(d) Category 1, no problems	303(d) Category 2, waters of concern	303(d) Category 4 – Impaired, does not require total maximum daily load (TMDL)
			OR	OR
			Suspected sources of water quality concern	303(d) Category 5 – Impaired, requires TMDL
	Developing pools, riffles, gravel bars, nutrient flux, recruitment and transport of large woody debris and other organic material	High level of features are present	Low to moderate level of features are present	Low level of features are present
		OR	OR	OR
		Channel and flow configuration is complex, and not impaired by bank armoring	Channel and flow configuration is moderately complex or simple, but not impaired by bank armoring	Channel and flow configuration is simple primarily because of bank armoring or other development

Table 4 (continued). Reach-Scale Functional Assessment Threshold Criteria.

Function Category^a	Function	3 (High)	2 (Moderate)	1 (Low)
Hydrologic/ Water Quality (Lakes)	Storage of water and sediment	Lake or wetland is connected with other water bodies through surface or groundwater flow to provide storage potential	Lake or wetland has limited connectivity with other water bodies	Lake or wetland is isolated from other water bodies and provides limited or no storage potential
	Attenuation of wave energy	No armoring is present or it is limited (< 10% of reach length)	Armoring is present but is limited (10–50% of reach length)	Significant armoring is present (> 50 percent of reach length)
	Removing excessive nutrients and toxic compounds ^b	303(d) Category 1, no problems	303(d) Category 2, waters of concern	303(d) Category 4 – Impaired, does not require total maximum daily load (TMDL)
			OR	OR
			Suspected sources of water quality concern	303(d) Category 5 – Impaired, requires TMDL
Vegetation (Streams and Lakes)	Recruiting woody debris and other organic material	Majority (> 75%) of shoreline area is vegetated with dense forest, shrub, or emergent vegetation, and not impaired by bank armoring	Shoreline vegetation is moderate (25–75% cover), but majority of shoreline is not impaired by armoring or other development	Shoreline vegetation is limited (< 25% cover) and/or shoreline may be impaired by armoring, bulkheads, altered vegetation types, or other development.
	Maintaining temperature	Dense forest vegetation provides > 75% cover in the shoreline area	25–75% forest vegetation cover in the shoreline area	< 25% forest vegetation cover in the shoreline area
			OR	
			Wetlands may be a significant source of cool groundwater discharge to other waters	
	Removing excessive nutrients, toxic compounds, and sediment	A broad (> 50 feet wide) band of vegetation is dominated by dense, ungrazed, herbaceous plants	Vegetation is dominated by dense, ungrazed, herbaceous plants, but is generally equal to or less than 50 feet wide or the shoreline is steeply sloped	The shoreline is steeply sloped and/or herbaceous vegetation is sparse to moderate density or disturbed if present.
		Shoreline is gently sloped	OR	
			The shoreline has a broad band of vegetation and gentle slope likely to contain herbaceous plants	

Table 4 (continued). Reach-Scale Functional Assessment Threshold Criteria.

Function Category^a	Function	3 (High)	2 (Moderate)	1 (Low)
Vegetation (cont'd)	Sediment stabilization	A broad band of dense vegetation separates uplands from shoreline	A narrow band of dense vegetation or a broad band of sparse vegetation or grass separates uplands from shoreline. Vegetation may be disrupted by roadway.	No vegetation or a narrow band of sparse vegetation separates uplands from shoreline
			OR	OR
		Trees and shrubs stabilize banks	Portion of the shoreline is armored	A majority of the reach is armored
	Attenuation of high stream flow energy or wave energy in lakes and wetlands	Majority of the reach is not armored or confined by levees	Majority of the reach is not armored or confined by levees	Significant armoring or levees present
		Large wetlands or backwaters present in > 50% of area	Few (20–50%) wetlands or backwaters present in area	Few (< 20%) wetlands or backwaters present in area
		Large adopted floodway and good floodplain connectivity	Minor to moderate adopted floodway and connectivity to floodplain	Limited adopted floodway and connectivity with floodplain
	Provision of recruitable woody debris and other organic material	Dense forest vegetation provides > 50% cover in area	Vegetation provides 25–100% cover in area.	< 25% vegetation cover in area
			Vegetation may be composed of forest, shrubs, and/or herbaceous plants including grass.	
Hyporheic and groundwater/surface water exchange (Streams and Lakes)	Water storage, sediment storage, maintaining base flows, and removing excessive nutrients and toxic compounds	Wetlands are present over > 50% of area and not separated from the river or lake by armoring or levees	Few (10–50%) wetlands are present in area or are separated by levees	Wetlands are limited (< 10% of area), absent, or largely separated by levees
		Large wetlands are present	Shoreline supports moderate scrub or forest vegetation	Shoreline supports little to no scrub or forest vegetation
	Support of vegetation	OR	OR	OR

Table 4 (continued). Reach-Scale Functional Assessment Threshold Criteria.

Function Category ^a	Function	3 (High)	2 (Moderate)	1 (Low)
		Hydric soils comprise > 75% of the reach area	Hydric soils comprise 50 to 75% of the reach area	Hydric soils comprise < 50% of the reach area
Habitat (Streams and Lakes)	Physical space and conditions to support water-dependent species and life history stages; reproduction; resting, hiding and migration; and food production and delivery	High wetland presence	Moderate wetland presence	Few or no wetlands present
		Broad band of moderate to dense riparian vegetation	Narrow band of dense vegetation or broad band of sparse vegetation	Dense riparian vegetation is absent
		Moderate to high channel sinuosity or bed and bank complexity	Moderate to high channel sinuosity or bed and bank complexity	Low channel sinuosity or bed and bank complexity
		OR	OR	OR
		Narrow to broad band of dense vegetation	Priority species or habitat features are present	Priority species or habitat features are present but shorelines are highly altered or corridors between habitats are absent or degraded
		High channel sinuosity or bed and bank complexity	Shorelines or floodplains exhibit moderate degree of alterations or corridors between habitats may be degraded	
		Multiple priority species or habitat features (including breeding areas or regular concentrations of species) are present		

^a Wetland functions are assessed within the context of the associated streams, floodplains, and lakes within each reach.

^b A low score for the function (removing excessive nutrients and toxic compounds) indicates the function is impaired. However, a low score reflects an opportunity for this function to be actuated under Vegetation and Hyporheic and Groundwater/Surface Water Exchange categories.

ECOSYSTEM PROFILE

Regional Overview

The city is in Water Resource Inventory Area (WRIA) 22, the lower Chehalis watershed. The city has approximately 352 acres and 5 miles of shoreline associated with Sylvia Lake, Sylvia Creek, the Wynoochee River, and the Chehalis River. Sylvia Lake is a dammed reservoir in the rural forested foothills that extend from the interior of the Olympic Peninsula toward the Chehalis River valley. The lake and associated wetlands are the headwater of Sylvia Creek, a small tributary stream that flows through the forested hills and meets the Wynoochee River near its confluence with the Chehalis River. The Wynoochee River flows 63.5 miles from its headwaters in the Olympic Mountains to its confluence with the Chehalis River (Grays Harbor County 2011). The lower 20 miles, including its most downstream segment adjacent to the city, flows through a wide, flat, floodplain valley with farms. The Chehalis River originates from headwaters in steep sided valleys in southeastern Lewis County before transitioning into the broad farming valley that characterizes the lower watershed in Grays Harbor County and the city's vicinity. The city is located on the north bank of the Chehalis River approximately 14 miles upstream from its mouth at Grays Harbor, and near the upstream extent of tidal influence.

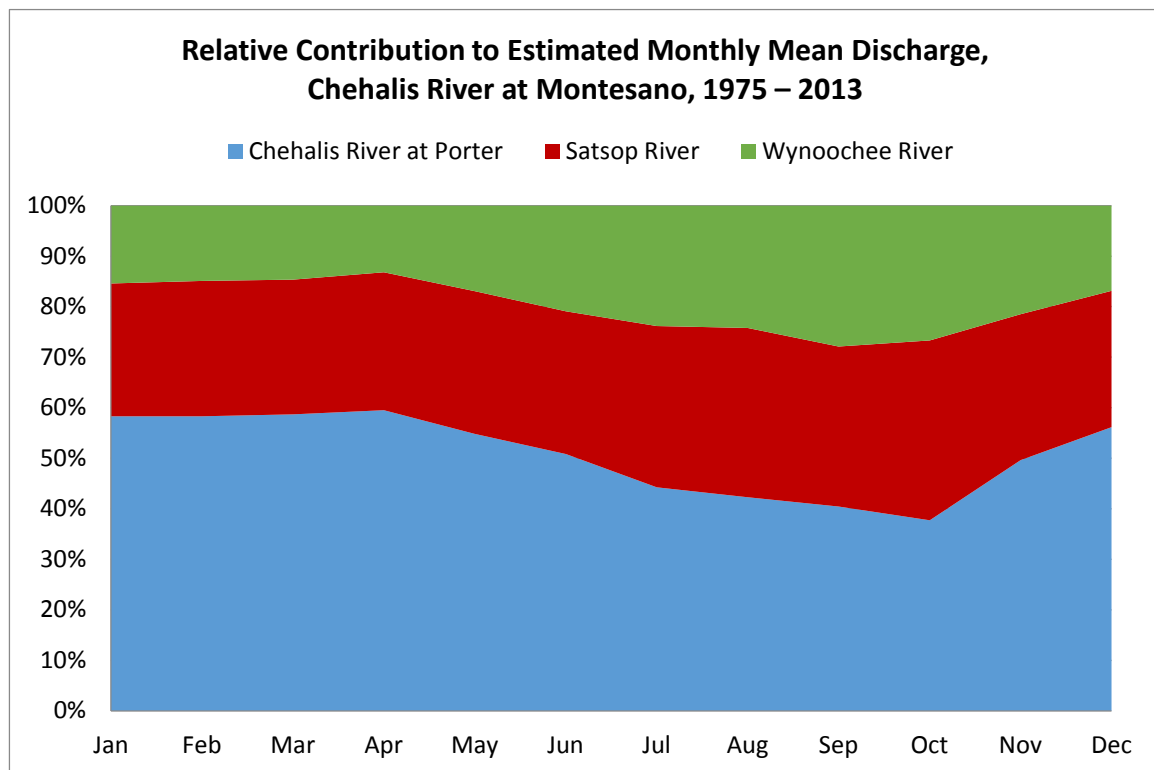
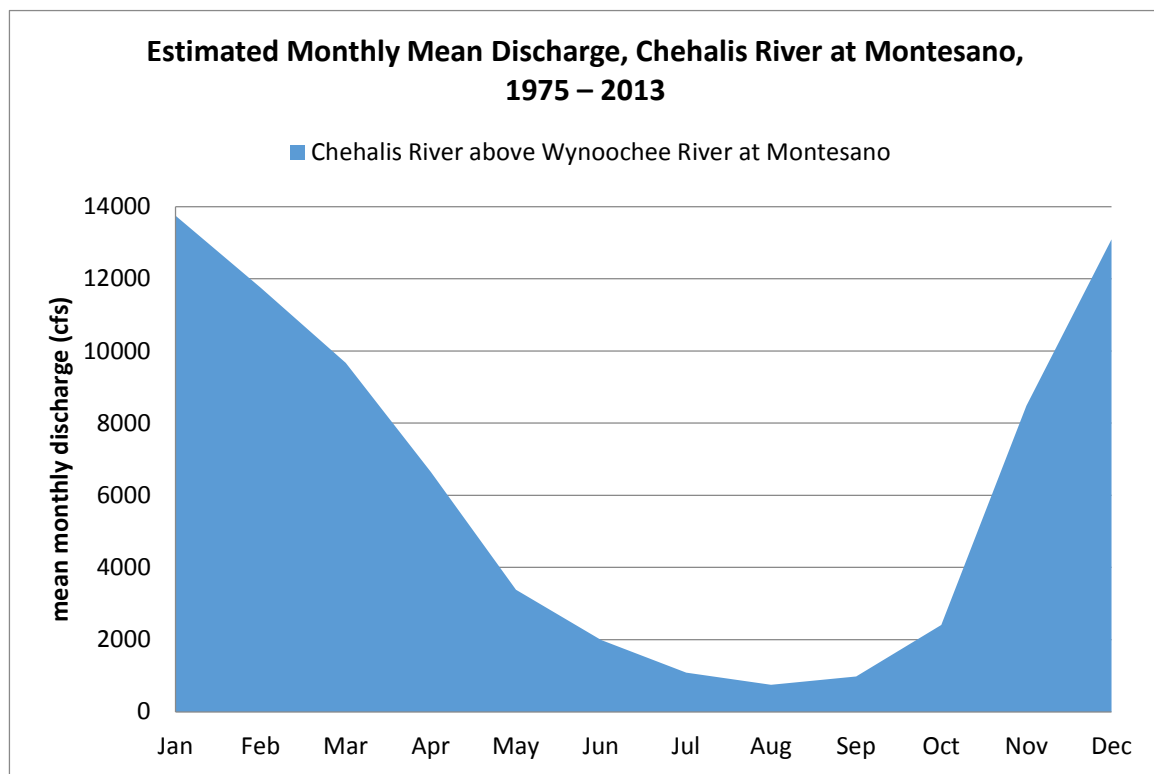
Key Physical Controls

Key physical controls on shoreline processes can be classified as due to climate, lithology, topography, soils, vegetation, and/or human activities.

Climate

Climate establishes seasonal and annual patterns of discharge and temperature, and constrains the vegetation that grows in the riparian zones of streams and lakes. It also establishes the hydrology of a region. The current climate is characterized by mild wet winters and warm dry summers. The average daily temperature range varies from 34 to 46 degrees F° in December to 52 to 79 degrees F° in August, while monthly average precipitation ranges from 1 inch in July to above 10 inches for November, December, and January (Weather.com 2014). Mean annual precipitation is between 50 and 75 inches at Montesano, and ranges up to more than 250 inches in the headwaters of the Wynoochee River (Gendaszek 2011).

In Montesano, eighty percent of average annual precipitation falls and runs off between October and March (City of Montesano 2008), a seasonal pattern that is consistent with that found further upstream in the Chehalis River basin. The headwaters of the Wynoochee River, however, store some precipitation in the form of snow, which is released in the spring and summer. A consequence of this differing seasonality in precipitation is that there is a strong seasonality in discharge for both rivers, as well as seasonality in relative contribution to stream discharge (Figure 2). This seasonality and its influence in the hydrology likely control



Source: USGS (2014a, 2014b, 2014c)

Figure 2. Monthly Variations in Discharge at Montesano, Washington.

the timing of various life stages of fish and other aquatic species that use the Chehalis and Wynoochee Rivers and associated floodplains. In terms of interannual variability, stream flow and climate station records in the Chehalis River basin are consistent with broader regional climate variability patterns (Envirovision et al. 2000).

Future Climate and Sea Level Rise

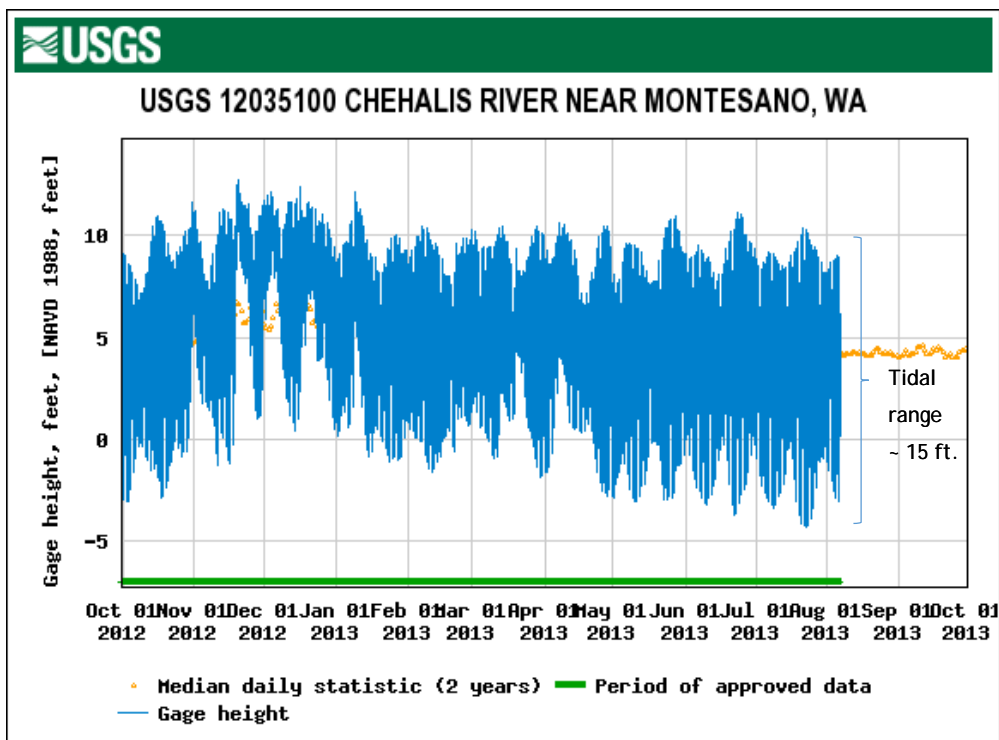
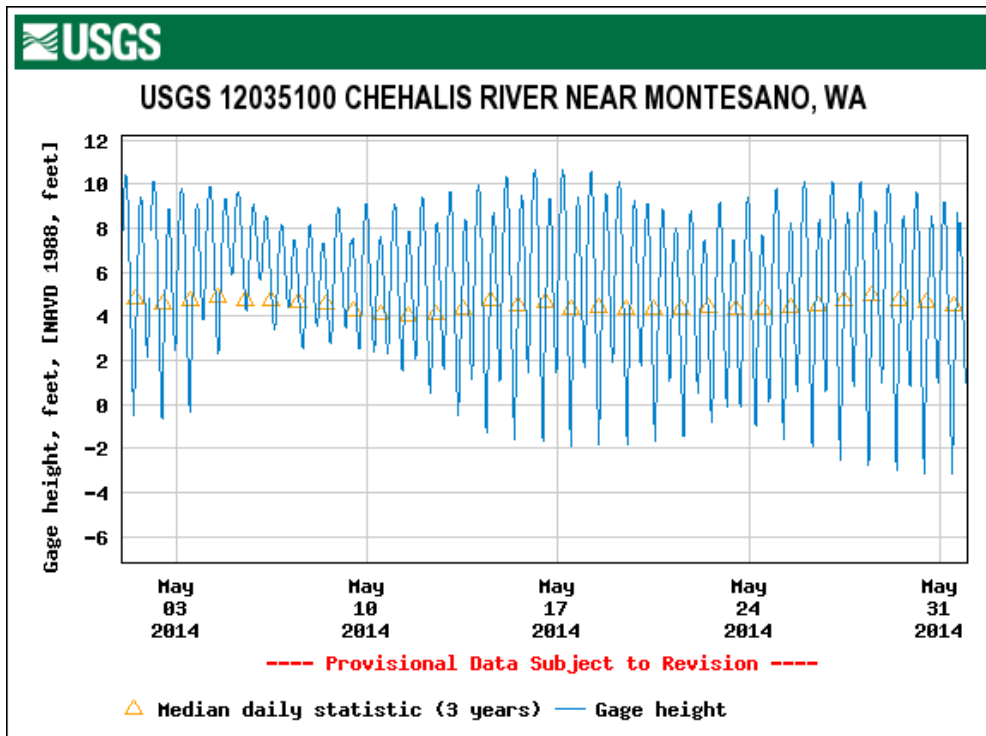
Climate changes are expected within the current century that will affect the City's shorelines by virtue of increased water temperatures. However, because the Chehalis River is a rainfall dominant system, alterations to the effect of seasonal snowpack and the hydrocycle (timing of runoff) are expected to be small in comparison with transient and snow-dominated basins in the state (Sandell and McAninch 2013). Water levels in the Chehalis River at Montesano are tidally influenced, however, with typical intra-day variations in water level that dwarf seasonal variations in water level due to river discharge. As can be seen in Figure 3, the approximate tidal range at Montesano is 15 feet, which is greater than the seasonal variations in vertical water level due to river discharge. Under current climate conditions, the furthest extent of the tidal salt wedge just barely reaches the city, and then only at times of low river discharge (Beverage and Swecker 1969).

Local relative sea level rise is projected to be between 1 and 18 inches by 2050, increasing to between 2 and 43 inches by 2100, so the greatest effect of climate change is likely to be elevated water levels due to tides. Increased sea level could result in greater salt-wedge intrusion, in which case the Chehalis and Wynoochee Rivers at Montesano would begin to experience saline conditions during low river discharges. Climate change could also result in less saline ocean water, greater mixing, and a less distinct salt wedge extending a shorter distance up the rivers, which would produce negligible change in salinity at Montesano (Sandell and McAninch 2013).

Geology

The city is located at the northern edge of the Chehalis River valley where it passes between the Olympic Mountains to the north and the Willapa Hills to the south. Contemporary lithology and topography has been shaped by tectonic and glacial processes during Tertiary and Quaternary periods (Gendaszek 2011). The Olympic Mountains and the Willapa hills are largely composed of Tertiary marine sedimentary and volcanic rocks that have been scraped off, folded, faulted, and uplifted as the Juan de Fuca plate was subducted below the North American plate; the Chehalis River valley is underlain at depth by the same materials, but at and near the surface is comprised of late Pleistocene glacial outwash and Holocene alluvial fill. In the watersheds above the shorelines in the city, older sedimentary rocks of the Astoria and Montesano formations comprise the hills and ridges, while more recent glacial and alluvial sediments form the valley bottoms and terraces (Rau 1967; Gower and Pease 1965).

During Pleistocene episodes of Puget lowland glaciation and de-glaciation, large pro-glacial lakes at the southern end of the Puget lowland drained to the Pacific Ocean through what is now the lower Chehalis River valley, leaving behind thick sequences of advance and recessional glacial outwash (Gendaszek 2011). This outwash material forms terraces above the current Chehalis River floodplain. Alpine glaciers from the Olympic Mountains also left



Source: USGS (2014d)

Figure 3. Tidal Fluctuation in Chehalis River Water Levels at Montesano, Washington.

behind till and outwash sediments in the northwestern portion of the Chehalis River basin (Gendaszek 2011), which includes the Wynoochee River valley. These geological characteristics provide the basic setting for physical processes occurring in the city's streams, lakes, and wetlands, and for their associated ecological functions. For example, clay layers in the hills north of the city may limit groundwater recharge but coarse materials derived from glacial outwash and alluvial deposits are in the Chehalis River valley, and facilitate groundwater and surface water interaction. This provides the habitat diversity that supports salmon and a variety of water-dependent species. The geological setting influences the hydrology, geomorphology, soils, and vegetation of the City's shorelines, including aspects such as stream flow and erosion, discussed later in this report under *Key Ecosystem Processes*.

The reader interested in further discussion of the geological setting of the Chehalis River basin is referred to Gendaszek (2011).

Lithology and Topography

Lithology determines the permeability to groundwater flow of subsurface layers, and the nature of soils formed in conjunction with climate and topography. Clay layers in the hills to the north of Montesano limit groundwater recharge there (City of Montesano 2008), while the coarser materials in the terraces and floodplain of the Chehalis and Wynoochee River valleys facilitate groundwater flow and interchange with surface waters (Gendaszek 2011). The present river valley elevation is around 160 feet lower than oldest alluvial terrace deposits (City of Montesano 2008). Alluvial deposits form a sequence of terraces above the current valley floor. These terraces provide level areas for habitation (City of Montesano 2008), and also a groundwater gradient that feeds wetlands at the base of the lowest terrace (see Figure 6 in Gendaszek [2011]). In Montesano, a key topographic influence on shoreline processes is that the floor of the river valleys is within the tidal surge plain of Grays Harbor, which extends up the Chehalis River valley as far as the Satsop River. The river stages in Montesano fluctuate daily due to tidal influence, driving alternating shallow groundwater exchanges between the floodplain and the rivers. As a result, the stability and functionality of the Chehalis and Wynoochee River shorelines are adapted to rapid, frequent, and relatively large changes in water surface elevation.

Soils and Vegetation

Soils are formed by the interaction of lithology, climate, topography, and vegetation, and in turn serve to constrain topography as well as natural and introduced vegetation. The two major soil groups found in the Montesano area are soils of the forested foothills and steep slopes north of the city and the level and gently sloping alluvial soils found in the Chehalis and Wynoochee River floodplains. The foothill soils would, under current climatic conditions and in the absence of management activities, support a native vegetation characterized by Sitka spruce, western hemlock, and western red cedar. The foothill soils around Montesano are currently used to support commercial forestry, with Douglas fir the dominant species. The Montesano City Forest consists of 5,000 acres, of which 4,000 are harvested on a 55-year rotation (City of Montesano 2008). The average annual harvest was 81 acres between 1973 and 1991; the forest was completely logged between 1900 and 1920, prior to purchase by the City (GHRPC 1992). Floodplain soils currently support cropland, pasture, and some Douglas fir;

under unmanaged conditions, they would support a mix of western red cedar, red alder, black cottonwood, and willow (Envirovision et al. 2000).

Human Activities

Although pre-European residents may have locally altered shorelines, human activities that substantially affected shoreline processes began in earnest with European occupation of the landscape that began around the beginning of the 20th century. Changes introduced at that time include deforestation, filling and diking of lowlands for agriculture or other development, removal of large woody debris (LWD) from rivers, and bank armoring. By 1967, for example, most of the floor of the Wynoochee River valley had been transformed from floodplain forest to dairy farm pastureland, while upland areas were covered with second-growth Douglas fir, hemlock, and spruce (Rau 1967).

Key Ecosystem Processes

Key ecosystem processes affecting shoreline functions in Montesano include runoff generation and groundwater flow, stream flow, and sediment yield.

Runoff Generation

Runoff to the streams and lakes of Montesano is driven primarily by rainfall and shallow groundwater movement. Snowmelt runoff is a relatively minor component, limited to the Wynoochee River (Envirovision et al. 2000). Groundwater levels rise during autumn and winter and then decline during spring and summer (Gendaszek 2011). During low flow periods, groundwater discharge is an important source of water for streams and rivers. Median estimated unit runoff for the Chehalis River at Montesano varies from 0.5 cfs per square mile in August and September to over 6.5 cfs per square mile December through February. Ninety percent exceedance unit runoff varies between 0.3 and 3.0 cfs per square mile according to a similar pattern (Envirovision et al. 2000).

In addition to natural runoff, human activities also result in discharge to—and potentially drawdown of—streams and lakes. Montesano uses a Septic Tank Effluent Pumping wastewater system, which pumps effluent from distributed septic tanks to the City wastewater facility (City of Montesano 2008), from which treated effluent is discharged to the Chehalis River. In addition, “Montesano’s natural and structural drainage system empties storm water directly into its creeks and wetland areas,” (City of Montesano 2008). Instantaneous water right allocation for the Chehalis basin above Montesano is greater than median monthly mean flow June through October, and greater than 90 percent exceedance monthly mean flow May through November (Envirovision et al. 2000). The City draws its municipal water supply from up to two wells in the Chehalis River aquifer. Each well can produce approximately 1,100 gallons per minute (2.5 cfs), which is a relatively small amount compared to even low-flow discharges, and both surface drainage and wastewater are discharged back to the Chehalis River. The Wynoochee River is dammed near its headwaters, so runoff from its watershed is moderated by dam operations. The dam is used for irrigation, flood control, and water supply for the City of Aberdeen; its maximum capacity is 70,000 acre-feet (Envirovision et al. 2000).

Stream Flow

Estimated average annual discharges and peak flows at Montesano for jurisdictional stream reaches are presented in Table 9 (see *Physical Processes* section). Mean annual and peak discharges for the ungauged reaches in Sylvia Lake, upper and lower Sylvia Creek, and the wetland complex were estimated by applying the same multipliers to their mean annual runoff potentials as were calculated for the Chehalis and Wynoochee rivers.

Flows to Sylvia Lake are determined by precipitation falling on the Sylvia Creek watershed, and mediated by the forest cover present within it. Lower Sylvia Creek receives additional discharge from the City's stormwater drainage system. Flows into the Wetland Complex are determined in part by discharge from Schofield Creek, which incorporates flow from the City's stormwater drainage system, in part from groundwater, and on occasion by flooding from the Chehalis and Wynoochee rivers.

The Wynoochee River flow is determined by precipitation on its southern Olympics watershed; most discharge is rainfall dependent, but there is a small snowmelt peak in the spring and early summer. Tidal effects from the Chehalis River have an effect on water levels and stream flow in the portion of the Wynoochee River that lies within the city. The Chehalis River flow is controlled by precipitation on its 7,183 square mile watershed. Discharge peaks between December and March with monthly averages between 9,600 and 13,800 cfs; low flow monthly averages from June to September range between 750 and 2,000 cfs. The Satsop and Wynoochee Rivers are largest tributaries to Chehalis River (Envirovision et al. 2000). The Satsop River confluence is just upstream of Montesano, and the Wynoochee River confluence is partially within the city boundary. Mean annual flow for period of record at the closest gages on the Satsop and Wynoochee Rivers is 2,045 and 1,245 cfs respectively. Flooding in Montesano is driven by Chehalis River peak flows (City of Montesano 2008), and can be exacerbated by tidal effects (see Figure 2).

Sediment Yield

Sediment is delivered to the city's shoreline reaches by transport from upstream, mobilization of inactive channel sediments, and bank failures. Sediment delivery to channels due to soil erosion is likely to be minimal, except when there is ground disturbance, as no soils within the city are susceptible to severe rill, inter-rill, or wind erosion (GHRPC 1992). However, the city does have soils that are susceptible to sloughing or caving during shallow excavation, including udorthent soils along the banks of the Chehalis River that are susceptible to bank erosion (GHRPC 1992).

Sediment available to Sylvia Lake is derived from the marine siltstones and silty sandstones of the Astoria and possibly the Montesano formations. Sediment available to Upper Sylvia Creek is of similar provenance, but coarser sediment from the portion of its drainage basin that drains to Sylvia Lake likely settles out in the lake. Sediment available to Lower Sylvia Creek comes both from further up Sylvia Creek and from surface drainage from the city.

Sediment available to the Chehalis River at Montesano is transported from upstream, or locally sourced from cut-banks and the inactive channel during floods. After the Satsop River, the Wynoochee River is the second largest contributor of sediment to the lower Chehalis River (below Montesano). Gravel and LWD is transported around the Wynoochee Dam (Chehalis Basin Partnership et al. 2008), and fine sediment is delivered from tributaries and within the floodplain.

Land Use and Land Cover

This section reviews current and planned land use in the shoreline jurisdiction. The intent is to provide the basis for establishing a compatible use pattern over the 20-year planning period of the SMP. It is also intended to identify current or planned preferred uses in the shoreline jurisdiction that should be protected or promoted to meet SMA goals for water-oriented uses, shoreline access, and ecological protection. The SMA promotes the following use preferences (RCW 90.58.020) for shorelines of statewide significance in the stated order:

1. Recognize and protect the statewide interest over local interest
2. Preserve the natural character of the shoreline
3. Provide for long term benefits over short term benefits
4. Protect the resources and ecology of the shoreline
5. Increase public access to publicly owned areas of the shorelines
6. Increase recreational opportunities for the public in the shoreline
7. Provide for any other element as defined in RCW 90.58.100 deemed appropriate or necessary

In the city, shorelines of statewide significance include the Chehalis River and the Wynoochee River. Sylvia Creek and Sylvia Lake are classified as shorelines of the state but do not meet the criteria for shorelines of statewide significance pursuant to the definition of shorelines of the state in RCW 90.58.030.

Existing land cover, zoning designations, and aerial imagery provide a baseline for the types of land use found within the shoreline jurisdiction. Future land use and current zoning data for the area covered by the City's shoreline jurisdiction were obtained from the City and existing land cover data were derived from the National Land Cover Database. These data sets are overlaid on the inventory maps in Appendix A.

Shoreline land uses within the shoreline jurisdiction are comprised of low density residential zones, moderate density residential zones, heavy commercial areas, industrial flood hazard areas, major public use districts (such as the Wynoochee Cemetery), and City Forest. The commercial area in the most southern point of the City's shoreline jurisdiction at the intersection of the Wynoochee River and the Chehalis River may be the area of most intensive use in the shoreline jurisdiction as it includes a boat launch and a lumberyard. Much of the remaining shoreline jurisdiction in the city is currently undeveloped and is dominated by undeveloped open space, emergent herbaceous wetlands, evergreen forest, open water, and woody wetlands (Figures 5.1, 5.2, and 5.3 in Appendix A).

According to Ecology's SMP Guidelines (WAC 173-26-020), "water-oriented use" means a use that is water-dependent, water-related, or water-enjoyment, or a combination of such uses. The SMA promotes uses that are "unique to or dependent upon use of the state's shoreline" as well as:

"... ports, shoreline recreational uses including but not limited to parks, marinas, piers, and other improvements facilitating public access to shorelines of the state, industrial and commercial developments which are particularly dependent on their location on or use of the shorelines of the state and other development that will

provide an opportunity for substantial numbers of the people to enjoy the shorelines of the state.” (RCW 90.58.020)

Definitions and examples of water-oriented uses are included in Table 5 below. Not all examples listed in the table are present or appropriate in the city, but they help to understand the definitions in the WAC. Based on review of land cover and zoning maps, there is not a single use category that is most likely to contain the majority of water-oriented uses; rather these uses are located in several zones. For example, Lake Sylvia State Park and Boat Launch is located within the City Forest Zone, and the Chehalis River Boat Launch and the Montesano Wastewater Treatment Plant are located in the Heavy Commercial zone.

Table 5. Water-Oriented Uses Definitions and Examples.	
Water-Oriented Use Definitions	Water-Oriented Use Examples
"Water-dependent use" means a use or portion of a use which cannot exist in a location that is not adjacent to the water and which is dependent on the water by reason of the intrinsic nature of its operations. (WAC 173-26-020(36))	Examples of water-dependent uses may include ship cargo terminal loading areas, ferry and passenger terminals, barge loading facilities, shipbuilding and dry-docking, marinas, aquaculture, float plane facilities and sewer outfalls.
<p>"Water-related use" means a use or portion of a use which is not intrinsically dependent on a waterfront location but whose economic viability is dependent upon a waterfront location because:</p> <ul style="list-style-type: none"> (a) The use has a functional requirement for a waterfront location such as the arrival or shipment of materials by water or the need for large quantities of water; or (b) The use provides a necessary service supportive of the water-dependent uses and the proximity of the use to its customers makes its services less expensive and/or more convenient. <p>(WAC 173-26-020 (40))</p>	Examples of water-related uses may include warehousing of goods transported by water, seafood processing plants, hydroelectric generating plants, gravel storage when transported by barge, oil refineries where transport is by tanker, log storage, and potentially agriculture.
"Water-enjoyment use" means a recreational use or other use that facilitates public access to the shoreline as a primary characteristic of the use; or a use that provides for recreational use or aesthetic enjoyment of the shoreline for a substantial number of people as a general characteristic of the use and which through location, design, and operation ensures the public's ability to enjoy the physical and aesthetic qualities of the shoreline. In order to qualify as a water-enjoyment use, the use must be open to the general public and the shoreline-oriented space within the project must be devoted to the specific aspects of the use that fosters shoreline enjoyment. (WAC 173-26-020 (37))	Primary water-enjoyment uses may include, but are not limited to, parks, piers and other improvements facilitating public access to the shorelines of the state; and general water-enjoyment uses may include, but are not limited to restaurants, museums, aquariums, scientific/ecological reserves, and resorts/hotels.

Reach 5, the Wynoochee River, and Reach 6, the Chehalis River, are both zoned for heavy commercial development. Current water-oriented development includes a lumberyard, which previously used the Chehalis River for business operations, and a boat launch. Within the shoreline jurisdiction, there is a small amount of residential development in Reach 3, Lower Sylvia Creek. Currently 98 percent of Reach 3 is zoned for low density or moderate density development and 20 percent of Reach 4, Wetland Complex, is zoned for low density residential. Reach 4 also contains areas zoned Heavy Commercial, which could allow residential and commercial development to occur in this area in the future.

Archaeological and Historical Resources

This section provides historical background and information on the archeological and historic resources in the City's shoreline jurisdiction. This section provides the basis for developing general, policies, and regulations consistent with requirements in WAC 173-26-221 and RCW 90.58.100. The intent is to ensure that the SMP includes "... policies and regulations to protect historic, archaeological, and cultural features and qualities of shorelines" and implements specific standards identified in WAC 173-26-221.

Native Americans

The original residents of what would become Montesano were members of the Chehalis Tribe of the lower Chehalis River drainage. Other tribes in the area included the Quinault, Queets, Humptulips, Satsop, Wynoochee, and Copalis.

The tribes lived in permanent villages along rivers and lakes in the area. The Chehalis people fished and hunted in the mountains and across the prairies to Grays Harbor and in lower Puget Sound. Water defined their economic and cultural lives (Chehalis 2014). They harvested salmon as the anadromous species swam upstream to spawn, as well as whales and seals along the coast. In the summers, hunters ranged inland and into the Olympic Mountains for game and to trade with other tribal groups. They developed a high degree of skill with canoes carved from cedar trees in a variety of specialized designs adapted to swift-flowing rivers, broad estuaries, and the ocean (History Link 2014).

Euro-American Settlement

Isaiah Scammon of Maine first settled on the banks of the Chehalis River near present-day South Montesano in 1852 after an unsuccessful gold mining adventure during the 1840's California Gold Rush. After making 500 dollars on a land sale, he returned to Maine and brought back his wife, Lorinda Hopkins Scammon, their son, and two daughters (Montesano 2014). Scammon built a home on their Donation Claim at the head of tidewater, the limit sailing ships could navigate up the river without assistance. This was a point convenient for river travelers to stop for the night and the couple operated a public house there. Scammon practiced his blacksmith trade for the next 36 years as well as serving as a postmaster, judge, church leader, and school administrator.

Lorinda named the claim Mount Zion, following her deep religious convictions, and later changed it to Montesano, meaning Mountain of Health (HistoryLink 2014). The Scammon home became the focal point for river traffic on the Chehalis River and was known as the Scammon Hotel. For 26 years, it was the only public house and landing for boats at Montesano. Another

settler, William Medcalf, was the first settler to build on land north of the Chehalis River in the area of present-day Montesano proper. After the territorial legislature split Chehalis County from Pacific County in 1860, the Scammon house was selected as the county seat. Isaiah Scammon became the postmaster when his home was selected as the first post office. Chehalis County became Grays Harbor County in 1915.

On October 9, 1883, Montesano officially became a city. On this date, the City adopted its Articles of Incorporation and elected its first slate of public officials. Families, churches, courts, and taxes had been established, and the city had a population of 300. By 1890, just seven years later, the population had more than quintupled to 1,632, a growth rate that has not been surpassed even today.

Properties on the Washington State Heritage Register

A search of the Washington State Department of Archeology and Historic Preservation (DAHP) online database, WISAAED, revealed two sites in Montesano: the Montesano City Hall and the Montesano Main Post Office. These sites, their listing status, site address, significance level, and date listed are provided in Table 6. No sites on the Washington Heritage Register are in the City's shoreline jurisdiction.

Table 6. Sites and Structures Listed on the Washington Heritage Register.				
Register Status	Site/Structure Name	Site Address	Significance Level	Date Listed
Washington Heritage Register	Montesano City Hall	104 North Main	Local	8/22/1978
Washington Heritage Register	US Post Office – Montesano Main	211 Pioneer Avenue North	Local	8/22/1978

Public Access

Public access facilities, parks, and public land are shown in Figures 4.1 through 4.3 in Appendix A. Existing public access to the city's shoreline includes Lake Sylvia State Park. The 233-acre park has nearly 3 miles of freshwater shoreline. Recreation opportunities include RV and tent camping, picnicking, 5 miles of hiking trails, non-motorized boating, fishing, and swimming. The park has a boat ramp and separate canoe access.

Sylvia Creek Interpretive Forestry Trail begins in Reach 1 on Sylvia Lake and extends beyond the shoreline jurisdiction following Sylvia Creek. The 2-mile trail includes signs that explore the plants, animals, history, and logging practices of the Montesano City Forest and Lake Sylvia.

On the Chehalis River, WDFW maintains the South Montesano concrete plank boat ramp. The ramp provides river access for motorized and non-motorized boats.

There are no public access areas in Reach 2, which is owned by the City and managed as part of the City Forest. While opportunity for public access exists in this reach, vehicular or pedestrian access would need to be constructed before public shoreline access could be

located in this reach. The City of Montesano also owns a significant portion of land near the confluence of the Chehalis River and the Wynoochee River. Much of the land is used for the wastewater treatment plant, but public access opportunities could be explored in this area.

Shoreline Modifications

Shoreline modifications in the city include such features as bridges and culverts, rock armoring or other stream bank modifications, dikes and levees, dams, boat ramps, and docks or piers. Shoreline modifications in the City's shoreline jurisdiction include such features as transportation and utility crossings that often include bank armoring for pier protection, as well as other rock embankments or revetments, fill, altered vegetation, ditches, dams, boat ramps, docks or piers, and piling. Dikes and levees, other common shoreline modifications, are not identified in the shoreline jurisdiction based on available data and review of aerial images.

Common shoreline modifications present in the City's shoreline jurisdiction and their potential impacts on shoreline processes include the following:

- Bridges and culverts constrict flow during flood events and locally restrict channel migration. Culverts can be perched, where there is an elevation break at the downstream side of the culvert that often acts as a barrier to migrating fish. Culverts can also be undersized, in which case peak flows back up behind them, and high velocities through the culvert impede fish passage.
- Dams can significantly change downstream hydrology, except when operated in run-of-the-river mode (i.e., operating with negligible changes in water storage and consequent effects on peak or low flows). Dams impound large wood and sediment along with water. Dams often cause degradation, erosion, and armoring downstream due to reduced sediment supply. They create lake-like conditions along what were previously stream shorelines, and usually result in the formation of deltas where streams flow into the impoundment.
- Revetments are erosion resistant structures, usually made of rock, that are placed to eliminate bank erosion where it threatens property or infrastructure. Revetments tend to reduce the structural complexity of shorelines, are typically accompanied by the removal of shoreline vegetation and, by design, eliminate the banks' ability to provide sediment to the stream.
- Fill is the addition of soil, sand, rock, gravel, sediment, earth-retaining structure, or other material to an area waterward of the OHWM, in wetlands, or on shorelands in a manner that raises the elevation or creates dry land. The characteristics of that shoreline depend on how it is constructed; often fill is accompanied by the construction of revetments and/or bulkheads.
- Overwater structures such as piers and docks are generally found on lakes rather than streams. They are often associated with bulkheads and/or revetments, and can serve to provide shade and cover in the absence of well-developed shoreline vegetation.
- Flow-directing structures such as pilings, barbs, and groins are not common in Montesano's shoreline jurisdiction. Where present, these structures can impair

physical process but may also exhibit greater bank and bed complexity compared to simple revetments.

- Ditches drain historical wetland areas and do not provide the habitat structure and complexity associated with natural streams. Channelization and straightening tend to increase the conveyance capacity of streams, at the cost of hydraulic and shoreline complexity. Channelization is often combined with or effected by the installation of revetments and/or dikes.

Key Habitats and Species

This section describes priority habitats and species of state and local concern including streams, wetlands, riparian areas, fish, and other wildlife dependent on water and shoreline environments in the City's shoreline jurisdiction (WDFW 2002, 2004, 2014a, 2014b, 2014c). The species descriptions focus on those that are most likely to be present in the City's shoreline jurisdiction. Priority habitats and species are shown in Appendix A, Figures 8.1 through 8.3 and 10.1 through 10.3.

Streams

Instream areas are a priority aquatic habitat designated by WDFW. Instream habitat is defined as the combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources. This priority habitat occurs in Sylvia Creek (Reaches 2 and 3), the Wynoochee River (Reach 5) and the Chehalis River (Reach 6), which contain river and stream water features. Other reaches including Sylvia Lake (Reach 1) and the large wetland complex in the Chehalis River floodplain (Reach 4) are dominated by lake or wetland habitats representing other priority aquatic habitat types.

Freshwater Wetlands and Deep Water

WDFW designates freshwater wetlands and fresh deep water as priority aquatic habitats in Washington State. Wetlands are also designated critical areas. Mapped wetlands in the shoreline jurisdiction include those identified in the National Wetland Inventory (NWI), and from the PHS database. Other wetlands could potentially be present because, in general, many wetlands are not identified in these sources. Conversely, some areas identified as wetlands may not actually meet wetland criteria. Therefore, actual wetland boundaries should determine the associated shoreline jurisdiction boundary on a site-specific scale during local project reviews. Freshwater wetland and deep water priority habitats are defined as follows (WDFW 2008):

- **Freshwater Wetlands** - Lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. Wetlands must have one or more of the following attributes: the land supports, at least periodically, predominantly hydrophytic plants; substrate is predominantly undrained hydric soils; and/or the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year.

- **Fresh Deep Water** - Permanently flooded lands lying below the deep water boundary of wetlands. Deep water habitats include environments where surface water is permanent and often deep, so that water, rather than air, is the principal medium within which the dominant organisms live. The dominant plants are hydrophytes; however, the substrates are considered non-soil because the water is too deep to support emergent vegetation. These habitats include all underwater structures and features (e.g., woody debris, rock piles, and caverns).

There are many other types of wetlands found within the City's shoreline jurisdiction besides the types identified as priority habitats by WDFW. From a hydrogeomorphic perspective, other wetland types likely present in the shoreline jurisdiction include those associated with rivers and streams, slope wetlands, and depressional wetlands. Each of these wetland types functions differently and all have important roles in the landscape. Wetlands are present in all of the reaches in the City's shoreline jurisdiction. Significant deep water areas in the shoreline jurisdiction include Sylvia Lake (Reach 1), which has surface area of approximately 30 acres and depths up to 45 feet.

Riparian Areas

Riparian habitat in a variety of forms ranging from low slope, valley bottom grasslands to steeply sloped, mountain forest are also common throughout the shoreline jurisdiction. Riparian habitat that is a designated priority habitat in Washington State is the area adjacent to flowing or standing freshwater aquatic systems. It encompasses the area beginning at the OHWM and extends to that portion of the terrestrial landscape that is influenced by, or that directly influences, the aquatic ecosystem. For example, hyporheic zones associated with riparian habitats can influence the vegetative structure and subsequently affect food production and food web interactions for fish and other aquatic organisms.

In riparian systems, the vegetation, water tables, soils, microclimate, and wildlife inhabitants of terrestrial ecosystems are often influenced by perennial or intermittent water. Simultaneously, adjacent vegetation, nutrient and sediment loading, terrestrial wildlife, as well as organic and inorganic debris influence the biological and physical properties of the aquatic ecosystem.

Riparian habitat includes the entire extent of the floodplain and riparian areas of wetlands that are directly connected to stream courses or other freshwater. Therefore, it is present throughout the entire shoreline jurisdiction, albeit at various levels of development and functional quality or value.

Snags and Logs

Snags and logs are habitat features that are designated by WDFW as priority habitat in Washington State. Snags and logs are generally limited within the City's shoreline jurisdiction. However, snags and logs may be present in the designated priority habitats described in the previous sections to the extent that those habitats support trees or the transport of large wood through the aquatic system.

Priority snag and log habitat includes individual snags and/or logs, or groups of snags and/or logs of exceptional value to wildlife due to their scarcity or location in a particular landscape. Areas with abundant, well-distributed snags and logs are also considered priority snag and log

habitat. Examples include large, sturdy snags adjacent to open water, remnant snags in developed or urbanized settings, and areas with a relatively high density of snags.

In western Washington, priority snags have a diameter at breast height of greater than 51 cm (20 inches), and are greater than 2 m (6.5 feet) in height. Priority logs are greater than 30 cm (12 inches) in diameter at the largest end, and greater than 6 m (20 feet) long.

Priority Fish

Priority and sensitive fish species in the City's shorelines are summarized in Table 7 (WDFW 2002, 2004, 2014b). The Chehalis and Wynoochee Rivers, including within the City's SMP jurisdiction are designated critical habitat for bull trout (75 FR 63898). These waterbodies provide freshwater and marine foraging, migration, and overwintering habitat outside of the Hoh, Queets, and Quinault core areas where breeding populations occur. Although bull trout presence in the watershed is rare, critical habitat extends approximately 3.4 miles upstream from the city. Additionally, all of the streams in the shoreline jurisdiction that support Chinook or coho salmon are considered "essential fish habitat" protected by the Magnuson-Stevens Fishery Conservation and Management Act under the jurisdiction of NMFS. Coastal resident cutthroat trout is a federal listed species of concern, and both cutthroat and rainbow trout are WDFW designated priority species due to their recreational value. Olympic mudminnow is a state listed sensitive species, defined as "... any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened throughout a significant portion of its range within the state without cooperative management or removal of threats" (WAC 232-12-297). Wetland protection is considered essential for the conservation of the Olympic mudminnow (WDFW 2013). Although it is not a State priority species, largemouth bass are also present in the Chehalis River and provide additional fishing opportunities.

Table 7. Priority Fish Presence in City of Montesano Shoreline Jurisdiction.				
Species	Endangered Species Act Unit ^a	Federal Listing Status	State Listing Status	PHS Criteria ^b
Chinook (<i>Oncorhynchus tshawytscha</i>)	Washington Coast ESU	Not warranted	Candidate	#1, #2, #3
Coho (<i>O. kisutch</i>)	Southwest Washington ESU	Not warranted	None	#2, #3
Steelhead and Rainbow Trout (<i>O. mykiss</i>)	Southwest Washington DPS	Undetermined	Candidate	#1, #3
Bull Trout (<i>Salvelinus confluentus</i>)	Olympic Peninsula RU	Threatened/designated critical habitat	Candidate	#1, #2, #3
Coastal Resident Cutthroat Trout (<i>O. clarki clarki</i>)	Southwestern Washington/Lower Columbia River DPS	Species of Concern	None	#3
Olympic Mudminnow (<i>Novumbra hubbsi</i>)	Not Applicable	None	Sensitive	#1

^a ESU is Evolutionarily Significant Unit. DPS is Distinct Population Segment. RU is Recovery Unit.

^b Criterion 1 = State-Listed and Candidate Species; Criterion 2 = Vulnerable Aggregations; Criterion 3 = Species of Recreational, Commercial, and/or Tribal Importance (WDFW 2008).

Birds and Mammals

Bald eagles are commonly associated with shorelines where they are often attracted by the presence of live or dead fish and other prey items. They nest in tall trees (generally greater than 85 feet in height) usually within 0.25 mile of shorelines. While the bald eagle was delisted from a federal ESA status of threatened in 2008, it is still protected under the Bald Eagle Management Act, and is a state sensitive species that requires protection. Individual occurrences of bald eagles are documented along the Chehalis River and vicinity of the City's shoreline jurisdiction. They likely forage along the banks of the river and in nearby streams and wetlands.

Documented wetland areas contain emergent and scrub-shrub vegetation that may host concentrations of waterfowl or individuals or colonies of birds commonly associated with shorelines such as bald eagles or great blue herons. Areas that may support waterfowl concentrations and are mapped as priority habitat cover 170 acres in the shoreline jurisdiction, including 60 acres in the wetland complex, 43 acres along the Wynoochee River, and 67 acres along the Chehalis River.

Areas that support regular concentrations of trumpeter swans are designated priority habitat. This priority habitat is mapped in the city's vicinity but not within the City's shoreline jurisdiction, and overlaps with mapped priority habitat for other waterfowl (see Appendix A, Figure 10.1). Portions of the City's shorelines where individuals of a species have not been mapped may support species such as bald eagle, great blue heron, trumpeter swan, and other waterfowl by providing nesting and foraging opportunities. Water-dependent priority mammals, typically associated with marine environments, are not mapped or known to occur in the City's shoreline jurisdiction.

REACH ANALYSIS

As described previously, the shoreline jurisdiction was divided into six reaches based on physical and ecological characteristics, land use, and development patterns (Figure 2.1 in Appendix A). The inventory and characterization, including physical and ecological conditions, is described in the following sections.

Physical and Biological Characterization

An overview of the reach characteristics is provided in Table 8. Physical and biological characteristics are described in the following subsections.

Physical Processes

Shorelines within the city are shaped by physical processes that occur at multiple scales, from infiltration of precipitation at the scale of individual soil units to stream flow variations that are determined by basin-wide processes. These processes can be differentiated into hydrologic-related, which affect the distribution and flow of water, and hydraulic-related, which affect channel morphology, hyporheic and stream flow characteristics, and the storage and transport of sediment and LWD. Table 9 illustrates the different processes that occur in each of the reaches.

Key Physical and Habitat Functions

The City's shorelines provide physical and ecological functions that are dependent on the physical processes described above found within each reach. For river reaches such as those in the City's shoreline jurisdiction, the functions include the transport of water and sediment at a range of flows; the attenuation of flow energy; the development of fluvial landforms including cut banks, pools, riffles, and gravel bars; recruitment, transport, and storage of LWD; surface-groundwater interactions; and sediment input and deposition. To the extent wetlands are present in local areas within the reaches, additional functions may include the interception and storage of surface water and sediment; attenuation of wave energy; and the recruitment of additional organic matter.

Land Use and Land Cover

Land use designations and zoning are shown on Figures 3.1 through 3.3 in Appendix A and mapped land cover on Figures 5.1 through 5.3 in Appendix A. Reach 1, Sylvia Lake, is zoned City Forest, and is primarily covered by evergreen forest (66 percent) and open water (13 percent). Reach 2, Upper Sylvia Creek, is also zoned City Forest, and is mostly characterized by woody wetlands (72 percent). Reach 3, Lower Sylvia Creek, is primarily zoned low density residential (98 percent) but also includes some moderate density residential as well as major public use. The land cover of Reach 3 is primarily developed open space (41 percent), but also includes some low and medium intensity development (15 percent and 6 percent) as well as emergent herbaceous wetlands (21 percent).

Table 8. Summary of Shoreline Reaches in the City of Montesano Shoreline Jurisdiction.

	Reach 1 Sylvia Lake	Reach 2 Upper Sylvia Creek	Reach 3 Lower Sylvia Creek	Reach 4 Wetland Complex	Reach 5 Wynoochee River	Reach 6 Chehalis River
Shoreline Jurisdiction Area (acres)	86.1	13.7	17.5	124.6	43.4	66.7
Water Body	Sylvia Lake	Sylvia Creek	Sylvia Creek	Associated Wetland	Sylvia Creek Wynoochee River	Chehalis River
Lake Area/ Stream Length	area 28.5 acres perimeter 2.4 mi.	0.68 miles	0.3 miles	n/a	Sylvia Creek 0.1 miles Wynoochee R. 0.3 miles	1.3 miles
FEMA 100-year Floodplain (% area)	0	9.0 acres (65%)	11.6 acres (66%)	121. 7 acres (98%)	43.4 acres (100%)	66.7 acres (100%)
Wetlands^a (% area)	4.7 acres (6%) ^b	9.8 acres (72%) ^c	2.7 acres (15%)	93.4 acres (75%)	26.3 acres (60%)	0.8 acres (1%) ^d
Geological Hazards	Mapped known or suspected landslide and seismic risk	Mapped tsunami inundation zone	Mapped known or suspected landslide risk, Mapped tsunami inundation zone	Mapped known or suspected landslide and seismic risk, Mapped tsunami inundation zone	Mapped known or suspected landslide risk, Mapped tsunami inundation zone	Mapped known or suspected landslide and seismic risk, Mapped tsunami inundation zone
Primary Land Use^e	Parks	Undeveloped Land	Very Low Density Residential	Commercial, Industrial Land	Transportation, Communication, and Utilities	Recreation, Industrial Land
Dominant Land Cover	Evergreen Forest, Open Water	Woody Wetland	Emergent Wetland, Open Space	Emergent Wetland, Woody Wetland	Open Space, Woody Wetland	Open Water, Emergent Wetland

Table 8 (continued). Summary of Shoreline Reaches in the City of Montesano Shoreline Jurisdiction.

	Reach 1 Sylvia Lake	Reach 2 Upper Sylvia Creek	Reach 3 Lower Sylvia Creek	Reach 4 Wetland Complex	Reach 5 Wynoochee River	Reach 6 Chehalis River
Shoreline Modifications	Transportation corridors, dam, recreational facilities (docks, boat ramp), culverts	No apparent channel or bank modifications	Transportation corridors, ditches	Transportation corridors, culverts	Rock embankments and sheet pile	Transportation corridors, rock embankments and sheet pile, fill
Water Quality	No impairments identified	No impairments identified	No impairments identified	No impairments identified	No impairments identified	Temperature – Category 2 Bacteria – Category 4A
Priority Habitat and Species	Resident Cutthroat Presence/Migration	Coho Salmon Known Juvenile Rearing, Resident Cutthroat Presence/Migration	Coho Salmon Known Juvenile Rearing, Resident Cutthroat Presence/Migration	Olympic mudminnow (presumed present based on point location in close proximity and hydrologic connection), Waterfowl Concentrations 60.4 acres	Coho Salmon, Fall Chinook, and Winter Steelhead Known Juvenile Rearing, Fall Chum Known Spawning, Bull Trout, Resident Cutthroat, and Summer Steelhead Presence/Migration, Waterfowl Concentration 43.4 acres	Coho Salmon, Fall Chinook, and Spring Chinook Known Juvenile Rearing, Fall Chum Known Spawning, Bull Trout, Resident Cutthroat, Summer Chinook and Winter Steelhead Presence/Migration Waterfowl Concentration 66.7 acres

^a Wetland presence is based on National Wetland Inventory (NWI) data except where noted.

^b NWI data does not indicate wetland presence in Sylvia Lake Reach. USGS land cover data indicates 4.74 acres (6 percent) woody wetlands in Sylvia Lake Reach. Lake fringe emergent and scrub shrub wetlands are also likely present based on aerial images.

^c NWI data does not indicate wetland presence in Upper Sylvia Creek Reach. USGS land cover data indicates 9.81 acres (72 percent) woody wetlands in Upper Sylvia Creek Reach.

^d Wetlands in Reach 4 (Wetland Complex) are associated with the Chehalis River floodplain.

^e Primary land use is based on Grays Harbor County Assessor classifications, zoning, land cover, and/or known land uses.

Table 9. City of Montesano Shoreline Physical Processes.			
	Reach 1 Sylvia Lake	Reach 2 Upper Sylvia Creek	Reach 3 Lower Sylvia Creek
Mean Annual Runoff Potential (Drainage Area X Mean Annual Precipitation^a)	29 cfs (5.01 sq. mi. X 76.8 in.)	46 cfs (7.52 sq. mi. X 77.8 in.)	50 cfs (8.71 sq. mi. X 78 in.)
Stream Flow	Est. Mean Annual Inflow 20 cfs Est. Mean Peak Inflow 230 cfs	Est. Mean Annual Flow 31 cfs Est. Mean Peak Flow 360 cfs	Est. Mean Annual Flow 34 cfs Est. Mean Peak Flow 390 cfs
Hyporheic Flow	n/a	Controlled by bedform and substrate characteristics	Controlled by bedform and substrate characteristics
Groundwater Discharge/Recharge Surface/Groundwater Interactions	Unknown	Unknown	Exchange with Wynoochee River floodplain aquifer
Overbank Flow	n/a	Minimal	Minimal
Bank Storage	n/a	Minimal	Minimal
Channel Morphology/ Development of Fluvial Landforms	Lake	Pool-Riffle dunes, ripples, bars, pools	Pool-Riffle/Dune-Ripple Transitional dunes, ripples, bars, pools
Flow Characteristics	n/a	Rainfall dominated	Rainfall dominant, Storm-water inputs, Tidal influence
Sediment Transport/Storage Sediment Sources	Sediment storage Local sediment input negligible	Sediment transport Limited input from upstream, banks, inactive channel	Sediment transport Limited input from upstream, banks, inactive channel
Development, Transport, and Retention of Woody Debris and Organic Material	Forested shoreline provides recruitable debris, low transport potential	Deciduous riparian zone, LWD accumulations visible in aerial photographs	Sparse deciduous/herbaceous riparian zone No LWD accumulations visible in aerial photographs

Table 9 (continued). City of Montesano Shoreline Physical Processes.

	Reach 4 Wetland Complex	Reach 5 Wynoochee River	Reach 6 Chehalis River
Mean Annual Runoff Potential (Drainage Area X Mean Annual Precipitation^a)	5 cfs (0.94 sq. mi. X 78.2 in.)	1,875 cfs (195.95 sq. mi. X 130 in.)	9,137 cfs (1783.18 sq. mi. X 69.6 in.)
Stream Flow	Est. Mean Annual Inflow 3.4 cfs Est. Mean Peak Inflow 39 cfs	Mean Annual Flow 1,269 cfs Est. Mean Peak Flow 14,704 cfs	Est. Mean Annual Flow 6,195 cfs Est. Mean Peak Flow 61,573 cfs
Hyporheic Flow	n/a	Controlled by tidal/surface/groundwater interaction	Controlled by tidal/surface/groundwater interaction
Groundwater Discharge/Recharge Surface/Groundwater Interactions	Inflow from hillside to north Exchange with Chehalis/Wynoochee River floodplain aquifer	Exchange with Chehalis/Wynoochee River floodplain aquifer	Exchange with Chehalis/Wynoochee River floodplain aquifer
Overbank Flow	n/a	Yes	Yes
Bank Storage	n/a	Yes	Yes
Channel Morphology/ Development of Fluvial Landforms	Floodplain wetland	Dune-ripple dunes, ripples, bars	Dune-ripple dunes, ripples, bars
Flow Characteristics	Driven by ground/surface-water interactions, runoff	Rainfall dominant, Small snow-melt peak, Tidal influence	Rainfall dominant, Strong tidal influence
Sediment Transport/Storage Sediment Inputs/Deposition	Sediment storage potential Local sediment input negligible	Sediment transport Input from upstream, banks, inactive channel	Sediment transport Input from upstream, banks, inactive channel

Table 9 (continued). City of Montesano Shoreline Physical Processes.			
	Reach 4 Wetland Complex	Reach 5 Wynoochee River	Reach 6 Chehalis River
Development, Transport, and Retention of Woody Debris and Organic Material	Forested shoreline provides recruitable debris, low transport potential	Deciduous/herbaceous riparian zone Channel-margin LWD accumulations visible in aerial photographs	Deciduous/herbaceous/industrial riparian zone Sparse channel-margin LWD accumulations visible in aerial photographs, high transport potential

^a Mean annual precipitation is the total precipitation volume that falls on a watershed in an average year divided by the area of the watershed.

Reach 4, Wetland Complex, is zoned primarily for industrial flood hazard (63 percent) and low density residential (21 percent) but it also includes some heavy commercial (16 percent). This reach is largely woody wetlands (30 percent), emergent herbaceous wetlands (28 percent), and developed open space (16 percent). Reach 5, the Wynoochee River, and Reach 6, the Chehalis River, are both zoned for heavy commercial as well as industrial flood hazard. Reach 5 is characterized primarily by woody wetlands (30 percent) and emergent herbaceous wetlands (28 percent) whereas Reach 6 is primarily open water (46 percent) with some inclusions of wetlands and developed open space as well.

Critical Areas and Priority Habitat and Species

This section describes critical areas in the City's shoreline jurisdiction including the following:

- Fish and wildlife habitat conservation areas
- Wetlands
- Geological hazard areas
- Frequently flooded areas
- Aquifer recharge areas

Fish and Wildlife Habitat Conservation Areas

State priority fish species are present in all of the shoreline reaches. Sylvia Lake supports Coastal resident cutthroat trout. Sylvia Creek (Reaches 2 and 3) provides juvenile rearing habitat for coho salmon. The wetland complex (Reach 4) is not mapped as containing fish (Appendix A, Figures 2.1 and 8.1). However, the wetlands are associated with the Chehalis River, and likely support fish species indirectly providing food production, removal of pollutants, and refuge opportunities during extreme flood events.

The Wynoochee and Chehalis Rivers (Reaches 5 and 6) provide habitat for Chinook, coho, chum, steelhead, as well as coastal resident cutthroat trout and bull trout. The Wynoochee River contains juvenile rearing habitat for coho, Chinook, and steelhead, as well as spawning habitat for chum. The Chehalis River provides habitat for steelhead migrating to upstream spawning and rearing areas, and for rearing juvenile Chinook. Although rare in the watershed, bull trout are also protected by federal listing under the ESA. Reaches 5 and 6, the Wynoochee and Chehalis Rivers, are designated critical habitat for bull trout (75 FR 63898). The Chehalis River also contains largemouth bass, a warm water species that may provide additional recreational fishing opportunities in the shoreline jurisdiction.

Within their range, which includes the City's shorelines, Olympic mudminnow are usually found in slow-moving streams, wetlands, ponds, ditches, or sloughs with muddy substrate, still or slow moving water, and abundant aquatic vegetation. Olympic mudminnow presence is not well documented throughout its range. However, general known locations were documented by Mongillo and Hallock (1999) and WDFW (2013). Olympic mudminnow is documented near the wetland complex and may be present throughout the wetland (Reach 4).

Riparian buffers have been affected by altered vegetation structure due to development that includes industry and open space in the floodplain in Reaches 4 and 5, and along the Chehalis River in Reach 6. Riparian vegetation in the other reaches (Reaches 1, 2, and 3) is relatively intact based on aerial imagery and land cover, comprised mainly of forest and woody wetland vegetation.

Reach 4 is dominated by wetlands considered a priority habitat in the State of Washington (WDFW 2008) due to their overall functions and values. Freshwater streams and riparian areas (where aquatic and terrestrial environments interact to influence each other) are also considered priority habitats for their unique environment and important role for fish and other wildlife. Additionally, the wetland complex, the Wynoochee River, and the Chehalis River contain habitat for bald eagles and waterfowl concentrations.

Wetlands

Wetlands occur throughout all of the reaches in the City's shoreline jurisdiction. Wetland cover in each reach is summarized in Table 8 and shown in Figures 5.1 and 6.1, Appendix A. Wetland cover within each reach ranges from 1 percent (Chehalis River) to 75 percent (Wetland Complex). Wetland hydrology is generally derived from flooding in adjacent streams, precipitation and water storage in Sylvia Lake, and potentially perched or high groundwater in wetlands associated with the lower Sylvia Creek. Although the Chehalis River Reach contains a minor amount of mapped wetlands (0.83 acre representing 1 percent coverage in the reach), it is important to recognize that wetlands in Reach 4 (Wetland Complex) are in the Chehalis River floodplain and significantly influenced by, and associated with, the Chehalis River. Therefore, shoreline planning and development regulations in the Chehalis River Reach should consider impacts on wetlands, including connectivity with wetlands in the floodplain.

Geological Hazard Areas

No soils within the city are susceptible to severe rill, inter-rill, or wind erosion (GHRPC 1992). However, the city contains soils that are susceptible to sloughing or caving during shallow excavation, including udorthent soils along the banks of the Chehalis River that are susceptible to bank erosion (GHRPC 1992).

Landslides in Montesano typically occur in the hills north of town (City of Montesano 2008). The udorthents and soils with slopes steeper than 15 percent within the city have also been classified as Seismic Hazard Areas due to the possibility of earthquake-induced landslides (GHRPC 1992).

Montesano experienced earthquakes that caused damage to structures due to ground shaking in 1999 and 2000 (City of Montesano 2008), but the main seismic hazard in Montesano is that of tsunamis caused by seismic activity along the Cascadia subduction zone (or elsewhere in the Pacific Ocean). Tsunami hazard is lower at Montesano than closer to the entrance of Grays Harbor, but a tsunami coinciding with precipitation-generated flood and/or high tide could fill much of the 100-year floodplain (GHRPC 1992). For areas where tsunami inundation modeling has not been completed, including in Montesano, the 25-foot topographic contour line is used to approximate potential tsunami inundation (Wood and Soulard 2008). The mapped tsunami inundation zone in Montesano (see Figure 6 in Wood and Soulard 2008)

encompasses the Wynoochee River, lower and upper Sylvia Creek, the Wetland Complex, and the Chehalis River reaches.

Frequently Flooded Areas

Montesano experiences river flooding during the winter when heavy rains and snowmelt produce the highest runoff. At times, high tides restrict river flows and aggravate flood problems (GHRPC 1992). The risk and frequency of flooding events changes over time and is influenced by climate changes and land development, among other factors. Peak flows in the lower Chehalis River increased 15 percent between 1990 and 2004 (Grays Harbor County, undated) indicating a potentially increasing risk of flooding. Grays Harbor County, including Montesano, has experienced numerous federal disaster declarations related to flooding in the Chehalis River. In addition, there is growing concern about the increasing frequency of floods since 2005 as there were six federal disaster declarations related to flooding between 2005 and 2010. Key flooding concerns in the Montesano shoreline jurisdiction include protection of the Mary's River lumberyard in the Chehalis River reach and the municipal wastewater treatment facility in the Wynoochee River reach.

The City recognizes that floodplains and other areas subject to flooding perform important hydrological functions (MMC 14.30.070). Frequently flooded areas or flood hazard areas are mapped by FEMA and include all areas within the 100-year floodplain (Figure 6 in Appendix A). Development in the floodplain is regulated by the City's zoning code (MMC Chapter 17.40), in which a flood hazard overlay district is established. The purpose of the flood hazard overlay district is to regulate development within areas subject to potential flood damage. The code includes design and construction requirements to minimize flood damage and reduce exposure to flood hazards (MMC 17.40.027). With the exception of Sylvia Lake, which is mapped outside of the 100-year floodplain, all of the shoreline reaches in Montesano have significant areas in the floodplain, ranging from 65 percent cover (Upper Sylvia Creek) to 100 percent of the reach (Wynoochee River and Chehalis River reaches). Nearly all of the Wetland Complex reach (98 percent) is within the Chehalis River floodplain and the flood hazard overlay district.

Aquifer Recharge Areas

Critical aquifer recharge areas have not been mapped in the city. Where no specific studies have been done, jurisdictions may use existing soil and surficial geologic information to determine where recharge areas exist. To determine the threat to groundwater quality, existing land use activities and their potential to lead to contamination should be evaluated (WAC 365-190-100). Reaches 4, 5 and 6 also overlie a wellhead protection area identified by Washington State Department of Health (WDOH 2014).

Shoreline Modifications

Shoreline modifications identified in the inventory and characterization are listed in Table 10 and summarized in this section.

Culverts that may be partial barriers or restrict the movement and migration of sensitive fish species are mapped in Reach 1 and Reach 4 (Figure 9.1 in Appendix A). Sylvia Lake also contains one bridge within the shoreline jurisdiction, which carries Sylvia Lake Road over the lake to parking, swimming, and fishing areas. The lake is also characterized by the Lake Sylvia dam at the lake's outlet where water flows into Sylvia Creek. Bridge and utility crossings are common shoreline modifications, and often include bank protection such as rock armoring. Fill and rock armor embankments are present in the Chehalis and Wynoochee River reaches. Loss of vegetation along banks on the Chehalis and Wynoochee Rivers reduces near-bank shade. Climate change impacts are expected to raise water temperatures, so efforts to enhance near-bank shade through native vegetation planting are recommended.

In response to flood concerns near Mary's River lumberyard and the City's wastewater treatment plant, alternatives for protecting these facilities were evaluated in 2013 (Parametrix 2013). Several alternatives were considered unfeasible primarily due to the large scope (e.g., amount and extent of excavation and filling), potential habitat loss in the relict channel south of the main river channel and outside the city boundary, regulatory permitting constraints, and property acquisition constraints. For protection of the lumber mill, the selected alternative involves armoring approximately 1,400 linear feet of Chehalis River shoreline (Reach 6) with a sheet pile wall (see Figure 9.2 in Appendix A). The wall was constructed in 2014. Constructing a wall was also recommended for protection of the wastewater treatment plant in the Wynoochee River, Reach 4 (Parametrix 2013) and the wall was constructed in 2014 (Figure 4), resulting in approximately 630 feet of armored shoreline in the reach (see Figure 9.2 in Appendix A).

The sheet pile is located landward of the OHWM of the Chehalis River to minimize impacts, but such structures are widely recognized to have long-term effects on floodplain connectivity and associated ecological functions. The overall impacts of the structure, compared to areas with a more natural shoreline, may be limited in this local instance because much of the shoreline was already armored along the mill site. The existing shoreline protection structures represent an opportunity for shoreline restoration due to the impairment on processes and functions. Although removal of the structures or significant alterations to restore the shoreline are unlikely to occur in the near term due to the constraints described



(Source: Chehalis River Basin Flood Authority)

Figure 4. Sheet Pile Wall Construction at the Montesano Municipal Wastewater Treatment Facility in 2014.

for the alternatives, other actions may be considered for restoring shoreline functions (see *Restoration Opportunities/Special Management Considerations*).

Water Quality

Water quality is generally good in the City's shoreline jurisdiction. Reach 6, the Chehalis River, is the only reach with a water quality impairment listed on Ecology's 303(d) list. A portion of the reach extending from the lumberyard downstream to the city boundary is listed as Category 2 for temperature, and Category 4A for bacteria. Category 2 water bodies indicate a potential water quality concern but there is not enough evidence to require a water quality improvement project such as a total maximum daily load (TMDL). Category 4A water bodies are considered polluted but the impairment is currently addressed with an approved TMDL.

Table 10. Shoreline Modifications in the City of Montesano Shoreline Jurisdiction.	
Reach	Shoreline Modifications
Reach 1 Sylvia Lake	Dam, bridges, picnic areas, fishing dock, boat ramp, and swimming beach at south end of the lake, campgrounds with road access on east and west shore in the south half of lake, walking trail around lake. Northern 2/3 of lake is unmodified, well vegetated, with plentiful LWD.
Reach 2 Upper Sylvia Creek	No visible channel or bank modifications. East side was clear-cut down to a trees-width from the banks shortly prior to 1990.
Reach 3 Lower Sylvia Creek	Ditched tributary at Pioneer Ave W. Bridges at Pioneer Ave W, Wynoochee Ave W, Puget Sound and Pacific railroad, US 12, and possible revetment between railroad and US 12.
Reach 4 Wetland Complex	Crossed by railroad, US 12 and its ramps, Main Street. Apparent tree farm at west boundary with Lower Sylvia Creek. Gravel road and ditches between US 12 and the Chehalis River.
Reach 5 Wynoochee River	Rock embankment and sheet-pile wall at west corner of wastewater treatment plant pond exposed due to eastward migration of meander bend since 2005. Old railroad prism along north/west side of SR 107.
Reach 6 Chehalis River	SR 107 bridge, power line corridor 100 feet east of and parallel to it. Parking lot east of SR 107 bridge and power line appears to be fill and to have piles protecting the bank. Entire length of Mary's River Lumber Co. yard embankment is revetment comprised of sheet pile and rock armoring. South end building platform is fill with rock revetment. Overwater structure on bank across from east entrance, with line of piles 50 feet from the bank at approximately 120 foot spacing extending 600 feet downstream and 200 feet upstream of the downstream end of the overwater structure. Fill pad and likely rock revetment at Bowers construction building; possible revetment along road prism along bank upstream of it.

Although the segment of the Wynoochee River within the City's shoreline jurisdiction is not included on the 303(d) list, segments immediately upstream and downstream are listed as Category 1 for bacteria, indicating that the stream is unimpaired. Lake algae monitoring results reported by Washington State's freshwater algae bloom monitoring program show water quality is historically and currently below the state standard for toxicity, indicating good water quality in the Lake Sylvia, Reach 1 (Ecology 2014).

Public Access Structures

At the most southern point of Montesano there is a concrete plank boat ramp onto the Chehalis River (Reach 6). Administered by WDFW, this boat launch provides access to the Chehalis River within one mile of downtown Montesano. A restroom facility and large parking area are also provided at this site. The site is prone to floods when the river level is high.

Lake Sylvia State Park (Reach 1), which is operated by the Washington State Parks and Recreation Commission, provides facilities to support activities such as tent and trailer camping, hiking, fishing, and swimming as well as a public access structure for non-motorized boat access.

Functional Assessment

Table 11 summarizes the functional assessment of the reaches based on the methods described previously and information identified and reviewed for the inventory and characterization.

Based on the rating of the function (low to high), a numerical number was applied to each function (low = 1, medium = 2, high = 3) to arrive at a total score for each reach. Most reaches in the City's shoreline jurisdiction scored relatively high at 31 or 32 total points out of a possible 36 across all criteria. The Chehalis River scored in the low to moderate range (17 points) primarily due to bank armoring and existing development that reduces vegetation and hydrologic functions in the reach. All of the reaches scored high for hydrologic and habitat functions except the Chehalis River (Reach 6), which ranked low to moderate in those categories, and Wetland Complex (Reach 4) which had a moderate ranking for habitat.

Reach 1: Sylvia Lake scored relatively high for functions (31 points) primarily due to good coverage by conifer forest and other vegetation. Moderate shoreline development and modifications, and limited coverage by wetlands and herbaceous plants limit functions related to vegetation and groundwater and surface water exchange. Future development may be focused in areas already disturbed or impacted by development such as adjacent roads and infrastructure. Less disturbed areas may be considered for protection given the relatively high score.

Reach 2: Upper Sylvia Creek scored relatively high (31 points), also due to good forest cover, stream structure including channel sinuosity and LWD, and connectivity with other habitats. A low level of development in this reach combined with good functional value indicates that protection would be appropriate for this reach.

Reach 3: Lower Sylvia Creek generally scored the same as Reach 2 (31 points), although functions provided are somewhat different due to a different vegetative structure (emergent

and shrub dominated), and presence of wetlands. Although most development appears outside of the mapped shoreline jurisdiction, the reach has complex hydrology and wetland conditions that add importance to field delineation if development is proposed. Impairments or altered conditions may be associated with ditches, road crossings, and potentially runoff to the extent that it enters the reach from adjacent development outside the shoreline jurisdiction. Restoration is likely an appropriate objective for this reach.

Table 11. Reach-Scale Functional Assessment.

Reach Number	Reach Name	Hydrologic: Transport/Storage of Water and Sediment	Hydrologic: Attenuation of flow/wave energy	Hydrologic: Removing nutrients, toxins, sediment	Hydrologic: Developing stream structure	Vegetation: Maintaining Temperatures	Vegetation: Removing nutrients, toxins, sediment	Vegetation: Sediment Stabilization	Vegetation: Attenuation of high energy	Vegetation: Recrutable woody debris and organic material	Hyporheic: Water/sediment storage, base flows, nutrients...	Hyporheic: Support vegetation	Habitat: Physical space and conditions	Total Score for all Functions
1	Sylvia Lake	3	3	3	3	3	2	3	1	3	2	2	3	31
2	Upper Sylvia Creek	3	3	3	3	3	1	3	2	3	1	3	3	31
3	Lower Sylvia Creek	3	3	3	3	2	2	2	3	2	2	3	3	31
4	Wetland Complex	3	3	3	2	2	3	2	3	2	3	3	2	31
5	Wynoochee River	3	3	3	3	2	2	2	3	2	3	3	3	32
6	Chehalis River	1	2	1	1	1	1	2	1	1	2	2	2	17

Note: To determine total score for each reach, low = 1, medium = 2, high = 3, and scores are added.

Reach 4: The Wetland Complex is ranked relatively high (31 points). Wetlands often perform important functions for water quality, water storage, and habitat, particularly when located in the floodplain and connected with other bodies of water such as the Chehalis River. The reach functions are limited primarily by lack of significant forest cover and a diverse stream and floodplain structure that would be expected with better connectivity to the river and absence of development. The wetland complex was ranked moderate for habitat functions due to the presence of the highway and adjacent roads that interrupt the connection with other habitats. Protection or restoration are likely to be appropriate objectives for this reach.

Reach 5: The Wynoochee River received the highest functions score (32 points) but ranked closely with most other reaches in the city. Functional impairments are primarily related to vegetation. Although much of the vegetation appears intact, extensive forest cover and herbaceous plants are lacking, resulting in moderate scores for some functions. Development is limited but bank protection associated with the water treatment facility also affects the functions of this reach. An overall good score for functions in combination with limited development indicates that protection or restoration may be appropriate objectives for this reach.

Reach 6: The Chehalis River has the lowest functions score (17 points), primarily due to shoreline modifications and development, altered vegetation, and impaired water quality. Although the Chehalis River scored moderately, and low, relative to the other reaches, some of the functional benefits of this reach are reflected in the score for the wetland complex (Reach 4) located in the Chehalis River floodplain. As stated before, wetlands in these reaches support processes and functions affecting both reaches. Because the Chehalis River reach is functioning at a moderate level and development is still limited within the reach, restoration would be an appropriate objective for this reach. However, since the Chehalis River is ranked lowest in comparison to other reaches in the city and has a moderate level of existing development, development that provides for water-oriented uses may be most appropriately focused in this reach. However, opportunities for water-oriented uses may be limited and development will be constrained by flood hazards and other critical areas (e.g., wetlands) that are present within this reach and the associated floodplain wetland complex in Reach 4. This is particularly the case in light of growing concerns over increasing peak flows and flood frequency in the Chehalis Basin.

Restoration Opportunities/Special Management Considerations

This section describes existing and potential restoration opportunities, constraints, and recommended priorities. Shoreline ecology on a landscape and basin-wide scale is already degraded and the SMP implemented by the City must recognize that long-term sustainability of ecological functions is only achievable if restoration of those ecological functions is accomplished over time. The following objectives of the restoration plan support the overall goal to restore impaired ecological functions in the shoreline jurisdiction on a local and basin-wide scale:

- Encourage and facilitate cooperative restoration programs between local, state, and federal public agencies, tribes, non-profit organizations, and landowners to address shorelines with impaired ecological functions or processes

- Restore and enhance shoreline ecological functions and processes, as well as shoreline features, through voluntary and incentive-based public and private programs
- Target restoration and enhancement toward improving habitat required to support the life cycles of priority or locally important fish and wildlife species
- Ensure restoration and enhancement is consistent with and, where practicable, prioritized based on the biological recovery goals for several salmonid species (Chinook, steelhead, coho, etc.), and other species or populations for which a recovery plan is available
- Seek funding for restoration, enhancements, easements or acquisitions using federal, state, county, grant, private donation, or other funding sources

A formal restoration plan will be prepared in a later phase of the SMP update process and will contain specific projects that conform to, and support the objectives above.

Loss of riparian vegetation along the Chehalis and Wynoochee Rivers reduces near-bank shade. Climate change impacts are expected to raise water temperatures, so efforts to enhance near-bank shade through planting of native vegetation are recommended. Given expected climate change, restoration priorities should include identification and protection of thermal refugia (e.g., groundwater and tributary in-flows, undercut banks, deep stratified pools, retention and/or restoration of riparian forest cover to limit stream warming). Off-channel refugia from high flows (in the tidal surge plain) should be protected and enhanced (Sandell and McAninch 2013). The tidal surge plain includes the Chehalis River and lower Wynoochee River, and their floodplain in Montesano (Reaches 4, 5, and 6). Improving native vegetation cover in the Wynoochee River reach, Wetland Complex, and the Chehalis River may be priority measures for restoring shoreline functions. Restoring hydrologic and vegetation functions in the Lower Sylvia Creek reach by removing or modifying ditches and planting native vegetation are also potential restoration opportunities that could improve shoreline ecological functions.

The Chehalis Basin salmon habitat restoration strategy (Grays Harbor County 2011) identifies connectivity to the tidally influenced surge plain as a potential limiting factor and identifies reconnection as a restoration goal for the Grays Harbor estuary. The plan notes that although connectivity is good in most of the Chehalis River main stem, it is degraded near Montesano due to stream diking. The plan recommends enhancing access to off channel habitat as a general restoration action. Soft shore-stabilization methods are a recognized strategy to address SMA policies by providing protection for a prioritized shoreline use, while also providing for environmental protection and enhancing public benefit (Gianou 2014). Goals to minimize new hard shoreline armoring or reduce existing armoring should be considered in the SMP.

Channel migration is not specifically addressed in the City's municipal code. As an ecological process relevant to shoreline functions, channel migration should be considered in planning and regulating future development proposals in the shoreline jurisdiction.

There is current concern about the potential cutoff of the meander bend immediately upstream from Mary's River lumberyard. It is possible that the bend could be cut off from the main channel and the main channel would become realigned through the eroding oxbow to flow more directly toward the lumberyard (see Figure 5).

The extent and magnitude of potential channel and habitat changes that might occur due to the eventual cutoff of the meander bend, and the potential resultant exposure of sheet piling to high velocity flows, is highly uncertain (Parametrix 2013). The City should continue to monitor channel and bank structure, particularly along the migrating channel of the Chehalis River and the Wynoochee and Chehalis floodplain near the confluence of those rivers.

Historical and recent shoreline modifications (i.e., armoring), as well as potential scour that could eventually occur along the

sheet pile wall or other armored shoreline, represent opportunities for restoring shoreline functions. Affected functions that could benefit from restoration include floodwater storage, attenuation of flow energy for flood protection, and providing suitable habitat conditions to support fish and other wildlife. The City should consider log structures and other habitat features to restore lost habitat and reduce downstream velocities that may be affected by shoreline armoring. Avoiding the use of bank hardening structures such as rock armoring and sheet piling, particularly in places where they are currently absent, will help maintain ecological processes and protect shoreline functions in the future.

The City's wastewater treatment plant is located on the outside of a migrating bend of the Wynoochee River, and prior measures to protect it have resulted in a length of sheet-pile and riprap shoreline. Moving the plant out of harm's way would allow restoration of that shoreline, and prevent further loss of habitat function. It is also possible that alternative forms of bank protection could be used to divert the river away from the existing plant location while restoring habitat functionality.



Figure 5. Meander Bend Along the Chehalis River Near Mary's River Lumber Company Lumberyard.

An apparently abandoned railroad grade along the northwest side of SR 107 forms the left bank of a portion of the Wynoochee River within the city. Removal of that railroad grade or enhancement with vegetation or LWD could improve shoreline functions in the reach.

A potential measure to restore and protect functions includes the installation of stormwater Best Management Practices (BMPs) to reduce pollutant loading of Lower Sylvia Creek and the Wetland Complex.

Shoreline Use Analysis

Examining land use patterns and existing public access opportunities are important considerations in the SMP analysis because such examinations can identify options for preferred uses, especially water-dependent, water-oriented and water-enjoyment uses. Land uses adjacent to the water are also a determinant in assigning environment designations to specific sections of the shoreline. Additionally, an analysis of land use conditions is necessary to determine potential land use changes and their effect on shorelines with respect to SMA objectives. The proposed environment designation boundaries and provisions must be mutually consistent with the City's Comprehensive Plan.

Existing Land Use Patterns

Current land use in the City's shoreline jurisdiction is based on zoning and existing development or land use patterns. Current land use is summarized in Table 12 and described below for each shoreline reach.

Current Land Use Patterns	Percentage of Shoreline Area
Agriculture Classified Under Open Space Law RCW 84.34	6%
All Other Residential Not Elsewhere Coded	3%
Commercial Land	7%
Contract Construction Services	0%
Household, Single-family Units	1%
Industrial Land	36%
Institutional Lodging	0%
Miscellaneous Services – Churches	0%
Open Space Land Classified Under RCW 84.34	1%
Other Cultural, Entertainment, and Recreational	2%
Other Transportation, Communication, and Utilities not Classified Elsewhere – Water Systems	11%
Parks	24%
Repair Services	1%
Retail Trade-Auto, Marine Craft, Aircraft, and Assc.-Gas Stations	1%
Undeveloped Land	7%

Reach 1: Sylvia Lake is currently undeveloped and consists primarily of evergreen forest and open water. Reach 1 is zoned City Forest and utilized as a park with little to no development in the vicinity. This 5,000-acre site encompasses the city's watershed and provides 6 miles of developed hiking trails.

Reach 2: Upper Sylvia Creek is less developed than Reach 1, consisting of completely undeveloped lands that are dominated by woody wetlands, forest, and shrub/scrub.

Reach 3: Lower Sylvia Creek includes five developed single-family residential parcels. The majority of development on these parcels appears to be located outside of the shoreline jurisdiction, although appurtenant structures may be located within the jurisdiction. Additionally, there are ten Unclassified Residential parcels in Reach 3 that are undeveloped. Much of the reach is currently undeveloped with the exception of a few residential structures and four road and rail transportation corridors that bisect the reach (see Figure 2.2 in Appendix A).

Reach 4: The Wetland Complex is zoned for Low Density Residential, Heavy Commercial, and Industrial Flood Hazard however very little of this reach is developed land. The area is mostly comprised of wetlands and, as it lies within the floodplain, it is subject to the Chehalis River flooding in the winter and spring.

Reach 5: The Wynoochee River is zoned Heavy Commercial and Industrial Flood Hazard. Aside from the Montesano Waste Treatment Plant, the area is largely comprised of wetlands and open space.

Reach 6: The Chehalis River is zoned Heavy Commercial and Industrial Flood Hazard. Mary's River lumberyard is the one commercial use within the reach, which is mostly open water and wetlands. A WDFW boat launch is located in the reach, and it provides public access to the shoreline.

Projected Land Use Patterns

Comprehensive Plan designations for land in the City's shoreline jurisdiction (Table 13) and current zoning designations (Table 14) provide a basis for projecting future land use in the City's shorelines. Projected land use is described below for each reach in the City's shoreline jurisdiction.

Reach 1: Sylvia Lake zoning consists of City Forest (54 acres). Forest uses are limited to City-owned forestland that are suitable for forest activities or may serve as open space. Areas within this reach are largely undeveloped and they will continue to be parks and open space unless changes in the adopted zoning are made.

Reach 2: Upper Sylvia Creek consists of undeveloped land that is zoned City Forest (14 acres). Reach 2 lies within the floodplain of Sylvia Creek and as such will likely remain undeveloped land, unless changes are made to the adopted zoning code.

Table 13. Comprehensive Plan Designations Representing Planned Land Use in the City of Montesano Shoreline Jurisdiction.

Land Use Designation	Typical Uses	Percentage of Shoreline Area
City Forest	Areas that are suitable for commercial forest activities, or other areas where such uses may be appropriate. Forestry areas may also serve as permanent open space.	27.9%
Heavy Commercial/Light Industrial	Uses that rely on high interregional traffic volumes such as motels, quick-food restaurants and gas stations; commercial uses which are not conducted in enclosed areas such as service stations, car lots, building materials suppliers; and industrial uses that consist of light manufacturing uses and are conducted in wholly enclosed buildings.	23.9%
Heavy Industrial	Consists of heavy industrial uses that support the economic base of the city.	35.4%
Low Density Residential	Single-family or multi-family residential with a density of 7 units or less per acre.	12.6%
Major Public Use District	A combination of City, County, and School District uses.	0.1%
Moderate Density Residential	Single-family or multi-family residential with a density of 20 units or less per acre, averaging 15 units per acre.	0.1%

Table 14. Current Zoning Designations in the City of Montesano Shoreline Jurisdiction.

Designation	Symbol	Typical Uses	Percentage of Shoreline Area
City Forest	F	Areas that are suitable for commercial forest activities, or other areas where such uses may be appropriate. Forestry areas may also serve as permanent open space.	27.9%
Heavy Commercial/Light Industrial	C2	Heavy Commercial/Light Industrial districts serve to provide suitable area for commercial uses, which might detract from the character of general commercial activities, particularly in the downtown areas.	23.9%
Industrial Flood Hazard	IFH	The purpose of the flood hazard overlay district is to regulate development located within areas subject to potential flood damage. This district is applied to areas that have at least a one percent chance of being inundated in any year.	35.4%
Low Density Residential	R1	Low Density Residential districts serve to provide suitable areas for family neighborhoods with adequate play areas and open space amenities.	12.6%
Major Public Use District	MPU	Major Public Use districts serve to provide suitable areas that are committed to public use and are publicly owned.	0.1%
Moderate Density Residential	R2	The purpose of the Moderate Density Residential district is to provide suitable areas for housing types, which balance the provision of residential amenities with the need to provide economical housing opportunities.	0.1%

Reach 3: Lower Sylvia Creek zoning consists largely of low-density residential (13 acres). However, a small amount of moderate density residential and major public use district exists within the shoreline jurisdiction (see Figure 3.2 in Appendix A). Only a small fraction of the parcels with these zoning designations are located in the shoreline jurisdiction. Existing development in this reach consists of single-family residences. While lots that intersect the shoreline jurisdiction are developed, the majority of the single-family homes are located outside of the shoreline jurisdiction boundary. There are 6.5 acres remaining that could be developed as single-family residential within this reach.

Reach 4: The Wetland Complex zoning consists of Low Density Residential (18 acres), Heavy Commercial (14 acres), and Industrial Flood Hazard (54 acres). While this area has been zoned for Low Density Residential, it is not particularly suited for development because over 60 percent of the land is covered by wetlands and is within the floodplain of the Chehalis River.

Reach 5: The Wynoochee River zoning consists mostly of Heavy Commercial (36 acres) and Industrial Flood Hazard (7 acres). This reach lies within the floodplain of the Wynoochee and Chehalis River. While the City has indicated that the most appropriate areas for industrial development lie in this reach south of Highway 12, growth and development within this area must consider the requirements and limitations that are imposed by flood hazards.

Reach 6: The Chehalis River zoning consists of Heavy Commercial (9 acres) and Industrial Flood Hazard (25 acres) zoning. This reach also lies within the floodplain of the Chehalis River; however, there currently exists some heavy commercial development within this reach. Any future development will need to consider the requirements and limitations in place because of this flooding hazard.

Public Shoreline Access

The city has a few public shoreline access options. Lake Sylvia State Park in Reach 1 provides city residents shoreline access as well as many benefits such as boating, camping, hiking, swimming, fishing, mountain biking and bird watching. There is currently limited public shoreline access to the Chehalis and Wynoochee Rivers within Montesano. Trails provide visual access to the shoreline within Reach 2 as well as hiking, biking and horseback riding opportunities along Sylvia Creek. At the southernmost point of Reach 6, a boat launch provides public access to the Chehalis River.

The City stated its recreation and public access goals for shoreline areas in the 1992 SMP document. The City seeks to increase and enhance public access to publicly owned shoreline areas as well as encourage the development of water-related recreation opportunities within the city. To achieve either of these goals the City needs to enhance public access to its shoreline through the creation of public access structures and urban pathways.

The City recommends in its Parks and Recreation Comprehensive Plan that waterfront opportunities be reviewed by the City Park Board for the potential development of a trail adjacent to the Chehalis River, which would directly affect Reach 6.

Identification of Potential Conflicts and Effects on Ecological Function

Most of the land uses in the shoreline jurisdiction are industrial (36 percent) and park and city forest uses (24 percent). Approximately 60 percent of the shoreline jurisdiction is zoned as either Industrial Flood Hazard (35 percent) or Heavy Commercial/Light Industrial (24 percent). The City has indicated that the most appropriate areas for heavy commercial and industrial development lie in the wetland complex (Reach 4) and in Reach 5 and 6, south of Highway 12. Unless water-dependent, such development types are not preferred shoreline uses. Commercial and industrial development has the potential to reduce the ecological function of shorelines, including wetlands, in the absence of adequate measures to reduce and limit impacts.

Frequently flooded areas and significant wetland presence in Reaches 4, 5, and 6 may restrict development opportunities due to existing and future regulation that protects critical areas. Portions of the Chehalis River and Wynoochee River reaches are zoned Industrial Flood Hazard, while other portions are zoned Moderate Density Residential and Heavy Commercial, but are within the flood hazard district. Opportunities for typical water-dependent and water-related uses (see Table 5) are limited in these reaches, which provide important ecological functions and contain sensitive critical areas. Channel depth, flow, and configuration, for example, may limit the potential for shipping and transportation related industrial development. The City may consider reviewing the comprehensive plan designations and zoning for these reaches in order to protect shoreline functions and encourage appropriate preferred shoreline uses, particularly in light of growing concerns around flooding and the key role that these reaches play in providing flood protection and habitat functions.

The City must ensure that permitted development within the shoreline jurisdiction does not result in ecological harm. Without proper regulation, residential, commercial, and industrial development can generate runoff that degrades water quality or results in shoreline modifications that reduce ecological functions.

Another significant portion of the shoreline (27.9 percent) is zoned City Forest, including the entire Lake Sylvia and Upper Sylvia Creek shorelines. All land within the Sylvia Lake reach is owned and managed by the State of Washington. Future development is likely to support recreational uses in the shoreline jurisdiction, considered a preferred use under the SMA. There is little potential for development that would conflict with the policies of the SMA. The Upper Sylvia Creek shoreline is owned and managed by the City. As City Forest, this shoreline is likely to be managed under existing state forest practice rules, which should reduce the potential for impacts on ecological functions of the shoreline.

Data Gaps

The following key data gaps were identified during the shoreline inventory and characterization.

A comprehensive inventory of shoreline modifications was not available for the City's shorelines. Detailed information regarding shoreline modifications such as bank armoring, water diversion inlets and outlets, and other areas of altered bank or bed conditions could be collected and compiled into a georeferenced database. This information could then be used

to make informed decisions on protection and restoration opportunities along the shorelines. The information could also be used to monitor development overtime and determine net increases and reductions. Similarly, a survey of habitat features such LWD, substrate types, and riparian vegetation could inform site-specific management decisions for protection, restoration, and enhancement activities.

Analysis of historical and current channel migration trends in the vicinity of the Mary's River lumberyard and the adjacent meander in the Chehalis River was conducted in 2013 to evaluate alternatives for protecting the lumber mill and Montesano's wastewater treatment facility from flooding. The area evaluated represents a majority of the Chehalis River Reach. However, the channel migration zone (CMZ) for streams in the City's shoreline jurisdiction has not been comprehensively analyzed or mapped. Shoreline planning and regulations should consider the CMZ in order to adequately protect shoreline functions that rely on channel structure and ecological processes associated with channel migration; therefore, a complete analysis of the City's CMZs is warranted.

Wetlands in the city are not well mapped and existing data is limited primarily to the NWI geospatial data. Although the NWI is a good source for a planning level assessment of shoreline conditions, field delineation or additional assessment and mapping of wetlands in the city would help to determine what related functions are present and unimpaired or impaired. In particular, the wetland complex in the Chehalis River floodplain and wetlands associated with the Wynoochee River may have impairments that cannot reasonably be identified without a detailed field investigation. Additional investigation could also provide insight into additional restoration opportunities in the city.

Critical aquifer recharge areas have not been mapped in the city. Ecology recommends mapping critical aquifer recharge areas and provides steps to characterizing where groundwater resources are important to the community and how to protect them (Ecology 2005).

Environment Designations

For areas under SMA jurisdiction, the intent of shoreline environment designations is to encourage uses that will protect or enhance the current or desired character of a shoreline. WAC 173-26-211(2)(a) requires that SMPs classify all shoreline areas into specific environment designations based on "existing use pattern, the biological and physical character of the shoreline, and the goals and aspirations of the community as expressed through comprehensive plans ..."

For urban areas, the SMP Guidelines recommend using the five environment designations below. The purposes are defined in WAC 173-26-211(5).

1. **High Intensity** - The purpose of the High Intensity environment is to provide for high intensity water-oriented commercial, transportation, and industrial uses while protecting existing ecological functions and restoring ecological functions in areas that have been previously degraded.
2. **Shoreline Residential** - The purpose of the Shoreline Residential environment is to accommodate residential development and appurtenant structures that are consistent

with this chapter. An additional purpose is to provide appropriate public access and recreational uses.

3. **Urban Conservancy** - The purpose of the Urban Conservancy environment is to protect and restore ecological functions of open space, floodplain and other sensitive lands where they exist in urban and developed settings, while allowing a variety of compatible uses.
4. **Natural** - The purpose of the Natural environment is to protect those shoreline areas that are relatively free of human influence or that include intact or minimally degraded shoreline functions intolerant of human use. These systems require that only very low intensity uses be allowed in order to maintain the ecological functions and ecosystem-wide processes. Consistent with the policies of the designation, local government should include planning for restoration of degraded shorelines within this environment.
5. **Aquatic** - The purpose of the Aquatic environment is to protect, restore, and manage the unique characteristics and resources of the areas waterward of the OHWM.

Once each environment designation is established, management policies and regulations specific to the environmental designations will be prepared as part of Phase 3 of the SMP. The management policies and regulations will reflect the purpose and intent of each environment designation.

These policies and regulations will apply to all uses allowed within each environment designation. They establish what kind of uses will be permitted outright, need a shoreline conditional use permit, or are prohibited in that part of the shoreline jurisdiction. They also establish bulk and dimensional regulations for each environmental designation. Similar to a zoning code, these regulations can include maximum heights, setbacks, maximum lot coverage, maximum impervious surface coverage, as well as specific regulations that, for example, address site development, vegetation, and public access.

Environment designations proposed for Montesano shorelines are shown in Figures 14.1 through 14.3 in Appendix A. Existing (1992 SMP) designations are shown in Figure 15.1 in Appendix A. For proposed designations in all portions of the City's shoreline jurisdiction, lands that are waterward of the OHWM are designated Aquatic. Other proposed shoreline environment designations, including the criteria used to determine the designation based on SMP Guidelines in WAC 173-26-211(2)(a), are described for various portions of the shoreline jurisdiction in the sections below.

Reach 1 – Sylvia Lake

Urban Conservancy

Criteria for determining the proposed environment designation for Reach 1 (Urban Conservancy) include the following:

1. Specific designation criteria in WAC 173-26-211(5)(e)(iii): Assign an "urban conservancy" environment designation to shoreline areas appropriate and planned for development that is compatible with maintaining or restoring of the ecological functions of the area, that are not generally suitable for water-dependent uses, and that lie in incorporated municipalities, UGAs, or commercial or industrial "limited

areas of more intensive rural development" if any of the following characteristics apply:

- They are suitable for water-related or water-enjoyment uses.
 - They are open space, floodplain, or other sensitive areas that should not be more intensively developed.
 - They have potential for ecological restoration.
 - They retain important ecological functions, even though partially developed.
 - They have the potential for development that is compatible with ecological restoration.
2. The existing land use pattern is primarily natural open space suitable for water-enjoyment uses.
 3. The shoreline reach lies within a state park and Lake Sylvia is a recreation destination. In addition to boating, swimming, and other water-dependent recreational uses, there are several miles of hiking trails along Lake Sylvia and a small portion of the Sylvia Creek Trail. The lake is home to coast resident cutthroat trout and is stocked with rainbow trout for fishing in the early spring and summer. The physical and biological characteristics of the lake indicate that it should be preserved for recreation.
 4. The Comprehensive Plan designations for the reach are:
 - City Forest - Areas that are suitable for commercial forest activities, or other areas where such uses may be appropriate. Forestry areas may also serve as permanent open space.
 5. The adopted zoning districts in the reach are:
 - City Forest (F) - The City owns a nearly 5,000-acre forest immediately north of the city and within the city limits. Reach 1 is zoned City Forest (F), but the majority of land within the reach is state-owned and not a part of the City Forest.

Reach 2 – Upper Sylvia Creek

Urban Conservancy

Criteria for determining the proposed environment designation for Reach 2 (Urban Conservancy) include the following:

1. Specific designation criteria in WAC 173-26-211(5)(e)(iii): Assign an "urban conservancy" environment designation to shoreline areas appropriate and planned for development that is compatible with maintaining or restoring of the ecological functions of the area, that are not generally suitable for water-dependent uses and that lie in incorporated municipalities, UGAs, or commercial or industrial "limited areas of more intensive rural development" if any of the following characteristics apply:
 - They are suitable for water-related or water-enjoyment uses.
 - They are open space, floodplain, or other sensitive areas that should not be more intensively developed.
 - They have potential for ecological restoration.
 - They retain important ecological functions, even though partially developed.
 - They have the potential for development that is compatible with ecological restoration.

2. The existing land use pattern is undeveloped forested land with natural open space. The reach is exclusively owned by the City of Montesano, and it is part of the City Forest. The City Forest is an active commercial forest, and therefore must operate in a manner consistent with the Forest Practice Rules (WAC 222). Commercial forestry activities are subject to SEPA requirements. The Forest Practice Rules provide protection for Riparian Management Zones, which extend 90 to 200 feet from the OHWM, depending on the site class of the land. Refer to WAC 222-16-050 for class definitions. No timber harvesting is permitted 50 feet landward of the OHWM of shorelines of the state. The Forest Practice Rules combined with the Urban Conservancy shoreline environment designation provide adequate protection to ensure no net loss of ecological function.
3. Sylvia Creek is home to several species of fish including coastal resident cutthroat trout and coho salmon. A sub-basin of Sylvia Creek drains the western quarter of the city.
4. The Comprehensive Plan Designations for the reach are:
 - City Forest - See the designation description under Reach 1.
5. The adopted zoning districts in the reach are:
 - City Forest (F) - The City owns a nearly 5,000-acre forest immediately north of the city and within the city limits. It is operated for multi-use goals, including sustained income, recreation, and fish and wildlife habitat.

Reach 3 – Lower Sylvia Creek

Shoreline Residential

Criteria for determining the proposed environment designation for Reach 3 (Shoreline Residential) include the following:

1. Specific designation criteria in WAC 173-26-211(5)(f)(iii): Assign a Shoreline Residential environment designation to shoreline areas inside incorporated municipalities if they are predominantly single-family or multifamily residential development or are planned and platted for residential development.
2. Existing land use includes single-family residential. On developed parcels, houses and appurtenant structures are located both inside and outside of the shoreline jurisdictions..
3. The Comprehensive Plan Designations for the reach are:
 - Low Density Residential - Single-family or multi-family residential with a density of seven units or less per acre.
4. The adopted zoning districts in the reach are:
 - Low Density Residential (R1) - Low Density Residential districts serve to provide suitable areas for family neighborhoods with adequate play areas and open space amenities.

Reach 4 – Wetland Complex

Urban Conservancy

Criteria for determining the proposed environment designations for Reach 4 (Urban Conservancy) include the following:

1. Specific designation criteria in WAC 173-26-211(5)(e)(iii): Assign an "urban conservancy" environment designation to shoreline areas appropriate and planned for development that is compatible with maintaining or restoring of the ecological functions of the area, that are not generally suitable for water-dependent uses, and that lie in incorporated municipalities, UGAs, or commercial or industrial "limited areas of more intensive rural development" if any of the following characteristics apply:
 - They are suitable for water-related or water-enjoyment uses.
 - They are open space, floodplain, or other sensitive areas that should not be more intensively developed.
 - They have potential for ecological restoration.
 - They retain important ecological functions, even though partially developed.
 - They have the potential for development that is compatible with ecological restoration.
2. The existing land use pattern is primarily open space as well as low and medium intensity land uses.
3. The area includes sections of Olympic Highway 12 as well as State Route 107 and as such, it is focused on heavy commercial and industrial uses. However, most of the reach includes forested and shrub wetlands and includes biological functions such as priority habitat fish and waterfowl.
4. The Comprehensive Plan Designations for the reach are:
 - Heavy Commercial/Light Industrial - Uses that rely on high interregional traffic volumes such as motels, quick-food restaurants and gas stations; commercial uses which are not conducted in enclosed areas such as service stations, car lots, building materials suppliers; and industrial uses that consist of light manufacturing uses and are conducted in wholly enclosed buildings.
 - Heavy Industrial - Consists of heavy industrial uses that support the economic base of the city.
 - Low Density Residential - See the designation description under Reach 3.
5. The adopted zoning districts in the reach are:
 - Heavy Commercial/Light Industrial (C2) - Heavy Commercial/Light Industrial districts serve to provide suitable area for commercial uses which might detract from the character of general commercial activities, particularly in the downtown areas.
 - Industrial Flood Hazard (IFH) - The purpose of the flood hazard overlay district is to regulate development located within areas subject to potential flood damage. This district is applied to areas that have at least a one percent chance of being inundated in any year.
 - Low Density Residential (R1) - See the district description under Reach 3.
6. Urban conservancy is proposed for areas zoned for Low Density Residential development.

Reach 5 – Wynoochee River

High Intensity

Criteria for determining the proposed environment designation for Reach 5 (High Intensity), which is limited to the wastewater treatment plant, include the following:

1. Specific designation criteria in WAC 173-26-211(5)(d)(iii): Assign a "high-intensity" environment designation to shoreline areas within incorporated municipalities, UGAs, and industrial or commercial "limited areas of more intensive rural development," as described by RCW 36.70A.070, if they currently support high-intensity uses related to commerce, transportation or navigation; or are suitable and planned for high-intensity water-oriented uses.
2. The existing land use is the City of Montesano wastewater treatment plant.
3. The area is largely comprised of wetlands and falls within the 100-year floodplain of the Chehalis River. It is likely not suitable for commercial and industrial development beyond the current use on the site.
4. The Comprehensive Plan designations for the reach are:
 - o Heavy Commercial/Light Industrial - See the designation description under Reach 4.
5. The adopted zoning districts in the reach are:
 - o Heavy Commercial/Light Industrial (C2) - See the district description under Reach 4.
6. Industrial Flood Hazard (IFH) - See the district description under Reach 4.
7. High Intensity is proposed for areas zoned for Heavy Commercial/Light Industrial.

Urban Conservancy

Criteria for determining the proposed environment designations for Reach 5 (Urban Conservancy) include the following:

1. Specific designation criteria in WAC 173-26-211(5)(e)(iii): Assign an "urban conservancy" environment designation to shoreline areas appropriate and planned for development that is compatible with maintaining or restoring of the ecological functions of the area, that are not generally suitable for water-dependent uses, and that lie in incorporated municipalities, UGAs, or commercial or industrial "limited areas of more intensive rural development" if any of the following characteristics apply:
 - o They are suitable for water-related or water-enjoyment uses.
 - o They are open space, floodplain, or other sensitive areas that should not be more intensively developed.
 - o They have potential for ecological restoration.
 - o They retain important ecological functions, even though partially developed.
 - o They have the potential for development that is compatible with ecological restoration.
2. The existing land use pattern is open space and is reserved for commercial land uses.

3. The area is largely comprised of wetlands and falls within the 100-year floodplain of the Chehalis River. Future development would require mitigation and could occur provided the ecological functions of the area are retained and proposed development adheres to the provisions of the floodplain ordinance.
4. The Comprehensive Plan designations for the reach are:
 - Heavy Commercial/Light Industrial - See the designation description under Reach 4.
5. The adopted zoning districts in the reach are:
 - Heavy Commercial/Light Industrial (C2) - See the district description under Reach 4.
 - Industrial Flood Hazard (IFH) - See the district description under Reach 4.
6. High Intensity is proposed for areas zoned for Heavy Commercial/Light Industrial.

Reach 6 – Chehalis River

High Intensity

Criteria for determining the proposed environment designation for Reach 6 (High Intensity) include the following:

1. Specific designation criteria in WAC 173-26-211(5)(d)(iii): Assign a "high-intensity" environment designation to shoreline areas within incorporated municipalities, UGAs, and industrial or commercial "limited areas of more intensive rural development," as described by RCW 36.70A.070, if they currently support high-intensity uses related to commerce, transportation, or navigation; or are suitable and planned for high-intensity water-oriented uses.
2. The existing land use pattern of the High Intensity portion of the reach is industrial land. A cedar saw mill that employs approximately 110 persons is located in this portion of the reach.
3. The area is built out with industrial uses but lies within the floodplain of the Chehalis River and as such is subject to flooding.
4. The Comprehensive Plan designations for the reach are:
 - Heavy Commercial/Light Industrial - See the designation description under Reach 4.
 - Heavy Industrial - See the designation description under Reach 4.
5. The adopted zoning districts in the reach are:
 - Heavy Commercial/Light Industrial (C2) - See the district description under Reach 4.
 - Industrial Flood Hazard (IFH) - See the district description under Reach 4.
6. High Intensity is proposed for areas zoned for Heavy Commercial/Light Industrial and Industrial Flood Hazard (IFH).

Urban Conservancy

Criteria for determining the proposed environment designations for Reach 6 (Urban Conservancy) include the following:

1. Specific designation criteria in WAC 173-26-211(5)(e)(iii): Assign an "urban conservancy" environment designation to shoreline areas appropriate and planned for development that is compatible with maintaining or restoring of the ecological functions of the area, that are not generally suitable for water-dependent uses, and that lie in incorporated municipalities, UGAs, or commercial or industrial "limited areas of more intensive rural development" if any of the following characteristics apply:
 - They are suitable for water-related or water-enjoyment uses.
 - They are open space, floodplain, or other sensitive areas that should not be more intensively developed.
 - They have potential for ecological restoration.
 - They retain important ecological functions, even though partially developed.
 - They have the potential for development that is compatible with ecological restoration.
2. The existing land use pattern in this portion of the reach is open space and is reserved for commercial land uses. A WDFW boat launch is located within the Urban Conservancy area.
3. The area is largely comprised of wetlands and falls within the 100-year floodplain of the Chehalis River. Future development would require mitigation and could occur provided the ecological functions of the area are retained and proposed development adheres to the provisions of the floodplain ordinance.
4. The Comprehensive Plan designations for the reach are:
 - Heavy Commercial/Light Industrial – See the designation description under Reach 4.
5. The adopted zoning districts in the reach are:
 - Heavy Commercial/Light Industrial (C2) – See the district description under Reach 4.
 - Industrial Flood Hazard (IFH) – See the district description under Reach 4.
6. High Intensity is proposed for areas zoned for Heavy Commercial/Light Industrial.

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APPENDIX A

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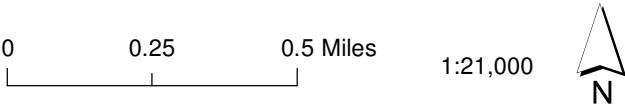
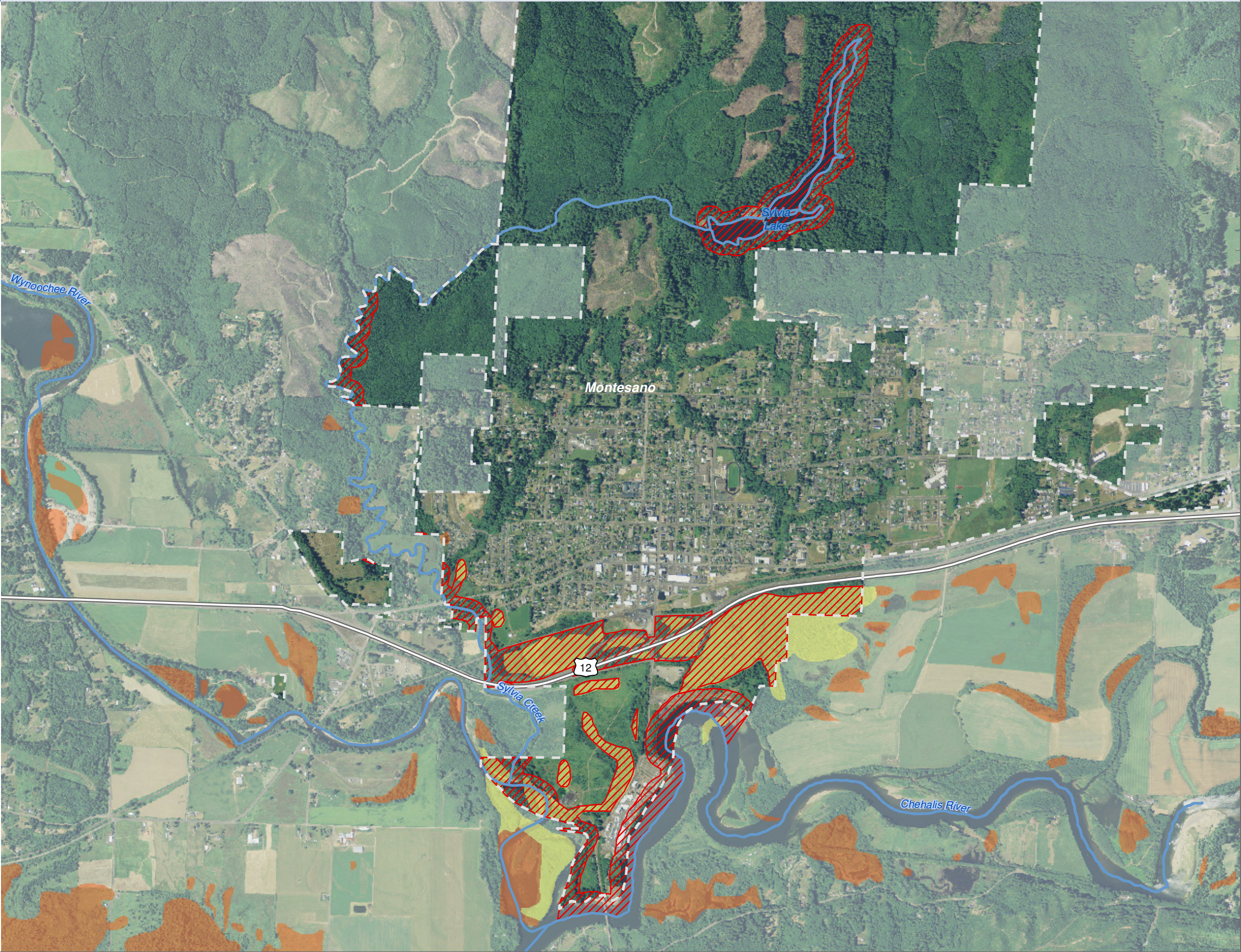
Figure 15: Shoreline Boundary and Environmentals (1992 SMP)



Figure 1.1: City of Montesano

Date: 9/12/2014

- Associated NWI Wetland
- Potentially Associated NWI Wetland
- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)

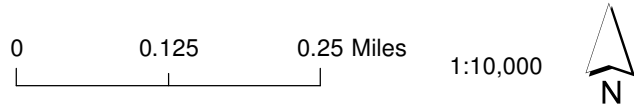
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Figure 1.2: Chehalis River & Sylvia Creek

Date: 9/12/2014

- Associated NWI Wetland
- Potentially Associated NWI Wetland
- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)

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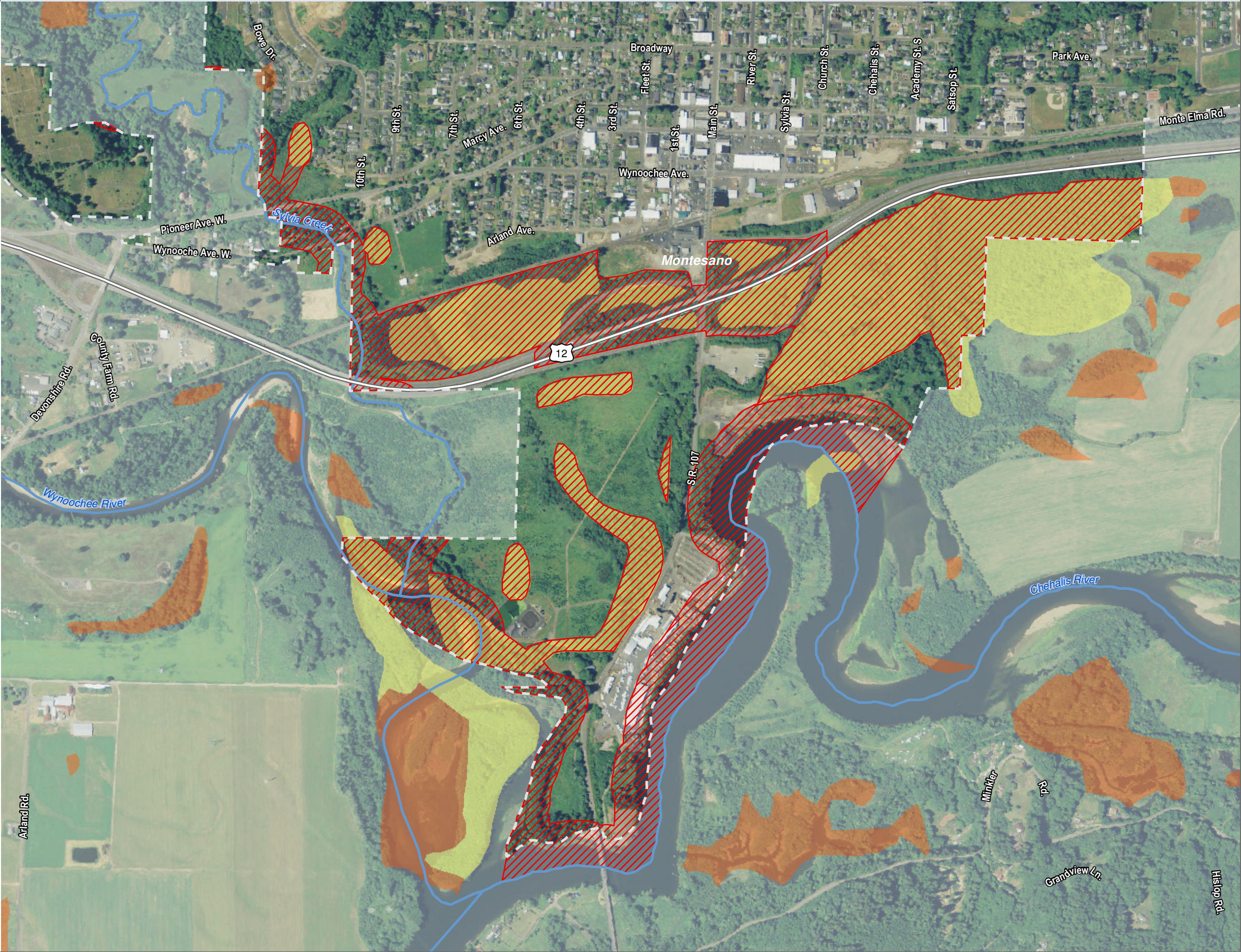







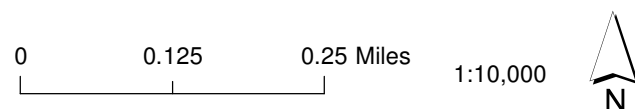


Figure 1.3: Sylvia Lake & Sylvia Creek

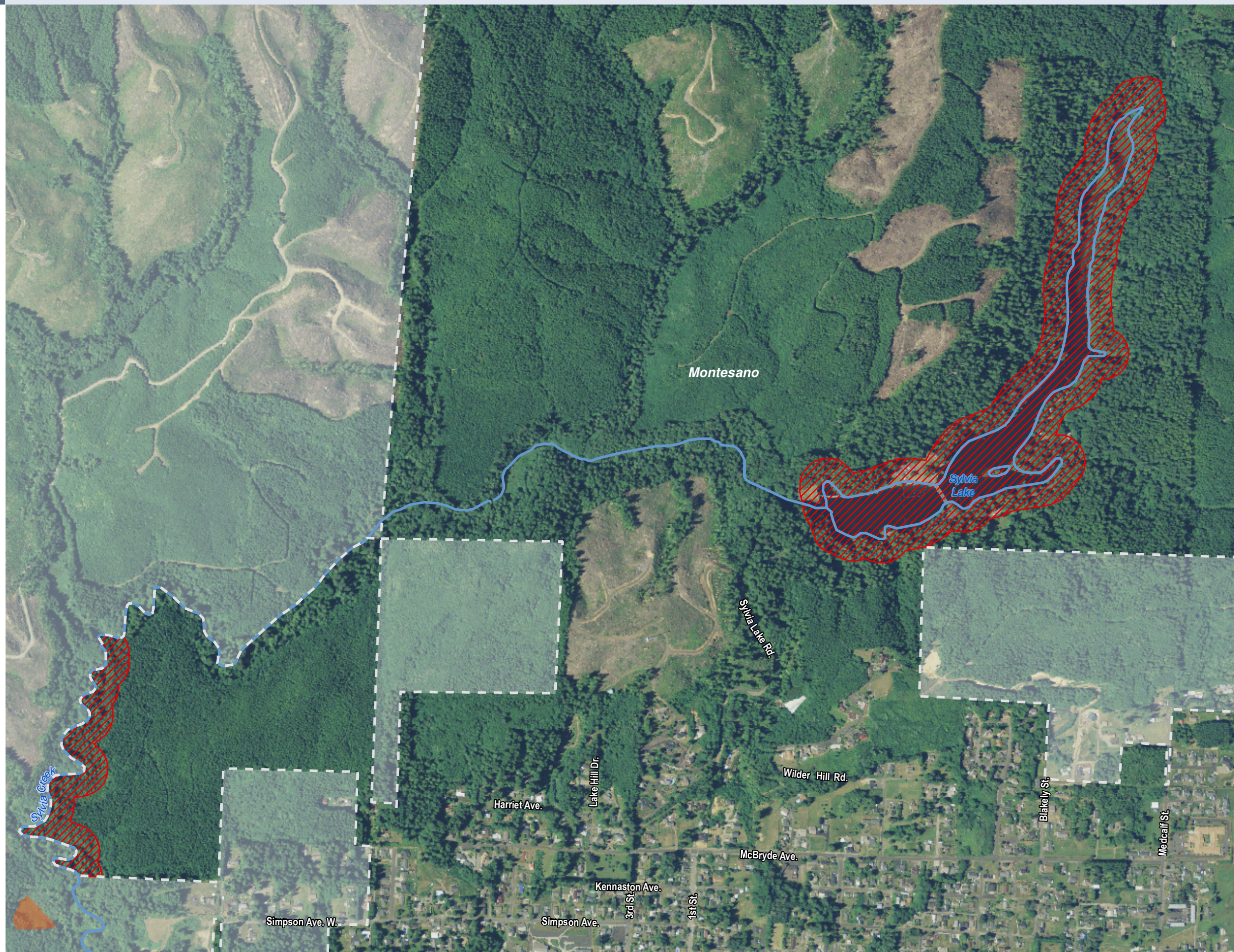
Date: 9/12/2014

-  Associated NWI Wetland
-  Potentially Associated NWI Wetland
-  Preliminary Shoreline Jurisdiction
-  Montesano City Boundary
-  SMA Lakes
-  SMA Rivers
-  Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)

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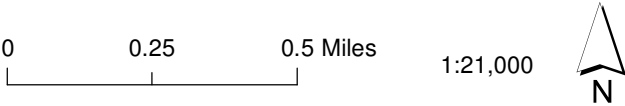
Shoreline Reaches

Figure 2.1: City of Montesano

Date: 9/12/2014

Shoreline Reach

- 1. Sylvia Lake
- 2. Upper Sylvia Creek
- 3. Lower Sylvia Creek
- 4. Wetland Complex
- 5. Wynoochee River
- 6. Chehalis River
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)

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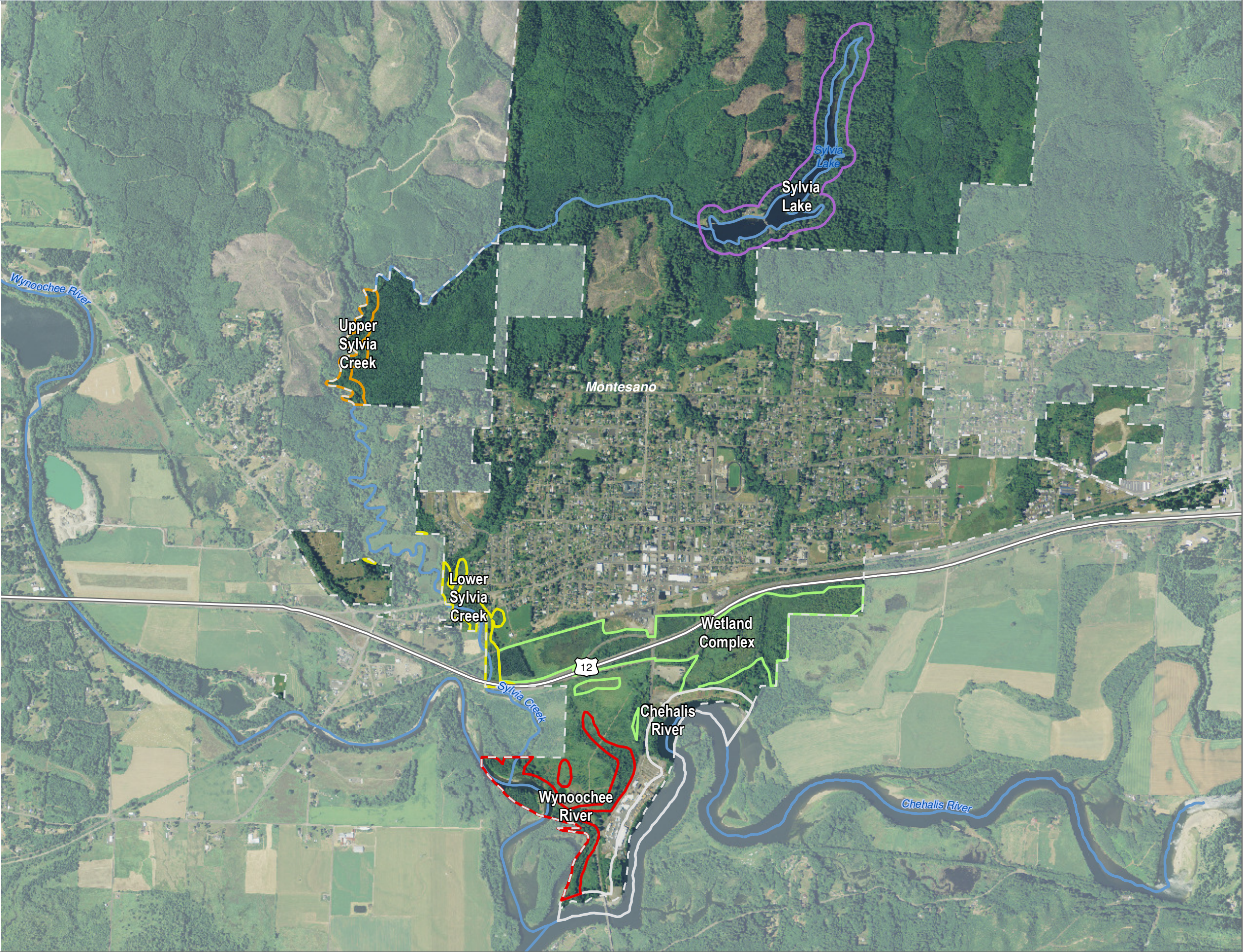
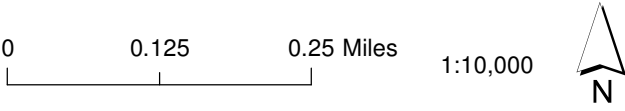


Figure 2.2: Chehalis River & Sylvia Creek

Date: 9/12/2014

Shoreline Reach

- 1. Sylvia Lake
- 2. Upper Sylvia Creek
- 3. Lower Sylvia Creek
- 4. Wetland Complex
- 5. Wynoochee River
- 6. Chehalis River
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)
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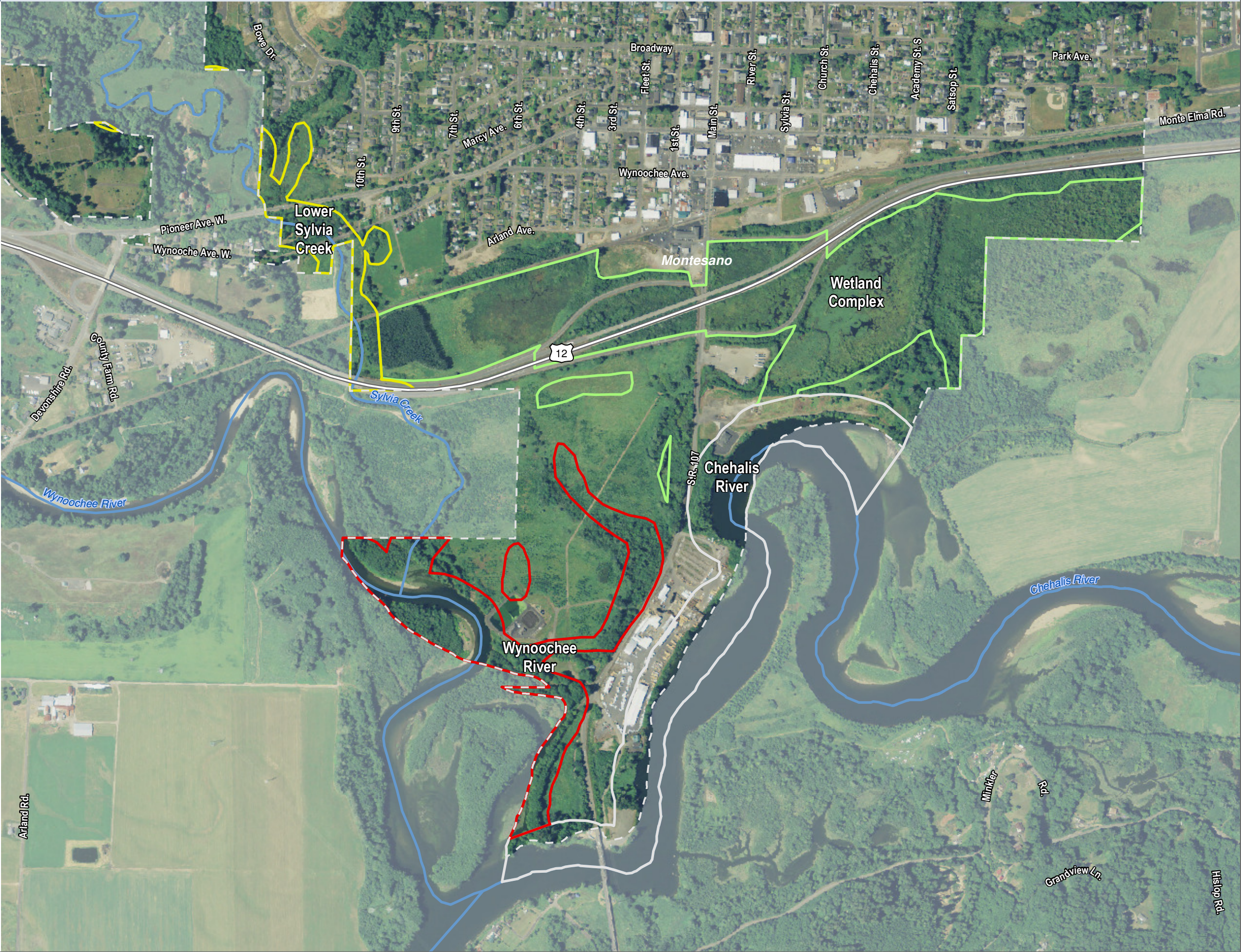
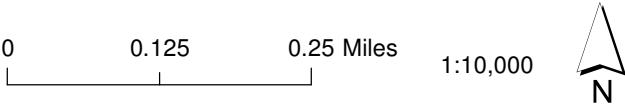


Figure 2.3: Sylvia Lake & Sylvia Creek

Date: 9/12/2014

Shoreline Reach

- 1. Sylvia Lake
- 2. Upper Sylvia Creek
- 3. Lower Sylvia Creek
- 4. Wetland Complex
- 5. Wynoochee River
- 6. Chehalis River
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)

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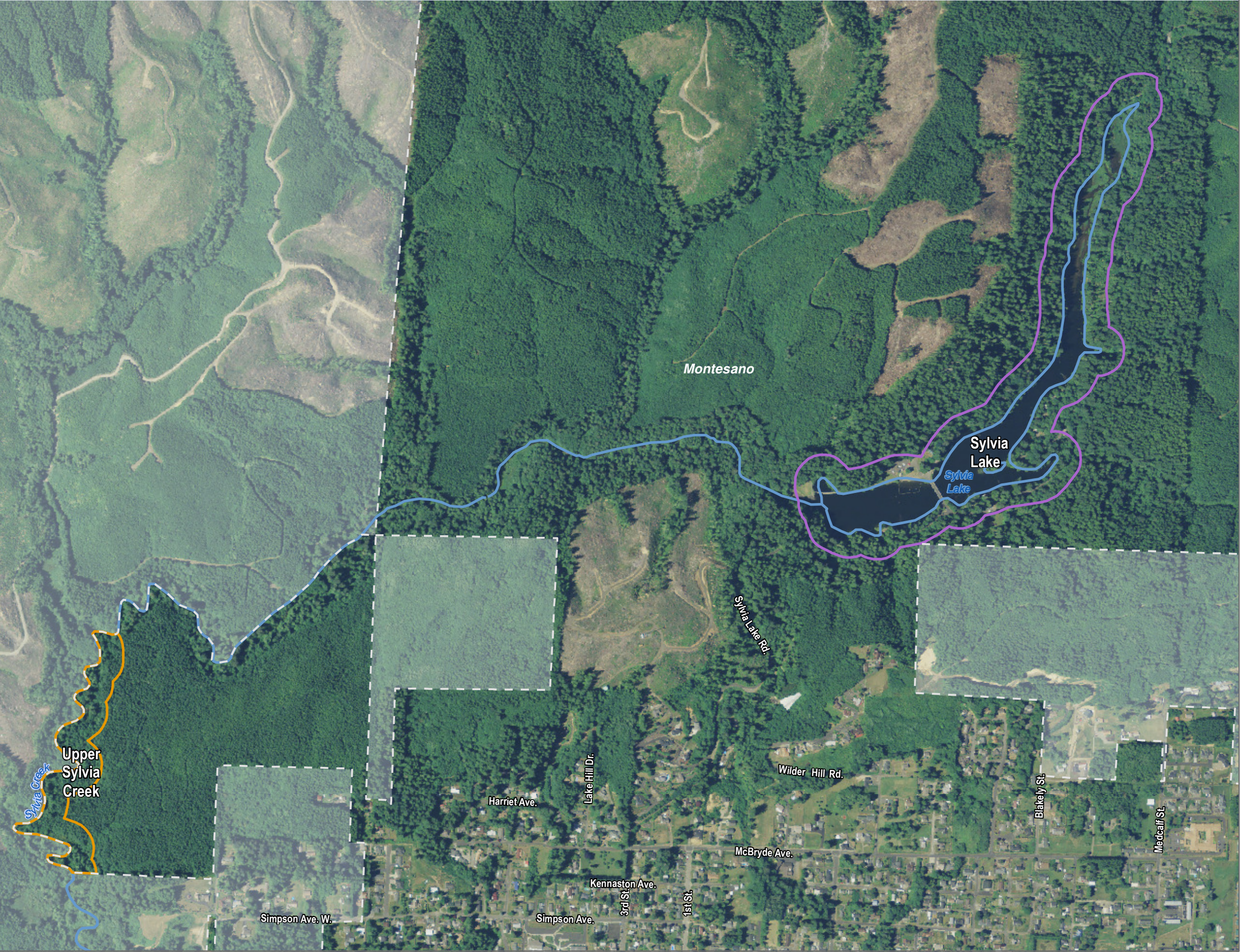
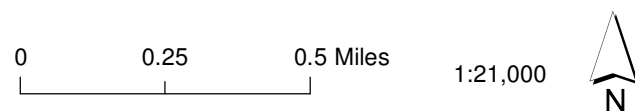


Figure 3.1: City of Montesano

Date: 9/12/2014

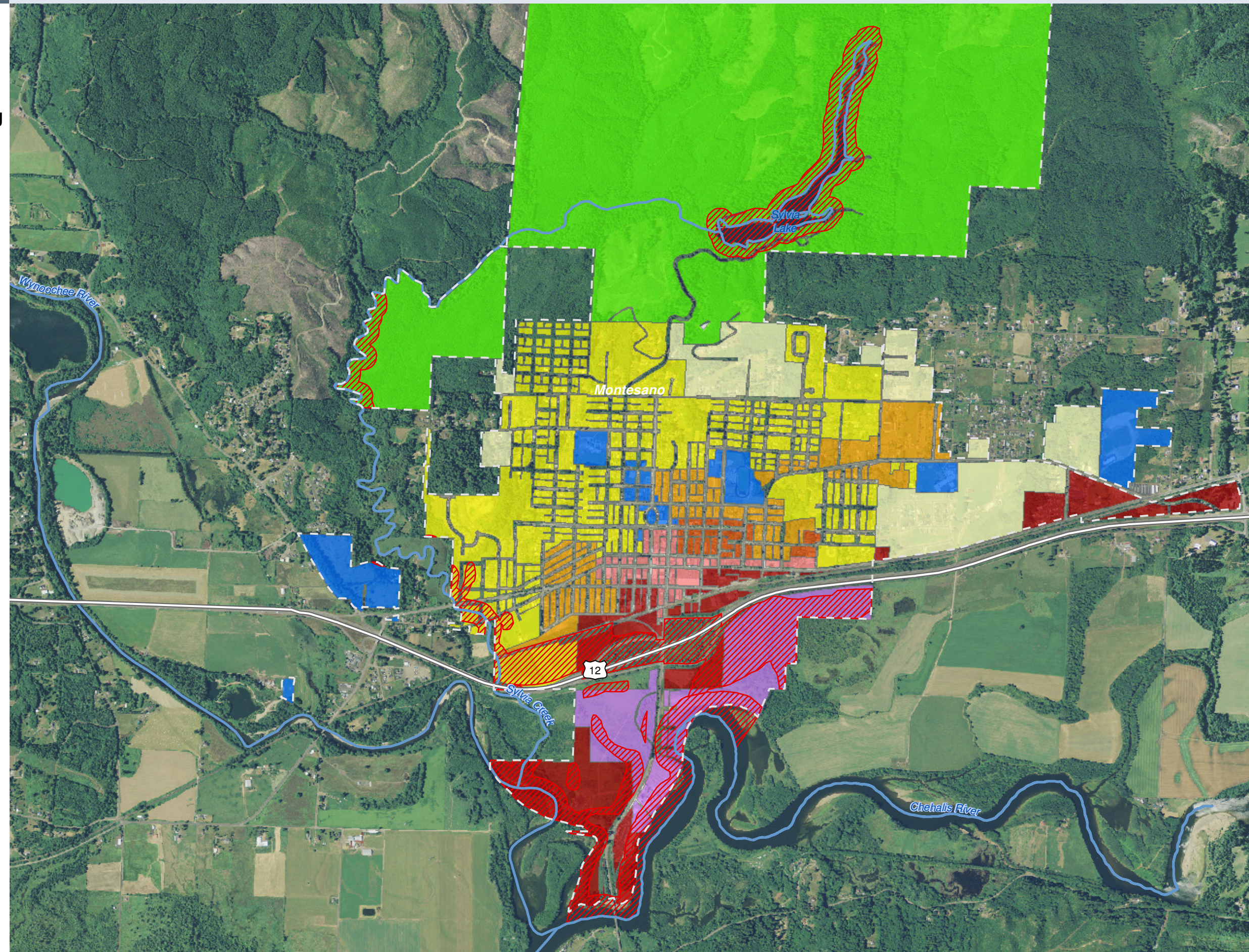
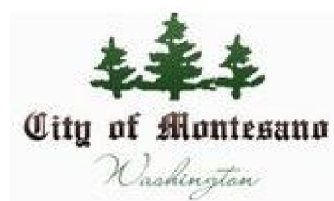
Comprehensive Land Use Designations/Zoning

- R - Rural Residential
- R1 - Low Density Residential
- R2 - Moderate Density Residential
- R3 - High Density Residential
- C1 - General Commercial
- C2 - Heavy Commercial
- IFH - Industrial Flood Hazard
- MPU - Major Public Use District
- F - City Forest
- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, Grays Harbor Council of Governments, Ecology, DNR, WSDOT, NRCS NAIP (2013)

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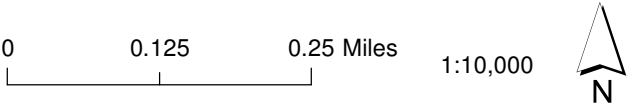
Comprehensive Land Use Designations & Zoning

Figure 3.2: Chehalis River & Sylvia Creek

Date: 9/12/2014

Comprehensive Land Use Designations/Zoning

- R - Rural Residential
- R1 - Low Density Residential
- R2 - Moderate Density Residential
- R3 - High Density Residential
- C1 - General Commercial
- C2 - Heavy Commercial
- IFH - Industrial Flood Hazard
- MPU - Major Public Use District
- F - City Forest
- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, Grays Harbor Council of Governments, Ecology, DNR, WSDOT, NRCS NAIP (2013)

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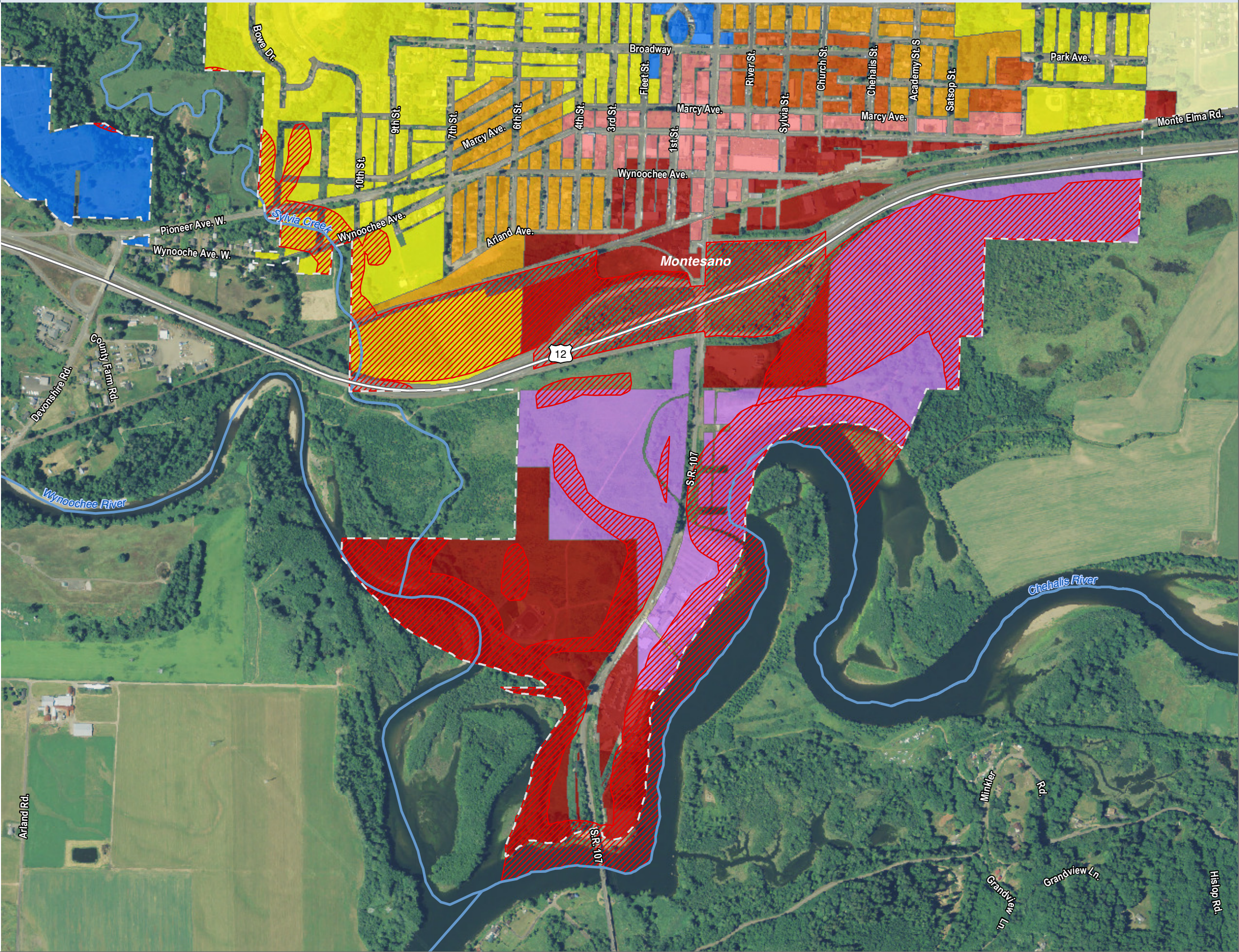














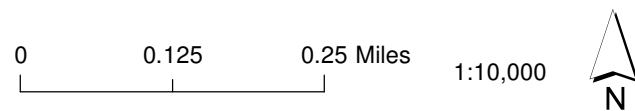


Figure 3.3: Sylvia Lake & Sylvia Creek

Date: 9/12/2014

Comprehensive Land Use Designations/Zoning

-  R - Rural Residential
-  R1 - Low Density Residential
-  R2 - Moderate Density Residential
-  R3 - High Density Residential
-  C1 - General Commercial
-  C2 - Heavy Commercial
-  IFH - Industrial Flood Hazard
-  MPU - Major Public Use District
-  F - City Forest
-  Preliminary Shoreline Jurisdiction
-  Montesano City Boundary
-  SMA Lakes
-  SMA Rivers
-  Highways



Source: Grays Harbor County, Grays Harbor Council of Governments, Ecology, DNR, WSDOT, NRCS NAIP (2013)

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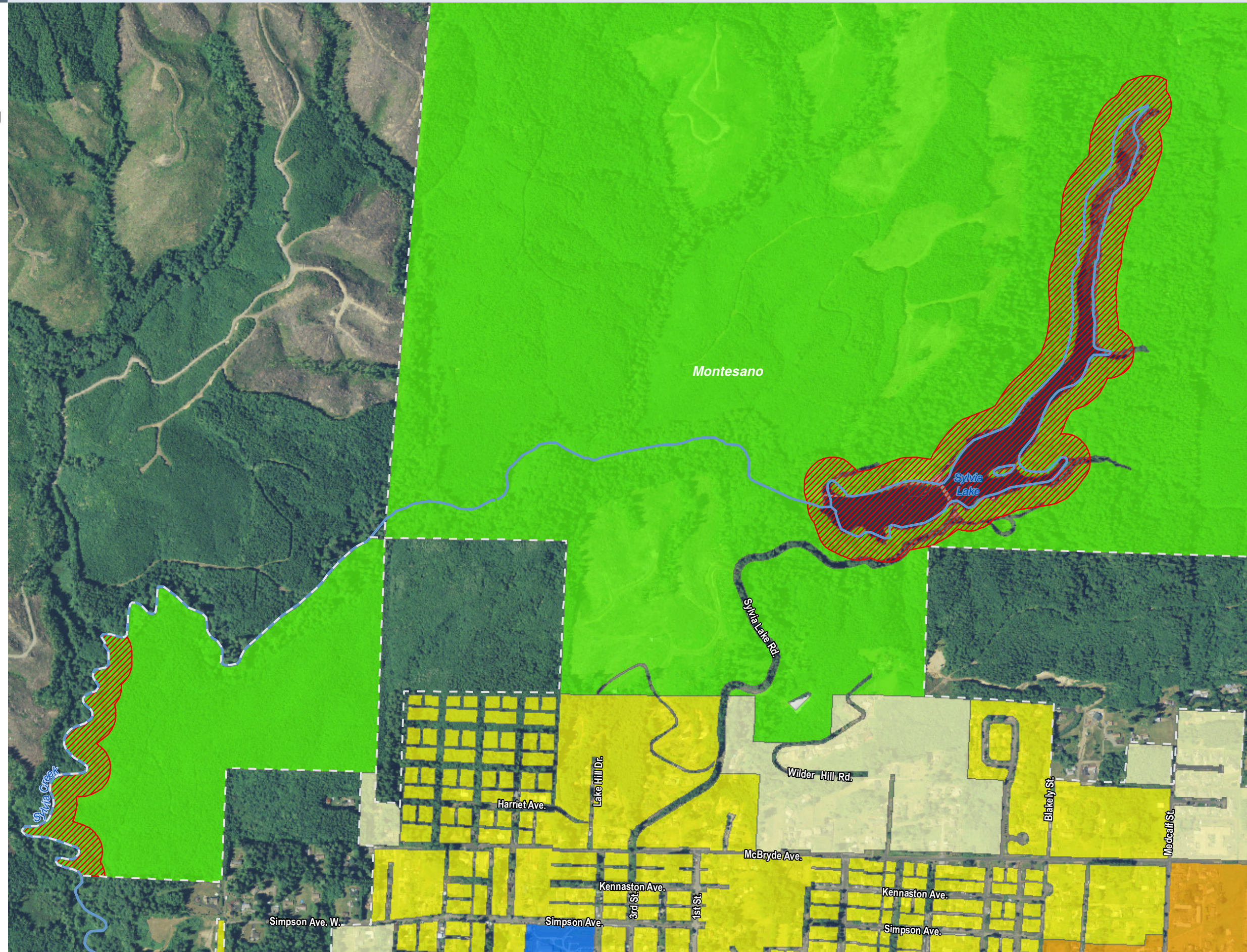
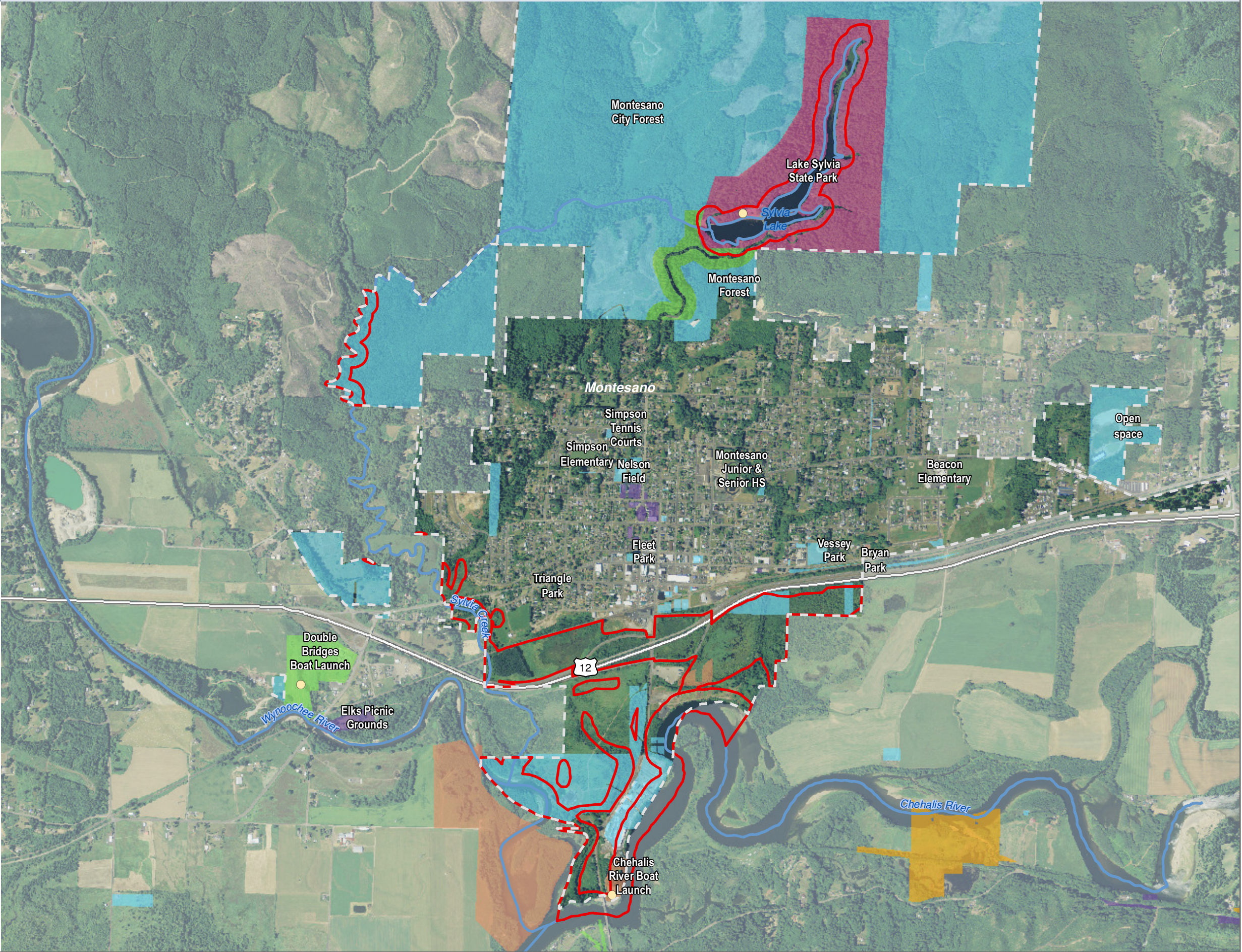


Figure 4.1: City of Montesano

Date: 9/12/2014

- Public Land**
- Municipal
 - Port of Grays Harbor
 - Grays Harbor County
 - State of Washington
 - Washington Dept of Fish & Wildlife
 - Washington State Parks
- Boat Launch
- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)

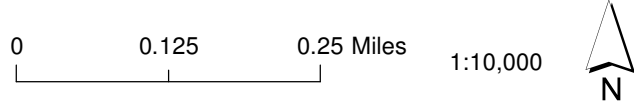
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Figure 4.2: Chehalis River & Sylvia Creek

Date: 9/12/2014

- Public Land**
- Municipal
 - Port of Grays Harbor
 - Grays Harbor County
 - State of Washington
 - Washington Dept of Fish & Wildlife
 - Washington State Parks
- Boat Launch
- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)

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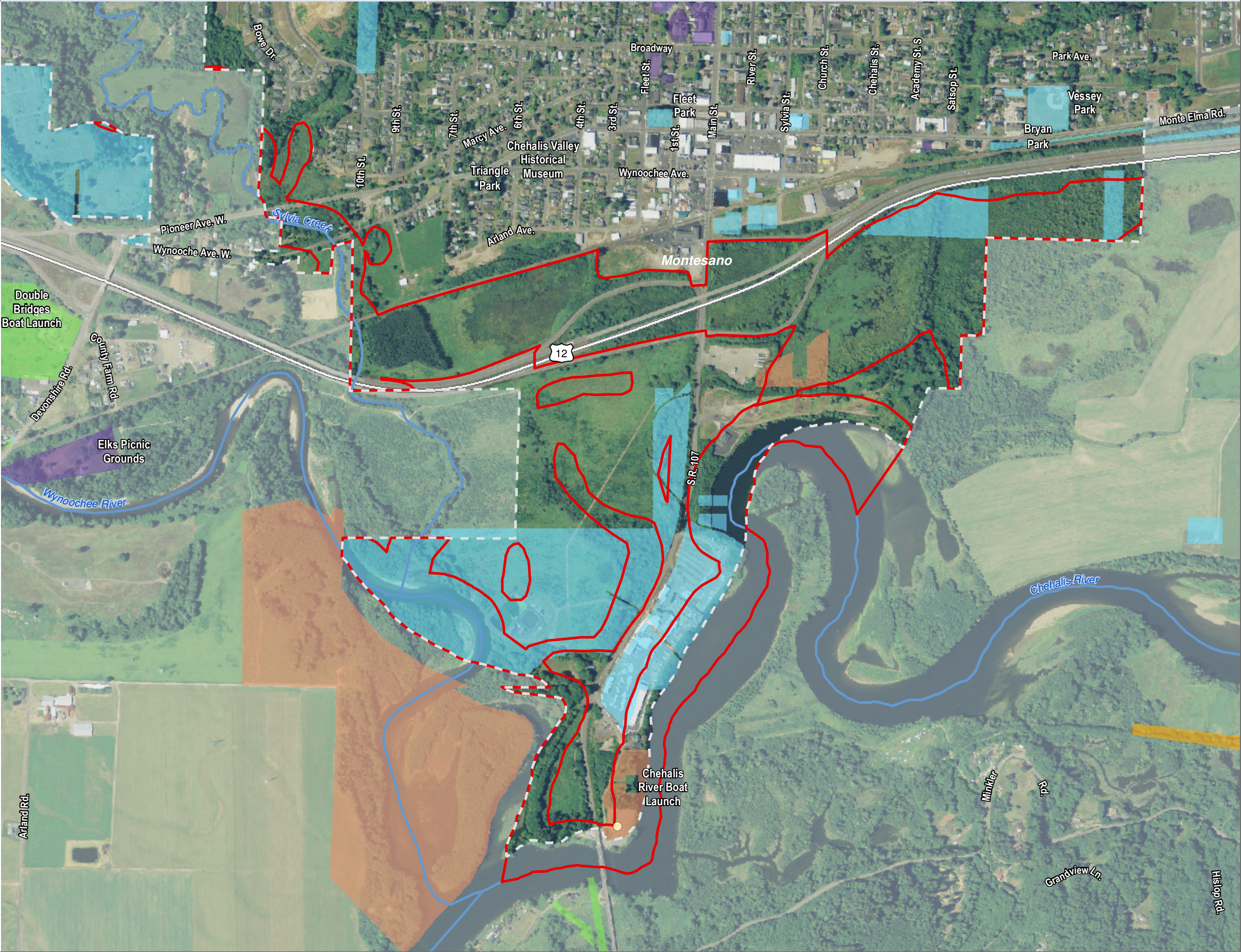
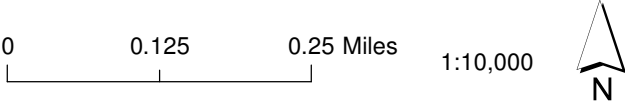


Figure 4.3: Sylvia Lake & Sylvia Creek

Date: 9/12/2014

- Public Land**
- Municipal
 - Port of Grays Harbor
 - Grays Harbor County
 - State of Washington
 - Washington Dept of Fish & Wildlife
 - Washington State Parks
- Boat Launch
- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)

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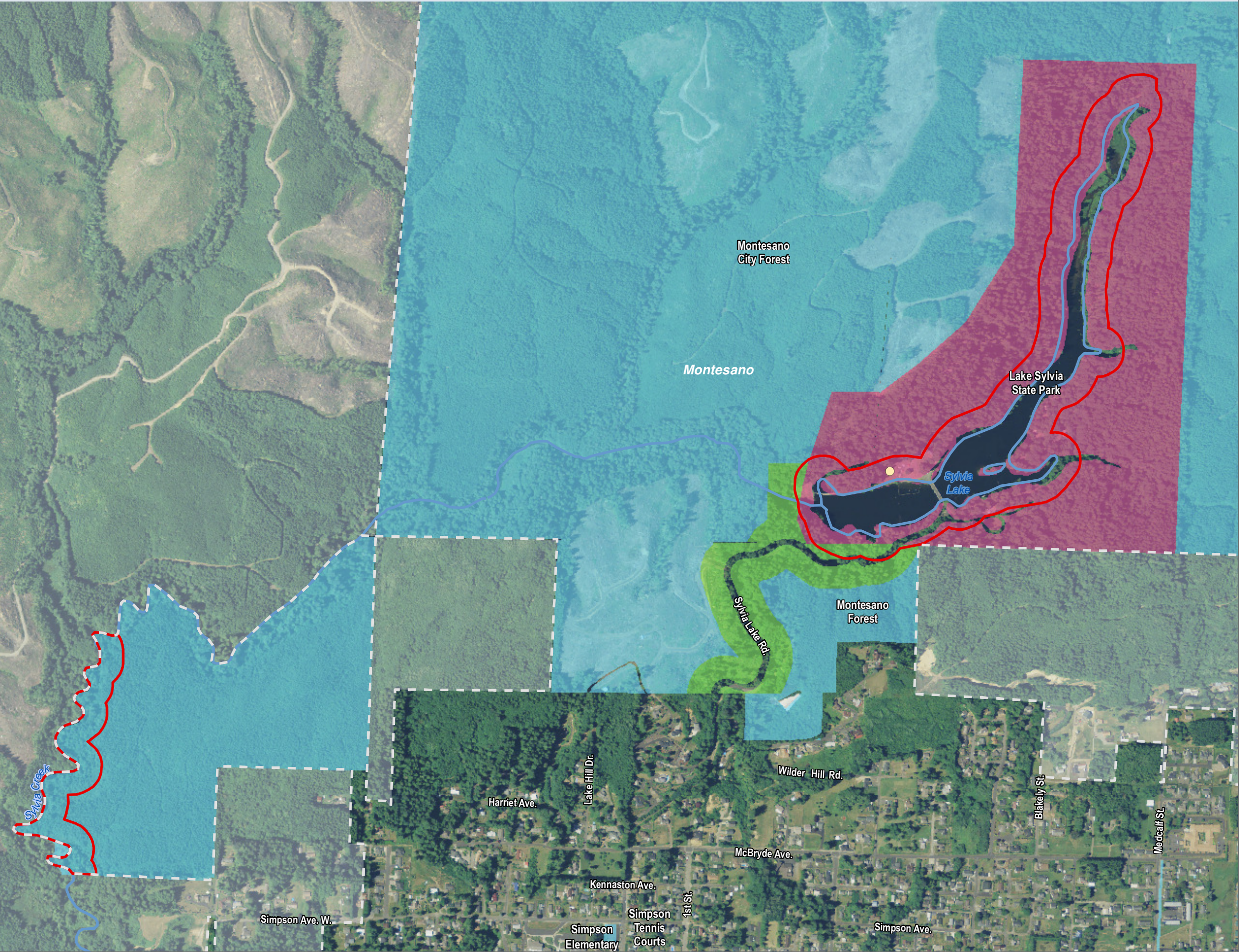


Figure 5.1: City of Montesano

Date: 9/25/2014

Land Cover (2006)

- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Barren Land
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Herbaceous
- Hay/Pasture
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

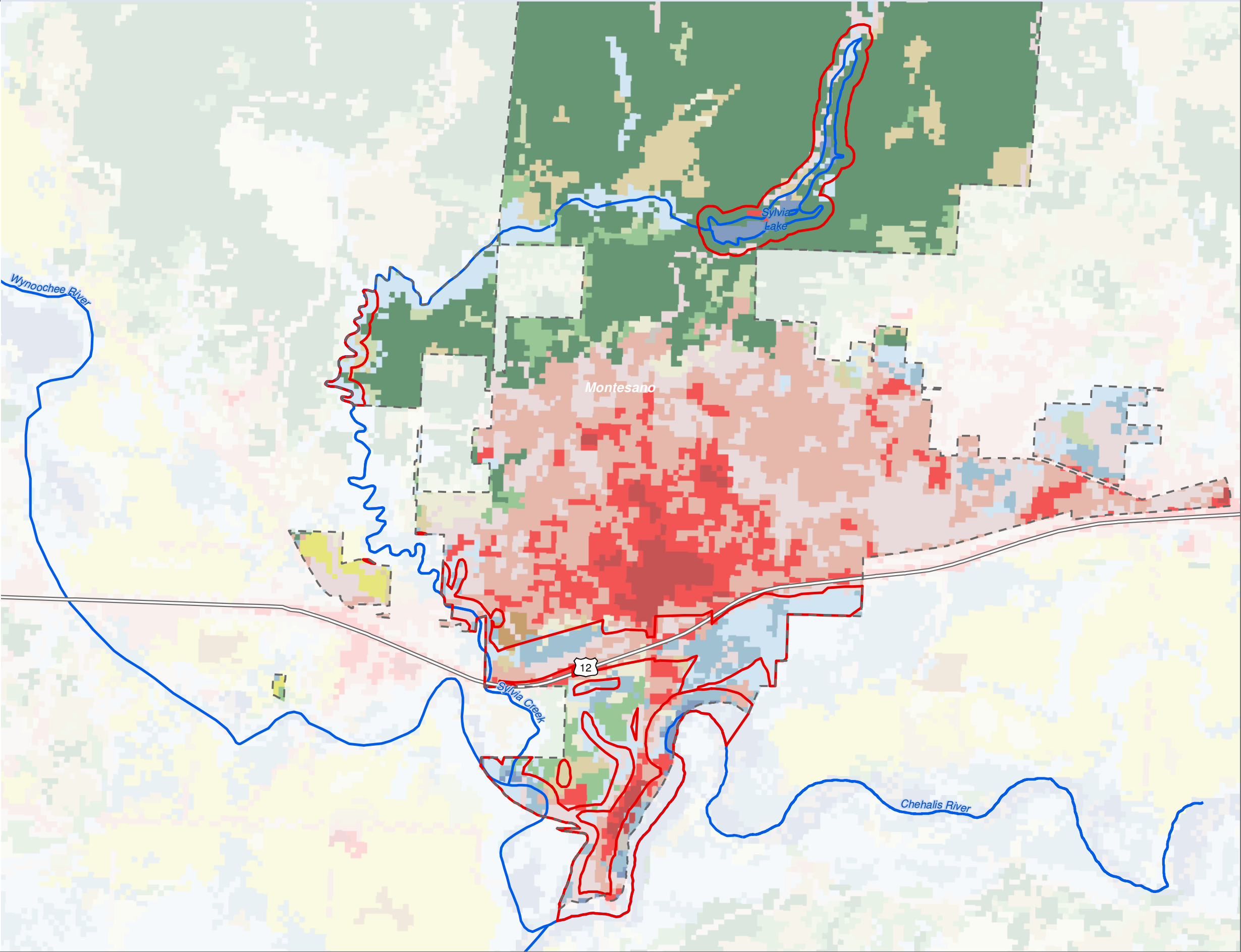
Preliminary Shoreline Jurisdiction

Montesano City Boundary

SMA Lakes

SMA Rivers

Highways



Source: USGS NLCD (2006), Grays Harbor Co., GHCG, USFWS NWI, FEMA, WA DNR, WSDOT, DOE, NRCS NAIP

Shoreline jurisdiction boundaries depicted on this map are approximate. They have not been formally delineated or surveyed and are intended for planning purposes only. Additional site-specific evaluation may be needed to confirm/verify information shown on this map.



Figure 5.2: Chehalis River & Sylvia Creek

Date: 9/25/2014

Land Cover (2006)

- | | |
|-----------------------------|------------------------------|
| Open Water | Mixed Forest |
| Developed, Open Space | Shrub/Scrub |
| Developed, Low Intensity | Herbaceous |
| Developed, Medium Intensity | Hay/Pasture |
| Developed, High Intensity | Cultivated Crops |
| Barren Land | Woody Wetlands |
| Deciduous Forest | Emergent Herbaceous Wetlands |
| Evergreen Forest | |

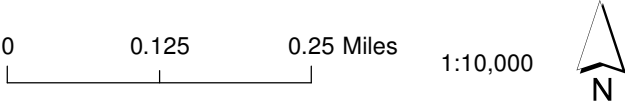
Preliminary Shoreline Jurisdiction

Montesano City Boundary

SMA Lakes

SMA Rivers

Highways



Source: USGS NLCD (2006), Grays Harbor Co., GHCG, USFWS NWI, FEMA, WA DNR, WSDOT, DOE, NRCS NAIP

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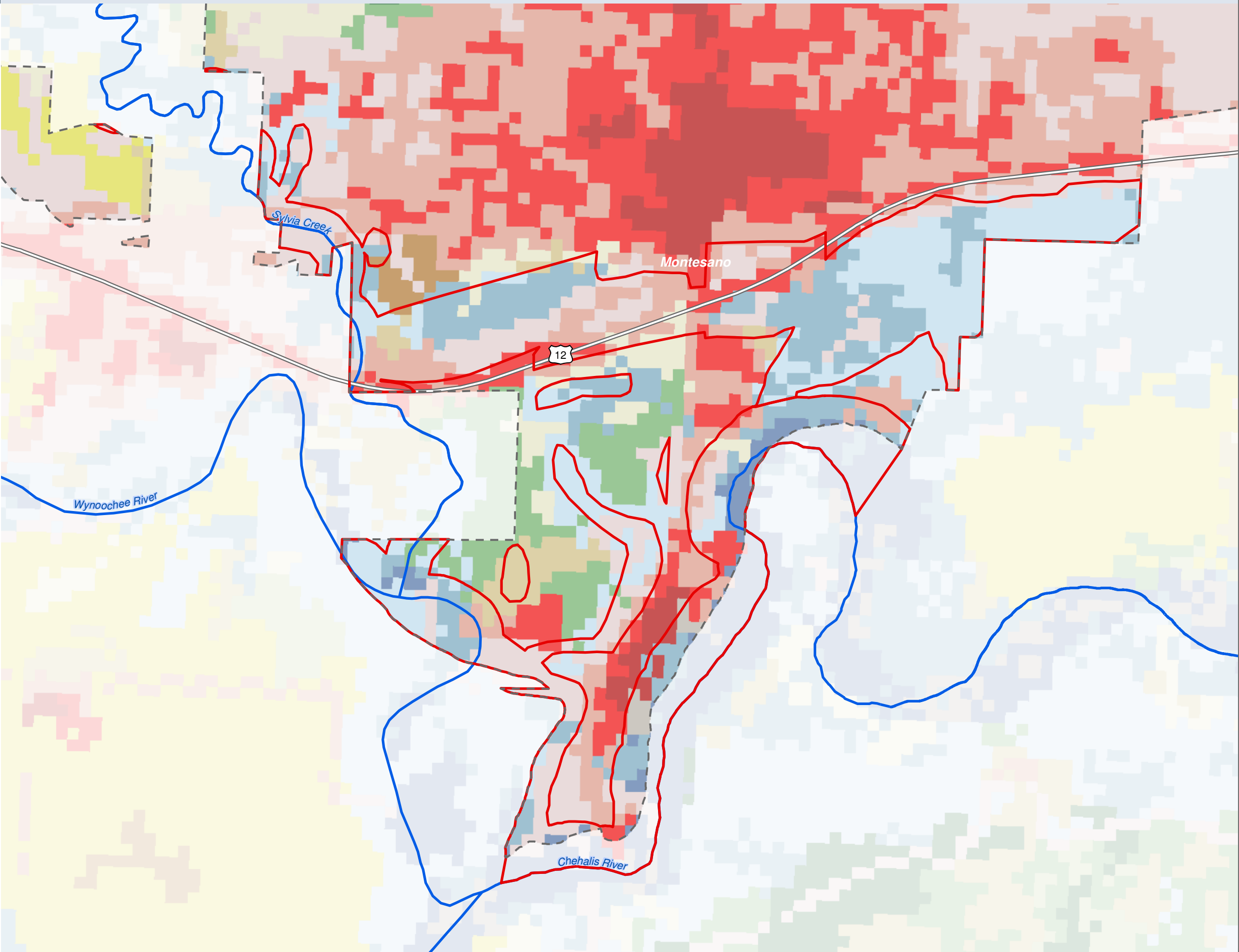


Figure 5.3: Sylvia Lake & Sylvia Creek

Date: 9/25/2014

Land Cover (2006)

- | | |
|-----------------------------|------------------------------|
| Open Water | Evergreen Forest |
| Developed, Open Space | Mixed Forest |
| Developed, Low Intensity | Shrub/Scrub |
| Developed, Medium Intensity | Herbaceous |
| Developed, High Intensity | Hay/Pasture |
| Barren Land | Woody Wetlands |
| Deciduous Forest | Emergent Herbaceous Wetlands |

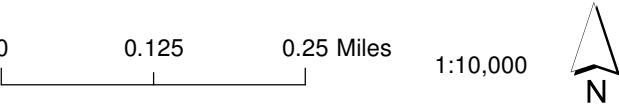
Preliminary Shoreline Jurisdiction

Montesano City Boundary

SMA Lakes

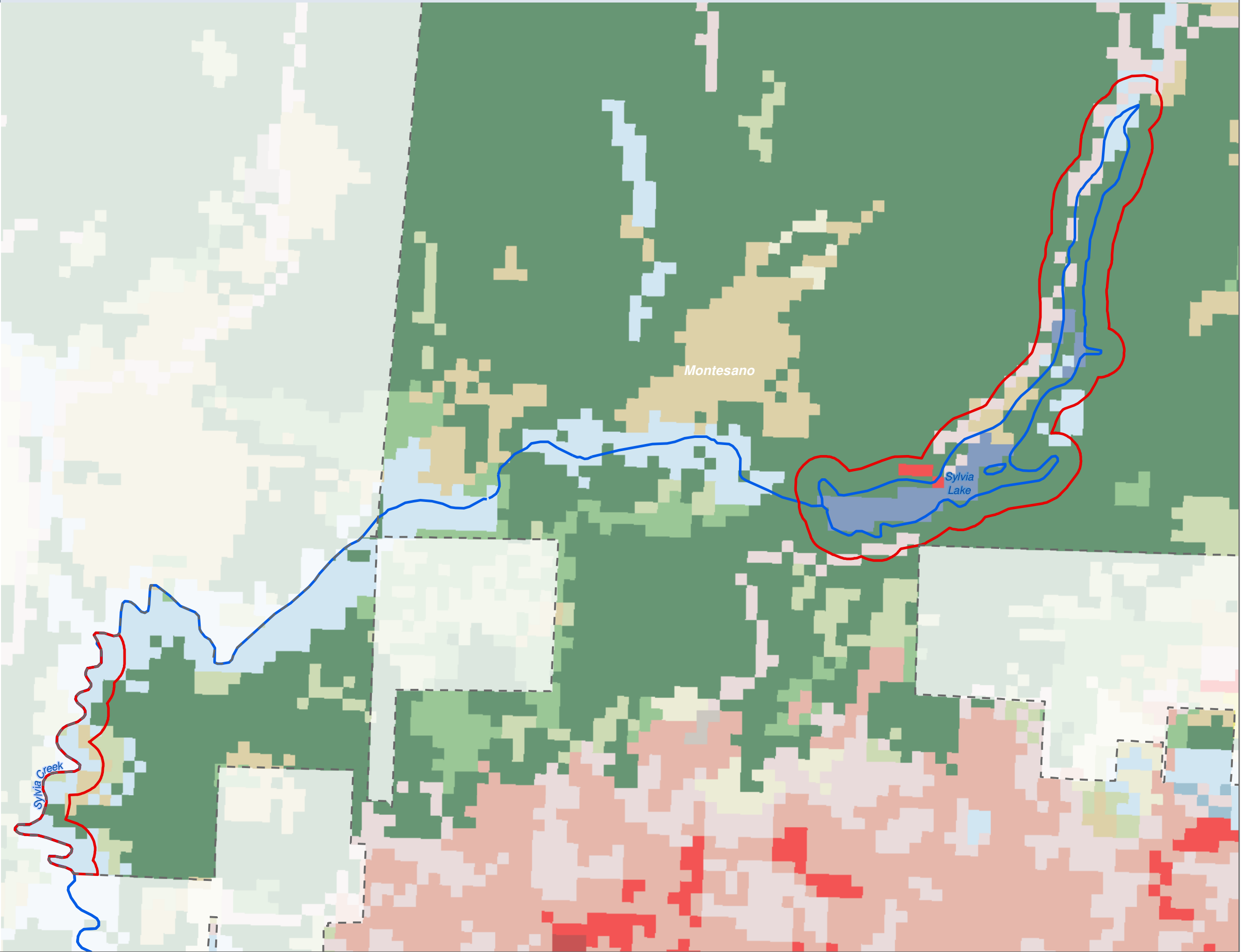
SMA Rivers

Highways



Source: USGS NLCD (2006), Grays Harbor Co., GHCG, USFWS NWI, FEMA, WA DNR, WSDOT, DOE, NRCS NAIP

Shoreline jurisdiction boundaries depicted on this map are approximate. They have not been formally delineated or surveyed and are intended for planning purposes only. Additional site-specific evaluation may be needed to confirm/verify information shown on this map.



100 Year Floodplain & Wetlands

Figure 6.1: City of Montesano

Date: 9/25/2014

FEMA Preliminary DFIRM

100-Year Floodplain

NWI Wetland by Type

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

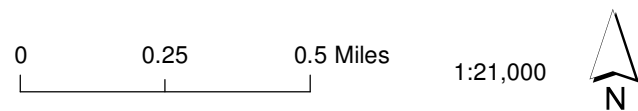
Preliminary Shoreline Jurisdiction

Montesano City Boundary

SMA Lakes

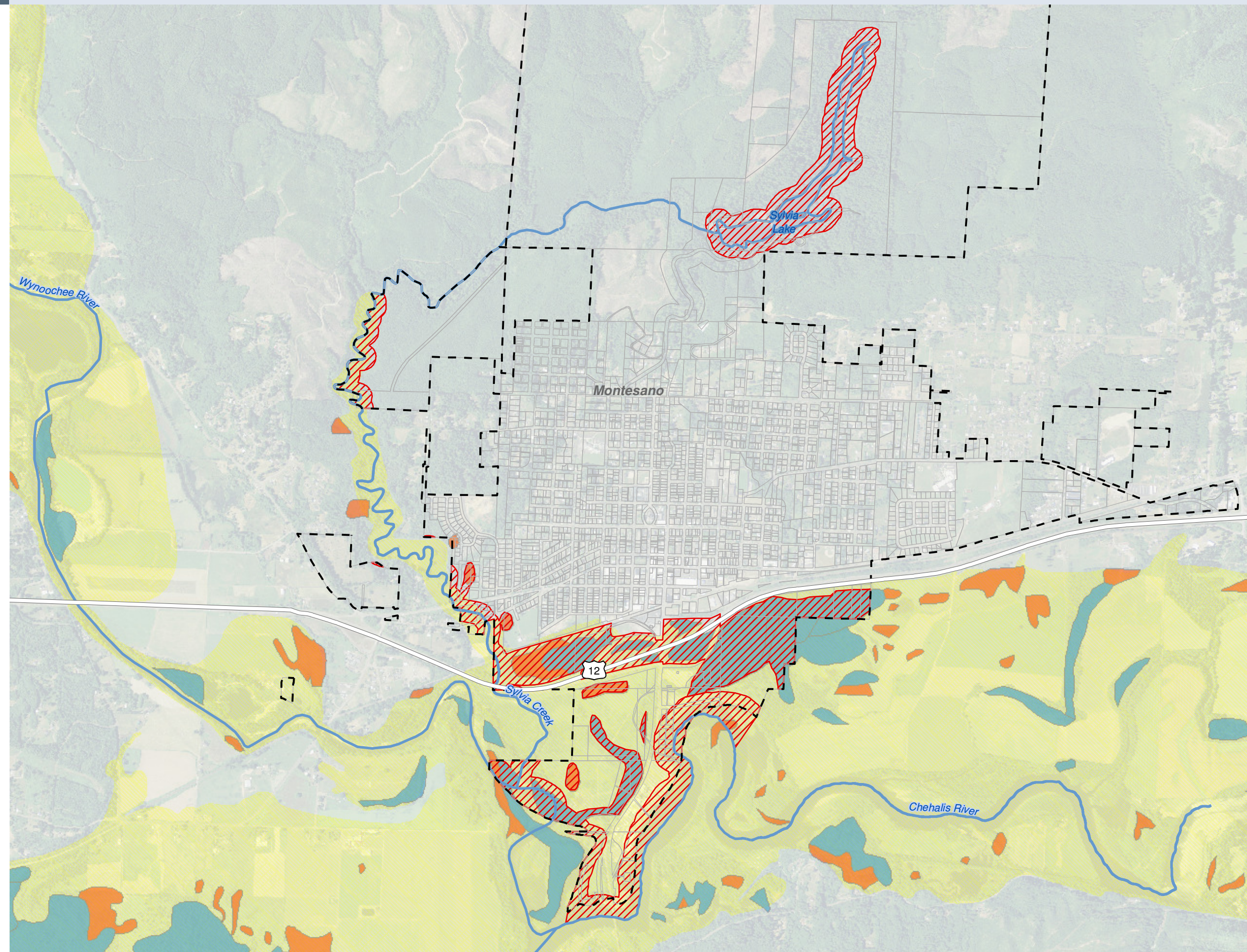
SMA Rivers

Highways



Source: Grays Harbor County, Grays Harbor Council of Governments, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP

Shoreline jurisdiction boundaries depicted on this map are approximate. They have not been formally delineated or surveyed and are intended for planning purposes only. Additional site-specific evaluation may be needed to confirm/verify information shown on this map.



100 Year Floodplain & Wetlands

Figure 6.2: Chehalis River & Sylvia Creek

Date: 9/25/2014

FEMA Preliminary DFIRM

100-Year Floodplain

NWI Wetland by Type

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

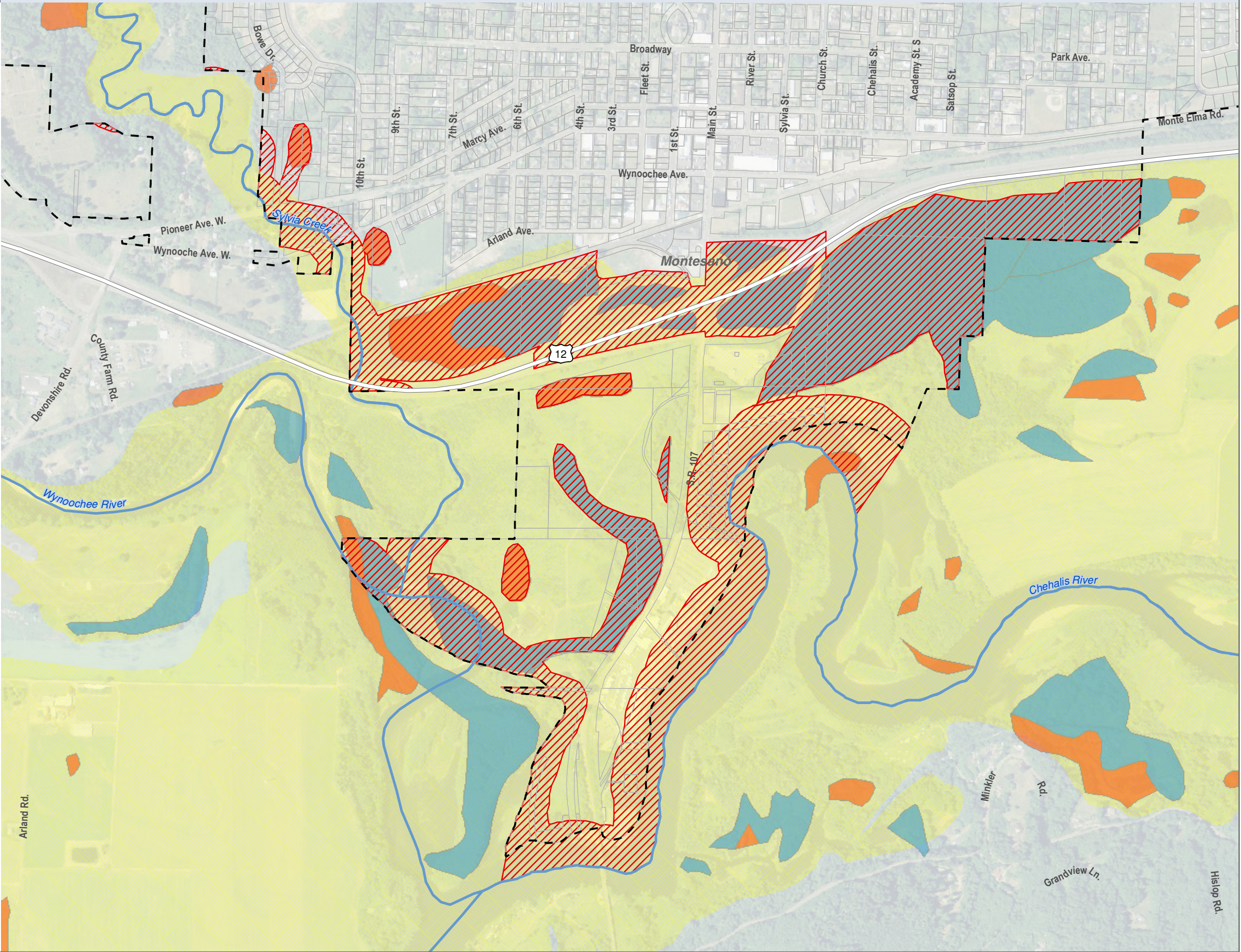
Preliminary Shoreline Jurisdiction

Montesano City Boundary

SMA Lakes

SMA Rivers

Highways



Source: Grays Harbor County, Grays Harbor Council of Governments, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP

Shoreline jurisdiction boundaries depicted on this map are approximate. They have not been formally delineated or surveyed and are intended for planning purposes only. Additional site-specific evaluation may be needed to confirm/verify information shown on this map.



100 Year Floodplain & Wetlands

Figure 6.3: Sylvia Lake & Sylvia Creek

Date: 9/25/2014

FEMA Preliminary DFIRM

100-Year Floodplain

NWI Wetland by Type

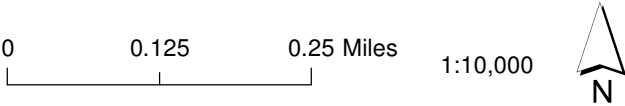
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Preliminary Shoreline Jurisdiction

Montesano City Boundary

SMA Lakes

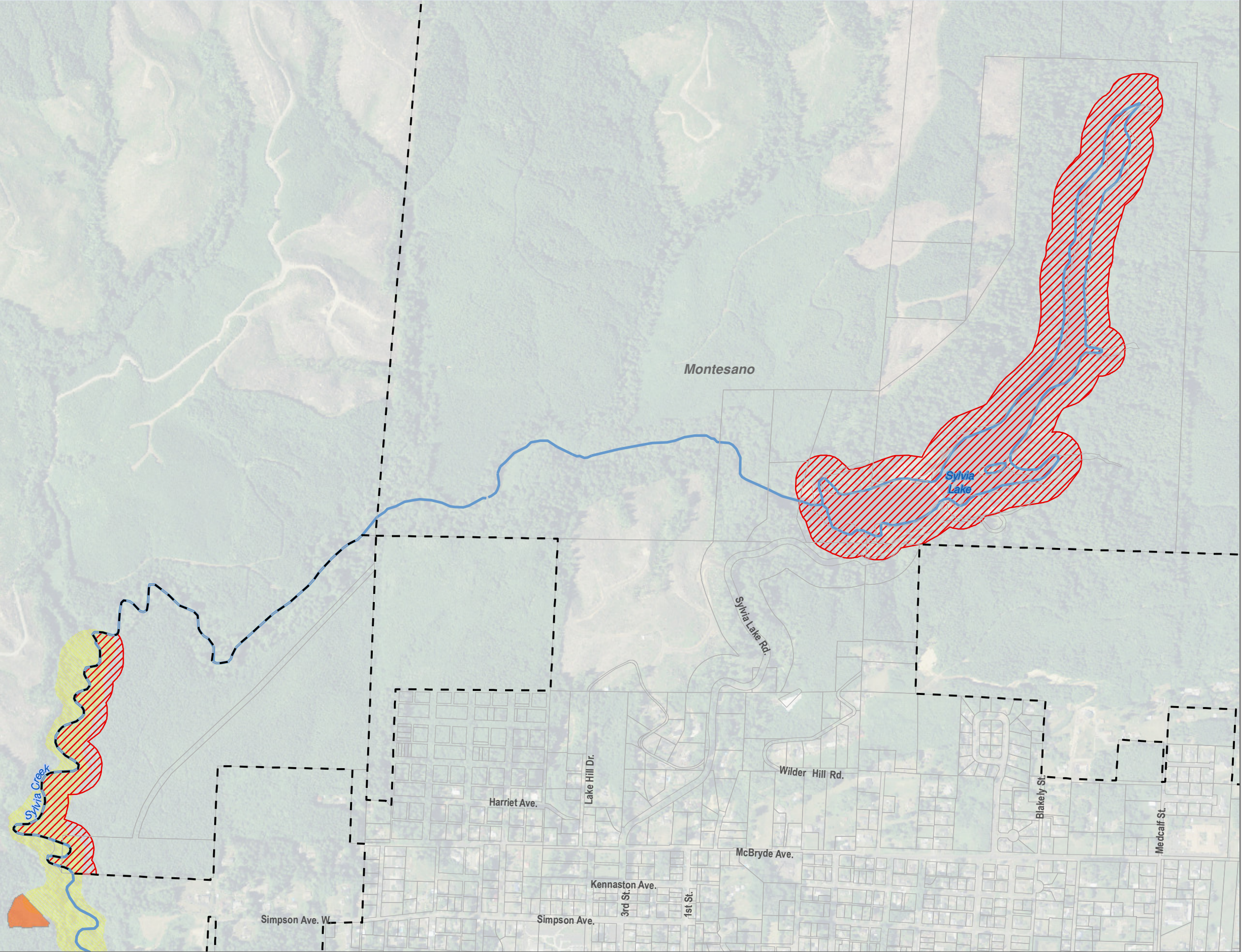
SMA Rivers

Highways



Source: Grays Harbor County, Grays Harbor Council of Governments, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP

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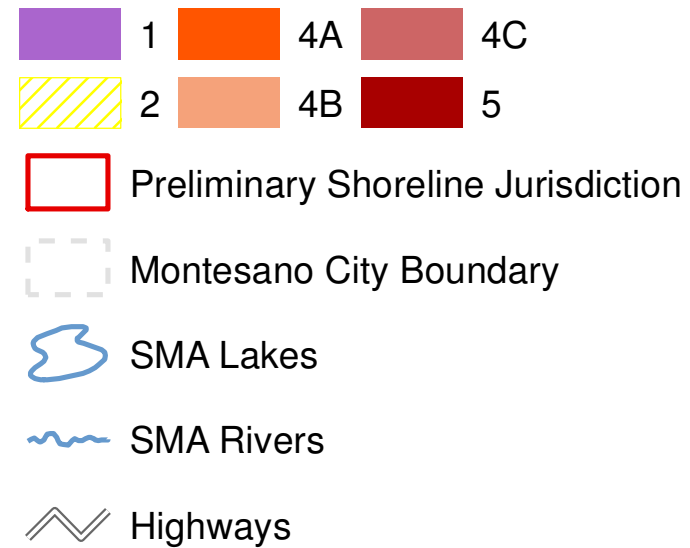


Water Quality 303(d) Listed Waterbodies

Figure 7.1: City of Montesano

Date: 9/12/2014

303d Waterbodies by Category (2012)



303d Categories:

Category 1: Meets tested standards

Category 2: Waters of concern

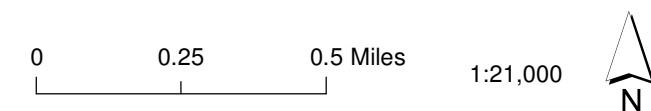
Category 4: Polluted waters that do not require a TMDL

4a: Approved TMDL control plan in place

4b: Approved pollution control plan in place

4c: Cause cannot be addressed through TMDL

Category 5: Polluted waters that require a TMDL



Source: Grays Harbor County, USFWS NWI, FEMA, WA DNR, WSDOT, DOE, NRCS NAIP

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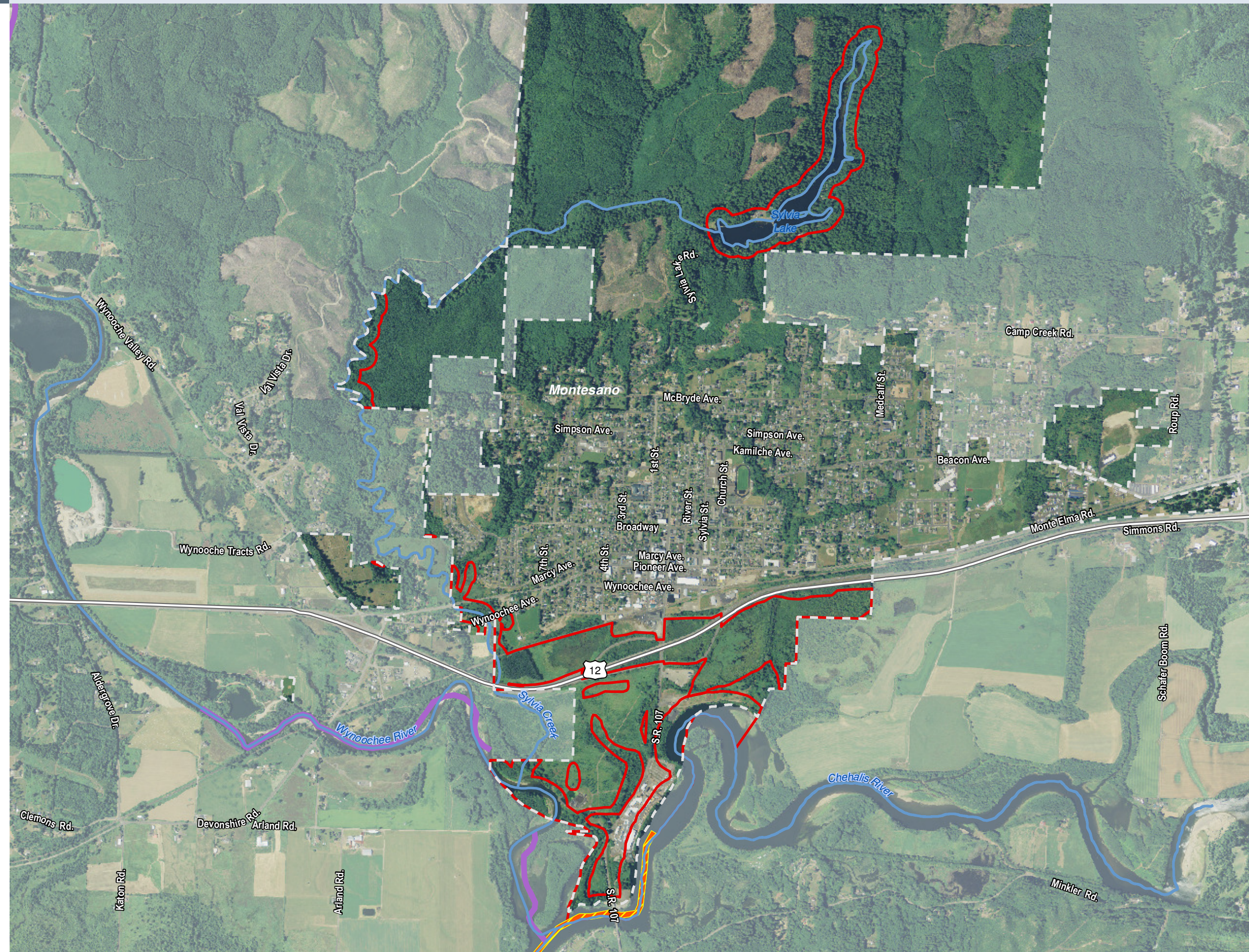
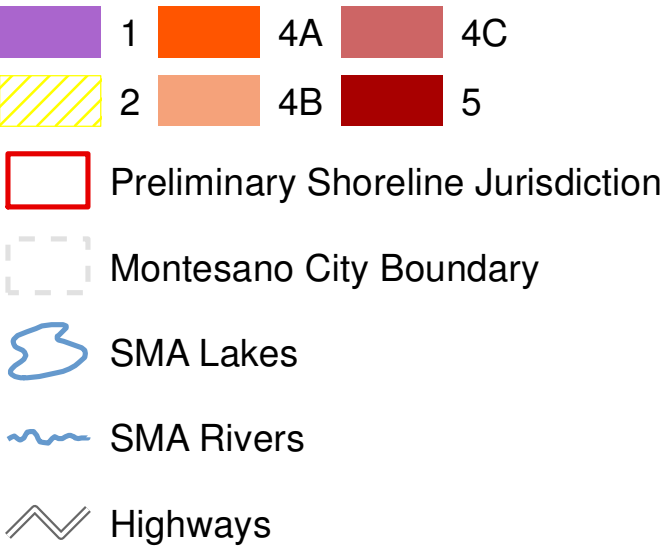


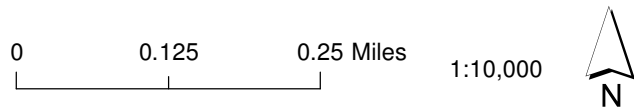
Figure 7.2: Chehalis River & Sylvia Creek

Date: 9/12/2014

303d Waterbodies by Category (2012)



303d Categories:
Category 1: Meets tested standards
Category 2: Waters of concern
Category 4: Polluted waters that do not require a TMDL
4a: Approved TMDL control plan in place
4b: Approved pollution control plan in place
4c: Cause cannot be addressed through TMDL
Category 5: Polluted waters that require a TMDL



Source: Grays Harbor County, USFWS NWI, FEMA, WA DNR, WSDOT, DOE, NRCS NAIP
Shoreline jurisdiction boundaries depicted on this map are approximate. They have not been formally delineated or surveyed and are intended for planning purposes only. Additional site-specific evaluation may be needed to confirm/verify information shown on this map.

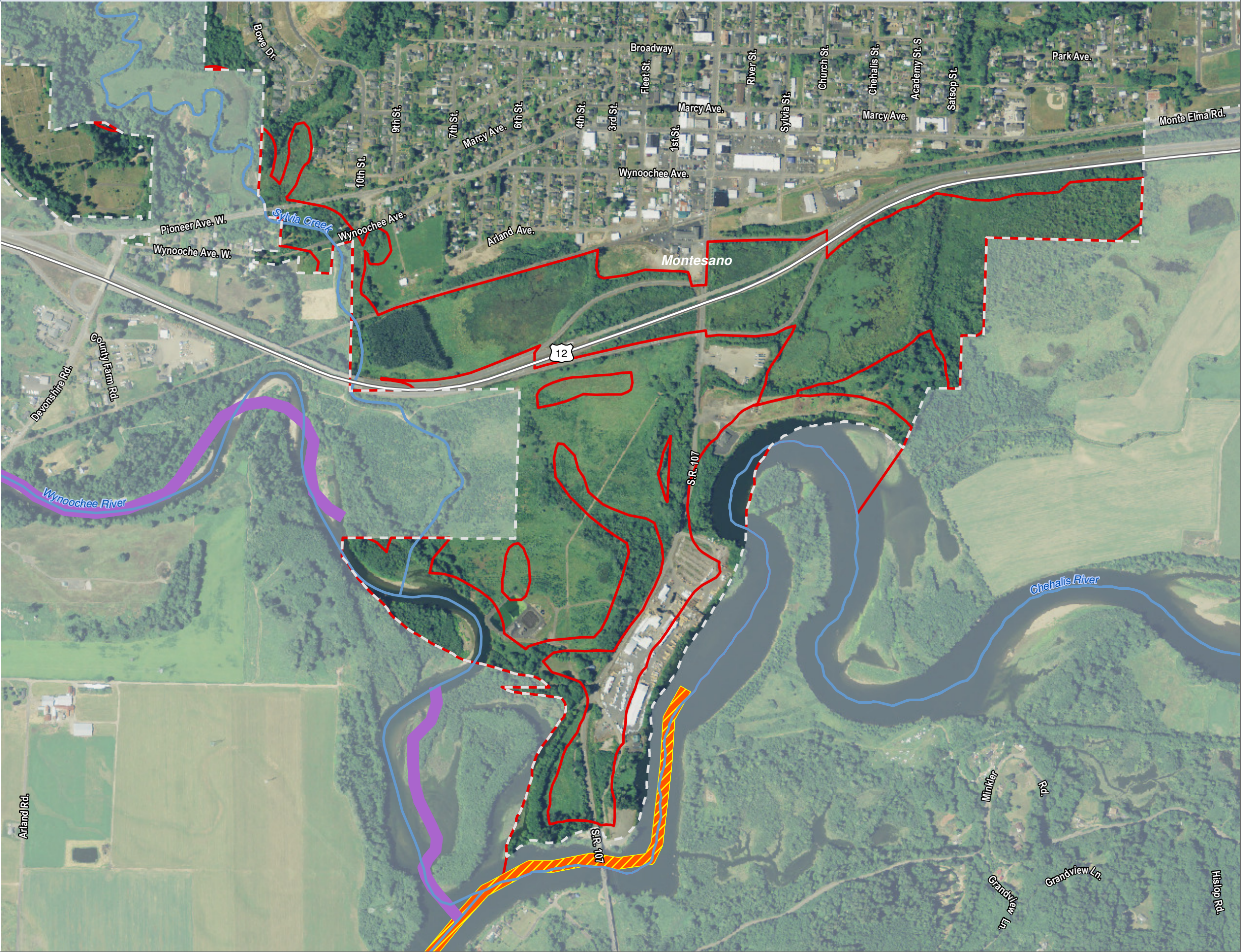
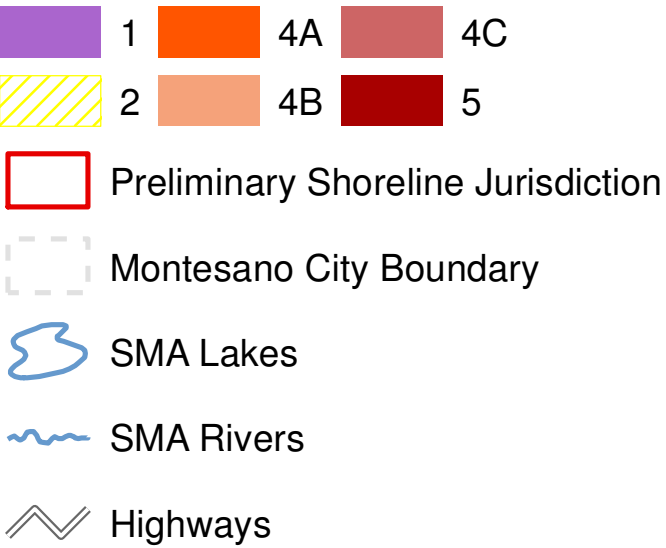


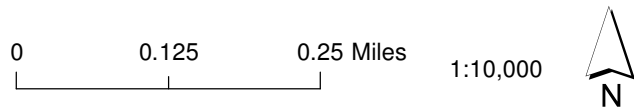
Figure 7.3: Sylvia Lake & Sylvia Creek

Date: 9/12/2014

303d Waterbodies by Category (2012)



303d Categories:
Category 1: Meets tested standards
Category 2: Waters of concern
Category 4: Polluted waters that do not require a TMDL
4a: Approved TMDL control plan in place
4b: Approved pollution control plan in place
4c: Cause cannot be addressed through TMDL
Category 5: Polluted waters that require a TMDL



Source: Grays Harbor County, USFWS NWI, FEMA, WA DNR, WSDOT, DOE, NRCS NAIP
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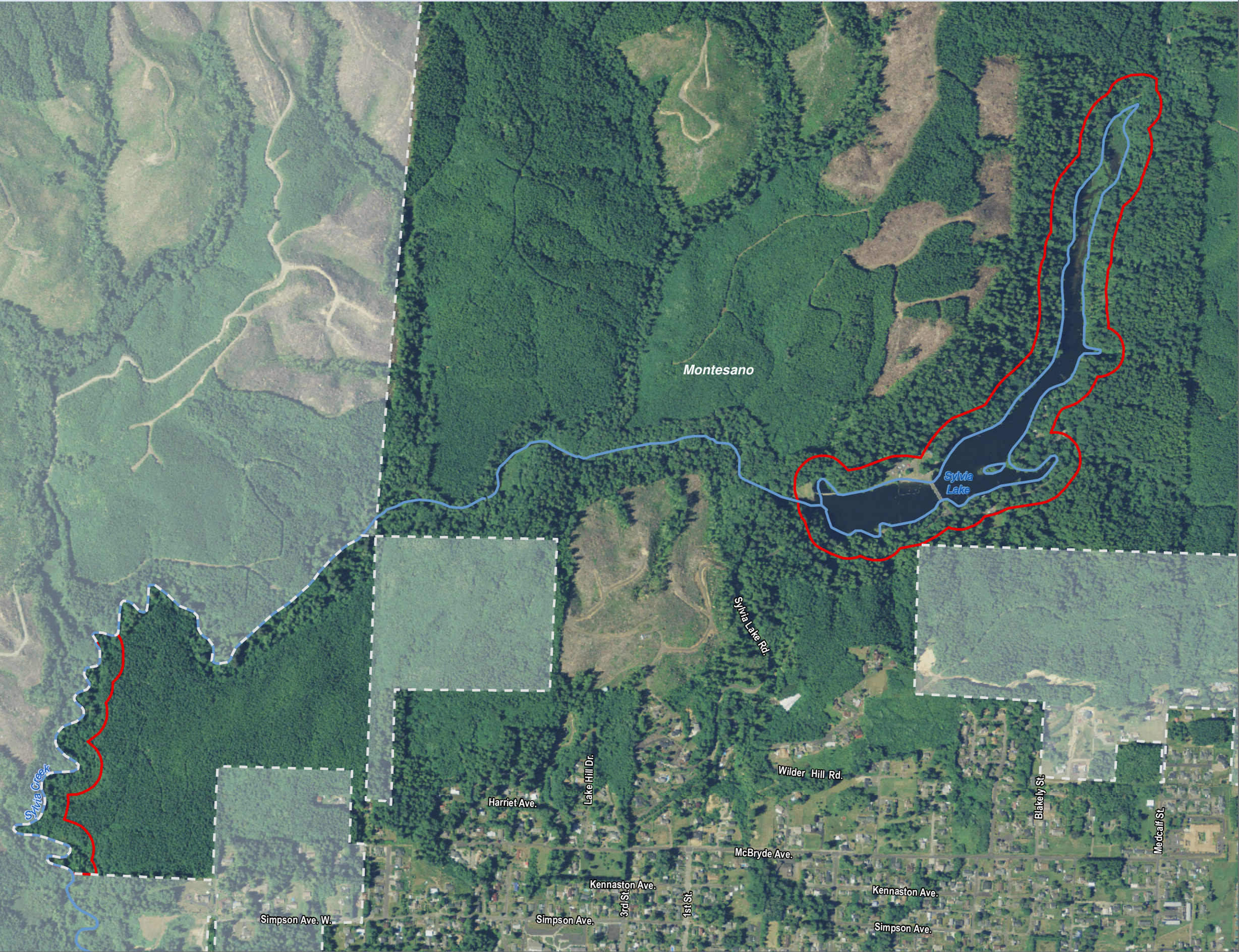









Figure 8.1: City of Montesano

Date: 9/10/2014

PHS Wildlife

-  Fish Species Present
-  Olympic Mudminnow
-  SMA Rivers
-  SMA Lakes
-  Preliminary Shoreline Jurisdiction
-  Montesano City Boundary
-  Highways

0 0.25 0.5 Miles 1:21,000



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), WDFW, DNR, WSDOT, Ecology, NRCS NAIP (2013)

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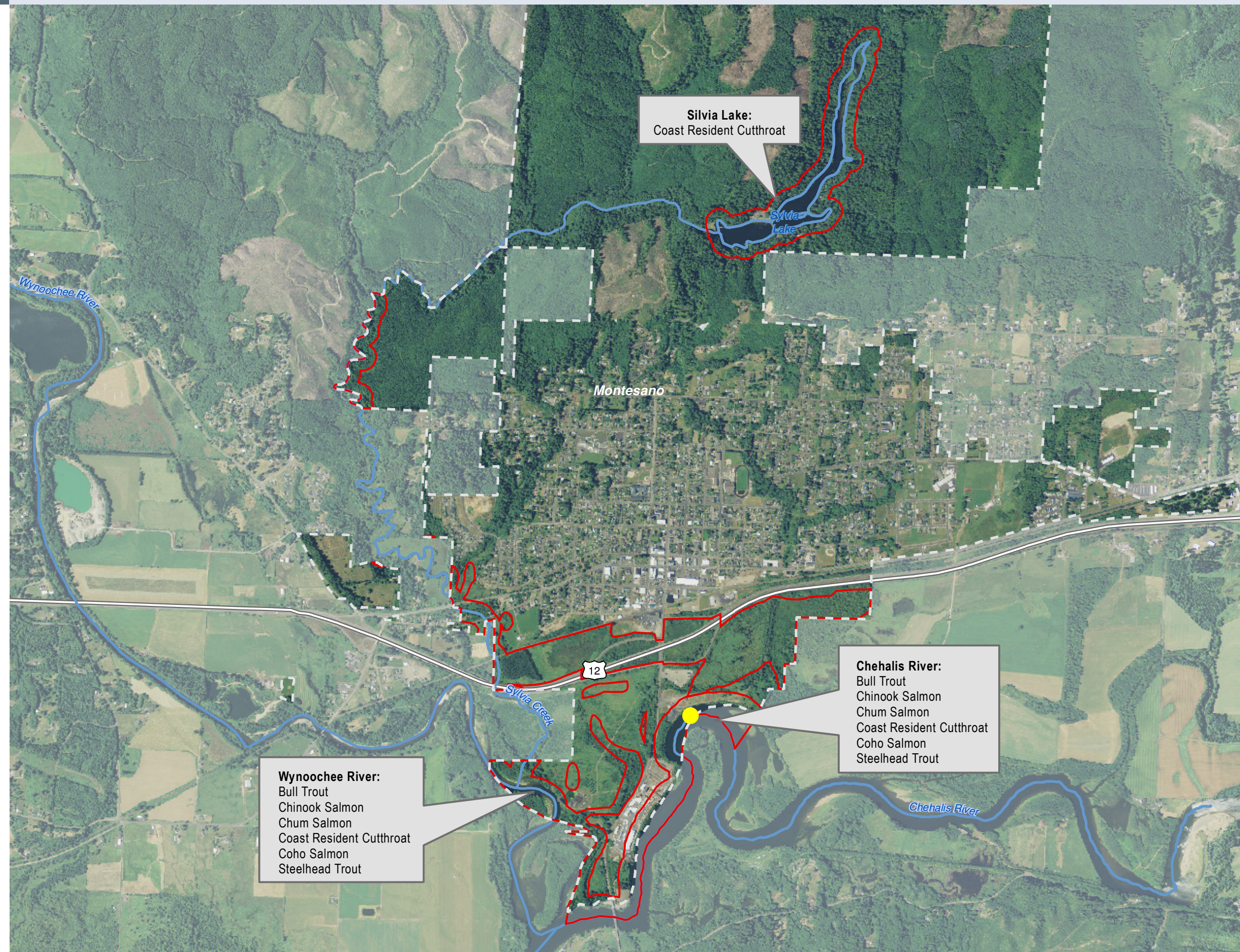







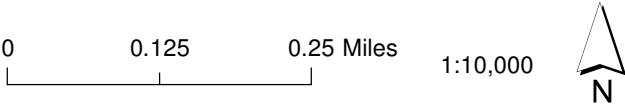


Figure 8.2: Chehalis River & Sylvia Creek

Date: 9/10/2014

PHS Wildlife

-  Fish Species Present
-  Olympic Mudminnow
-  SMA Rivers
-  SMA Lakes
-  Preliminary Shoreline Jurisdiction
-  Montesano City Boundary
-  Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), WDFW, DNR, WSDOT, Ecology, NRCS NAIP (2013)

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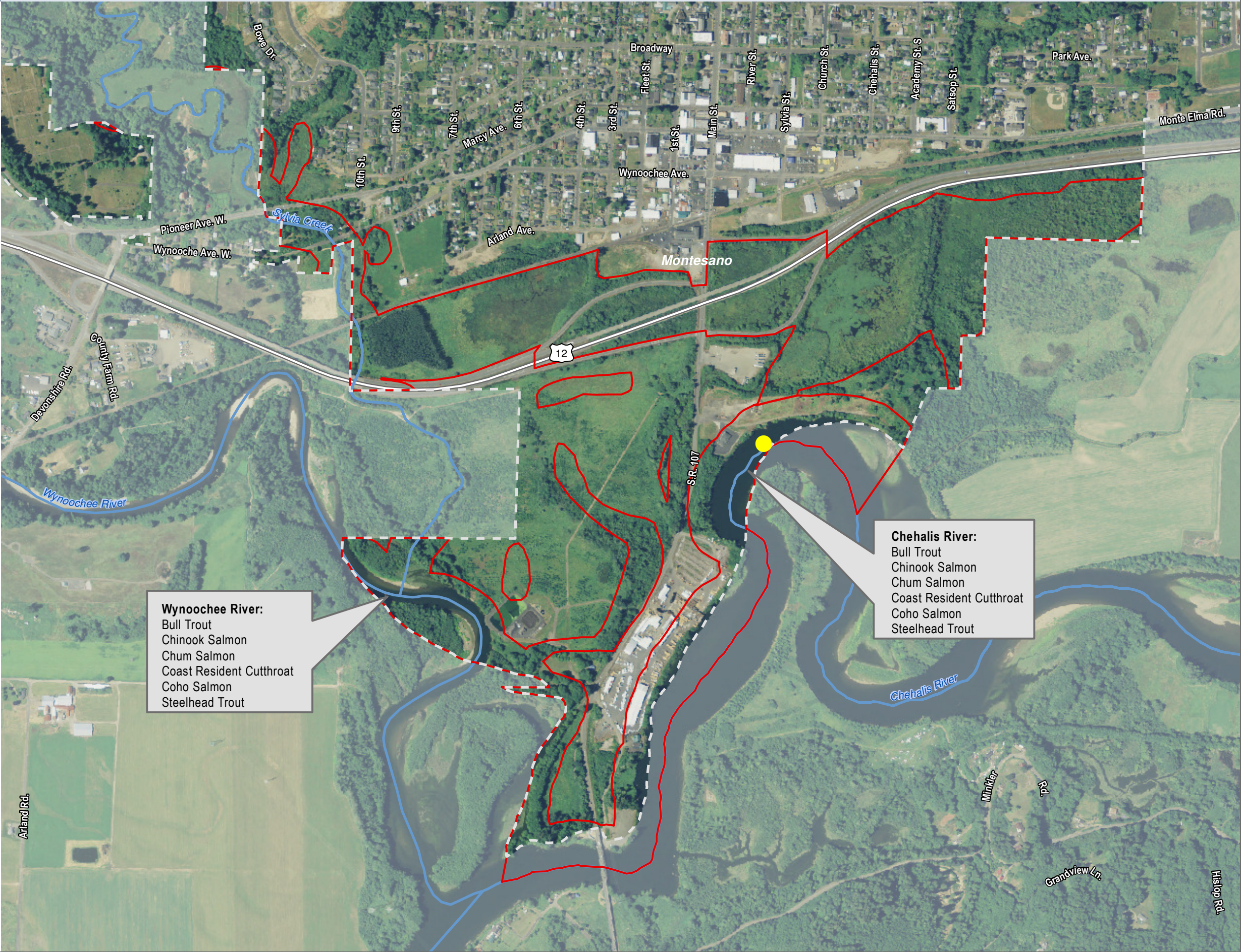







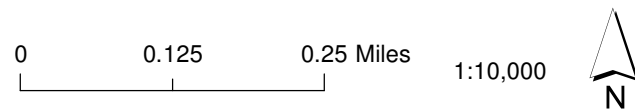


Figure 8.3: Sylvia Lake & Sylvia Creek

Date: 9/10/2014

PHS Wildlife

-  Fish Species Present
-  Olympic Mudminnow
-  SMA Rivers
-  SMA Lakes
-  Preliminary Shoreline Jurisdiction
-  Montesano City Boundary
-  Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), WDFW, DNR, WSDOT, Ecology, NRCS NAIP (2013)

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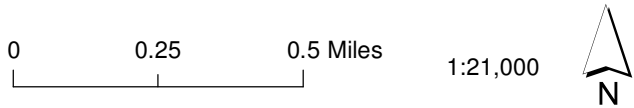


Figure 9.1: City of Montesano

Date: 9/25/2014

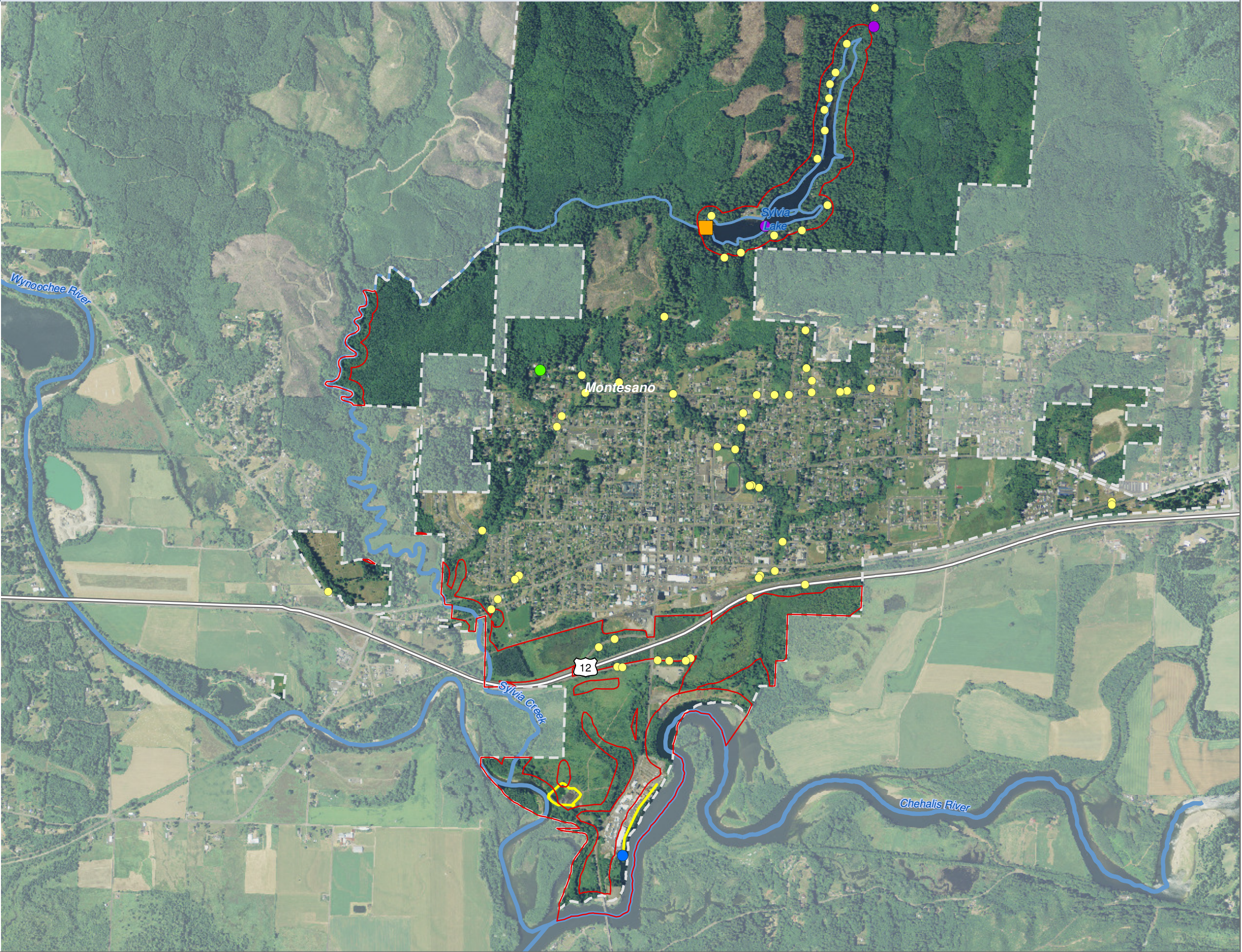
Road Crossing - Blockage Type

- Bridge
- Culvert
- Fill/Puncheon
- Permitted Wastewater Outfall
- Dam
- Levees
- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, Chehalis River Basin Flood Authority, WA DNR, WSDOT, DOE, NRCS NAIP

Shoreline jurisdiction boundaries depicted on this map are approximate. They have not been formally delineated or surveyed and are intended for planning purposes only. Additional site-specific evaluation may be needed to confirm/verify information shown on this map.



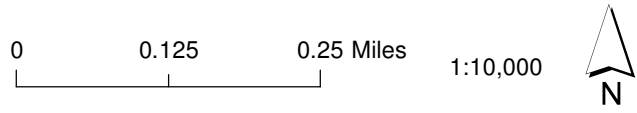
Shoreline Modifications

Figure 9.2: Chehalis River & Sylvia Creek

Date: 9/25/2014

Road Crossing - Blockage Type

- Culvert
- Permitted Wastewater Outfall
- Dam
- Levees
- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, Chehalis River Basin Flood Authority, WA DNR, WSDOT, DOE, NRCS NAIP

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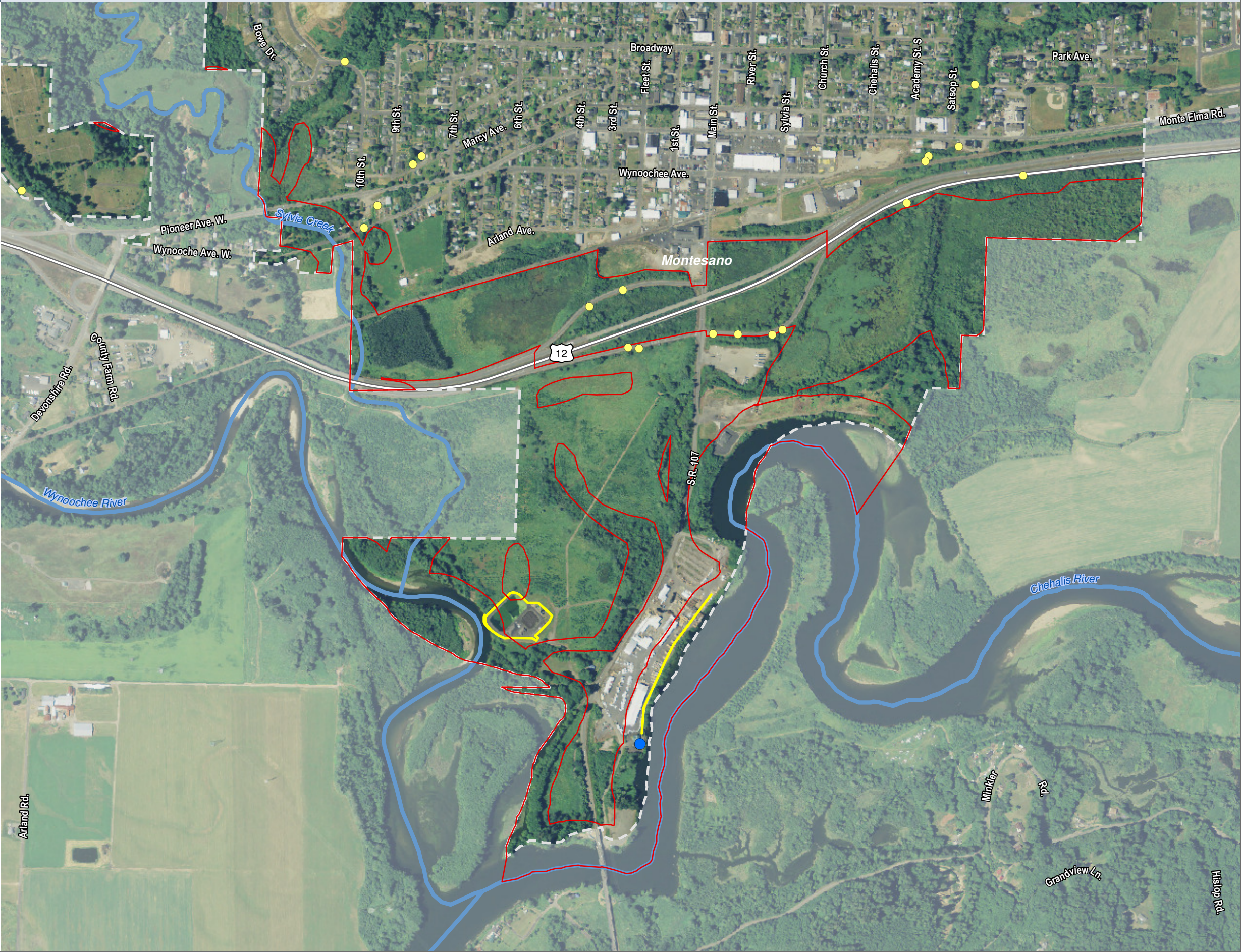
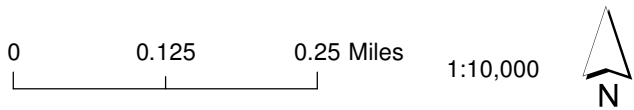


Figure 9.3: Sylvia Lake & Sylvia Creek

Date: 9/25/2014

Road Crossing - Blockage Type

- Bridge
- Culvert
- Fill/Puncheon
- Dam
- Levees
- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, Chehalis River Basin Flood Authority, WA DNR, WSDOT, DOE, NRCS NAIP

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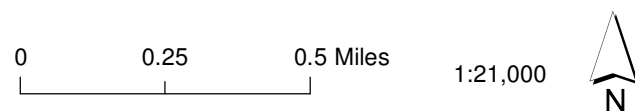


Figure 10.1: City of Montesano

Date: 9/12/2014

PHS Wildlife

- Bald Eagle
- Green Heron
- Osprey
- Waterfowl Concentrations
- Trumpeter Swan
- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- ~ SMA Lakes
- ~ SMA Rivers
- ≡ Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)

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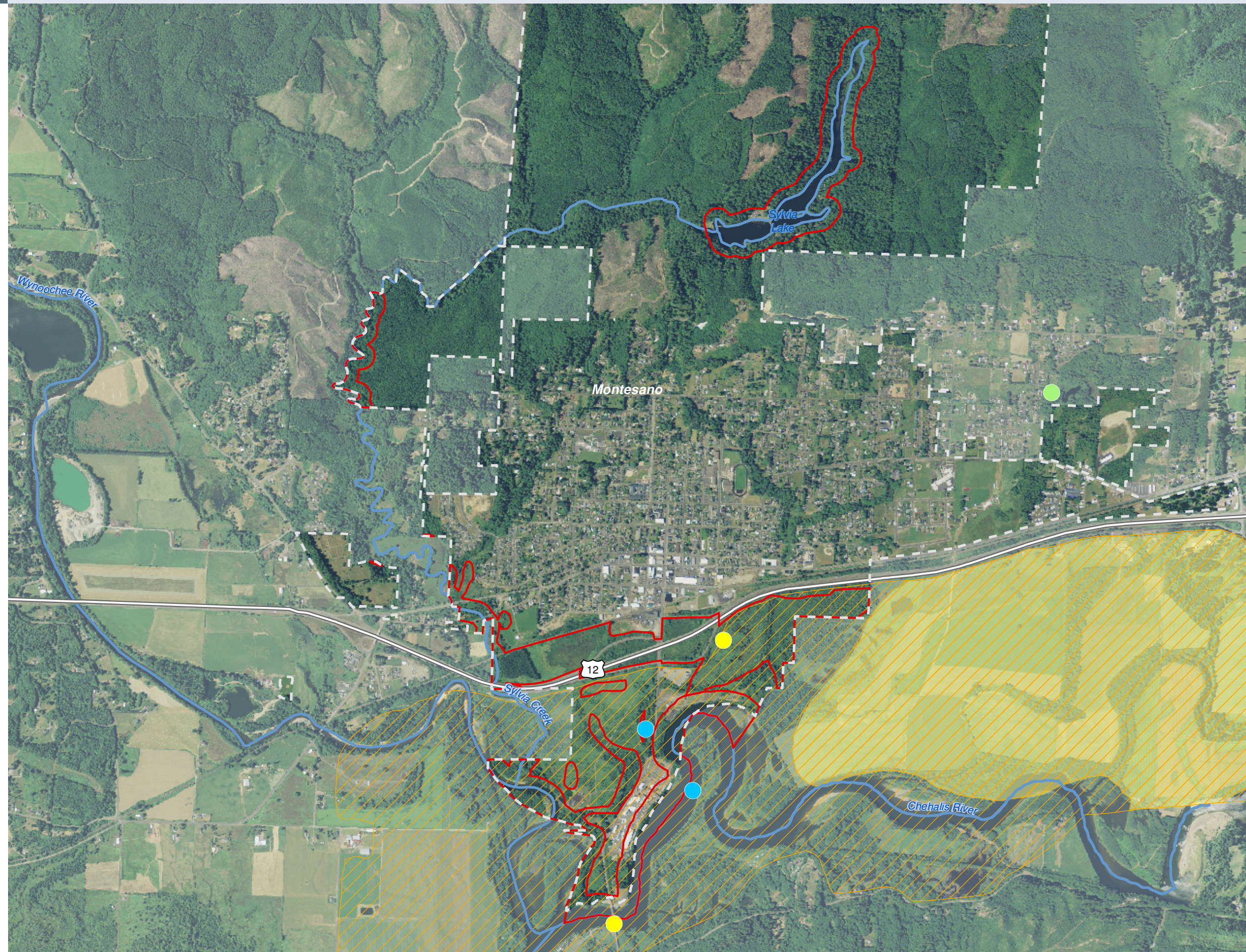
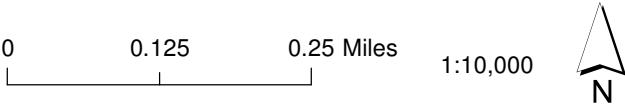


Figure 10.2: Chehalis River & Sylvia Creek

Date: 9/12/2014

PHS Wildlife

- Bald Eagle
- Osprey
- Waterfowl Concentrations
- Trumpeter Swan
- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)
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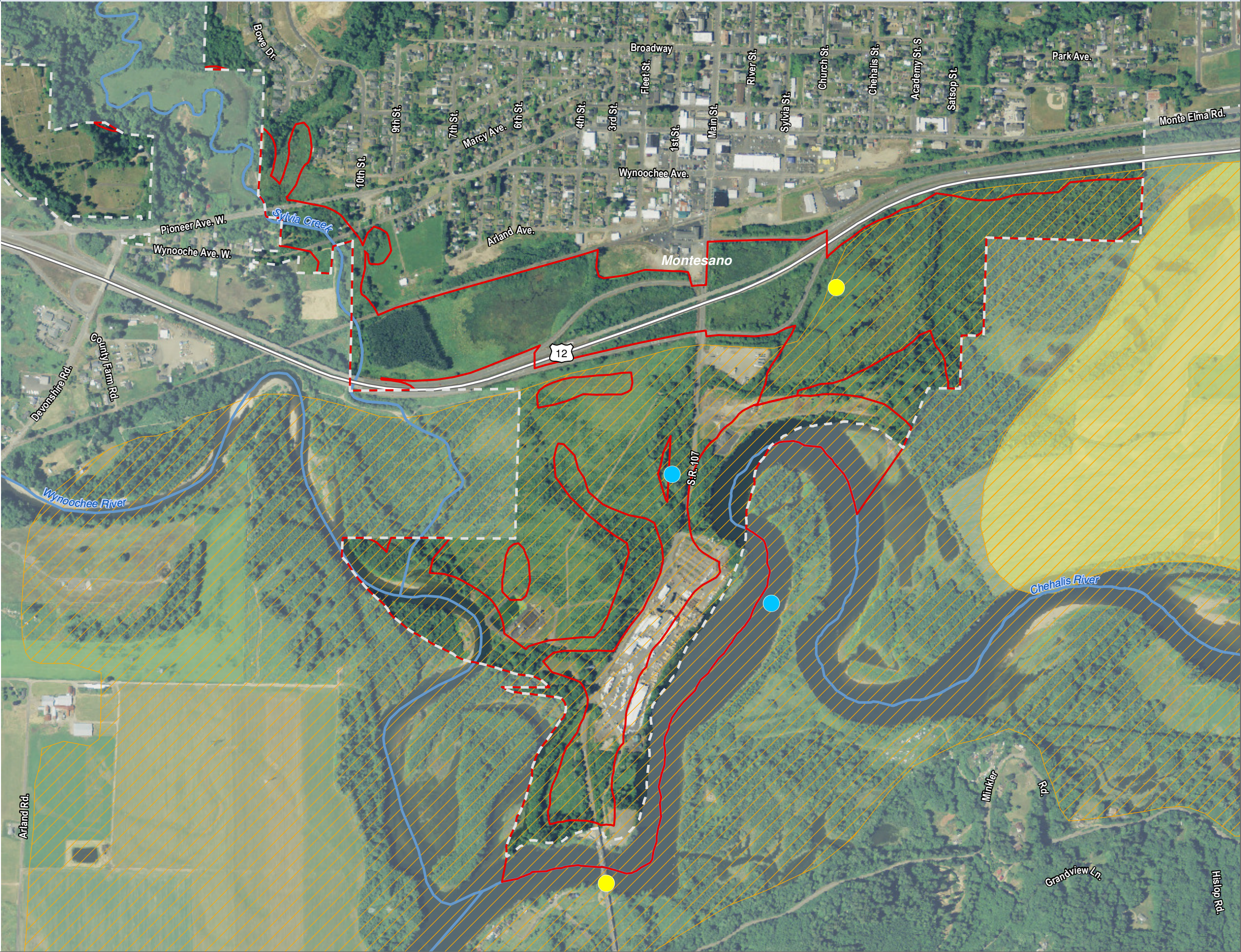







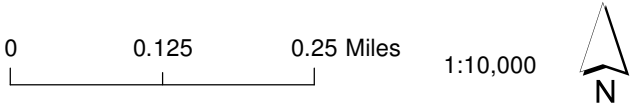


Figure 10.3: Sylvia Lake & Sylvia Creek

Date: 9/12/2014

-  Waterfowl Concentrations
-  Trumpeter Swan
-  Preliminary Shoreline Jurisdiction
-  Montesano City Boundary
-  SMA Lakes
-  SMA Rivers
-  Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)

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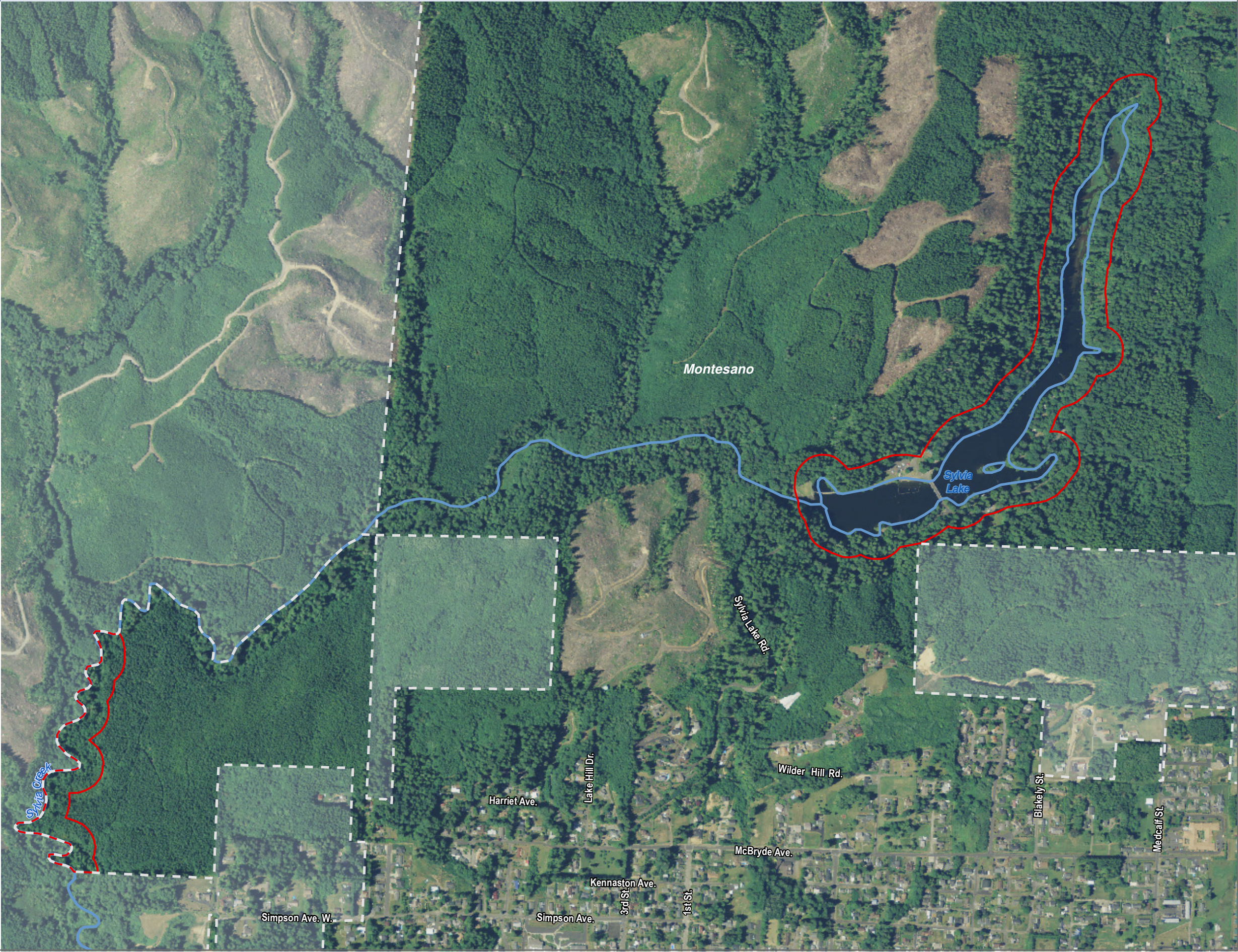


Figure 11.1: City of Montesano

Date: 9/12/2014

Soil Type

- Aabab silt loam

Bear Prairie silt loam

Chehalis silt loam

Cloquato silt loam

Copalis silt loam

Elochoman silt loam

Hoquiam silt loam

Humptulips silt loam

Juno sandy loam

Le Bar silt loam

Lyre variant

Lyre very gravelly loamy sand

Lytell silt loam

Montesa silt loam
- Nemah silty clay loam

Newberg silt loam

Nordby very gravelly loam

Ocosta silty clay loam

Orcas peat

Pits, gravel

Rennie silty clay loam

Riverwash

Salzer silty clay

Skamo silt loam

Udorthents, level

Wishkah silty clay loam

Zenker silt loam

Water

Preliminary Shoreline Jurisdiction

Montesano City Boundary

SMA Lakes

SMA Rivers

Highways

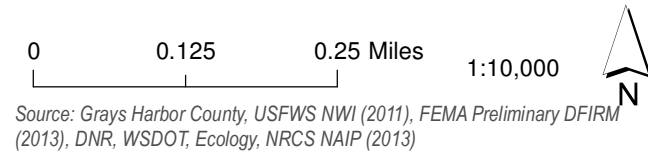
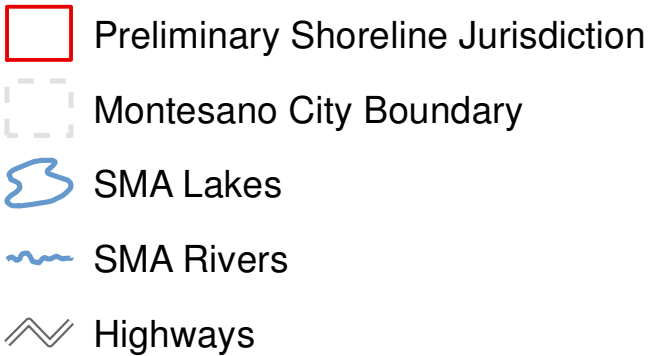
0 0.25 0.5 Miles 1:21,000

Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)

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Figure 11.2: Chehalis River & Sylvia Creek



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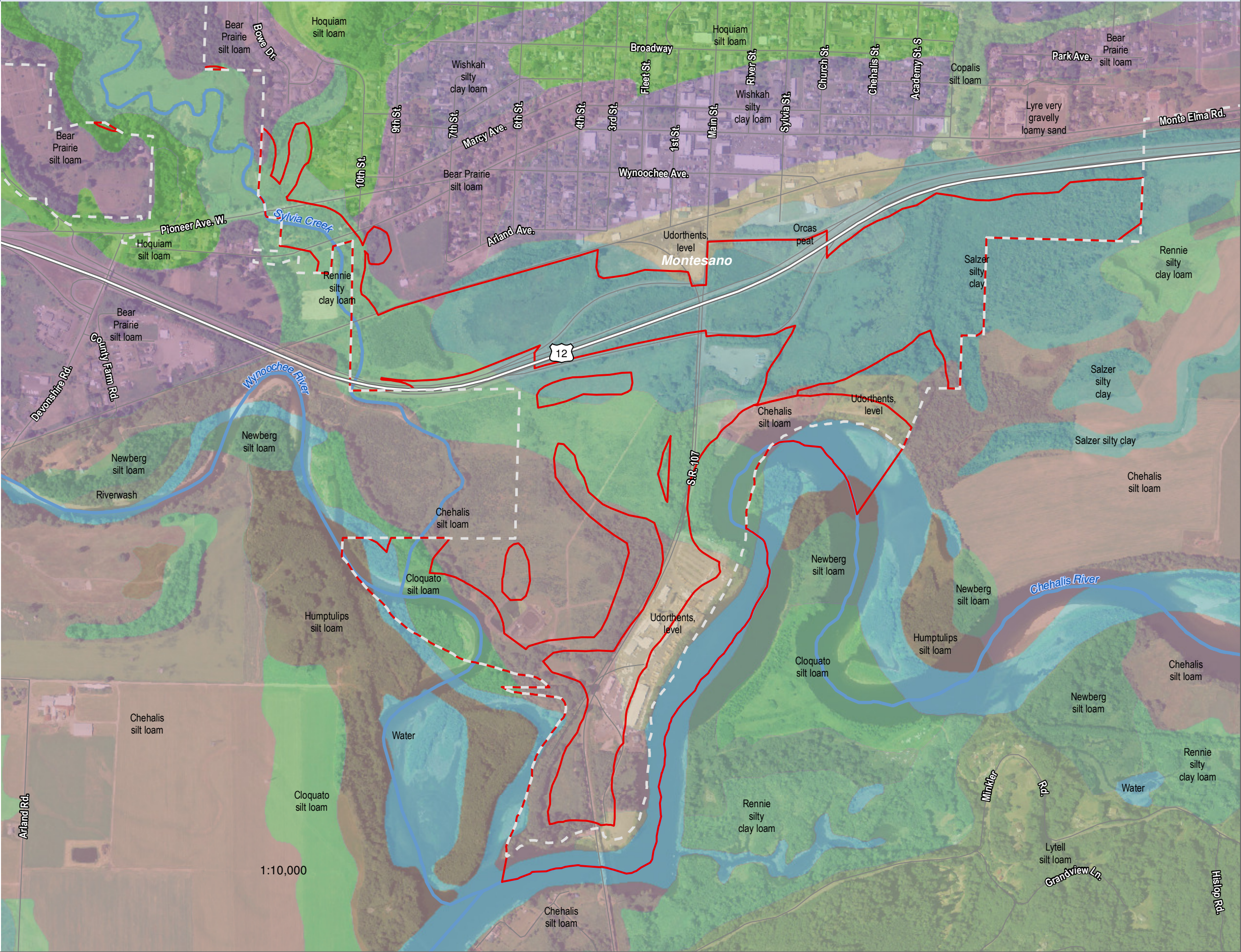


Figure 11.3: Sylvia Lake & Sylvia Creek

Date: 9/12/2014

Soil Type

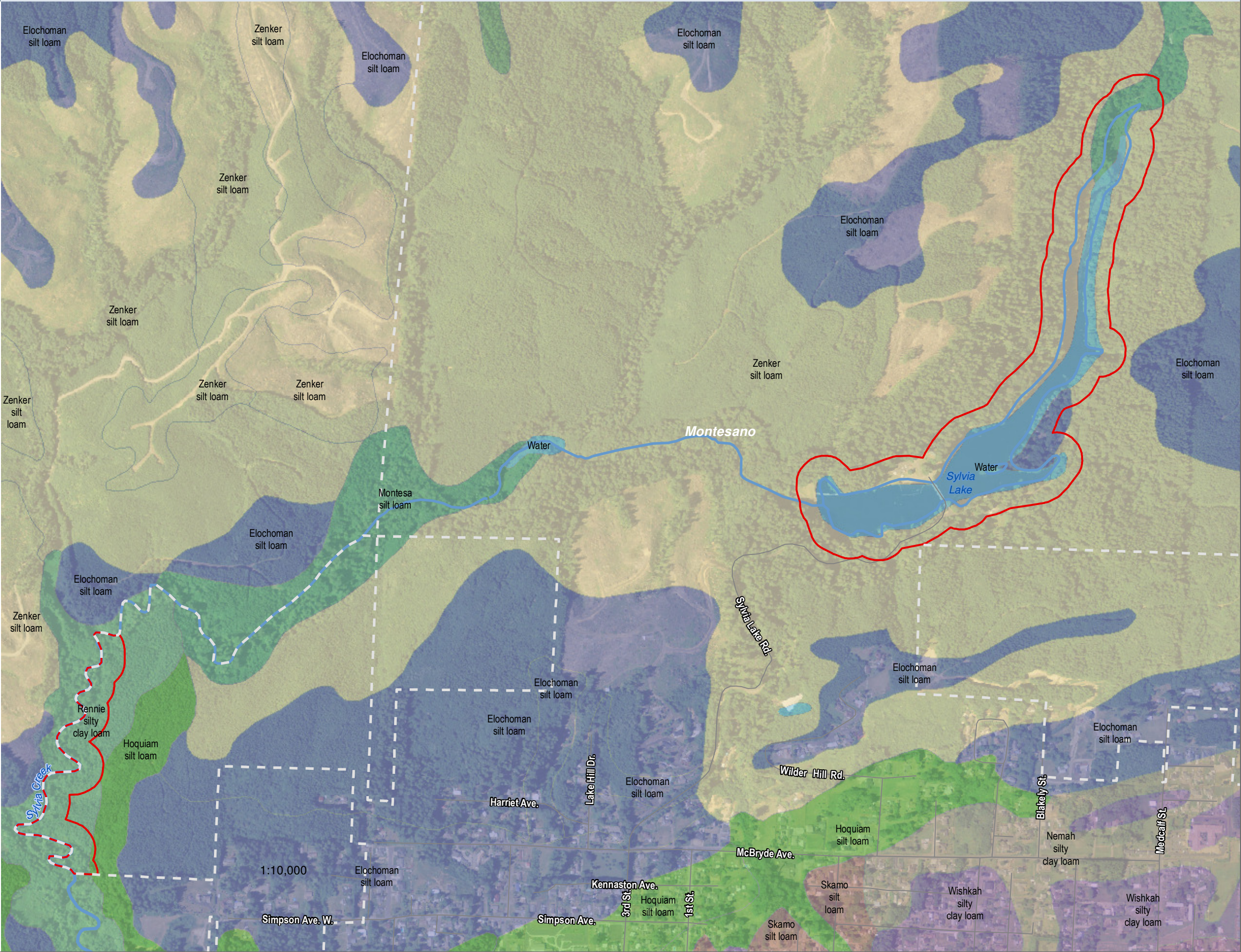
- Bear Prairie silt loam
- Elochoman silt loam
- Hoquiam silt loam
- Le Bar silt loam
- Montesa silt loam
- Nemah silty clay loam
- Rennie silty clay loam
- Skamo silt loam
- Wishkah silty clay loam
- Zenker silt loam
- Water

- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways

0 0.125 0.25 Miles 1:10,000

Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)

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Contaminated Sites

Figure 12.1: City of Montesano

Date: 9/12/2014

Underground Storage Tank Status

● Operational

Contaminated Sites

■ Awaiting Cleanup

■ Cleanup Started

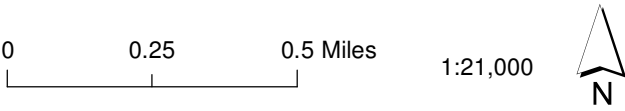
▨ Preliminary Shoreline Jurisdiction

▭ Montesano City Boundary

☁ SMA Lakes

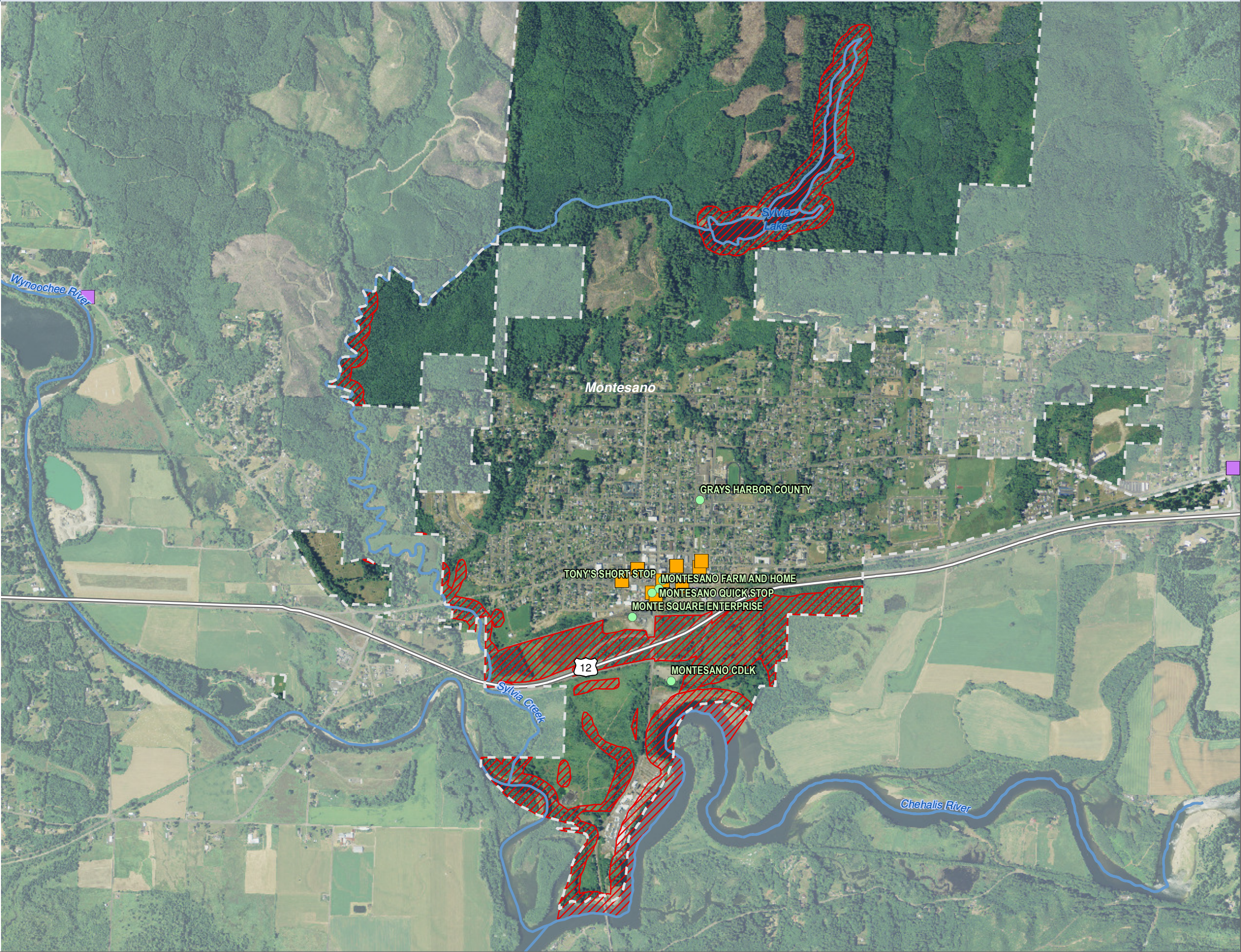
~ SMA Rivers

≡ Highways



Source: Grays Harbor County, USFWS NWI, FEMA, WA DNR, WSDOT, DOE, NRCS NAIP

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Contaminated Sites

Figure 12.2: Chehalis River & Sylvia Creek

Date: 9/12/2014

Underground Storage Tank Status

● Operational

Contaminated Sites

■ Cleanup Started

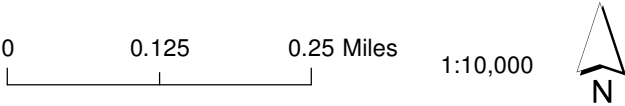
▨ Preliminary Shoreline Jurisdiction

▭ Montesano City Boundary

☞ SMA Lakes

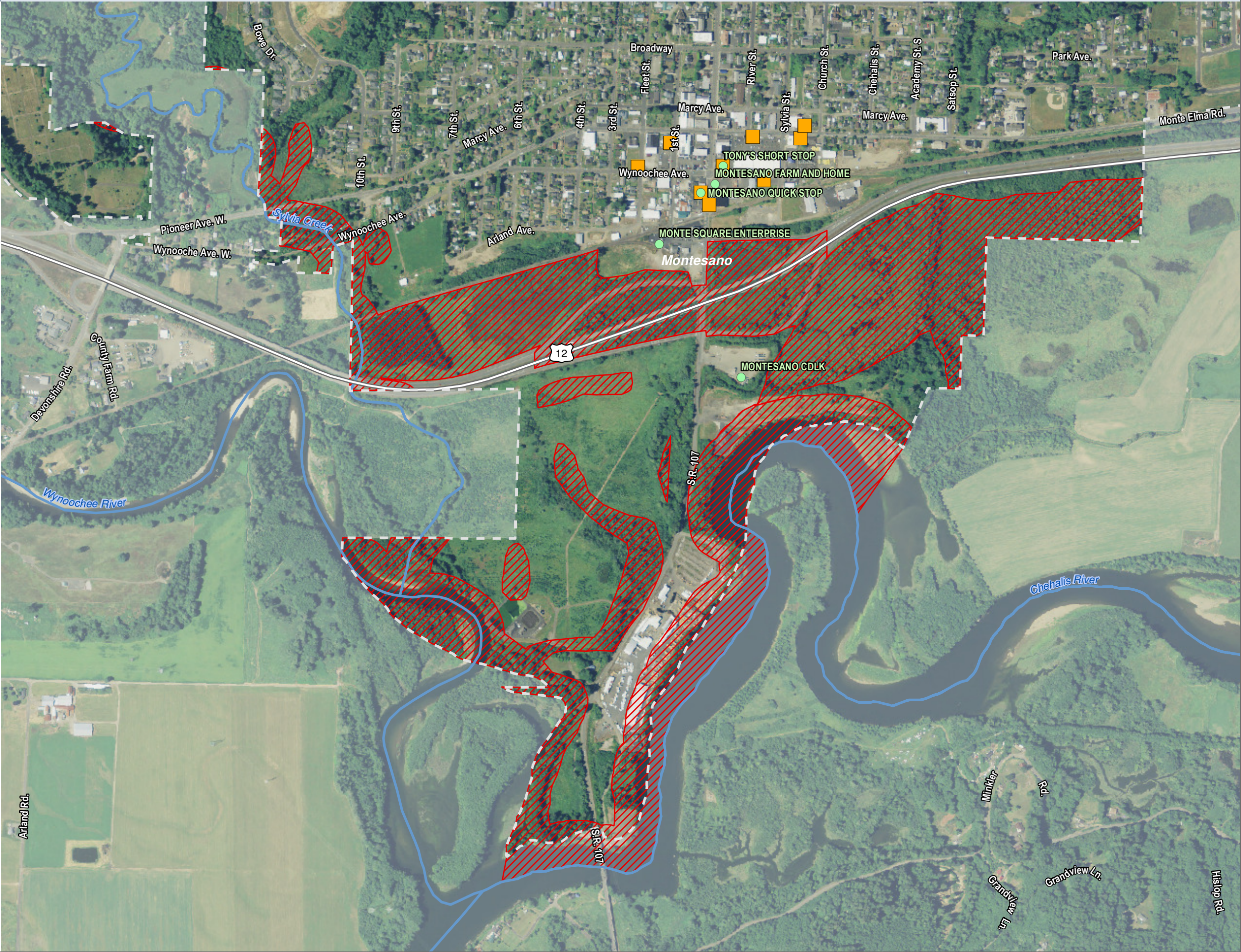
~~~~~ SMA Rivers

≡ Highways



Source: Grays Harbor County, USFWS NWI, FEMA, WA DNR, WSDOT, DOE, NRCS NAIP

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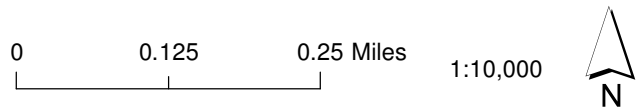
# Contaminated Sites

Figure 12.3: Sylvia Lake & Sylvia Creek

Date: 9/12/2014

Underground Storage Tank Status

- Operational
- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, USFWS NWI, FEMA, WA DNR, WSDOT, DOE, NRCS NAIP

Shoreline jurisdiction boundaries depicted on this map are approximate. They have not been formally delineated or surveyed and are intended for planning purposes only. Additional site-specific evaluation may be needed to confirm/verify information shown on this map.

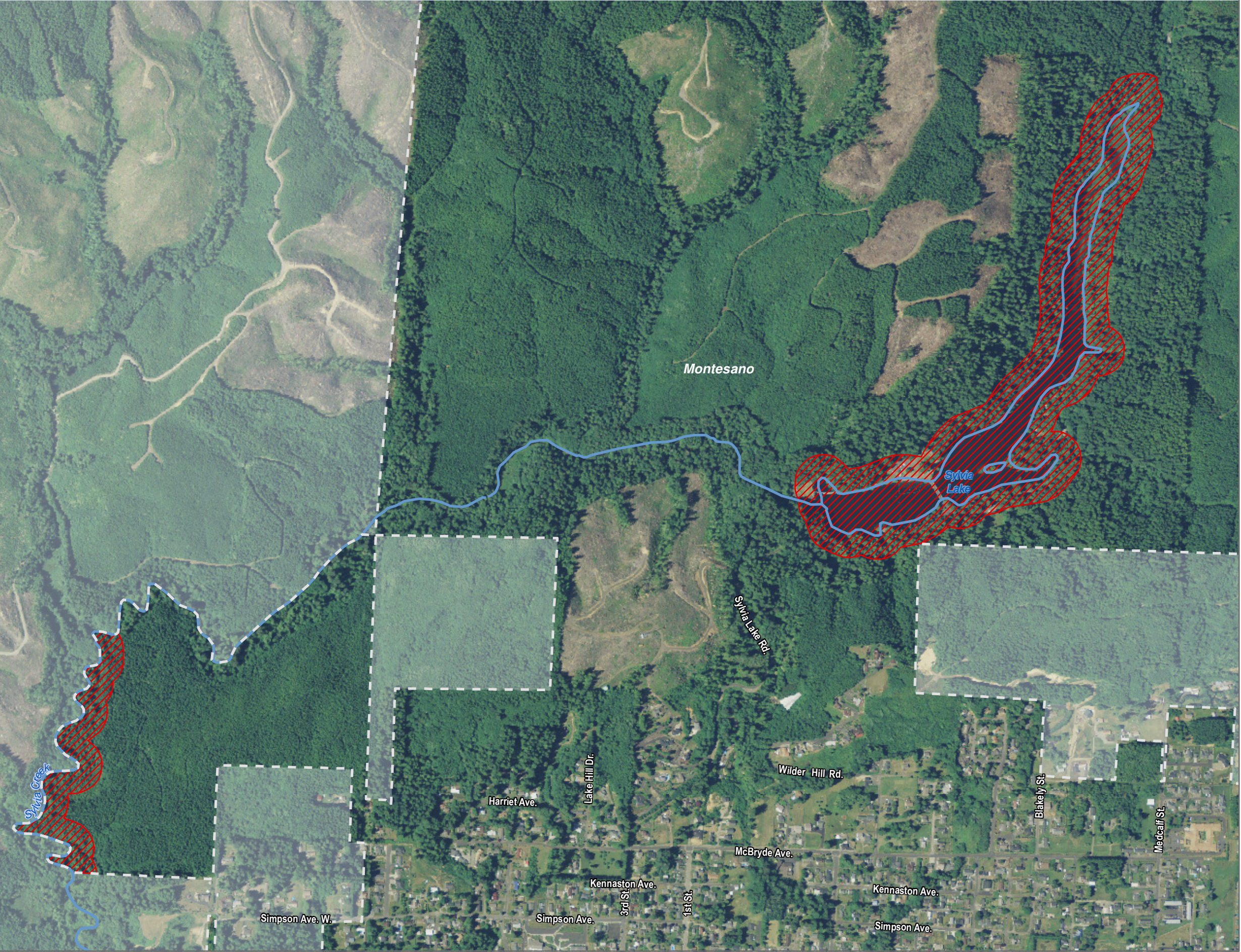






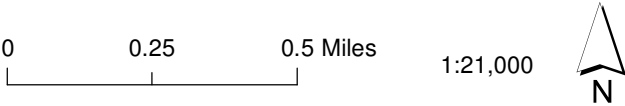


Figure 13.1: City of Montesano

Date: 9/12/2014

USGS Principal Aquifer

- Other rocks
- Pacific Northwest basin-fill aquifers
- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, USFWS NWI, FEMA, WA DNR, WSDOT, DOE, NRCS NAIP

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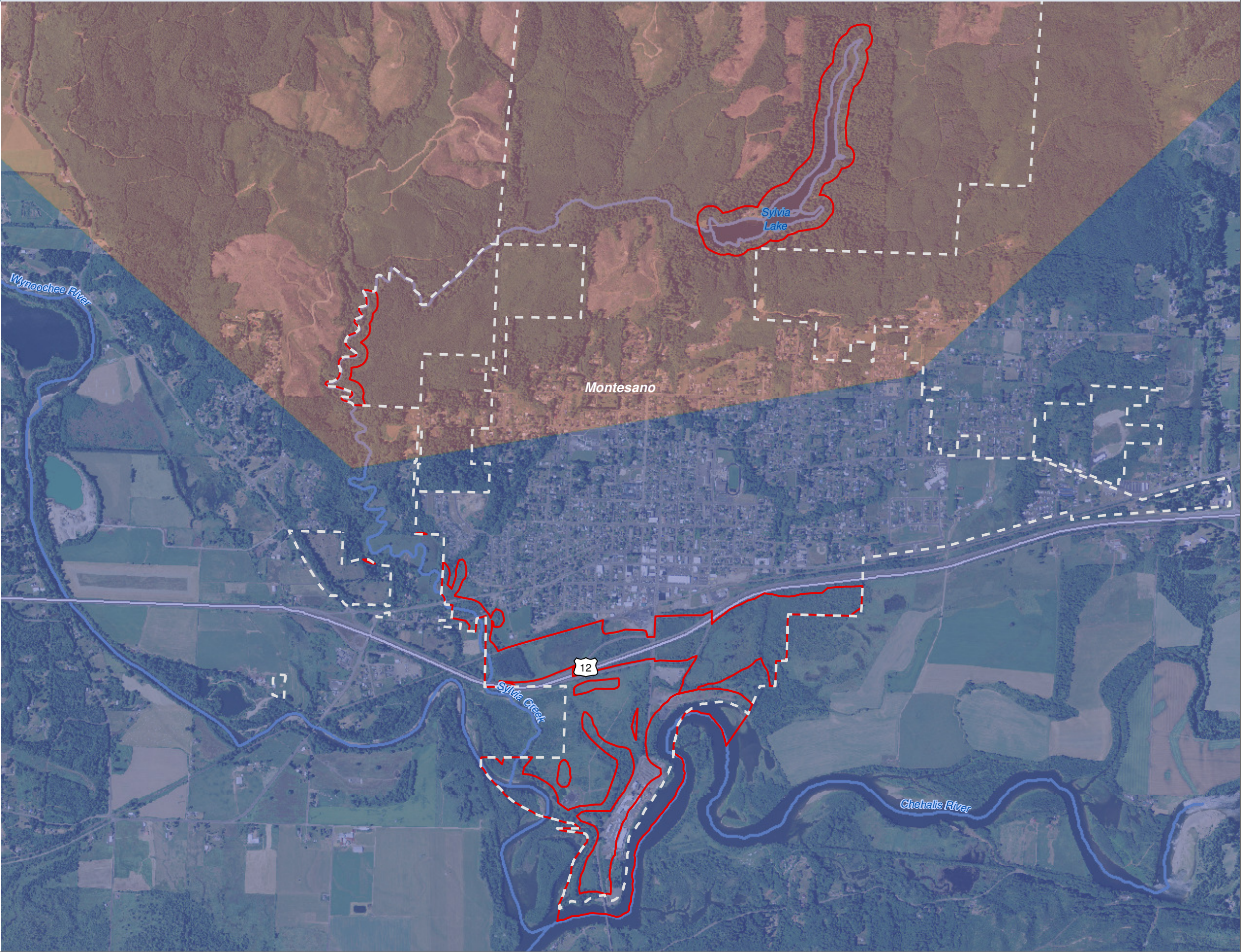






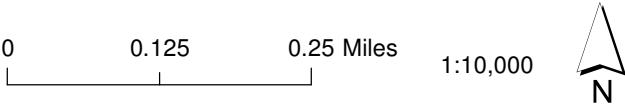


Figure 13.2: Chehalis River & Sylvia Creek

Date: 9/12/2014

USGS Principal Aquifer

- Pacific Northwest basin-fill aquifers
- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, USFWS NWI, FEMA, WA DNR, WSDOT, DOE, NRCS NAIP

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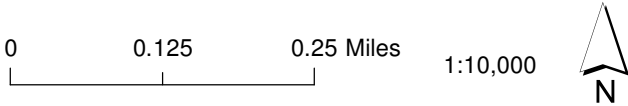


Figure 13.3: Sylvia Lake & Sylvia Creek

Date: 9/12/2014

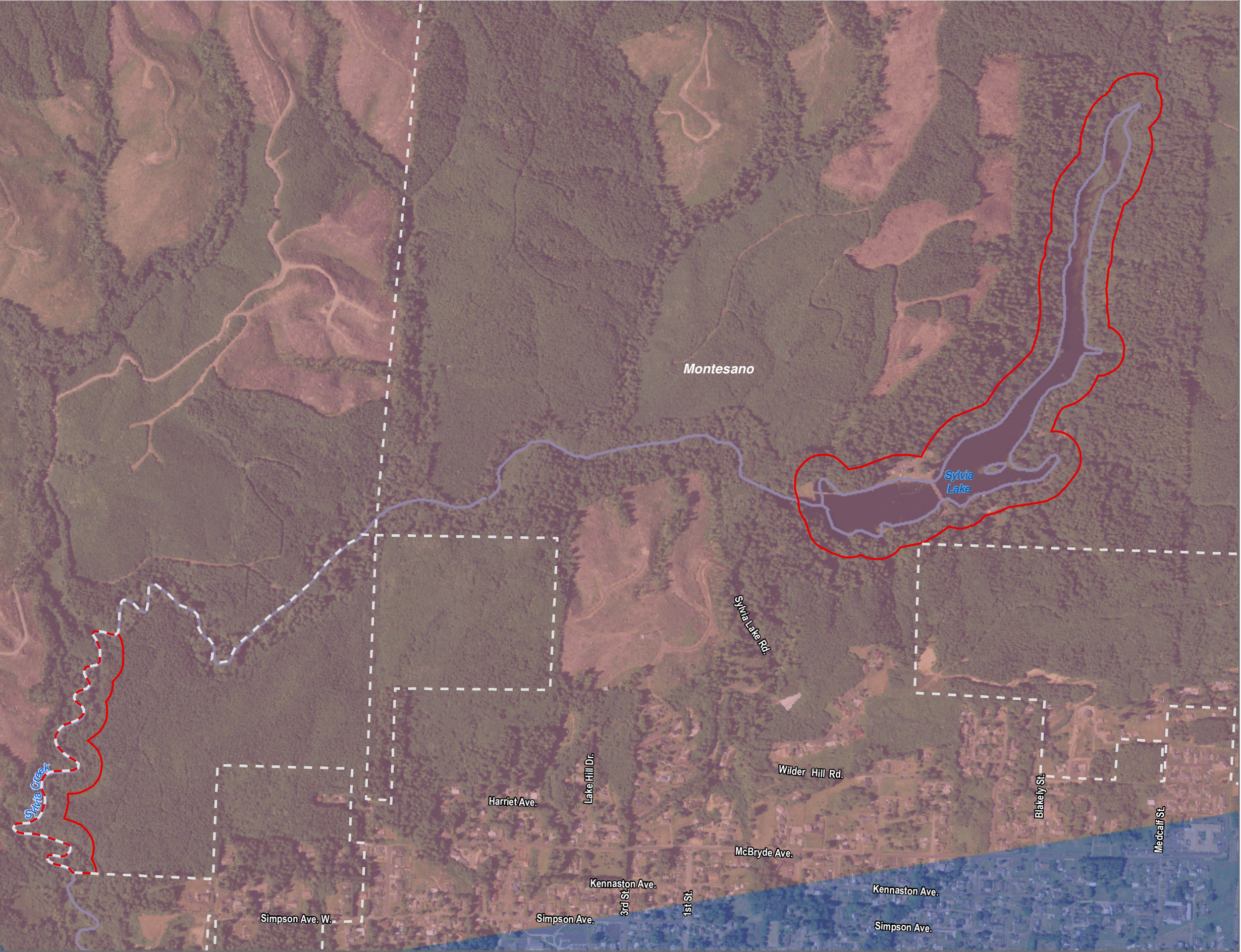
USGS Principal Aquifer

- Other rocks
- Pacific Northwest basin-fill aquifers
- Preliminary Shoreline Jurisdiction
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, USFWS NWI, FEMA, WA DNR, WSDOT, DOE, NRCS NAIP

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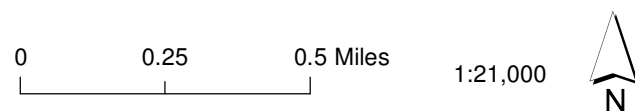
# Potential Shoreline Environment Designations

Figure 14.1: City of Montesano

Date: 10/8/2014

## Shoreline Environment Designation

-  High Intensity
-  Shoreline Residential
-  Urban Conservancy
-  Urban Conservancy or Natural
-  Parcels
-  Montesano City Boundary
-  SMA Lakes
-  SMA Rivers
-  Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)

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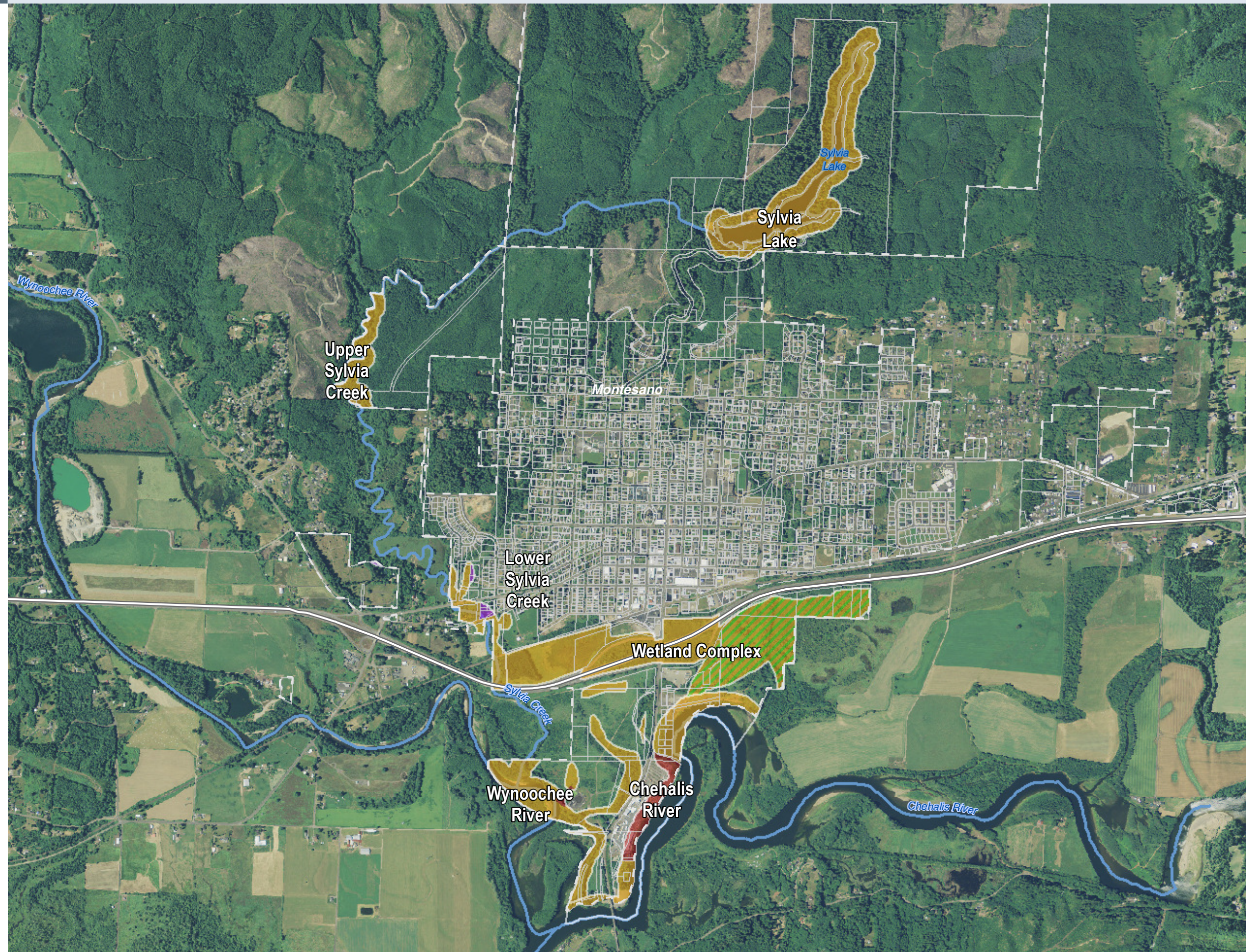






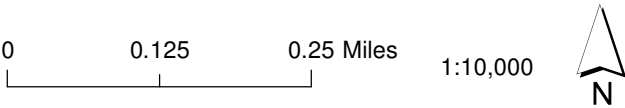


Figure 14.2: Chehalis River & Sylvia Creek

Date: 10/8/2014

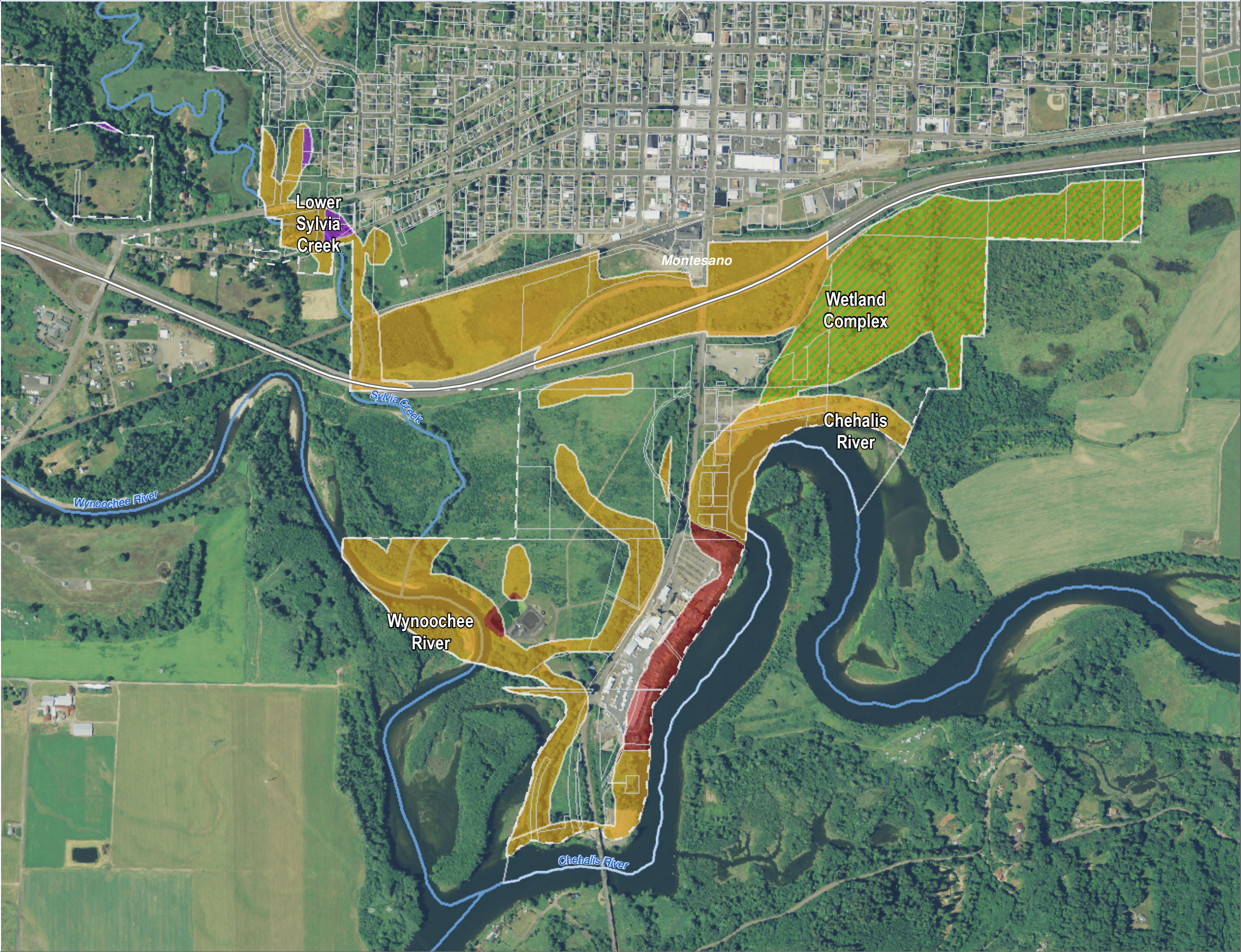
Shoreline Environment Designation

- High Intensity
- Shoreline Residential
- Urban Conservancy
- Urban Conservancy or Natural
- Parcels
- Montesano City Boundary
- SMA Lakes
- SMA Rivers
- Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)

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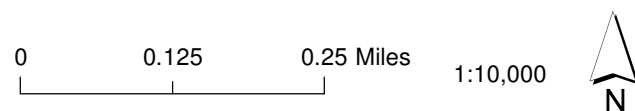
# Potential Shoreline Environment Designations

Figure 14.3: Sylvia Lake & Sylvia Creek

Date: 10/8/2014

## Shoreline Environment Designation

-  High Intensity
-  Shoreline Residential
-  Urban Conservancy
-  Urban Conservancy or Natural
-  Parcels
-  Montesano City Boundary
-  SMA Lakes
-  SMA Rivers
-  Highways



Source: Grays Harbor County, USFWS NWI (2011), FEMA Preliminary DFIRM (2013), DNR, WSDOT, Ecology, NRCS NAIP (2013)

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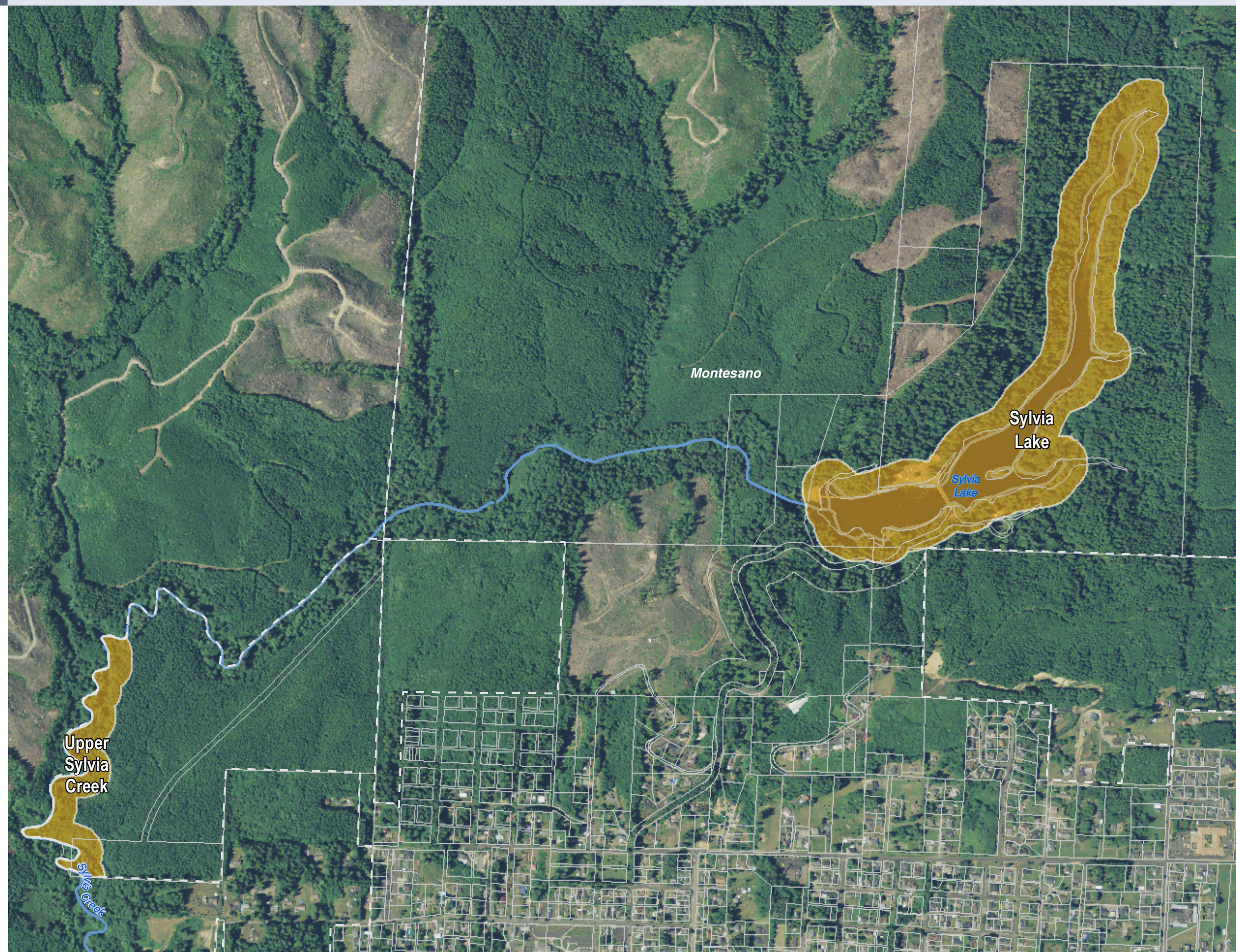
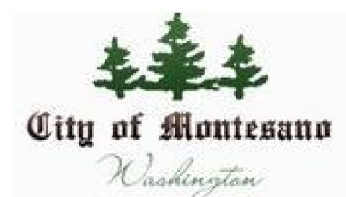




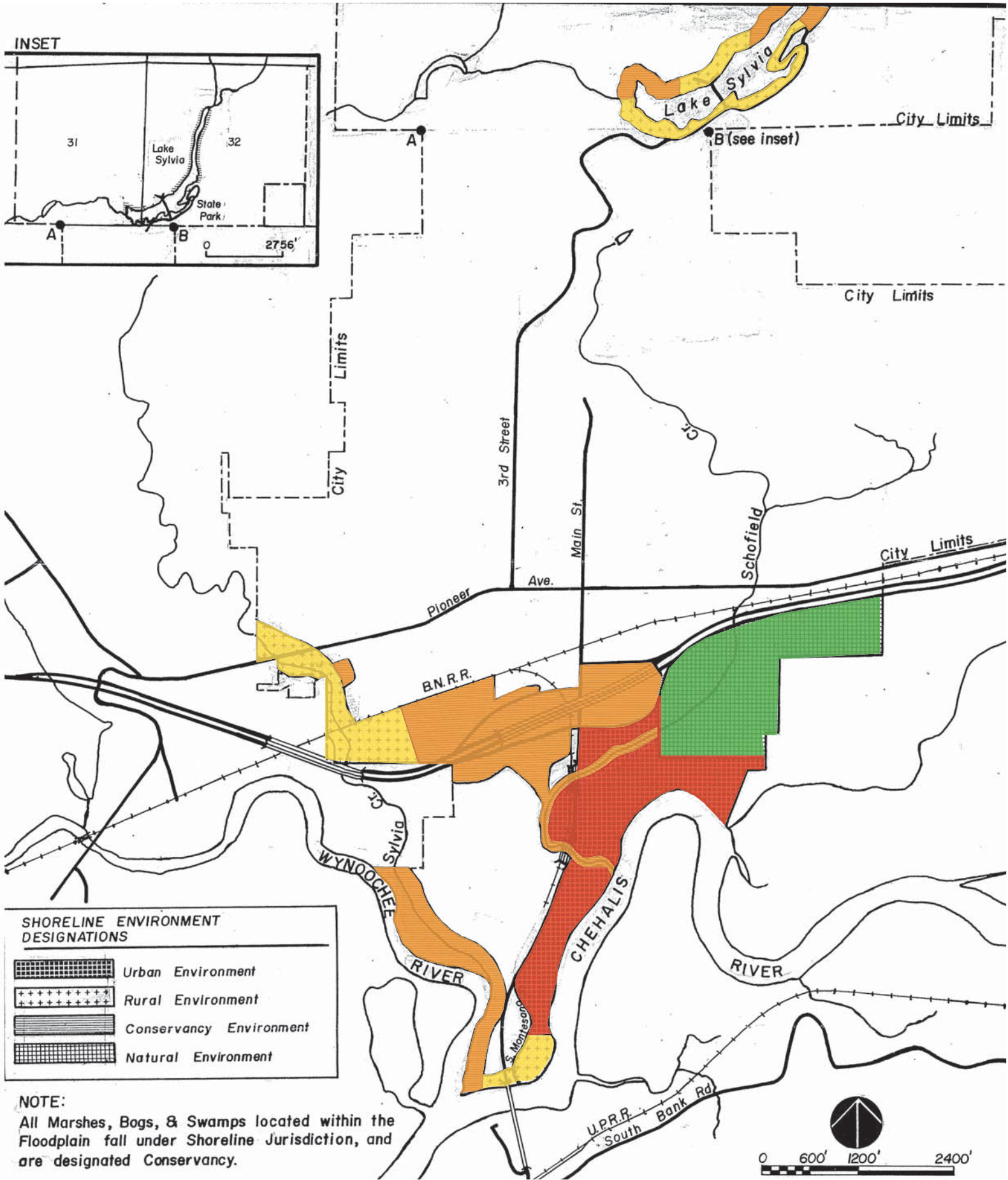


Figure 15.1: City of Montesano

Date: 9/25/2014

Shoreline Environment Designation

- Urban Environment
- Rural Environment
- Conservancy Environment
- Natural Environment



Source: City of Montesano Shoreline Master Program (1992)

Shoreline jurisdiction boundaries depicted on this map are approximate. They have not been formally delineated or surveyed and are intended for planning purposes only. Additional site-specific evaluation may be needed to confirm/verify information shown on this map.





