CITY OF SPOKANE VALLEY
SHORELINE MASTER PROGRAM UPDATE

SHORELINE INVENTORY
AND
CHARACTERIZATION REPORT
Accepted by Resolution No. 10-014

City of Spokane Valley
11707 East Sprague Ave.
Spokane Valley, WA 99206

Prepared April 4, 2010
Amended on September 7, 2010

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City of Spokane Valley
Community Development Department
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Spokane Valley, WA 99206

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LIST OF ACRONYMS

BNSF	Burlington Northern-Santa Fe
cfs	cubic feet per second
COSV	City of Spokane Valley
SRCT	Spokane River SRCT
DNR	Washington State Department of Natural Resources
DO	dissolved oxygen
Ecology	State of Washington Department of Ecology
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GIS	Geographical Information System
HED	Hydroelectric Dam
HOA	Homeowners' Association
LWD	large woody debris
MSL	mean sea level
NRCS	Natural Resources Conservation Service
OHWM	Ordinary High Water Mark
pH	Measure of acidity or alkalinity of a solution
PCBs	polychlorinated biphenyls
PFC	Proper functioning condition
PHS	Priority Habitat and Species
QAPP	Quality Assurance Project Plan
RCW	Revised Code of Washington
RHA	Riparian habitat areas
RM	River Mile
ROW	Right-of-Way
SCCD	Spokane County Conservation District
SMA	The State of Washington Shoreline Management Act
SMP	shoreline master programs
SRHD	Spokane Regional Health District
SVRP	Spokane Valley-Rathdrum Prairie
TMDL	Total Maximum Daily Load
USGS	United States Geological Survey
USTs	underground storage tanks
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDOH	Washington Department of Health
WRIA	Water Resources Inventory Area
WSDOT	Washington State Department of Transportation
WTP	Wastewater Treatment Plant

1.0 INTRODUCTION

The State of Washington Shoreline Management Act (SMA), adopted in 1972, includes guidelines, goals, and policies to protect ecological function, foster reasonable use, and maintain the public right of navigation for shorelines of the State. Shorelines of the State include marine shores, shorelines of streams with a mean annual flow greater than 20 cubic feet per second (cfs), and the shorelines of water bodies greater than 20 acres. In order to implement the SMA, local jurisdictions containing Shorelines of the State are required to prepare a Shoreline Master Program (SMP) and review and update them every seven years (RCW 90.58.080 (4). For communities in Spokane County, the SMP update is required by December 1, 2013. The next review and update will be required in 2020.

In 2003, the Washington Department of Ecology (Ecology) adopted new SMP guidelines (WAC 173-26) that outline a "comprehensive process to prepare or amend shoreline master programs" in accordance with the SMA (RCW 90.58). The State considers shorelines as among the most valuable and fragile of the state's natural resources, and their appropriate utilization, protection, restoration, and preservation is important. Many ecological functions of river and stream corridors depend both on continuity and connectivity along the length of the shoreline, and on the conditions of the surrounding lands on either side of the river channel. Environmental degradation such as loss of vegetation or alteration of runoff quality and quantity along the corridor resulting from incremental development can impair ecological functions. Improper or ineffective shoreline planning and regulation can result in shoreline areas that are inhospitable for priority fish and wildlife species and increase susceptibly to flooding, droughts, landslides, and channel changes. These conditions can threaten human health, safety, and property.

Section 8.5 of the City's July 2008 Comprehensive Plan, "Shoreline Master Program," references use of the 1975 Spokane County Shoreline Master Program as the City's interim SMP. The Comprehensive Plan states that "It is the intent of the City to prepare a shoreline master plan consistent with applicable state law (RCW 90.58) and the adopted policies in this Plan as part of the implementation of the comprehensive plan."

This inventory and characterization report is part of the City of Spokane Valley's SMP update. It establishes the baseline for "no net loss" of ecological conditions, provides supporting information for development of environmental designations, and identifies degraded areas and opportunities for protection. This information provides the background for the required Cumulative Impacts Analysis, Restoration Plan and the development of shoreline regulations.

1.1 Purpose and Goals of the Inventory & Characterization Report

This Shoreline Inventory and Characterization report meets the requirements of WAC 173-26-201 (3) (c) and (d) and generally follows the requirements of Chapter 7 – Inventory and Characterization of the draft SMP Handbook, dated August 26, 2009. The following provides a summary of the information included with this report.

Goals of the Inventory

- Summarize regional context
- Identify and map areas influencing SMA shorelines
- Identify management issues of concern
- Map shoreline physical, biological and cultural features
- Determine river study segment boundaries
- Detail indicators of ecological function by reach
- Summarize ecological functions and uses

- Summarize shoreline characterization
- Summarize and map protection/restoration opportunities

Purpose of the Characterization

- characterize ecological functions including biodiversity, native plant and animal community integrity, etc., so as to achieve a "meaningful" understanding of shoreline ecological functions;
- identify elements of natural character, shoreline habitats and ecosystems and related attributes which should not be disturbed, damaged or destroyed because they can't be restored or replicated within the time horizon of the SMP (10-12 years);
- identify opportunities for restoration of shoreline resources and ecological function;
- characterize reasonably foreseeable uses and developments in the shorelines as the basis for assessing potential cumulative impacts.

1.2 SMA Jurisdiction within the City of Spokane Valley

Shorelines of Statewide Significance and Shorelines of the State fall within the jurisdiction of the SMA. Shorelines of Statewide Significance are described in RCW 90.58.030. For rivers east of the Cascade Mountain Range crest, a Shoreline of Statewide Significance is defined as "those natural rivers or segments thereof where the mean annual flow is two hundred cubic feet per second (cfs) or more; or the portion of the rivers downstream from the first three hundred square miles of drainage area, whichever is less." The Spokane River is designated a Shoreline of Statewide Significance (WAC 173-18-360).

The SMA directs local governments to manage shoreline uses along Shorelines of Statewide Significance (Spokane River) in the following order of preference:

- Recognize and protect the statewide interest over local interest;
- Preserve the natural character of the shoreline;
- Result in long-term over short-term benefit;
- Protect the resources and ecology of the shoreline;
- Increase public access to publicly owned areas of the shorelines;
- Increase recreational opportunities for the public in the shoreline; and
- Provide for any other element deemed appropriate or necessary as defined by the SMA (RCW 90.58.020; WAC 173-26-250).

Shorelines of the State include all streams or rivers having a mean annual flow of 20 cfs or greater and waterbodies greater than 20 acres in size. Shorelines of the State within the City of Spokane Valley include the Spokane River, Shelley Lake, and the Park Road and Sullivan Road Gravel Pits. The general state policies for Shorelines of the State are to protect ecological functions while fostering reasonable utilization and maintaining the public right of navigation. The SMA provides the following policy goals:

- The utilization of shorelines for economically productive uses that are particularly dependent on shoreline location or use.
- The utilization of shorelines and the waters they encompass for public access and recreation.
- Protection and restoration of the ecological functions of shoreline natural resources.
- Protection of the public right of navigation and corollary uses of waters of the state.
- The protection and restoration of buildings and sites having historical, cultural, and educational use.
- Planning for public facilities and utilities correlated with other shoreline uses.
- Prevention and minimization of flood damages.

- Recognize and protect private property rights.
- Preferential accommodation of single family uses.
- Coordination of shoreline management with other relevant local, state, and federal programs.

Shorelines included in this analysis include the portions of the Spokane River that are located within the boundaries of the City of Spokane Valley. This includes shorelines from the eastern City boundary (River Mile [RM] 91) to the western City boundary (RM 81.5), excluding the area within the Town of Millwood (RM 82.1 to RM 83.4), which is intending to adopt Spokane County's SMP. City shorelines also include the shorelines of Shelley Lake and the shorelines within the Park Road and the Sullivan Road Gravel Pits owned by Central Premix. **Figure 1-1** shows the shorelines within the City at the time the inventory was completed (2009). Continuing gravel extraction operations are expected to increase the open water area at the Sullivan Road Pit.

The shoreline jurisdiction for the Spokane River is based on evidence of the ordinary high water mark (OHWM) determined by field observations that were used in conjunction with high quality aerial photography to digitize an approximate OHWM. The OHWM was then offset 200-feet landward to determine the City's shoreline jurisdiction. Existing GIS data layers for wetlands and critical areas were then evaluated to identify associated wetlands and to determine if the shoreline jurisdiction would be extended to include any critical areas (fish and wildlife habitat areas, frequently flooded areas, and geologically hazardous areas). Upstream of Flora Road, at approximate RM 89.1 and 89.6 the FEMA 100 year flood plain is located outside the 200 foot shoreline jurisdiction on portions of the north bank and upstream of Barker Road on the south bank. The three areas were reviewed and in part based on local knowledge of the river system and evidence of woody debris on the shore, it was decided that these areas were not frequently flooded and, so, were not included in the SMP jurisdiction.

As the shoreline jurisdiction is relative to the OHWM boundary, this SMP development effort is based on an OHWM that is considered fairly accurate but not exact. Development proposals working near the identified shoreline jurisdiction are advised to delineate and survey the OHWM for permitting purposes. The OHWM is identified by examining the bed and banks of the water along the shore to determine where action of the water has created a distinct mark upon the soil with respect to upland vegetation. The SMP boundary would then be based on the best available survey information and, so, may change from the boundaries shown herein where surveyed OHWM data is available.

The OHWM and proposed shoreline jurisdiction from the 2009 inventory for the City of Spokane Valley is included in **Appendix F, *Map Portfolio*. Table 1-1** includes physical data from the shoreline jurisdiction. Shorelines include both the open water portion of a water body and its adjacent 'shorelands'. Shorelands encompass the area 200-feet horizontally landward from the Ordinary High Water Mark (OHWM) of a Water of the State. Shorelands are areas that contain resources such as riparian vegetation and floodplains, which are important to the protection of the waterway.

The shoreline jurisdiction can extend beyond the 200-foot limit if floodways and associated wetlands are present (RCW 90.58.030(2)(f)). A recent legal decision (*Samuel's Furniture, Jaffa Holdings, and City of Ferndale vs. Ecology* (Washington Court of Appeals Division I, 105 Wn. App. at 290), has indicated that readily available Federal Emergency Management Agency (FEMA) floodways are not sufficient to define SMP jurisdiction. The shoreline jurisdiction must extend to the landward edge of associated wetlands that are defined as wetlands that physically extend into the shoreline jurisdiction, or wetlands that are functionally related to the shoreline jurisdiction through surface water connection and/or other factors such as wildlife habitat. All critical areas (as defined in the Growth Management Act (GMA)) within SMP jurisdiction shall be managed with the comprehensively updated SMP after it is approved by the Department of Ecology and becomes part of the statewide Shoreline Master Program. This was clarified

in March 2010 by the legislature in its most recent amendments to the SMA and GMA (EHB 1653, March 18, 2010).

Table 1-1
Shoreline Master Program Jurisdiction

Water	Shoreline Length[1] (miles)	Water within SMA (acres)	Shorelands within SMA (acres)	Wetlands within SMA (acres)[2]	Total Area within Shoreline Buffer (acres)
Spokane River	7.96	205	121	0	**326**
Shelley Lake	0.92	20.9	13.2	2.3	**36.4**
Park Road Pit	1.70	58	36	0	**94**
Sullivan Road Pit[3]	1.81	25	30	0	**55**

[1] Shoreline Length = linear measurement following the center of the river.
[2] Based on City GIS database and field investigations.
[3] The SMA boundary for the Sullivan Road Pit overlaps with the SMA boundary for the Spokane River. The land area provided for the Sullivan Road Pit does not include the overlap area.

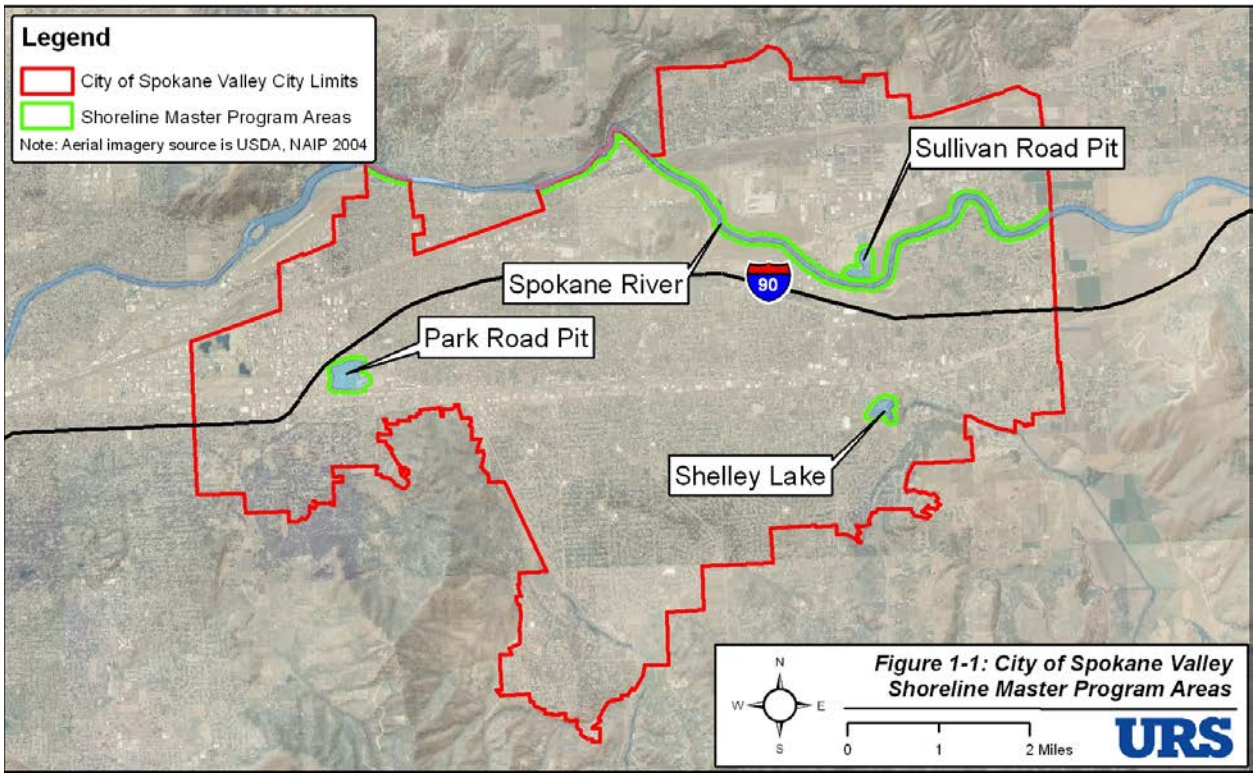


Figure 1-1: City of Spokane Valley Shoreline Master Program Areas

2.0 METHODOLOGY

URS and the City worked collaboratively to acquire relevant baseline data for the purpose of establishing an inventory of available shoreline reference material (shoreline inventory). This included geospatial/GIS data, reports, and input from local experts. In conjunction with the inventory effort, URS and City worked to determine additional data that could benefit the SMP update process (gap analysis). This resulted in a field inventory of shoreline areas under the jurisdiction of SMA. During the field inventory, existing data was verified and augmented with direct observations from an ecologist and an engineer working to document natural resources and the condition of the built environment, respectively. To augment the shoreline inventory, URS and the City requested input from a Technical Review Group (TRG) and the public. Meetings were held with TRG representatives at the beginning of the SMP update project and their input was solicited during and after the shoreline inventory effort. Public input was gathered through personal interaction during the field inventory and at an open house held at City Hall on November 5, 2009 and February 4, 2010.

The TRG is comprised of state and local agencies that have information related to the City Shorelines. The TRG committee includes the following agencies:

- Washington Department of Fish & Wildlife,
- Washington Department of Ecology,
- Washington Department of Natural Resources,
- Washington State Parks and Recreation
- City of Spokane Valley Parks Department
- Spokane County Conservation District
- Spokane County Division of Utilities/Water Resources
- Spokane Tribe
- Coeur d'Alene Tribe

The gathered information was analyzed through review of existing reports, aerial photography, and geospatial assessment using GIS software. The following description of the shoreline inventory and characterization methods is presented.

2.1 Initial Data Collection and Gap Analysis

WAC 173-26-201(3)(c) addresses the requirements of a shoreline inventory conducted for a new or amended SMP. The rule specifies that the local government collect the following information provided it is relevant and reasonably available:

- Shoreline, adjacent land use patterns, transportation and utility facilities:
  - Extent of existing structures,
  - Impervious surfaces,
  - Vegetation and shoreline modifications,
  - Water-oriented uses.
- Critical areas:
  - Wetlands,
  - Aquifer recharge areas,
  - Fish and wildlife habitat conservation areas,
  - Geologically hazardous areas.
- Frequently flooded areas.
- Degraded areas and sites with ecological restoration potential.
- Areas of special interest:

  - Priority habitats,
  - Developing or redeveloping harbors and waterfronts,
  - Previously identified toxic or hazardous material clean-up sites,
  - Dredged material disposal sites,
  - Eroding shorelines.
- Conditions and regulations in shoreland and adjacent areas that affect shorelines:
  - Surface water management,
  - Land use regulations.
- Existing and potential shoreline public access sites:
  - Public access sites,
  - Public rights-of-way,
  - Utility corridors.
- Channel migration zones and floodplains.
- Data gaps.
- Land use changes relative to cumulative impacts.
- Archaeological and historic resources.

To support the acquisition, review, and processing of the above data, URS developed a Quality Assurance Project Plan (QAPP) that outlined a process for locating and reviewing relevant data sources, determining the adequacy of previously collected data, and collecting new data.

URS was able to collect most of the data identified above via geospatial (GIS) sources, input from local agencies, input from local experts, and existing reports. After reviewing reports, base maps created from existing data, and speaking with local agencies and experts, URS identified several areas where additional fieldwork was needed. The additional fieldwork needed included a precise demarcation of the OHWM, information on the vegetation communities present, areas affected by noxious weeds, areas of high wildlife use, areas suitable for restoration or preservation, and an inventory of the built environment. A summary of the documentation reviewed and the additional fieldwork needed is included in **Appendix A** of this report.

2.2 Field Inventory

To address the identified data gaps, verify existing information, and familiarize the team with the City's shorelines, URS and the City prepared for and conducted a field inventory. This included the following steps:

- Prepare a safe work plan (URS)
- Prepare a fieldwork plan (URS)
- Create map books for use during field data collection (COSV)
- Complete field reconnaissance activities to fill data gaps (URS)
- Prepare working digital maps of field-collected data (URS & COSV)

Inventory elements not adequately addressed in existing data resources were identified for field data collection. Two teams were assigned to data collection. The first team focused on Ordinary High Water Mark (OHWM) identifiers, unique shoreline features, wetlands, riparian vegetation, upland vegetation, and shoreline habitat. The second team focused on the built environment, including eroded banks, shore protection such as bank armoring, combined sewer outfalls, shoreline infrastructure likely to require significant redevelopment, hard engineering structures affecting fluvial stream dynamics, and other

elements that may affect shoreline planning. Field data was digitized and imported into the existing project geodatabase. Digitized data met the specifications required by the City and Ecology.

2.2.1 Vegetation Survey Protocol

Existing riparian vegetation conditions are a key factor in the evaluation of proper management actions for shoreline areas. Riparian vegetation characteristics indicate what types of wildlife are likely to use the shoreline areas. These characteristics also indicate the quality of riparian corridors for the migration of wildlife through the city. Wildlife often use riparian corridors because they provide cover, food, and water. Proper documentation of the riparian vegetation was conducted to inform the SMP update but also to set a benchmark for the future evaluation of "no net loss of shoreline ecological function."

URS and Mike Folsom, PhD, a local wetland specialist and a professor of geography at Eastern Washington University, developed a vegetation monitoring protocol to quantify and classify the various types of vegetation communities, or plant associations, within the shoreline areas. The goals of the inventory were to document the dominant vegetation according to species name, percent cover, floodplain position, and native/introduced status. The Spokane River and Shelley Lake were examined on foot and from the water, but the gravel pits could not be examined in the field and are inventoried from aerial photograph examination only.

The shoreline vegetation was classified into distinct stands, each with a characteristic dominant vegetation structure and species mix (plant association). Each stand was given an identifying letter, A through W and was described on a field data sheet at a representative site or "data point." Each data point was given an identifying number. Each stand was documented with least one data point; larger stands have as many as five data points. Photographs were taken at each data point.

The stands identified in this task essentially follow the plant associations described by Crawford (2003) and elaborated as plant associations in the Spokane County PFC Assessment (2005); however the Crawford study did not include the Spokane River drainage so it does not include all of the stand types encountered in this inventory.

Three fluvial/floodplain positions were documented at each data point along the shoreline. This information was recorded to classify how much of the vegetation is frequently flooded, how much is water dependent/transitional, and how much upland is within the shoreline zone that is otherwise indistinguishable from adjacent upland areas. The three floodplain zones are described as follows:

- Zone A- the frequently flooded lower elevation nearest the water,
- Zone B- the riparian transition area, and
- Zone C- the adjacent upland.

2.3 Analysis of Collected Data

Documents and geographical information system (GIS) data were selected for review from the comprehensive list of resources that addressed specific inventory elements. A review of each significant resource was completed and relevant data was summarized in the following sections. Spatial (GIS) data was clipped by river study segment and analyzed based on relative cover within that study segment, where appropriate. For example, the amount of impervious area is characterized by study segment to highlight differences in land use patterns and potential stormwater issues along the river, Shelley Lake, and the gravel pits. This analysis generally highlighted trends specific to each study segment, which were then summarized in **Section 5**.

Data analysis included an interpretation of findings with regard to historic conditions and disturbances as well as regional processes to determine which shoreline factors are controllable at the local level and which are the result of a historic alteration or regional process that are not under local control. For example, dams are a historic alteration beyond the control of reach-specific planning. The Rathdrum

aquifer depth, flow rate, and other characteristics are also beyond the control of reach-specific planning. However, a wetland, noxious weed population, recreational access need, or wildlife habitat areas are relevant to reach-specific planning.

The combination of existing data reviewed and summarized herein, together with additional data collected through field inventory and review of historic reference materials, adequately addressed each inventory element.

3.0 REGIONAL CHARACTERIZATION

Identifying ecosystem-wide processes that affect the shoreline is part of the comprehensive process of amending a shoreline master program. WAC 176-26-201(3)(c)(i) defines the processes that must be identified and assessed to determine their relationship to ecological functions present within the SMP jurisdiction. WAC 176-26-201(3)(c)(i)(II) defines the scope of identification and assessment to be used. It states: "*This characterization of ecosystem-wide processes and the impact upon the functions of specific habitats and human health and safety objectives may be of a generalized nature*." The following elements are provided to meet the requirements of WAC 176-26-201(3)(c)(i).

3.1 Spokane Valley-Rathdrum Prairie Aquifer

All Shorelines of the State within the City of Spokane Valley are located within and influenced hydrologically by the Spokane Valley-Rathdrum Prairie (SVRP) Aquifer. From the source of the Spokane River at Lake Coeur d'Alene to its confluence with Latah Creek west of the City, there are no permanent tributaries providing input to the river system. There is considerable interaction, however, between the aquifer and the river. The aquifer begins in Idaho between Spirit Lake and the south end of Lake Pend Oreille. The aquifer flows south until it reaches the middle of the Rathdrum Prairie, where it turns west and flows through the Spokane Valley. Most of the flow turns north near the City of Spokane and flows through the Hillyard Trough discharging into the Little Spokane River.

The EPA designated the aquifer as a "Sole Source Aquifer" in 1978 meaning that it is the sole or principal source of drinking water for an area. The aquifer was the second in the nation to receive this designation, providing the framework to develop special management practices by local jurisdictions. The highly permeable gravels of the Spokane Valley make the aquifer highly susceptible to contamination from the surface and much effort has been put into developing regulations and other mechanisms to protect the area's water supply.

The Spokane River is the only watercourse over the aquifer that remains on the surface for an extended distance. This provides for interaction between the Spokane River and the SVRP aquifer. The section of the Spokane River between Lake Coeur d'Alene and Flora Road is a losing reach, discharging water to the aquifer. Between Flora Road and the Greene Street Bridge the river is a gaining reach where the aquifer discharges to the Spokane River. During the summer months, much of the water in the Spokane River downstream of Flora Road is discharged from the aquifer. It is estimated that due to the river-aquifer exchange between the Idaho-Washington border and the Sullivan Road Bridge, stream flow losses of about 100 cfs occur during low-flow conditions and about 570 cfs during high-flow conditions. Between the Trent and Greene Street Bridges, stream flow gains range from 260 cfs in November to 450 cfs in July (Gearhart 2001). These gains and losses affect stream flow, water temperature, and water quality. On an annual basis, the Spokane River accounts for 48 percent of the SVRP aquifer recharge (the Spokane Valley-Rathdrum Prairie Aquifer Atlas – 2009 Update, City of Spokane, 2009).

Shelley Lake does not appear to be a surface manifestation of the SVRP Aquifer. According to conversations with Ecology staff, the bottom of Shelley Lake is perched above the level of the aquifer. Exfiltration from the lake bottom does discharge to the aquifer.

The Park Road and the Sullivan Road gravel pits have been excavated deep enough to intersect the aquifer, extending approximately 150 feet into the aquifer. Current mining operations are closely regulated in order to avoid contamination. The DNR approved reclamation plans address potential contamination by providing for limited public access and protection through use as conservation and wildlife habitat areas when mining operations cease and the pits are reclaimed.

3.2 Spokane River

The Spokane River begins at Coeur D'Alene Lake, Idaho and flows west to Spokane where it turns north and then west to its confluence with the Columbia River. The majority of the river bed is comprised of large cobbles, boulders, and bedrock. The stream channel was formed during the Pleistocene catastrophic glacial outburst floods and has not been significantly altered because the permeable character of the surrounding landscape does not promote surface drainage (USGS 2002). The drainage basin or watershed east of Spokane is about 4,200-square miles, and includes the Coeur d'Alene, St. Joe, and St. Maries Rivers. Flows vary seasonally reaching over 25,000 cfs in the spring to less than 1,000 cfs during the summer, (USGS gauge 12422500). The highest recorded daily mean flow was 49,000 cfs and the lowest was 50 cfs. Six dams are located on the Spokane River. Post Falls Dam downstream from Coeur d'Alene Lake located in Idaho, controls Spokane River flows for approximately six months during the summer and fall when flows are less than 5,000 cfs. **Figure 3-1** shows the Spokane River drainage basin.

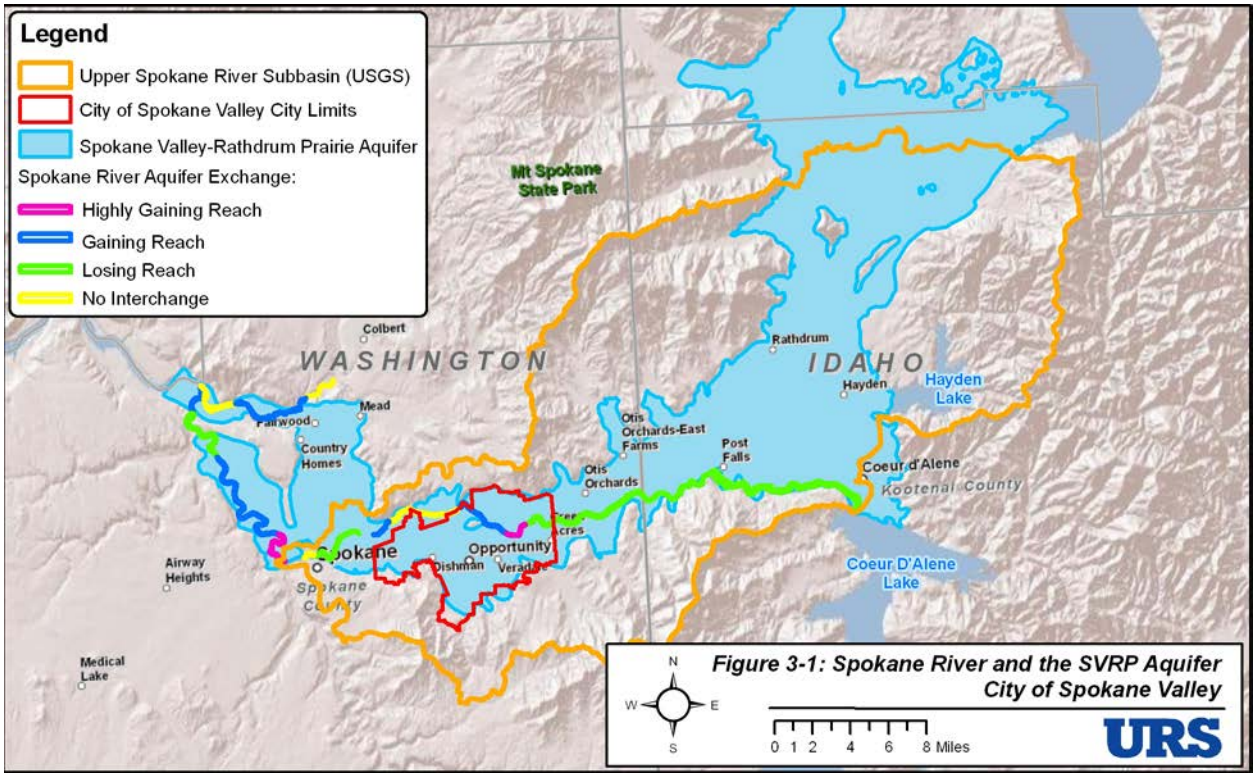


Figure 3-1: Spokane River and the SVRP Aquifer City of Spokane Valley

Table 3-1 provides meteorological data from the weather station at the Spokane Airport for the 1/1/1890 to 12/31/2005 period of record. Spokane Valley is slightly wetter and warmer than at the airport, which is located on the high plateau west of Spokane.

Table 3-1
SPOKANE WSO AIRPORT, WASHINGTON (457938)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg Max. Temp. (F)	33.0	39.1	48.2	58.2	67.0	74.3	83.9	82.7	72.4	59.2	42.9	34.7	58.0
Avg Min. Temp. (F)	21.7	25.1	30.5	36.5	43.7	50.1	55.8	54.6	46.6	37.6	29.9	24.3	38.0
Average Total Precip. (in.)	1.99	1.54	1.39	1.11	1.42	1.20	0.55	0.63	0.80	1.17	2.08	2.20	16.08

Land use within the basin includes mining in the upper reaches of the Coeur d'Alene River watershed; forest and related forestry practices along the St Joe River; agriculture and grazing activity throughout the region; and urbanization along much of the length of the Spokane River. The Spokane River has only a few tributaries. Streams that flow north or south into the Spokane Valley generally drain into the gravels that form the SVRP Sole Source Aquifer before reaching the river.

The Spokane River corridor is developed with a variety of residential, commercial, industrial, and recreational land uses. The majority of the shoreline is easily accessible and dispersed use is relatively intense due to adjacent residential development and the Spokane River Centennial Trail (SRCT). Transportation and major utility corridors are generally located away from the river but both do cross the river at a number of locations. Large areas of the shoreline are publicly owned and managed, primarily by the Washington State Parks and Recreation Commission.

According to the Spokane County Conservation District's *Proper Functioning Condition* (PFC) Assessment, prepared in 2005, the Spokane River is hydrologically stable. It is moderately to highly-entrenched, with little floodplain development. The shorelines of the Spokane River are characterized by small to medium-sized gravel banks with a few small sandy beaches. The Upper Spokane has moderate to well-vegetated river banks, containing a variety of native and non-native plant species. The PFC assessment generally rates the ecological condition of the Upper Spokane River as fair to good.

Geology and Soils

The geology of the Upper Spokane River study area is dominated by late Pleistocene glacial outburst flood gravels that comprise the Spokane Valley. The river flows in a shallow incised inner valley within the wider valley floor. These flood gravels constitute the matrix of the SVRP Aquifer.

According to the NRCS soil maps, the majority of the soils within the shoreline jurisdiction are Garrison gravelly loam and Garrison very stony loam, similar to much of the rest of the valley soils. These are gravelly, medium texture somewhat excessively drained soils with a typical topsoil depth of between 0 and 15 inches. The ability to retain water is low ranging between 0.08 to 0.16 inches per inch of soil. The NRCS rates the stony loam as difficult to establish vegetation on with a fairly easy rating for the gravelly loam. Neither soil is considered highly erosive.

Vegetation

Within the shoreland area (200 feet from the river's edge) there are generally three distinct, linear bands of vegetation. These include a thin band of frequently wetted, willow-dominated shrubs and herbs along the immediate edge of the river. Above this is generally a strip of riparian shrub or forest habitat along the river banks. The dominant riparian trees are black cottonwood and ponderosa pine. The most common riparian shrubs include willows, serviceberry, black hawthorn, and common chokecherry. Above the river banks, the riparian vegetation generally transitions to a band of upland vegetation that is not distinct from vegetation beyond the shoreland areas. Upland areas generally consist of Ponderosa pine and Douglas fir with grasses and shrubs. Upland areas include remnant patches of the historic Rathdrum prairie, which is now characterized by bluegrass, bluebunch wheatgrass, balsam root, buckwheat, and other native herbs. Much of the remnant prairie vegetation is heavily disturbed and the majority has been replaced by quackgrass, tall oatgrass, and/or spotted knapweed.

Biological Resources

All undeveloped shoreline habitat areas along the Spokane River in Spokane Valley are important to local fish and wildlife. The Spokane River and the non-developed areas adjacent to the shoreline provide open space and habitat for wildlife. Important wildlife communities found along the Spokane River include bats, neotropical birds, aquatic mammals and waterfowl according to the Washington Department of Fish and Wildlife (WDFW). Wildlife observed during the *Spokane County Proper Functioning Condition* (PFC) study (SCCD 2005) included red-winged blackbirds, mallards, common mergansers, dipper, Canada geese, mourning doves, gold finch, magpies, red-tailed hawks, coyote, and beaver activity. Residents along the river have reported seeing bald eagles, osprey, pheasant, deer, moose, rabbits, beaver, mink, river otters, and many seasonal and year-round bird populations. Many of the wildlife populations appear to be declining according to undocumented resident sightings.

The Washington Department of Fish and Wildlife publishes a Priority Habitats and Species (PHS) List. The PHS List is a catalog of habitats and species considered to be priorities for conservation and management.

Priority species require protective measure for their survival due to their population status, sensitivity to habitat alteration, and/or recreational, commercial, or tribal importance. Priority species include State Endangered, threatened, Sensitive, and Candidate species; animal aggregations (e.g., heron colonies, bat colonies) considered vulnerable; and species of recreational, commercial, or tribal importance that are vulnerable.

Priority habitats are habitat types or elements with unique or significant value to a diverse assemblage of species. A priority habitat may consist of a unique vegetation type (e.g., shrub-steppe) or dominant plant species)e.g., juniper savannah), a described successional stage (e.g., old-growth forest), or a specific habitat feature (e.g., cliffs).

There are 20 habitat types, 152 vertebrate species, 41 invertebrate species, and 10 species groups currently in the PHS List. These constitute about 17 percent of Washington's approximately 1,000 vertebrate species and a fraction of the state's invertebrate fauna.

Regionally significant PHS mapping includes a variety of terrestrial and aquatic habitats and species. In Spokane County, this includes many different amphibians, songbirds, raptors, neotropical migrants, and mammals that are dependent upon shoreline or riparian/wetland habitats. Some of these species are on the current federal and/or state threatened, endangered, and sensitive species lists.

Table 3-2: WDFW Priority Species Distribution in Spokane County

Life Form	Species
Fish	Kokanee
	Rainbow Trout/ Steelhead/ Inland Redband Trout
	Westslope Cutthroat
Amphibian	Columbia Spotted Frog
	Northern Leopard Frog
	Western Toad
Birds	American White Pelican
	Western grebe

Life Form	Species
	E WA breeding concentrations of Grebes, Cormorants
	E WA breeding: Terns
	Great Blue Heron
	Cavity-nesting ducks: Wood Duck, Barrow's Goldeneye, Common Goldeneye, Bufflehead, Hooded
	Tundra Swan
	Waterfowl Concentrations
	Bald Eagle
	Golden Eagle
	Merlin
	Northern Goshawk
	Peregrine Falcon
	Prairie Falcon
	Dusky Grouse
	Sandhill Crane
	Upland Sandpiper
	E WA breeding occurrences of: Phalaropes, Stilts and Avocets
	Yellow-billed Cuckoo
	Burrowing Owl
	Flammulated Owl
	Vaux's Swift
	Black-backed Woodpecker
	Lewis' Woodpecker
	Pileated Woodpecker
	White-headed Woodpecker
	Sage Thrasher
Mammals	Merriam's Shrew
	Preble's Shrew
	Roosting Concentrations of: Big-brown Bat, Myotis bats, Pallid Bat
	Townsend's Big-eared Bat
	White-tailed Jackrabbit
	Marten
	Wolverine
	Moose
	Northwest White-tailed Deer

Life Form	Species
	Elk
	Rocky Mountain Mule Deer
Invertebrates	Giant Columbia River Limpet
	Great Columbia River Spire Snail
	California Floater
	Silver-bordered Fritillary

The Spokane River contains fisheries and spawning areas that are important for maintaining and protecting unique or locally significant populations including interior redband trout, cutthroat trout, and mountain whitefish. Other species found in the river include, brown trout, suckers, and smallmouth bass. The smallmouth bass have reportedly entered the river system from Coeur d'Alene Lake and are considered to be damaging the cold-water salmonid fishery. Spawning areas for redband were identified in the 2003 Avista studies at Sullivan Road and the SRCT Bridge. The gaining reach of the river below Sullivan Bridge is considered critically important for the survival of salmonids in the river system.

Interior redband trout occur as both non-anadromous (resident) and anadromous (steelhead) forms (Small et al, 2007). Since the installation of dams on the Spokane River in the 1900s, the anadromous forms have been eliminated from the river system. In 2007 the Washington Department of Fish and Wildlife performed genetic DNA testing to investigate the genetic structure of the resident rainbow trout population. This study was done to determine the influence of past fish stocking efforts on the native population. The genetic inventory showed little hybridization between hatchery (coastal origin, O. m. irideus) stocks of rainbow trout and redband trout in the Spokane River drainage indicating a virtually pure population of Columbia River redband trout in the Spokane River (Small et al. 2007). However, redband trout populations have been degraded by urbanization, which has resulted in increased stream temperatures, hydraulic modifications, and lowered dissolved oxygen. Additionally, it appears that peak flows are occurring earlier in the year and combined with reduction of flows at Post Falls Dam, an increase in stranding of the redds is occurring. Poaching and predation by smallmouth bass introduced from Lake Coeur d'Alene have also reduced populations as has the hydraulic regime of the river where flows needed for spawning can be reduced at the Avista Corporation's Post Falls dam to fill Lake Coeur d'Alene. For these reasons, interior redband trout have become a focal species within the Spokane River. Avista Corporation's new FERC operating license provides for higher minimum river flows and also establishes a regime for spawning flows. Additional fishery studies are underway and it is anticipated that adaptive management techniques will be used to protect the resident fisheries. Protection of core areas critical to native stock persistence and restoration of productive habitats will be necessary to ensure the full expression of phenotypic and genotypic diversity in interior redband trout (Thurow, et. al. 2007)

The "Baseline Study to Determine the Water Quality and the Primary and Secondary Producers of the Spokane River" was published in 1984 (DOE Publication 84-e06). This study provided baseline information prior to the construction of the Liberty Lake Treatment Plant. It does not appear that any formal work was done on algae and macroinvertebrate populations since. The study indicated that macroinvertebrate populations were dominated by insects of the orders of Ephemeroptera (mayfly), Trichoptera (caddisfly), and Diptera. The report noted that species diversity was low possibly as a result of high zinc concentrations in the river.

Plant associations provide unique food and cover values for different species. The Upper Spokane River generally runs from east to west From Idaho to its confluence with Latah (Hangman) Creek. Because the south-facing river banks receive more afternoon sun, this results in different microclimates and associated

plant associations on each side of the river. Deciduous riparian communities are similar along the frequently flooded portions of both banks but, above this; the north side of the river tends to contain more dry-tolerant vegetation than the southern side. The south side of the river retains moisture somewhat better and vegetation is typically somewhat denser providing better cover for wildlife and birds. Some of the most beneficial riparian plant associations for a wide variety of fish and wildlife in the region include those containing:

- Quaking aspen (*Populus tremuloides*);
- Common chokecherry (*Prunus virginiana*);
- Common snowberry (*Symphoricarpos albus*);
- Water birch (*Betula occidentalis*);
- Various willows (*Salix* spp.);
- Douglas fir (*Pseudotsuga menziesii*);
- Black cottonwood (*Populus trichocarpa*);
- Ponderosa pine (*Pinus ponderosa*);
- Saskatoon serviceberry (*Amelanchier alnifolia*).

Adjacent to the riparian corridor is the Spokane Valley- Rathdrum Prairie, which is characterized by xeric (dry-tolerant) bunchgrass grasslands with scattered shrubs. The prairie has been almost entirely converted from native to non-native vegetation. The meeting point of the riparian and prairie vegetation communities provides unique habitat for species that use the riparian corridor for cover, nesting, or roosting and the prairie habitat for hunting/foraging. Additionally, various plants benefit from the partial shade provided along the edge of the riparian corridor, which can result in a higher diversity of plants within the upland portions of the shoreline zone relative to surrounding upland areas.

Water Quality

Water quality in the Spokane River is a result of natural influences such as the aquifer interchange as well as upstream influences such as mining and logging, point source effluents, combined sewer overflows, and stormwater inputs associated with roads and urbanization activities. The Spokane River is on the State of Washington Impaired Waters list, or Federal 303(d) list, for total polychlorinated biphenyls (PCBs) and 2,3,7,8 TCDD (dioxin). These contaminant listings are limited to portions of the river below Kaiser Aluminum and both listings are associated with accumulation in fish tissue. Additional parameters included on the 305(b) list include temperature, pH, lead, and zinc. The primary stressors affecting regional water quality include:

- Metals contamination from mining activities in the upper watershed;
- PCB contamination from industry;
- Municipal wastewater from upstream dischargers;
- Non-point source contributions including septic tank effluent and urban stormwater runoff.

The Spokane River also has issues with dissolved oxygen due to low summer flows in various reaches and excessive nutrients (phosphorus) within the river. Through collaboration with local governments, public interest groups, and NPEDS/Clean Water Act Section 401 Water Quality permit holders along the river, the Washington Department of Ecology has established a Water Quality Managed Implementation Plan for dissolved oxygen (2006). This plan concentrates on ways to reduce the amount of phosphorus concentrations in the river. The WRIA 55/57 instream flow work group is also collaborating on instream flow recommendations for the entire Spokane River. These recommendations will be based on recent studies, studies completed in 2004, and studies conducted in association with the Avista FERC re-licensing process (Ecology 2008).

<u>Metal Contamination</u>

Sediments in much of the Upper Spokane River are contaminated with metals from mining and milling activities in the Coeur d'Alene Basin. Spokane River sediments have high concentrations of arsenic (As), cadmium (Cd), copper (Cu), lead (Pb), and zinc (Zn). Metal concentrations in the river water generally increase during high spring flows (USGS 1998). Metal contamination impacts public use of the river and its shorelines. The Washington Department of Health (WDOH) and the Spokane Regional Health District (SRHD) have issued an advisory to reduce recreational exposure to shoreline sediments along portions of

the River within the study area (Barker Road and Flora Road access points) due to the presence of arsenic and lead at concentrations that pose a human health risk. The Department of Ecology (Ecology) and the U.S. Environmental Protection Agency (EPA) are involved in developing cleanup plans to establish formal public recreational access sites free of contamination. Future development of shoreline recreational access sites should be coordinated with ongoing efforts to remove or sequester contaminants so that neither public access, nor human or environmental health is compromised.

PCB Contamination

Sediments and fish tissue found within the study area contain PCBs. PCBs are a group of man-made chemicals historically used as insulating fluids or coolants and lubricants in transformers, capacitors, and other electrical equipment. They have also been used in hydraulic oils, fluorescent lights, inks, carbonless paper, and other uses. Manufacture of PCBs stopped in the U.S. in 1977 (Ecology 2005). There is currently an advisory issued by the WDOH and the SRHD to avoid consumption of fish in specific reaches of the Spokane River, including some within the City of Spokane valley due to elevated PCB levels. Ecology is in the process of cleaning up historical sources and developing a Total Maximum Daily Load (TMDL) allocation for PCBs in the Spokane River. Kaiser Aluminum at Trentwood and the Industrial Park were historical sources of PCB contamination in the river. In 2006 capping of PCB sediments behind Upriver Dam, and cleanup of contaminated sediments at Donkey Island occurred.

Municipal Wastewater

Municipal discharges from Liberty Lake, Hayden, Post Falls, and Coeur d'Alene add nutrients and other pollutants to the river. The major impact to the river at this time is the phosphorous loading coming from both point and non-point sources. Phosphorous is the limiting nutrient in the river and promotes algae growth and low dissolved oxygen. Kaiser Aluminum and Inland Empire Paper also discharge to the Spokane River.

Non-Point Sources

Non-point sources impacting water quality include lawn maintenance and septic systems. There are efforts underway to promote decreased use of lawn fertilizers in order to reduce nutrients in urban runoff. The Spokane County sewering of Spokane Valley is almost complete with the Greenacres area scheduled to be sewered in 2010 and 2011. Urbanization results in increased impervious cover, resulting in increased stormwater runoff and generation of pollutants. Within the Spokane/Rathdrum Valley, stormwater runoff is typically discharged into bio-infiltration (208) swales and drywells and has little direct impact on the river or shoreline.

Land Use, Transportation, and Utility Corridors

Land Use, Urbanization, and Population Growth

There is increasing interest in development along the shoreline and adjacent areas. Within the City, major developments recently constructed or proposed near the Spokane River include the development of residential housing upstream of the Barker Road Bridge (Riverwalk PUD); the Hanson Development and Centennial Properties land located between Flora and Sullivan Roads; Mirabeau Point; and Coyote Rocks. Other large areas along the shorelines that are undeveloped include the north bank upstream of Flora Road and almost the entire north bank downstream of Sullivan Road, including the Kaiser Aluminum property. Much of the immediate shoreline is owned by Washington State Parks with private ownership near the 200 foot shoreline boundary. Shoreline development has the potential to alter public open space, vegetation, and views, resulting in increased need for utility and transportation services and urban runoff.

Transportation and Utilities

Transportation and utility corridors are generally located away from the immediate shoreline. Exceptions to this include the AT&T communication line located in the SRCT right of way and a short segment of Union Pacific

track located on the shoreline downstream of Barker Road. Utilities and road and railroad bridges cross the river at various points within the study area.

Transportation and utility corridors intersecting the shoreline area have impacts on the shoreline during construction, operation, and maintenance. As a result of traffic, roads and bridges generate noise and pollutants and require periodic maintenance; they also result in disruption of the natural environment. In an urban setting, with appropriate design and location, roads and bridges can provide a means to limit significant adverse environmental impacts while providing needed transportation and utility functions. Utilities located in the shoreline include water, sanitary sewer, storm drains, natural gas, and electric and other transmission and distribution lines.

Recreation

The majority of the Spokane River is easily accessible. Dispersed use is relatively intense due to adjacent residential development and the SRCT. Common recreational shoreline uses include jogging/walking and sightseeing, biking, picnicking, and swimming according to the Avista Recreation Facility Inventory and User Surveys Report, April 2004. Other common uses include angling, birding, and canoeing/kayaking. During warm weather the Spokane River from Harvard Road to Plante's Ferry is heavily used for float trips. The Barker Road Bridge is one of the most used Spokane River access point for float trips. According to discussions with local anglers, angling use of the river has decreased in recent years due to a reduction in fish populations. An exception to this is angling use below Sullivan Road is still quite high during the summer when cold water species migrate to this location.

3.3 Shelley Lake

The following information has been acquired from the 2009 Saltese Flats Wetland Restoration project, the 1994 Environmental Impact Statement (EIS) for the development, the Shelley Lake Homeowners Association (HOA), SCCD, WDFW, Spokane County, Ecology, local residents familiar with the lake's history and a site visit performed by URS in September 2009. **Figure 3-2** shows the Shelley Lake area.

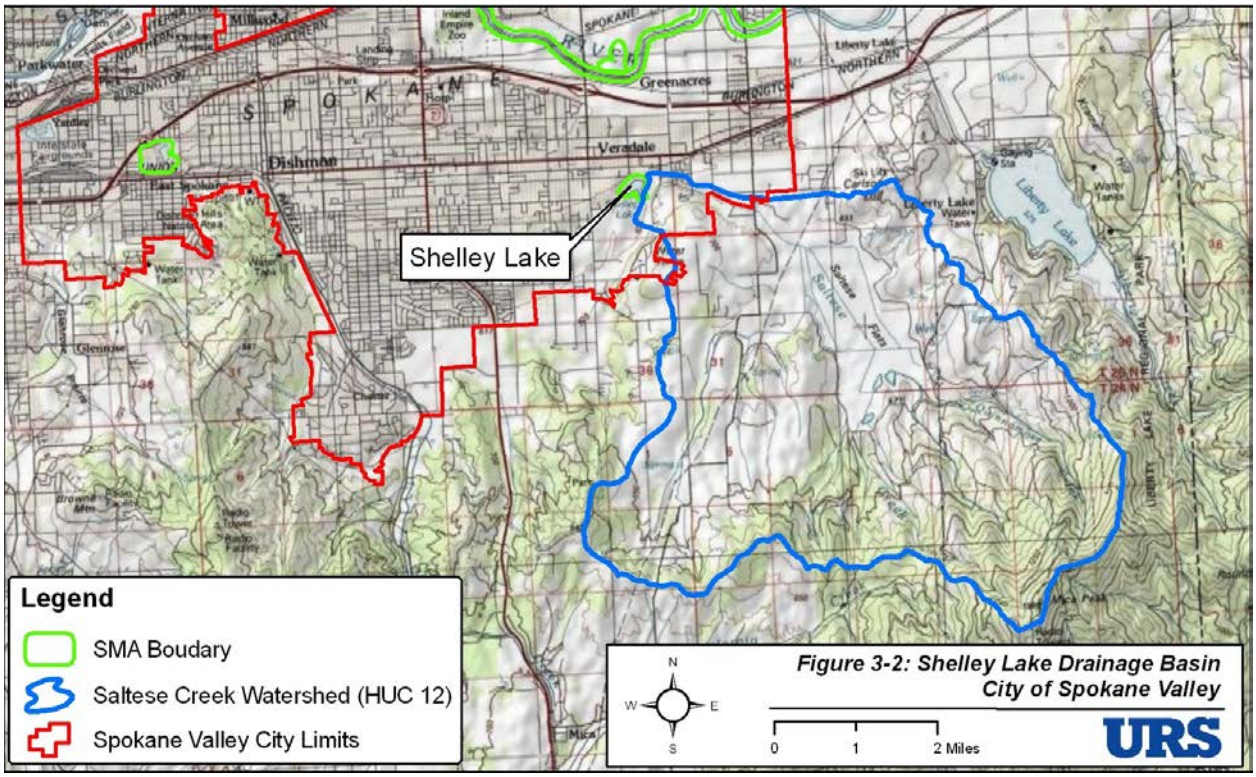


Figure 3-2: Shelley Lake Drainage Basin City of Spokane Valley

Shelley Lake is a discharge point for surface water from the Saltese Flats drainage basin. The Saltese Flats drainage basin covers approximately 14,000 acres and includes Washington's Mica Peak and Saltese Flats (PBS&J, 2009). The entire drainage basin is within Washington State. Saltese Flats includes land that functions as a wetland and also land that was historically a lake/wetland system that has been drained and used for agriculture and ranching. Recent residential land development has occurred in the Saltese area. Drainage from Saltese Flats flows to Saltese Creek and then to Shelley Lake. Shelley Lake has no outlet and water in the lake evaporates and infiltrates into the SVRP aquifer. Water flow in Saltese Creek is seasonal and Shelley Lake's water level fluctuates approximate sixteen feet through the year. In 1948, heavy rains and melting snow caused flooding in Saltese Flats and Shelley Lake. Spokane County excavated an overflow path to the Steen Road gravel pit. At that time it was reported that the gravel pit discharged the water as fast as it flowed into it (PBS&J, 2009). This diversionary drainage channel remains to route springtime flood waters into the Steen Road gravel pit. Shelley Lake water levels had, until the past few years, been maintained during the summer by pumping from an onsite well. This practice has been discontinued due to water rights issues with the well (PBS&J, 2009).

Spokane County, as part of the work being done on the Water Resource Inventory Area (WRIA)57 work, is evaluating restoration of wetlands within Saltese Flats. The primary intent of this work is to retain water in Saltese Flats and, by doing so, increase infiltration into the aquifer during the summer months. The evaluation includes using reclaimed water from the proposed Spokane County treatment plant and the Liberty Lake treatment plant to supplement the hydrological regime. Additional studies are planned, and if the county wetland restoration project is implemented Shelley Lake may have a different flow regime than it does now.

3.4 Gravel Pits

Of the many gravel pit operations located within the City, two meet the definition of a surface water area of the State, per WAC 173-20, because they contain greater than 20 acres of open water. These include the Sullivan Road and Park Road Gravel Pits. The location of these gravel pits is shown on **Figure 1-1.** These pits are isolated excavations that have exposed the SVRP aquifer in the process of excavating gravel deposits. The shorelines have been created by industry and are not the result of natural regional processes. Regional influences are a combination of economic drivers (gravel needs) and the Spokane Valley-Rathdrum Prairie geological and soil characteristics described above. Both gravel pits included in the shoreline jurisdiction have approved reclamation plans that require slope stabilization, planting of vegetation and a final use as a wildlife habitat and conservation area. As reported by the Audubon Society the gravel pits are heavily used by waterfowl.

3.5 Regional Processes, Stressors and Opportunities for Improvement

Per WAC 173-26-020-12, Ecosystem wide processes "…are the suite of naturally occurring physical and geologic processes of erosion, transport, delivery, 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." Understanding what ecosystem wide processes are at play helps shoreline planners understand how shorelines function within the context of regional forces. The following table provides a summary of regional processes, including human-induced processes, which affect the functions provided by shorelines within the City.

Table 3-3: Analysis of Ecosystem-Wide Processes

Process (Applicable Waters)	**Issues**	**Condition**	**Stressors**	**Recommendations** (General)
Erosion (Spokane River)	Sediment/gravel (bedload) transport, Impacts to infrastructure	Fair- erosion is largely diminished by HED flow controls and a stable channel form,, including natural bank armoring. Erosion is limited to specific locations. Low erosion has resulted in gravel & sediment "starved" reaches that are noted as a limiting factor affecting trout production.	High flows, HEDs, lack of gravel feeder bluffs	Bioengineering to support fluvial processes that redirect river energy away from areas where erosion could threaten public infrastructure. Plant vegetation on coarse, loose sediments on banks.
Flooding (Spokane River)	Infrastructure and property damage due to inappropriate development, water quality	Good- flooding limited by natural lake outlet and incised channel; rarely floods outside of existing channel	Channel confinement, natural episodic rain-on-snow events	Restrict development in 100-year floodplain. Increase flood storage where available to offset periodic flood damage.
Solarization & Aquifer Interchange (all waters)	Warm water temperature is a factor in the reduced survival of juvenile native trout populations. Warmer water also supports the non-native smallmouth bass that compete with the native fish in the river.	Poor in river above Sullivan Road due to low summer flows and being a "losing reach." Below Sullivan Road is a "gaining reach" and river temps are colder due to aquifer recharge. All SMP waters, including the river at the west end of town, provide unfrozen habitat for wintering waterfowl in most years.	Low flows, losing river reach to aquifer, areas of minimal riparian cover	Plant shade-producing vegetation along bare shoreline areas. Focus on southern exposures that receive more solar input. Work with Avista to ensure proper water releases during summer months
Vegetation Growth (all waters)	Habitat, visual aesthetics, thermoregulation, shoreline stabilization, nutrients, support for local plant	Good (trees and shrubs) Poor (herbs)	Non-native and invasive weeds, development, land conversion	Preserve high quality riparian forest corridors, restore forest in gaps, Increase riparian buffer width where too thin, control spread of non-native vegetation, support native vegetation restoration projects.

Process (Applicable Waters)	**Issues**	**Condition**	**Stressors**	**Recommendations** (General)
Water Quality Degradation (All waters)	Nutrient, sediment, and toxicant loading	Poor- 303(d)-listed for fecal coliform, DO, temperature, PCBs, and zinc	Mining in upper watershed, CSOs, point source pollution, non-point source pollution, stormwater	Work with regional governments to forward watershed implementation plan. Includes control of stormwater, point source pollution, and discouraging use of products that contain elements harmful to water quality.
Fish & Wildlife migration, foraging, and rearing (all waters)	In-stream habitat quality, riparian buffer quality and widths, conflicting shoreline uses. Lack of connectivity with upland areas.	Fish: Good habitat structure but poor habitat condition due to high water temperatures and low summer flows. Wildlife: generally good vegetation cover along shorelines allows east/west migration through the City.	HEDs limiting fish migration and disrupting riparian corridors, lack of LWD in streams, water quality, development, recreation	Work with Avista to maintain minimum flow in Spokane River, allow woody debris in river, also see recommendations for water quality, vegetation growth, and solarization above.
Recreation (Spokane River, Shelley Lake)	Fishing, boating, walking, biking, etc.	Fair-Good	Limited Access, HEDs, incompatible ecological goals (wildlife/fish habitat protection priorities).	Provide parking and access to specific locations along the river with high recreation use, encourage recreation that is sensitive to shoreline habitats (discourage motorboats, atvs, etc.).
Industrial development (Spokane River)	Tax revenue, employment	Fair- limited to specific industrial-zoned portions of the river	Conflicting shoreline goals and priorities (water quality, sensitive habitats, public access, etc.)	Create a reserve of water-dependent industrial-zoned land to support future growth. Place in areas with least conflict to recreation and ecological preservation/or enhancement.
Residential Development	Habitat losses including loss of open space, loss of riparian vegetation, and loss of habitat connectivity	Fair-Good: State park land generally provides a buffer between residential development and the river; however, in areas where the park land is absent, the shorelines are susceptible to habitat degradation.	Danger tree removal, private boat ramps & docks, shoreline armoring, trails, riparian impacts, & poaching	Ensure that activities authorized within shorelands evaluate direct, indirect, and cumulative impacts to riparian and instream habitat. Support WDFW's efforts to reduce poaching on the Spokane River (out of season angling, illegal use of bait/barbs, and keeping "release only" fish).

Process (Applicable Waters)	**Issues**	**Condition**	**Stressors**	**Recommendations** (General)
Instream Flows	Maintaining sufficient flow volumes to support resident fish	Poor- summertime base flows are insufficient to maintain cool water temperatures. Portions of the river dry out during the summer resulting in fish passage barriers.	HED flow controls, Attempts to maintain high water elevations during summer for recreation and lakefront development on Coeur D'Alene Lake	Participate in Instream work groups currently working to establish instream flows for the Spokane River. The west end of a long, losing reach (where river water infiltrates into the aquifer resulting in lower river volume) comes into the east end of the City. This area is a summertime fish migration barrier that should highlighted in the efforts to establish instream flows.

4.0 HISTORICAL ANALYSIS

To the extent practicable, the historic conditions of shoreline areas in Spokane Valley were researched to provide the following summary information. Historic conditions relate to several aspects of shoreline management, from protecting historic resources to establishing restoration targets.

4.1 Spokane River

Historic Flow Regime
Prior to the construction of the Post Falls hydroelectric dam (HED) in 1906 on the Spokane River, river flows were controlled by the water levels in Coeur d'Alene Lake at the natural outlet in Coeur d'Alene. Modeling done by Northwest Hydraulic Consultants Inc. in June 2003, as part of Avista's hydroelectric dam relicensing effort, provided an estimate of the historic flow regime for the Spokane River. Modeling results indicate that the effect of the Post Falls HED on river discharge is minimal during the months of December to April. However, generally between mid June and mid September the lake is held at an artificially high elevation, reducing discharge from the Post Falls HED relative to historic flow conditions. According to the simulation, this has resulted in decreasing average monthly summer river flows, measured at the Post Falls USGS gauge by approximately 1,200 cfs. According to the model regulated flows measured at Post Falls are 2040 cfs and 680 cfs while unregulated flows are 3480 cfs and 1290 cfs for July and August, respectively. In the fall, flows increase over natural conditions by approximately 1,000 cfs due to drawdown of the lake.

According to the studies done during the Avista FERC relicensing, the influence of current operations at the Post Falls HED on water quality is considered minimal. The modeling shows similar influences for the regulated and unregulated flows for temperature, dissolved oxygen, and pH. A slightly higher river temperature is attributed mainly to increased temperatures in the lake for the current HED operations. (HDR, 2005 Spokane River Hydroelectric Project – Current Operations Water Quality Report). The current operation of the dam does have an impact on fisheries, mostly attributed to reduction of river flows during spawning during low snowpack years and for in-river river recreation, where the minimum flow for boating is considered 1350 cfs.

Historic Vegetation
Current plant associations along the banks of the Spokane River are predominantly native and are likely similar to historic vegetation conditions in the shrub and tree strata, minus the increased frequency of non native woody vegetation, such as box elder (*Acer negundo*), sycamore (*Platanus occidentalis*), and black locust (*Robinia pseudo-acacia*). The herbaceous stratum is the area most affected by settlement. The majority of the native herbaceous vegetation has been converted to non native and/or invasive herbaceous vegetation in both grassland areas and beneath forest/shrub canopies.

The SVRP was presumably bunchgrass grassland during pre-settlement times, although its native vegetation is little studied and not well understood. The historic prairie is 5-15 miles wide and extends northeast from Spokane for approximately 50 miles. Nearly all of the historic prairie vegetation has been converted to agriculture, residential, or urban uses. One small remnant of native herb-rich SVRP grassland was found in 1990 during an endangered plant survey associated with a pipeline project (Taylor et al. 1990). This small remnant was used to estimate native vegetation of the SVRP by Lichthardt and Moseley (1997).

Lichthardt and Moseley (1997) characterize the native SVRP plant association as Rough fescue (*Festuca scabrella*) and Idaho fescue (*F. idahoensis*) co-dominating a community that includes a high diversity of forbs. The SVRP is similar to the Palouse Prairie of northern Idaho. The prominence of *F. scabrella* is

one of the main differences between the SVRP and the Palouse Prairie. Also, shrubs appear to have been less common in the SVRP than in the Palouse Prairie. Other characteristic plants found in the SVRP association include Koelaria (*Koelaria cristata*), sticky geranium (*Geranium viscosissimum*), and graceful cinquefoil (*Potentilla gracilis*).

Cultural Heritage and Settlement

The 57-square mile Spokane Valley is a lowland plain that contains many cultural and historic sites. The aboriginal territory of the Upper Spokane and the Coeur d'Alene tribes included the Spokane River within the City of Spokane Valley. Tribal culture was deeply rooted in the river as it provided a bountiful source of food. The Spokane River once teemed with salmon and other native fish, while the riparian areas provided game, berries, and edible plants.

The history of pioneer settlement in the Spokane Valley predates that of the City of Spokane. The first permanent settler in the Spokane Valley was Antoine Plante in 1849. The French Canadian trapper maintained a Hudson's Bay Company trading post near the Spokane River at what is now known as Plante's Ferry.

The United States government commissioned Captain John Mullan to survey and construct a road in 1859. The Mullan Road was the most important road along the Spokane Valley shorelines providing access across the River at Plante's Ferry and then later at the community of Spokane Bridge, located near the Idaho State line. There is reference to Schneblys Bridge constructed in 1867 across the river that appears to have been located immediately downstream of the current Sullivan Road Bridge at the Daschenboeb cabin. Both are listed on the National Register of Historic Places.

The Northern Pacific Railroad began laying tracks through the Spokane Valley in 1881. The first railroad bridge across the river near Trent was constructed in 1890. Remnants of the foundation remain.

The International Portland Cement Company constructed the cement plant across from Plante's Ferry in 1910. According to the documentation, the cement plant covered much of the area with cement dust when in operation. The plant was shut down in the early 1970s.

The agricultural history of Spokane Valley began in 1895 with the first attempts to supply irrigation from the nearby lakes. In 1899, the Spokane Valley Land and Water Company built a canal from Liberty Lake to irrigate the Greenacres area with water from Liberty Lake. The Spokane Canal company built a canal in 1905 to irrigate Otis Orchards with water from Newman Lake. Sometime between 1910 and 1925 the Spokane Valley Irrigation District constructed a canal to divert water from the river for irrigation near the state line. The Modern Irrigation and Land Company was the first to utilize the aquifer to irrigate the township of Opportunity in 1905. Within 20 years 30,000 acres of dry land had been converted to farmland. The population of the Spokane Valley increased from 1,000 in 1900 to nearly 10,000 in 1922 due to the availability of irrigated land.

The Spokane Valley was chosen in 1942 as a site for an inland naval supply depot. The Naval Supply Depot opened in 1944 and is now the Spokane Industrial Park. The U.S. government also constructed an aluminum plant in Spokane Valley to support the war effort. The Trentwood Aluminum Rolling Mill opened in 1942 with 450 employees. The aluminum plant facilities included a pump station to provide river water for cooling, a wastewater treatment facility, and a river discharge.

In the 1920s, Inland Empire Paper Company acquired most of the land along the river corridor from the Argonne Bridge to the Idaho state line. In 1979, Spokane County Parks proposed a bicycle/pedestrian pathway along the river. This idea was nurtured by the Parks and Recreation Committee of the Spokane Valley Chamber of Commerce in 1984 as they explored recreational opportunities along the river. In 1986, they proposed a 10-1/2 mile trail to be built in conjunction with the Washington Centennial in

1989. The Washington State Parks and Recreation Commission traded other Spokane County land holdings to Inland Empire Paper for their valley riverfront property. The Spokane River Centennial Trail (SRCT) was constructed on part of these properties.

A review of the historic documentation indicates that shoreline use of the Spokane River did not play a large role in the development of the Spokane Valley. Transportation and utility systems did not need to follow the river corridor. Early land development is generally associated with irrigation from surrounding lakes and from the Spokane Valley Farms Canal that diverted water from the Spokane River at Post Falls, and later with pumping from the Spokane-Rathdrum Aquifer. Wastewater from residential developments were typically treated and disposed of by individual septic systems. Within the City of Spokane Valley limits the Industrial Park and Kaiser Aluminum discharged wastewater to the river starting in the 1940's. Wastewater from the Industrial Park is now conveyed to Spokane's wastewater treatment plant.

Historic Shoreline Alterations

The most significant affect on the Spokane River's flow regime was the construction of six hydroelectric dams (HEDs). The HEDs have had an effect on historical fish migration. The most upstream of the six dams is the Post Falls HED (River Mile [RM] 102). This HED is located in Idaho approximately nine miles downstream of the Spokane River source at Coeur d'Alene Lake. Downstream from the City of Spokane Valley is the City of Spokane's Upriver HED located at RM 80.2. Following this are Avista's Upper Falls HED (RM 74.2), Monroe Street HED (RM 74), Nine Mile HED (RM 58), and Long Lake HED (RM 34). The City of Spokane Valley is most affected by the Post Falls HED, which regulates flow into the City, and the Upriver HED, which creates slack water at the City's west end, in the Orchard Avenue area.

The shorelines have also been altered by several bridge crossings, parks development, and industrial, residential, and commercial developments. Much of this development is outside of the immediate shoreline area but has altered the prairie adjacent to the shoreline. Bridges in the City include, from east to west, the Barker Road Bridge, Sullivan Road Bridge, the Union Pacific and the Burlington Northern railroad bridges, and Trent Avenue Bridge. Kaiser Aluminum has a water right for process water and a discharge under an NPDES permit.

One of the larger recent impacts to the shoreline is the SRCT, providing a continuous paved recreation corridor through most of the City east of Millwood. The trail was constructed along existing primitive roads where they existed and through areas of relatively untouched upland and riparian vegetation where there were no roads. Approximately 30 acres of intact native plant associations, including intact patches of native Rathdrum Prairie were lost in the Spokane Valley for the construction of the trail. The SRCT has increased recreational activities along the shoreline but has introduced noxious weeds and areas of shoreline erosion. Downstream of Barker Road portions of the trail have been damaged by high water and have required shoreline alterations to minimize damage to the trail during high water events. Trail maintenance includes activities associated with shoreline erosion, occasional asphalt patching, and use of herbicides for weed control.

Residential development has had an impact within the shoreline jurisdiction but only a fairly minor impact on the immediate shorelines, with the exception of the shoreline area west of Millwood. In this area the shoreline has been almost completely converted to residential landscaping, including docks and concrete bulkheads at the shoreline for some properties. Commercial development has mostly affected the shoreline areas near the Spokane Valley Mall with the construction of stormwater treatment basins within the shoreline jurisdiction just south of SRCT.

4.2 Shelley Lake

Shelley Lake is named for John Francis Shelley, who homesteaded the area in 1881. In the late 1950's the Rice family purchased a portion of the property, including the lake. The property was used for cattle grazing and a meat packing operation. According to the 1994 EIS most of the native vegetation near the lake had been destroyed by cattle grazing and the water quality in the lake was poor. When the Rice family owned the lake ice skating and miniature hydroplane races occurred. The property was sold for residential development and in the 1990's the 1st Addition of Shelley Lake Estates, a single family residential development, was constructed. The 5th Addition is currently being constructed.

Historic modifications made to the shorelines are difficult to determine since there is little information available on historical shoreline conditions. A 1914 photo contained in the History of the Spokane Valley by Florence Boutwell, 2003 shows a few buildings near the lake with very little shoreline vegetation. Recent modifications include residential development, the asphalt paved trail around the perimeter of the lake, and the culvert crossing for the trail at the inlet end of the lake. In addition to the shoreline modifications along the lake, a gravel access road and related fill material have been constructed along the west side of a wetland area around Saltese Creek near the confluence of the creek and the lake. The Shelley Lake HOA has been working to establish native vegetation around the perimeter of the lake with mixed success.

High lake levels are controlled by a constructed channel located upstream of the lake that directs excess flows to the Steen Road pit.

4.3 Park Road and Sullivan Road Gravel Pits

The Garrison series of soils that underlay the Spokane Valley are ideal for sand and gravel mining. There are a number of gravel pits in the Spokane Valley, some of which have reached the end of their extraction life. The Park Road and the Sullivan Road pits have both grown in area to the point of exceeding 20 acres and are now under SMP jurisdiction. Both gravel pits are currently owned by Central Pre-Mix. Much of the information contained in this section was provided by the mine operator permit application, reclamation/closure plan, and conversations with Central Pre-Mix.

The exposure of the SVRP aquifer by mining activities brought the gravel pits under the jurisdiction of the Spokane County Shoreline Program's "Shoreline Management Act of 1971." This required that a substantial development and conditional use permit be obtained. Conditions of this permit require a Hydraulic Project Approval permit and a water quality standards modification permit. It also binds the owner to preservation of archaeological sites, and enforces the reclamation plan. Initially the pits were supposed to be backfilled with clean fill. In 1989 Ecology prohibited backfilling with anything other than clean and natural material. This led to a revision of reclamation plans. The reclamation plans now leave the pits as lakes and provides for plantings and irrigation to provide areas for wildlife and bird habitat. Based on information from the local chapter of the Audubon Society the vacated gravel pits provide superb habitat for a variety of water fowl.

5.0 LOCAL CHARACTERIZATION

This section provides a detailed characterization of the land use, physical, biological, and ecological shoreline characteristics within the City. The primary sources of information for the following characterization include the S*pokane County Proper Functioning Condition Stream Inventory & Assessment Report* (SCCD 2005), Avista HED relicensing studies, direct observation by URS, consultation with state resource agencies, and input from the Technical Review Group.

5.1 Spokane River

Detailed analysis was conducted for four separate study segments along the Spokane River through the City. However, the following information is relative to all portions of the Spokane River:

Rare Plants

The Washington Natural Heritage Program, which tracks the location and status of rare plants, has no current rare plant records within the City's shoreline areas. This was confirmed by a rare plant survey that was conducted through the City's shoreline areas in 2003 for the Avista Dam Relicensing studies, which found no rare plants documented in the City (Parametrix 2003a).

Fish

No federally-listed Threatened or Endangered fish species are present within the Spokane River. However, Red-band trout are a Washington State Priority Species (WDFW 2010) listed within the river system. The location of trout spawning areas (redds) varies by river reach but, in general trout spawn in clean, small to medium gravels at river margins and riffle crests. The Spokane River contains the following fish species: Rainbow trout, brown trout, cutthroat trout, northern pikeminnow, mountain whitefish, small-mouth bass, and large-scale sucker fish, Redside shiner, and sculpin species (SCCD 2005, Parametrix 2003b). The river channel is characterized by diverse channel morphology and different fish species exploit different habitats. Temperature and dissolved oxygen also strongly affect the distribution of different species in the river. Of local importance is the fact that the majority of redband trout captured during a stock status of redband trout in the upper Spokane River were found in the lower 5 km of the study area, which spanned from Idaho to Plante's Ferry Park. This is attributed to the cold water thermal refugia available within the City, generally west of Flora Road.

Priority Habitats & Species

Within the City, the entire Spokane River and adjacent riparian corridor are classified as "Riparian Habitat Area." See **Section 3.2, Biological Resources** for further information regarding the Priority Habitats & Species database.

Critical Areas

Within the City, the entire Spokane River corridor contains the following critical areas:

- Fish habitat conservation area (within OHWM of river)
- Riparian habitat areas (areas within up to 250 feet from the OHWM)
- Critical aquifer recharge area (entire river segment)
- Special flood hazard area (100-year floodplain)

Soils

The Garrison soil series is the dominant soil type throughout the river's shorelines within the City of Spokane Valley. This association occurs on both sides of the Spokane River throughout the City. The topography is nearly level to gently sloping. The Garrison soils are nearly black, are gravelly and medium textured, and are somewhat excessively drained. Garrison soil phases within the City include: Garrison very stony loam (0 to 20% slopes), and Garrison gravelly loam (0 to 5% slopes). Garrison very stony loam is reported by the NRCS as not being a good soil to establish vegetation in.

A portion of this river also contains the Riverwash soil series. This soil type is found in low-lying terraces along perennial and intermittent streams. It consists of gravel, cobbles, and stones with very little fines. Riverwash provides stream substrate and functions to limit channel migration.

Cultural/Historic Resources

The Washington State Department of Archaeology and Historic Preservation (DAHP) maintains a state-wide database of previously-recorded cultural resource sites, historic register properties, and completed inventories. The locations of the cultural resource sites (e.g., archaeological sites) are managed as restricted access information. The locations of historic register properties (e.g., buildings and structures listed on the state or national register) are non-restricted information.

A records search was conducted at Olympia in July 2009, and updated via the online DAHP Washington Information System for Architectural and Archaeological Records Data (WISAARD) database, in November 2009. This restricted-access, searchable GIS database depicts locations of: previously-recorded archaeological sites, cultural resource surveys conducted after 1995, historic register properties, and cemeteries.

Recorded sites are noted throughout the Spokane River Corridor within the City. The greatest density of recorded sites is located between the Sullivan Bridge and the SRCT Bridge in SR-2 and SR-3. However, the entire river corridor is considered to have a high probability for the presence of historic and cultural resources.

Sediment Transport

In part due to the Post Falls HED, the lack of tributaries, and the gravelly soils, the river is sediment starved east of the Trent Street Bridge. Sedimentation is reliant on active bank erosion, which is minor within the City due to the gravelly soils which provide a degree of natural armoring. West of the Trent Street Bridge the flow rate is greatly reduced by the hydraulic impoundment of the Upriver Dam, located just west of the City. Sediment carried downstream by rapid flows begins to settle out near the Trent Street Bridge. The river bed near the west end of the City is covered with a layer of fines that will continue to accrete.

Vegetation and Wildlife

Natural areas and north/south-oriented wildlife migration corridors including Beacon Hill, Plante's Ferry, and Antoine Peak exist east and west of the City. These areas provide some connection to the river for wildlife that resides to the north. Due to urbanization of the valley it has become more difficult for wildlife to move between natural areas. Within the City, migration corridors occur primarily west and east along the vegetated riparian corridor of the Spokane River. In conversations with WDFW, enhancement of the riparian corridor was noted as the best way to improve the ecological baseline. Improvement to the vegetated river corridor would provide cover and food for wildlife.

URS and Mike Folsom, an independent consulting ecologist and professor at Eastern Washington University, conducted a detailed inventory of the existing plant associations within the City's shoreline areas to augment the near-shore work done by SCCD in 2005. **Table 5-1** identifies the relationship of the observed plant associations with the fish and wildlife that use them. This table is referenced in the following subsections of this chapter to indicate potential wildlife use within the shoreline study areas.

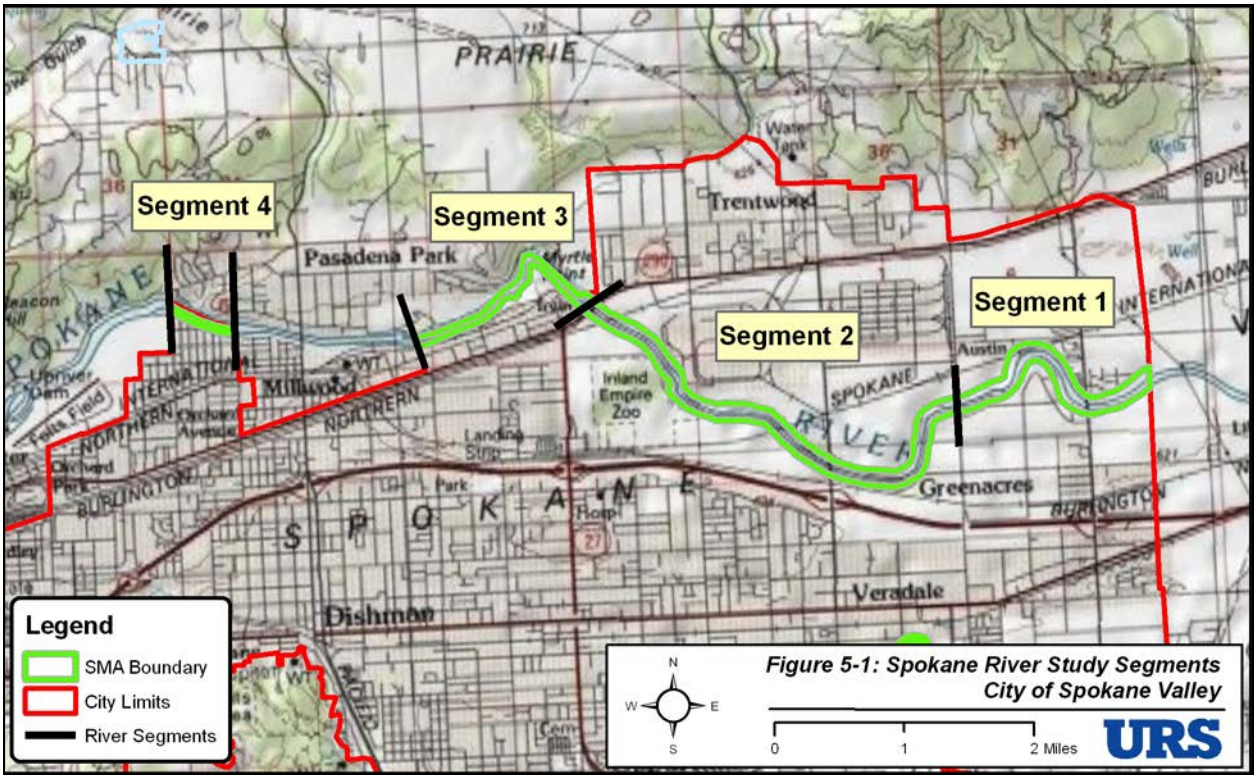
Table 5-1 Plant Association Use Analysis

Plant Association Abbreviation	Plant Association	Wildlife Use Analysis
• PIPO/AMAL • PIPO/CRDO • PIPO/SAEX • PIPO/JUOC	• Ponderosa pine/serviceberry (*Pinus ponderosa/Amalanchier alnifolia)* • Ponderosa pine/black hawthorn (*P. ponderosa/ Crataegus douglasii*) • Ponderosa pine/coyote willow (*P. ponderosa/ Salix exigua*) • Ponderosa pine/ western juniper (*P. ponderosa /Juniperus occidentalis*.)	• Fair food value for ungulates, good food value for upland birds and small mammals • Fair-good cover value for all fish and wildlife • Good shade potential, good shoreline stabilization, good source material for in-stream wood. • Important habitat for upland birds
• POBA/PRVI • POBA/CRDO • POBA/PREM	• Black cottonwood/common chokecherry (*Populus balsamifera/Prunus virginiana*) • Black cottonwood/black hawthorn (*P. balsamifera/ C. douglasii*) • Black cottonwood/bitter cherry (*P. balsamifer/P. emarginata*)	• Poor-fair food value for ungulates, good food value for upland birds and small mammals, • Good cover value for all fish and wildlife, • Good shade potential, good shoreline stabilization, good source material for in-stream wood. • Strong invertebrate production; supports fisheries
• POBA/Salix • POBA	• Black cottonwood/ willows (*P. balsamifera/Salix* spp.) • Black cottonwood (no understory)	• Poor food value for ungulates and waterfowl, good food value for upland birds and small mammals, • Fair-good cover value for all fish and wildlife • Good shade potential, good shoreline stabilization, good source material for in-stream wood.
Non-Native Grassland	Non-native grassland with scattered serviceberry and black hawthore. Dominant grasses are tall oatgrass (*Arrhenatherum elatius)* and/or quackrass (*Agropyron repens)*	• Poor-fair food value for ungulates, fair food value for neotropical songbirds, good food value for raptors, no food value for fish or waterfowl • Poor to no cover value for fish and macrofauna • Fair cover value for neotropical songbirds and small mammals • Good shoreline stabilization

Plant Association Abbreviation	Plant Association	Wildlife Use Analysis
Native bunchgrass prairie	Bluebunch wheatgrass (*Pseudoroegneria spicata*) and fescue (*Festuca* sp.) with balsamroot (Balsamorhizza sp.) and buckwheat (Eriogonum sp.)	• Poor-fair food value for native ungulates, fair food value for neotropical songbirds, good food value for raptors, no food value for fish or waterfowl • Poor to no cover value for fish and macrofauna • Fair cover value for neotropical songbirds and small mammals • Good shoreline stabilization • Remnant habitat important for protecting local heterogeneity in herbaceous stratum, which may have value to various bird species.
SAEX	Coyote Willow (*Salix exigua*)	• Fair food value for native ungulates, good food value for upland birds and small mammals, fair food value for waterfowl • Fair to good cover value for ungulates, good cover value for upland birds, waterfowl, and small mammals • Good shoreline stabilization and buffer against erosive hydraulic forces • Moderate shade potential
• PHLE/RHGL • CRDO-AMAL-PHMA	Mock orange-smooth sumac (*Philadelphus Lewisii/ Rhus glabra*) Black hawthorne, serviceberry, mallow nin-bark (Crataegus douglasii/A. alnifolia/Physocarpus malvaceus)	• Not reported in literature but likely to provide fair to good food value and fair to good cover value for ungulates, small mammals, and upland birds • Likely to provide poor to fair cover and food values for waterfowl and fish • These shrub habitats correlate with areas of notably high songbird use during field surveys. The Audubon society noted these habitats as "high value bird habitat." *Note: Estimates based on values for similar shrub species in Kovalchik, 2004.*
PSME/PREM	Douglas fir/bitter cherry (*Pseudotsuga menziesii/Prunus emarginata*)	• Good food value for upland game birds, fair food value for native ungulates and small mammals, and poor food value for waterfowl and small nongame birds. • Good cover value for ungulates, upland birds, and mammals • Poor cover value for waterfowl • Good shade potential, good shoreline stabilization, good source material for in-stream wood.

Spokane River Study Segments

The Spokane River was divided into four distinct study segments based on unique factors including surrounding land uses, ecological characteristics, aquifer characteristics (gaining vs. losing), hydraulics, and substrate characteristics. The unique characteristics within each study area provide the basis for assigning environmental designations that are used for planning purposes. **Figure 5-1** below provides an overview of the four river segments. River segment 1 is contains primarily residential land uses and the river recharges the aquifer in this segment resulting in low summer flows, warmer water, and relatively rapid streamflow. River segment 2 contains commercial and primarily industrial land uses. At the confluence of Segments 1 and 2 the river becomes a gaining reach as the aquifer begins to flow back into the river resulting in deeper and cooler water. River segment 3 contains rapidly developing shoreline areas and open space. Stream flow becomes slower and deeper in Segment 3. River segment 4 is completely developed residential area. The river is a slow, deep slack water in this segment due to the Upriver HED.



5.1.1 Spokane River Study Segment 1- Eastern City Limits to Flora Road

Spokane River Study Segment 1 (SR-1) includes both sides of the River between the eastern city limits (RM 91.0) and Flora Road (RM 89.1) to the west. Segment 1 is approximately 1.9 miles long and includes a total area of 88.4 acres of shoreland area within the SMP jurisdiction. This portion of the river is characterized by low to medium density residential land uses, a losing aquifer, and relatively fast, shallow river flows. The stream bed is primarily composed of cobble and large gravels in long riffles with few pools.

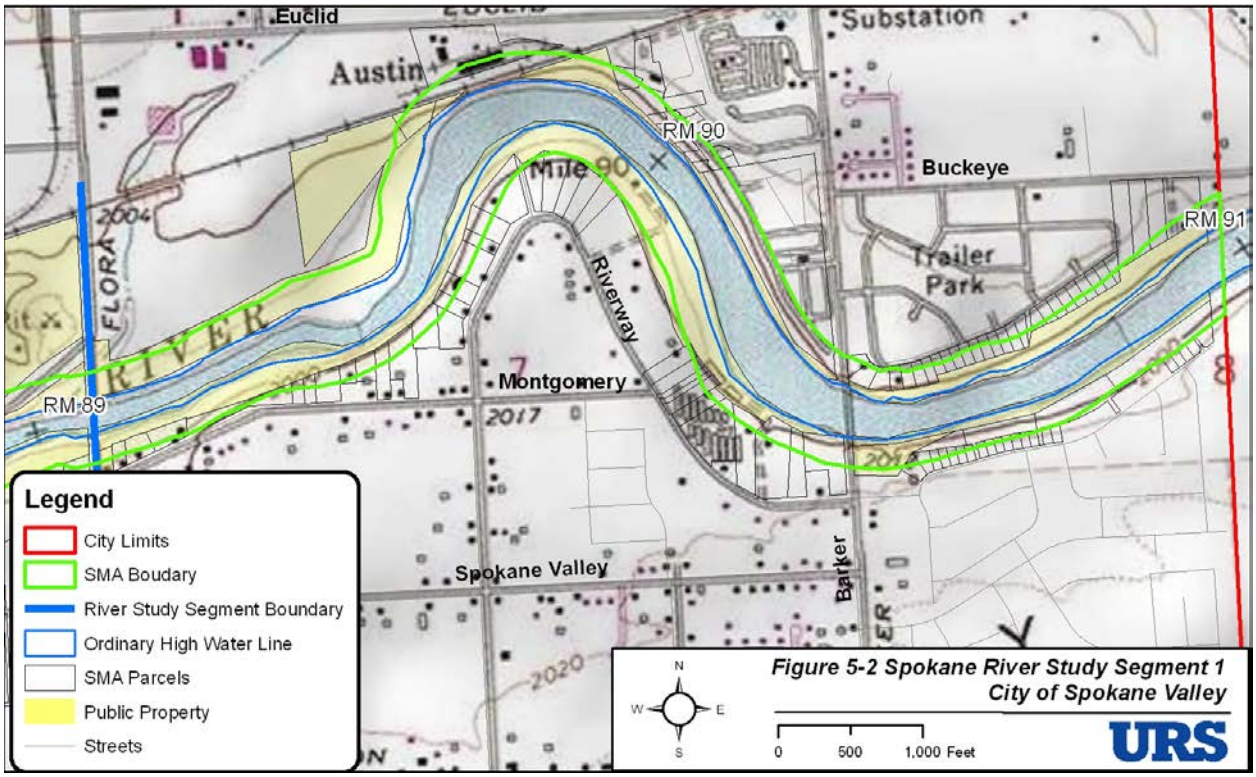


Figure 5-2 Spokane River Study Segment 1
City of Spokane Valley

5.1.1.1 SR-1 Land Use Summary

The City Comprehensive Plan provides land use and zoning designations. The primary land use in this segment is Park/Open space. Much of the public land is owned and managed by the Washington State Parks Commission and includes open, undeveloped land primarily on the north bank and the SRCT along the south bank. Most of this land was acquired by the State from Inland Empire Paper when the SRCT was developed.

The second largest land use is Low Density Residential. This river segment includes residential development both upstream and downstream of Barker Road. The north bank upstream of Barker Road includes manufactured home lots. The area immediately adjacent to the river is owned by State Parks. There is evidence that parts of the public shoreline have been altered by the homeowners in this development. On the south bank is the Riverwalk PUD development constructed in 1998. The River Rose Mobile Home Park is located on the north bank immediately downstream of the Barker Road Bridge. Some shoreline alteration has occurred to provide residents access to the river, however, the manager of the mobile home park has said that they have a policy to not allow improvements along river by the homeowners. Along the south side of the river is the Greenacres neighborhood. This area was originally platted into 1 and 2-acre lots in 1904 as the Greenacres Irrigation District. Subsequent development has increased the lot density and the current zoning along the river is now R-2 allowing for 10,000 square foot lots or 4.3 houses per acre. There is the potential for additional development in the Greenacres area.

Tables 5-2 and 5-3 show the existing land use and zoning designations within this reach.

Table 5-2: Land Use SR-1

Land Use	Area (acres)	Percent of Total
Railroad ROW	2.4	2.7
Heavy Industrial	2.0	2.3
Low Density Residential	32.1	36.3
Park/Open	51.9	58.7

Table 5-3: Zoning SR-1

Zoning	Area (acres)	Percent of Total
Railroad ROW	2.4	2.7
I-2	2.0	2.3
R-2 (10,000 sf lots)	11.9	13.5
R4 (6,000 sf lots)	20.2	22.8
Park/Open	51.9	58.7

Table 5-4 provides a summary of the built structures and impervious surfaces. This provides an estimate of the existing development intensity within this reach.

Table 5-4: Built Environment SR-1

Features	Area (acres)	Percent of Total
Rooftops	3.8	4.3
Pavement	2.3	2.6
Gravel Surfacing	3.1	3.5
Total Impervious	**9.2**	**10.4**

Recreational Use and Access

Recreational use areas and access locations are shown on **Figure 5** of the attached map portfolio (Appendix F). The SRCT is located along the south bank providing almost unlimited public access to the south shoreline. The SRCT provides a physical separation buffer between the Spokane River and adjacent residential land uses. The north bank is owned and managed by State Parks. Public land on the north bank is typically a fairly narrow strip between the OHWM and residential lots. Access and use of the public land on the north bank around the Barker Road Bridge is somewhat difficult since much of it is perceived as private property.

Formal public access to the SRCT and the shorelines include the SRCT parking lot at Barker Road (south bank) and the Barker Road River Access (north bank). This is one of the most popular river access points on the Spokane River. Additional access points are provided in the Riverwalk development for residents and another public access is located on City property at Montgomery Street. A locked vehicle gate and unlocked man gate are present at Montgomery Street. This access has been designated as an official river access point during the construction of the Barker Road Bridge. Two signs with this designation have been posted along the shoreline for people using the river. Access consists of a graded slope, which allows authorized vehicles, including the launching of emergency vehicles, access to the shoreline. Another formal access point has been provided to the SRCT at Flora Road. This access point is paved from the end of Flora Road, providing handicapped access. There is no formal parking lot at this location, but vehicles do park along the road, away from the shoreline.

The land use is predominately residential along the south bank and many residences have developed informal paths leading to the SRCT. There are four formal access points (wooden steps) along the SRCT leading down the river.

Downstream of the River Rose Mobile Home Park and the Union Pacific Railroad ROW, much of the property is owned by the Washington State Department of Transportation (WSDOT). It is zoned heavy industrial and in the early 1990's portions were used to extract gravels for re-paving of I-90. This area appears to be the largest publicly owned property adjacent to the SMP boundary. Access to the north bank is generally from Flora Road. A network of old roads and informal trails exist in this area that is widely used by day hikers and anglers.

Transportation

The Barker Road Bridge crosses the river within this river segment. The Barker Road Bridge is being reconstructed at this time (2009-2010) and will provide vehicle, bicycle, and pedestrian traffic. Parking on the bridge for boaters using the Barker Road River Access is planned. The SRCT discussed previously provides recreation and pedestrian and bicycle transportation between many parts of the City. The Union Pacific Railroad is located within the shoreline jurisdiction near the Greenacres Gypsum Plant. It is planned to relocate the Union Pacific tracks during the "Bridging the Valley" project away from the river sometime in the future. A private residential collector street within the River Rose Mobile Home Park lies within the shoreline jurisdiction.

Shoreline Modifications

The major shoreline modifications within the SR-1 shoreline jurisdiction include residential development, the Barker Road Bridge, the Union Pacific ROW fill, and the SRCT.

Residential development has converted much of the upland prairie into housing and lawns. Many informal trail and access points have been created. Impervious surfaces, lawn care products, septic systems, and other activities associated with residential development provide input of pollutants into the river. Remnants of previous residents were noted during the field inventory along the south bank, typically as rock foundations and lilac bushes. A concrete pad with a corrugated metal pipe (CMP) standpipe was observed along the SRCT just downstream of Barker Road. Its use is unknown.

The Barker Road Bridge is being replaced and is scheduled to be completed in 2010. The new bridge has reduced the number of bridge support piers in the river and the City, DNR, WDFW, and Ecology are working to develop cleanup and restoration plans for the immediate shorelines associated with the bridge construction.

The SRCT is a 12-foot-wide asphalt pedestrian trail that was constructed through intact native vegetation and along an existing dirt road at various locations. The trail and associated development such as retaining walls replaced some of the native vegetation. Most retaining walls are rock gabions, except for a keystone retaining wall at the Barker Road SRCT access. Smaller wooden retaining walls have been erected along the SRCT, mostly for erosion control. Much of the trailside erosion appears to result from informal trails. The SRCT in this river segment has been flooded downstream of Barker Road Bridge and the river bank has eroded at approximately RM 89.5 causing damage to the trail.

The Union Pacific railroad intersects the shoreline at RM 89.8. This area of the shoreline supports the railroad tracks and the dirt access road on what appears to be a fill area. Concrete foundations, likely associated with the railroad are located in this area between the Union Pacific Railroad tracks and the river. This area is noted as "Austin" on USGS maps. A remnant of historic railroad use on the northern/eastern shore is evident in crumbling concrete foundations near the Greenacres Gypsum plant.

Utilities
Overhead power lines cross the river immediately downstream of the Barker Road Bridge and at Flora Road. The Barker Road Bridge provides crossings for a water line, a sewer force main, and communication lines. An AT&T's fiber optics line is located under or alongside the SRCT. The buried fiber optics have utility vaults located in the trail throughout this river segment. An above ground appurtenance associated with the fiber optics line was noted along the shoreline immediately upstream of the Barker Road Bridge.

Two culverts for stormwater were found under the SRCT. One is situated in the gulley on the north bank, just upstream of Barker Road. This culvert appears to no longer be active as a result of the development of Riverwalk. A second culvert is located downstream of Barker Road and allows for drainage to pass under an elevated portion of the SRCT. Most stormwater management within this river segment is allowed to infiltrate prior to reaching the river or sheet flows through open areas.

Environmental
The Department of Ecology has identified heavy metal contaminated areas on both banks of the Barker Road Bridge and at Flora Road on the south bank. The Flora Road site was remediated in 2009 by capping the contaminated sediments with clean fill. This project resulted in removal of vegetation and an expansion of the beach. At Barker Road, a fence around the upstream gulley on the south bank is planned to prevent access to the contaminated sediments. On the north bank removal and capping of contaminated sediments is planned.

Cultural/Archeological Resources
The Washington Information System for Architectural and Archaeological Records Data (WISAARD) database identified three known sites throughout SR-1. All three sites are located along the southern shoreline, likely due to the focused surveys that were conducted there for the SRCT project. None of the sites are listed on the National Register of Historic Places.

5.1.1.2 SR-1 Physical and Biological Characterization

The substrate in this segment is characterized by large cobbles with little sediment. Water depths range from approximately eight feet in the spring when the Post Falls HED is passing most of the flow to zero feet in the late summer when this segment becomes primarily exposed gravels with surface water limited to small pools and very shallow riffles. This segment includes a large meander at River Mile 90, which results in dissipated river flow energy. The meander also results in areas of erosion at the inside meander bend (RM 89.5), which is armored by large riprap. The area was further damaged due to the 2008 high spring flows. Segment 1 provides high quality visual resources to users of the SRCT along the south bank due to the presence of fairly continuous mature forest between the trail and the shoreline. This is augmented by the location of surrounding residences along the south bank, which are located above the trail and generally visually separated from the trail by a shrub zone buffer.

Hydraulics and Water Quality
Within SR-1, the channel is moderately to highly entrenched and highly sinuous with little to no floodplain development. The dominant bed materials are cobbles and boulders with little gravel or fine sediment material. Boulders and persistent willows along the river edge provide energy dissipation and shoreline stabilization. The current is generally swift and the channel is comprised of a series of rapids with shallow pools.

Because of the dam upstream, the sediment supply is low unless the streambanks are eroding. The channel is vertically and laterally stable. Large woody debris is lacking, but rocks and intermixed vegetation are adequate to dissipate energy and protect banks. This reach is a Rosgen C3 stream type, which means that it has moderate sinuosity and a cobble-dominant substrate.

Biological Resources and Vegetation

Trout spawning surveys conducted by Parametrix in 2003 for the Avista relicensing effort documented no fish or spawning areas (redds) within this study segment. The identification of fish and redds within a mile to either direction of this stream segment indicates that the area is used for migration but not spawning. This may be due to lack of suitable spawning habitat at the river levels found during the spring spawning season. Fish surveys noted by SCCD in the 2005 PFC study indicated that brown trout, Chinook salmon, cutthroat trout, northern pikeminnow, and large-scale sucker fish are all likely to be present within River Segment 1.

Wildlife noted within Segment 1 includes bats, raptors, several neotropical songbirds, aquatic mammals, waterfowl, and reptiles (SCCD 2005). Residents in the area have reported seeing bald eagle, osprey, pheasant, moose, coyotes, deer, rabbits, beaver, mink, and river otter. No raptor nest sites were observed within this river segment.

The Audubon Society has reported that this area provides some of the best habitat for birds along the river due to its relatively continuous vegetation and the large fields that exist adjacent to the river.

The following plant associations were observed within SR-1 (see **Table 5-1** for reference):

Table 5-5: Habitat Analysis SR-1

Plant Association	Area (acres)	Percent of Total
Developed/Landscaped	25.84	23%
Non-native Grassland	15.61	14%
Ponderosa pine/serviceberry	30.58	27%
Ponderosa pine/black hawthorne	19.82	17%
Black cottonwood/ serviceberry	0.46	<1%
Black cottonwood/ black hawthorne	6.78	6%
Coyote willow	15.51	14%

Based on **Table 5-5** above, the dominant forest cover within SR-1 is a mixture of ponderosa pine forest communities. These communities are generally unfragmented, long stands that are mature in age with multiple age classes present within a given stand. Based on **Table 5-1**, these plant associations provide foraging and cover for most of the fish and wildlife present within the river corridor. A fairly continuous narrow band of ponderosa pine/serviceberry forest is present between the SRCT and the shoreline on the south side of the river. This band of vegetation provides a high quality functional corridor for wildlife as well as shade for aquatic habitat. Additional cover is provided along the northern shoreline within park property to the west of the River Rose mobile home park. These stands are located within State Park ownership and, therefore, likely to be conserved. The vegetation inventory included as **Appendix C** found that though there was a high degree of variability between sample plots, native vegetation cover within SR-1 averaged 35% in the flooded zone, 71% in the riparian zone, and 67% in the upland zone.

Areas south of the SRCT are dominated by non-native grasslands with scattered hawthorne and serviceberry shrubs. These areas are generally in a degraded condition due to off-road vehicle use, multiple pedestrian access trails, and the ubiquitous presence of spotted knapweed and everlasting pea (*Lathyrus latifolia*). Along the north shore, the vegetation has been highly altered by landscaping and includes many ornamental plants.

5.1.1.3 SR-1 Ecological Condition, Stressors, and Opportunities for Restoration or Conservation

The following ecological baseline will be used to measure changes over time as the City works to achieve the "no net loss of shoreline ecological functions" goal (per WAC 173-26-186(8)).

Ecological Baseline
This river study segment spans three river reaches classified by SCCD in the 2005 PFC study. Reach 3 begins east of the City and terminates at RM 90.3, where the river bends to the north. SCCD Reach 4 continues downstream around the river bend to RM 89.4. From there, SCCD Reach 5 continues into the next downstream River Study Segment (SR-2). All three SCCD reaches were rated as being in Proper Functioning Condition. SCCD Reach 3 was rated as being in "good" ecological condition, while SCCD Reach 4 was rated as "fair" and SCCD Reach 5 was rated as "fair to good." The good ecological rating for Reach 3 appears to be due to factors located east of the City near the Harvard Road Bridge so Segment 1 is best described as being in fair ecological condition.

High Quality Conservation Areas
The 2005 PFC study noted high quality areas along approximately half of the southern shoreline through this study segment. The high quality determination was based upon the presence of mixed cottonwood and ponderosa pine forests over ½-acre in area. These high-quality areas are generally located within park land are expected to remain in conservation status in perpetuity.

Degraded Areas and Opportunities for Restoration
Due to the extensive areas of mature riparian forest along the southern banks of this study segment, restoration potential was rated as "low" by the 2005 PFC study. Residential development along the south banks of the river is generally located above and away from the riparian vegetation. This buffer should be maintained by setbacks to avoid future development pressure. To the east of Barker Road along the southern shoreline, the area between the SRCT and residential development to the south is owned and managed by the Riverwalk Development LLC. This area is characterized by grassy slopes dominated by non-native herbaceous vegetation and sporadic native shrubs that provide good bird habitat. This area includes several uncontrolled access trails and would benefit from native herbaceous and shrub plantings as well as controlled access to discourage damage from foot traffic.

Manufactured home courts flank the northern banks of the river on both sides of Barker Road. Within these areas, several homes are located within SMA jurisdiction. A thin parcel of public park land separates these homes from the edge of the river. Due to the proximity of the homes to the river, there is occasional landscaping found on the state park property. This area has little opportunity for shoreline restoration or conservation with the exception of limiting landscaping within the public shoreline areas to preserve native habitat.

Between the northern apex of the river's meander bend and Flora Road to the west, there is a large undeveloped area along the northern banks of the river. This area contains a thin, discontinuous band of mature riparian vegetation on steep slopes above the river. Above this band of riparian vegetation, the habitat is degraded by a dirt road with several spur roads. The vegetation around the road is a mixture of early seral ponderosa pine saplings and non-native herbaceous upland grasses and knapweeds with a few small patches of native vegetation intermixed. This area would benefit from additional shoreline stabilization plantings on the steep slopes as well as native upland plantings in cleared areas and thinning of the existing pine saplings to provide cover, a functional migration corridor, and to prevent the spread of invasive vegetation.

Recommendations

Table 5-6 is a summary of ecological issues relevant to the selection of an appropriate shoreline designation and to the goal of achieving the goal of no net loss of shoreline ecological functions.

Table 5-6: Summary of Ecological Issues SR-1

Ecological Issues	Local Stressors	Recommendations
Woody Cover	SRCT, camping, residential development	Conserve/protect existing forest areas.
Erosion	Large river meander, seasonally high flow rates	Incorporate bioengineering concepts into maintenance of affected shoreline areas for visual and ecological benefits.
Invasive vegetation	Non-native herbaceous cover	Encourage landscaping with native plants. Control spread of knapweed. Support native herbaceous restoration projects.
Non-native fish	Small-mouth bass are outcompeting native trout due to warm water tolerance.	Work with WDFW, Trout Unlimited, SCCD, and Avista as habitat protection plans are developed.
Water Temperature	Low water discharge during summer from Post Falls HED. Hydraulics naturally discharging to aquifer.	Work with Avista and regional governments to ensure that adequate flows are maintained through summer months. Create pools in shaded areas near southern shoreline to provide trout refuge during low flows.
Contamination	Barker Road Clean up area/ heavy metals contamination.	Ensure that clean up efforts are monitored and that replaced bed/shoreline materials are appropriate size for the local hydrologic regime and public use.
Land Use Conflicts	Development potential along southern shoreline	Create setbacks that would limit future redevelopment near existing riparian zone. Control landscaping in public lands along the north shoreline area. Place signs prohibiting shoreline alterations on public lands.

5.1.2 Spokane River Study Segment 2 – Flora Road to Trent Avenue

Spokane River Study Segment 2 (SR-2) includes both sides of the River between Flora Road (RM 89.1) to the east and Trent Street (RM 85.3) to the west. Segment 2 is approximately 3.7 miles long and includes a total area of 178 acres of shoreland within the SMP jurisdiction. This portion of the river is characterized by commercial & industrial land uses beyond an inner band of State Park land that contains a fairly continuous riparian vegetation corridor. The lack of residential presence in SR-2 results in large open tracts of continuous grassland habitat above the river banks. The aquifer discharges to the river at the east end of SR-2. This results in cooler, deeper water relative to SR-1.

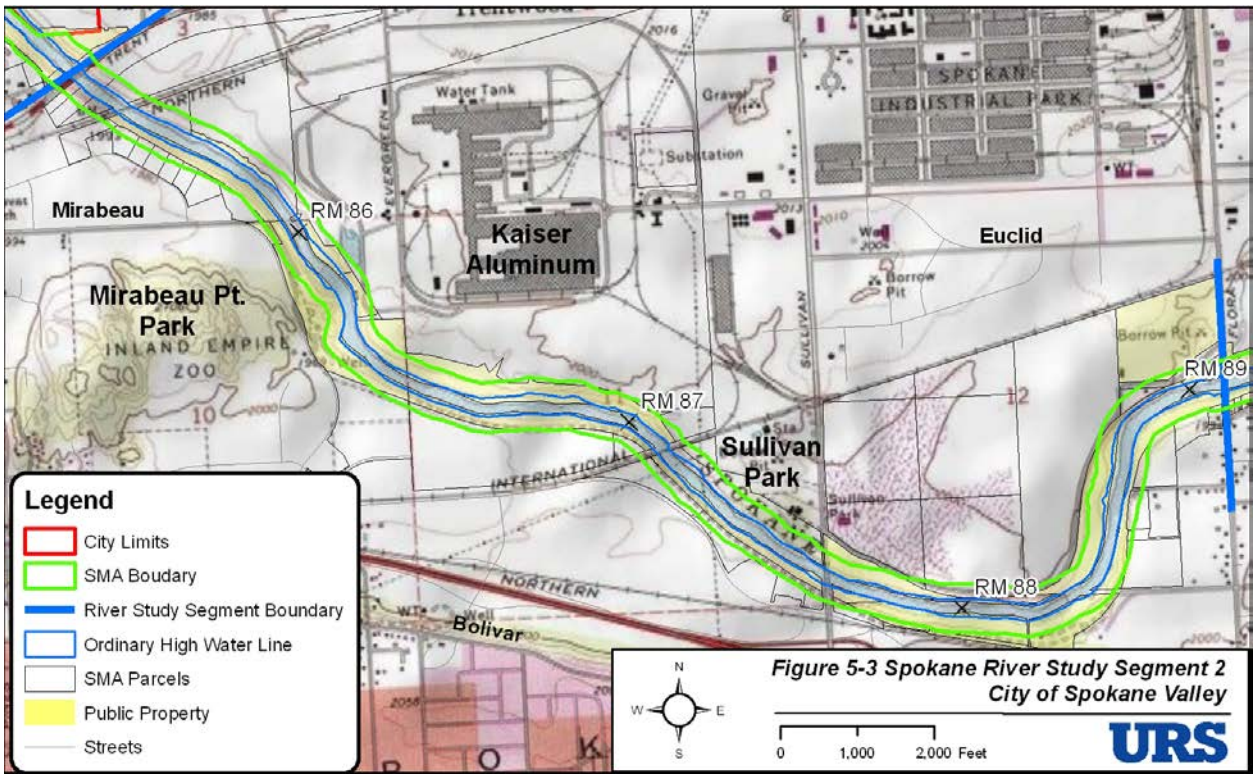


Figure 5-3 Spokane River Study Segment 2
City of Spokane Valley

5.1.2.1 SR-2 Land Use Summary

The City Comprehensive Plan shows that the land use within this river segment is composed of: Parks/Open Space, Heavy Industrial, Low Density Residential, Mixed Use, and Regional Commercial. The largest use is for Parks/Open Space. The next largest use is heavy industrial, much of which is associated with the Kaiser Trentwood Aluminum Plant. The Regional Commercial designation is associated with the Spokane Valley Mall. Mixed use areas include the area between Mission Avenue and Sullivan Road and the Mirabeau Point area. The mixed use areas are only partial developed and additional development is anticipated.

Tables 5-7 and **5-8** show the land use and zoning within this reach.

Table 5-7: Land Use SR-2

Land Use	Area (acres)	Percent of Total
Railroad ROW	2.4	1.4
Heavy Industrial	29.9	16.9
Low Density Residential	3.2	1.8
Mixed Use	11.3	6.4
Parks/Open Space	123	69.6
Regional Commercial	7.0	3.9

Table 5-8: Zoning SR-2

Zoning	Area (acres)	Percent of Total
Railroad ROW	2.4	1.4
Heavy Industrial (I-2)	29.9	16.9
Mixed Use Center (MUC)	11.3	6.4
Parks/Open Space	123	69.6
R-2 (10,000 sf lots)	1.6	0.9
R-3 (7,500 sf lots)	1.6	0.9
Regional Commercial (RC)	7.0	3.9

Table 5-9 provides a summary of the built structures and impervious surfaces. This provides an estimate of the existing development intensity within this reach.

Table 5-9: Built Environment SR-2

Features	Area (acres)	Percent of Total
Rooftops	0.3	0.2
Pavement	5.4	3.0
Gravel Surfacing	4.3	2.4
Total Impervious	**10.0**	**5.6**

Recreational Use and Access

Land use within the shoreline jurisdiction in this river segment is mostly Parks/Open Space with Heavy Industrial between Kaiser and the Trent Avenue Bridge. There are two parks within this river segment, Sullivan Road Park and Mirabeau Point Park. Both provide access to the SRCT and to the river. The SRCT is located on the south bank and provides almost unlimited access along the river.

The shoreline jurisdiction along the north side of the river is generally State Park land. Access to this area is from Flora Road (both sides of the river), Mission Avenue (south bank), a river takeout just upstream of the Sullivan Bridge (north bank), Sullivan Park and at the Trent Road Bridge. Except for Sullivan Park, all access points are informal. There are many trail and old dirt roads that are used for hiking in this area.

Sullivan Park is located on the west side of Sullivan Road on the north side of the river. The park includes a paved parking lot, picnicking facilities, and a gazebo overlooking the Spokane River. A network of trails extends downriver from the park to Kaiser's fence line. These trails are near the

OHWM and provide informal access to the Spokane River. Sullivan Park is heavily used for boater access. The banks have been heavily disturbed by users entering and leaving the river in this area.

Mirabeau Point Park, the former Walk in the Wild Zoo, provides access to the SRCT and the river. Footpaths lead from the SRCT to the granite rock outcrop. This rock formation is a popular day use recreation spot. Forest Service style fire pit was observed in the trees to the south of the outcropping. Another Forest Service style fire pit was found off of the SRCT upstream of the Sullivan Road Bridge. Kaiser's intake pumping plant is located on the opposite bank and the river channel is deep at this location.

An older access point that was closed in the early 1990's is located upstream of Sullivan Road at RM 88.5 on the north bank. A dirt access road leads to this area from Sullivan Road. The Spokane Canoe and Kayak Club (SCKC) is developing a proposal to reopen this access. Reopening this access would provide better access than currently exists to Sullivan Hole, which is the most widely used kayak play spot on the river.

The terminus of Mission Avenue is another popular access for the SRCT and the river. Currently it is heavily used by boaters to access the Sullivan Hole play spot. The SRCT can also be accessed from the Spokane Valley Mall and several access points are located leading from parking lots on the north side of Indiana Street. ADA compliant access has been provided at the Sullivan Road Bridge.

The section of river between the Flora Road and Mirabeau Point Park provides many locations for swimming, boating, and angling in the Spokane River. There are many locations within this section of the river that have sandy beaches. Informal footpaths are present between the SRCT and the beaches.

The river bank becomes steeper in the section between Mirabeau Park and the Trent Road Bridge limiting access. The SRCT tends to stay along the top of the slope through this section, and there are only a few informal access points to the river. This has protected the vegetation in this area.

Transportation

Four bridges cross the Spokane River within this river segment. These are the Sullivan Road Bridge, the Union Pacific Railroad bridge, and the Burlington Northern Santa Fe (BNSF) Railroad bridge, located immediately upstream of the Trent Avenue Bridge. The BNSF Railroad has access roads that are within the shoreline jurisdiction. These roads provide access to both the BNSF Railroad Bridge and the Yellowstone Pipeline. A section of the Flora Pit Road is also within the shoreline jurisdiction.

Shoreline Modifications

Shoreline modifications in this river segment are typically associated with the four bridges, the Kaiser property, and the SRCT. There are remnants of past shoreline modifications and uses along the SRCT in this river segment. Old mill stones from the Inland Paper Company have been placed along the SRCT where it crosses under the Union Pacific Railroad Bridge. A roof has been constructed under the bridge to protect users of the trail. There are a series of concrete piers next to the SRCT between Mirabeau Point and the Sullivan Road Bridge. One pier is located directly across the river from an old brick manhole on the northern shore. Three more concrete piers are located a couple hundred feet downstream.

Kaiser's modifications to the shoreline are mainly associated with the withdrawal and discharge of process water. Kaiser maintains and operates a river pumping station. This facility is equipped with three pumps and is located on the water's edge directly across from the rock outcropping at Mirabeau Point. Kaiser has also recently completed restoration of the shoreline at the location of its discharge pipe. Restoration included remediation of contaminated soils, revegetation, and slope stabilization of the drainage channel where the discharge pipe is located. A rock wall was also constructed near the OHWM, parallel to the river, at the base of this draw.

Shoreline modifications associated with the SRCT are paving and retaining walls. The majority of these retaining walls in this segment are wood structures, erected for erosion control at the many informal river access points. The SRCT is supported by a retaining wall where it goes underneath the Union Pacific Railroad Bridge.

Shoreline modifications associated with the river crossings are chiefly the bridge piers and retaining walls on the river bank. There are three remaining piers from an old bridge. This bridge was situated between the present Trent Avenue Bridge and the BNSF Railroad Bridge. Two of these piers are at the water's edge and the third sits atop the bluff on the east side of the Spokane River. There is also the remains of a dirt road, which extends to the water's edge on the north east corner of the Sullivan Road Bridge

Utilities

There are remnants of and current utilities present throughout this segment. These utilities are situated parallel and perpendicular to the Spokane River. Buried fiber optics and utility vaults are situated along the SRCT. The Yellowstone gas line crosses the river between the Trent Avenue Bridge and the BNSF Railroad Bridge. Two drinking fountains are found along the SRCT.

All utilities cross the river on bridges. A 24-inch cased sewer line crosses the river under the Sullivan Road Bridge. The sewer line goes under the SRCT at the south end of the bridge. The fencing around the sewer line on the north side blocks pedestrian access underneath the bridge. The BNSF Railroad Bridge has a six-inch casing attached to its south side. It is not known what utility type this is. The Trent Avenue Bridge has three four-inch casings and a six-inch casing attached under the south side, as well as an eight-inch casing under the eastbound lane. A 12-inch casing extends a quarter of the span from west to east under the west bound lanes.

Overhead power crosses the Spokane River in four places within this river segment. There are two crossings immediately upstream of the Union Pacific Railroad Bridge. Power lines cross the river between the Trent Avenue Bridge and the BNSF Railroad Bridge, and another crossing is located just downstream of the Trent Avenue Bridge.

Two bioswales providing stormwater treatment for the Spokane Valley Mall are located within the shoreline jurisdiction. The eastern swale has four drywells and no dry wells were observed in the western swale. Note that the western swale is equipped with an irrigation system.

An outfall structure is present along the upstream side of the Union Pacific Railroad Bridge on the north bank. This outfall consists of a suspended iron pipe, which disappears into a CMP standpipe near the OHWM. The pipe reemerges in the river channel below the water line. The structure appears to be abandoned, its use is unknown. A brick manhole was observed on the north bank downstream of the Union Pacific Railroad Bridge. This structure is approximately six feet in height and appears to have been part of the abandoned Industrial Park Treatment plant. The discharge pipe was not located.

On the Kaiser Aluminum property an old drainage channel was located. An outlet structure consisting of a 30-inch culvert and a broad crested weir was contained within the channel. The culvert extends to the water's edge. The channel and drainage structures appear to be abandoned. However, a minor amount of flow was observed discharging to the river from the culvert. A ten-inch culvert was observed on the west side of Kaiser's pump house. A drywell inlet was also noted in the concrete to the west side of the pump house near this culvert.

Kaiser's treatment pond is located just outside of the shoreline jurisdiction. Several monitoring wells were observed between the effluent pond and the Spokane River. The outfall is located in a drainage channel west of the effluent pond. The outfall extends under water to mid channel. An effluent irrigation

vault is located on the south side of the outfall. This vault is used to irrigate the new vegetation of the drainage channel.

The only drainage structures along the SRCT occur between the BNSF Railroad Bridge and the Trent Avenue Bridge. The retaining wall at the west end of the BNSF Railroad Bridge has a drainage system built behind it. This drainage system discharges to the SRCT where it sheet flows across and to the river. A catch basin has been installed in the SRCT where an old road intersects the trail from the BNSF Railroad right of way. The catch basin has been installed to intercept drainage from this road. A culvert extends from the catch basin and discharges onto a steep slope to the river.

Environmental
Portions of the Kaiser Property and the industrial areas downstream of Sullivan Bridge are noted as having contaminated soils per Ecology records.

Cultural/Archeological Resources
The WISSARD database identified more than 10 known sites throughout SR-2. None of the sites are listed on the National Register of Historic Places.

5.1.2.2 SR-2 Physical and Biological Characterization

The river substrate in this segment is characterized by large cobbles and boulders with little sediment accretion. The channel in SR-2 is moderately sinuous and moderately to highly entrenched with little active floodplain beyond the OHWM. An exception to this was noted along the northern shoreline, south of Kaiser Aluminum.

Hydraulics and Water Quality
The current in SR-2 is generally swift. The channel morphology is dominated by long rapids but SR-2 contains more and deeper pools that were observed in SR-1. Boulders line the river edge and are uniquely abundant along the northern shoreline south of Kaiser Aluminum. These boulders provide a great deal of energy dissipation and shoreline stabilization. The channel gradient is both vertically and laterally stable. Large woody debris is lacking, but the boulders along the shoreline diminish hydraulic shear stress sufficient to protect banks.

Biological Resources and Vegetation
Rainbow trout spawning surveys conducted by Parametrix in 2003 for the Avista relicensing effort documented radio-tagged trout and spawning areas (redds) within this study segment. Due to the aquifer discharging cool water into the stream, SR-2 provides important cold water refugia for fish downstream of Sullivan Road Bridge. Seven redds were documented around Sullivan Bridge (RM 87.2) during the 2003 surveys.

Wildlife noted within SR-2 during fieldwork associated with the 2005 PFC study includes Canada geese, mourning doves, chipmunks, magpies, red-tailed hawk, red - winged blackbird, as well as beaver activity, which was indicated by girdled cottonwoods. (SCCD 2005). In addition, an employee of Kaiser Aluminum found elk within the gated water intake facility more than once. Other than the fence around the water intake facility, SR-2 contains a fairly continuous narrow band of riparian forest or shrub habitat along both banks of the river, which provides a functioning wildlife corridor for species requiring cover.

A unique community of mature western juniper (*Juniperus occidentalis*) was located on the right bank of the Spokane River at RM 86.9, intermixed with ponderosa pine and black cottonwood. This was the only community of juniper in a riparian area noted for the entire county in the PFC Study (SCCD 2005). Due to the mature tree forms, they provide important habitat for cavity-nesting birds. In addition, the

Washington Natural Heritage Program maps unique/uncommon ponderosa pine plant associations along the upper periphery of the shoreline area through the Mirabeau Point Park.

The following plant associations were observed within SR-2 (plant codes reference Table 5-1):

Table 5-10: Habitat Analysis SR-10

Plant Association	Area (acres)	Percent of Total
Developed/Landscaped	8.86	4%
Native Bunchgrass Prairie	1.55	1%
Non-native Grassland	53.26	25%
Mock orange/smooth sumac	2.38	1%
Ponderosa pine/serviceberry	106.06	49%
Ponderosa pine/ black hawthorne	10.14	5%
Ponderosa pine/ western juniper	3.48	2%
Ponderosa pine/ mallow nine-bark	6.24	3%
Black cottonwood	0.51	0%
Black cottonwood/ serviceberry	7.03	3%
Black cottonwood/ common chokecherry	7.50	3%
Black cottonwood/ coyote willow	0.09	0%
Coyote willow	10.01	5%

Based on **Table 5-10**, the dominant forest cover within SR-2 is a ponderosa pine/serviceberry community. This community is generally located along the southern shoreline in long, often fragmented stands, occasionally with multiple age classes present within a given stand. Stands are generally fragmented by clearings associated with camping or historic shoreline disturbance. A very narrow band of alternating black cottonwood and ponderosa pine forests are present along the northern shoreline. This corridor is thin but fairly continuous between Trent and the Kaiser Plant. East of the Kaiser plant the riparian corridor is very thin and occasionally absent. Based on **Table 5-1**, forest habitat along the southern shoreline is likely to provide important foraging and cover functions for most of the fish and wildlife present within the river corridor. The cottonwood forests along the northern shoreline provide slope stabilization, insect production for birds and fish, and a thin/inadequate corridor for migratory wildlife. The vegetation inventory included as **Appendix C** found that, though there was a high degree of variability between sample plots, native vegetation cover within SR-2 averaged 33% in the flooded zone, 57% in the riparian zone, and 65% in the upland zone.

The large extent and continuous nature of the plant associations present within SR-2 indicate that this river segment provides a relatively important, functional migration corridor for wildlife. Additionally, the presence of snags and mature trees, including junipers, adjacent to the large prairie areas along the northern shoreline provide important hunting and foraging habitat for raptors. This use is augmented by the relatively low human presence relative to the southern shoreline.

5.1.2.3 SR-2 Ecological Condition, Stressors, and Opportunities for Restoration or Conservation

The following characterization of baseline ecological conditions is based on the Proper Functioning Condition Study conducted by SCCD in 2005. This ecological baseline will be used to measure changes over time as the City works to achieve the No Net Loss of Ecological Functions goal (per WAC 173-26-186(8)).

Ecological Baseline
This river study segment spans portions of two relatively similar river reaches classified by SCCD in the 2005 PFC study (**Figure 5-2**). SCCD Reach 5 begins just east of Flora Road and continues downstream to the Mirabeau Point Park, near the water intake facility for Kaiser Aluminum. SCCD Reach 6 continues from this point downstream into URS river study segment 3. Both reaches were rated as being in Proper Functioning Condition. Reach 5 was rated as being in "fair-good" ecological condition, which Reach 6 was rated as "poor-fair" ecological condition, a rating that does not correlate well with the determination of "high quality area" throughout this reach.

High Quality Conservation Areas
The entire portion of riparian vegetation with SR-2 was noted as high quality shoreline in the PFC study (SCCD 2005). The high quality determination was based upon large, intact areas of cottonwoods, ponderosa pine, willow, serviceberry, chokecherry, recreational floating, and rainbow trout spawning.

Degraded Areas and Opportunities for Restoration
The 2005 PFC study ranked restoration potential as "low" for most of the SR-2, despite noting that "The majority of this reach lacks adequate riparian vegetation due to development and parks, particularly on the right [north] bank" (SCCD 2005). .

URS observed degraded areas along both banks that would provide opportunities for enhancement of the riparian corridor. Along the south bank several small gaps within the woody riparian vegetation corridor were observed due to human disturbance. These areas also generally correlate with a high density of non-native/invasive vegetation. The disturbances appear to be recreational in nature and are associated with off-road vehicle use, camping, and gathering locations.

Large riparian corridor gaps exist along the northern shoreline as a function of steep slopes and xeric soil conditions. Above the areas influenced by groundwater, large woody vegetation has a difficult time establishing due to low water availability and depth to groundwater. Provision of an adequate riparian corridor, would require the installation of trees along the river edge. The establishment of riparian trees would likely require watering or custom-grown container stock to get plant roots in touch with moisture deep below the surface. Once established, the trees could create a microclimate that fosters further seral development. Beyond the forest corridor, areas along the northern ridge may be more appropriate for native prairie restoration or xeric shrub communities.

Ecological Recommendations

Table 5-11 provides a summary of ecological issues relevant to the selection of an appropriate shoreline designation and to the goal of achieving no net loss of shoreline ecological functions.

Table 5-11: Summary of Ecological Issues SR-2

Ecological Issues	Local Stressors	Recommendations
Woody Cover	Recreational off-road traffic, camping	Conserve/protect existing forest areas. Expand narrow bands of vegetation along the north bank and fill in gaps along the south bank. Plant tall tree species south of spawning areas and pools for shade.
Erosion (minor)	Concentrated flow from SRCT resulting in isolated bank erosion	Incorporate bioengineering concepts into maintenance of affected shoreline areas for visual and ecological benefits.
Invasive vegetation	Non-native herbaceous cover, particularly in upland areas	Encourage landscaping with native plants. Control spread of knapweed. Support native herbaceous restoration projects
Rare habitat	Scarcity	The mature juniper community located along the north bank should be protected against tree removal.
Non-native fish	Smallmouth bass competition	Protect cold water refugia by restricting vegetation removal. Limit fishing of native trout. Avoid in-water activities near known spawning areas.
Contamination	Flora Road Metal Site	Ensure that clean up efforts are monitored and that replaced bed/shoreline cap materials are appropriate size for the local hydrologic regime.
Land Use Conflicts	Fence around Kaiser's water intake facility is fenced off resulting in wildlife barrier	Provide tunnel or walkway around facility

5.1.3 Spokane River Study Segment 3- Trent Avenue to Millwood Town Limits

Spokane River Study Segment 3 (SR-3) includes the south side of the River from Trent Avenue (RM 85.3) to the Town of Millwood (RM 83.5). Segment 3 is approximately 1.8 miles long and includes a total area of 43.4 acres of shoreland within the SMP jurisdiction. It also includes a small segment of shoreline on the north side of the river between Trent Avenue and the city limits. This portion of the river is characterized by medium density, rapidly developing residential areas west of Myrtle Point and parks & open space east of the Myrtle Point. It has gaining hydraulics due to positive discharge from the aquifer, deeper water, and reduced flow velocity due to its proximity to Upriver Dam. The west end of SR-3 contains unique and visually interesting rocks formations in the channel. These rocks provide unique habitats for plants above the waterline as well as fish within the river. The Coyote Rock development will alter current shoreline conditions west of Myrtle Point by introducing additional foot traffic, runoff from impervious areas, docks, and associated shoreline access development.

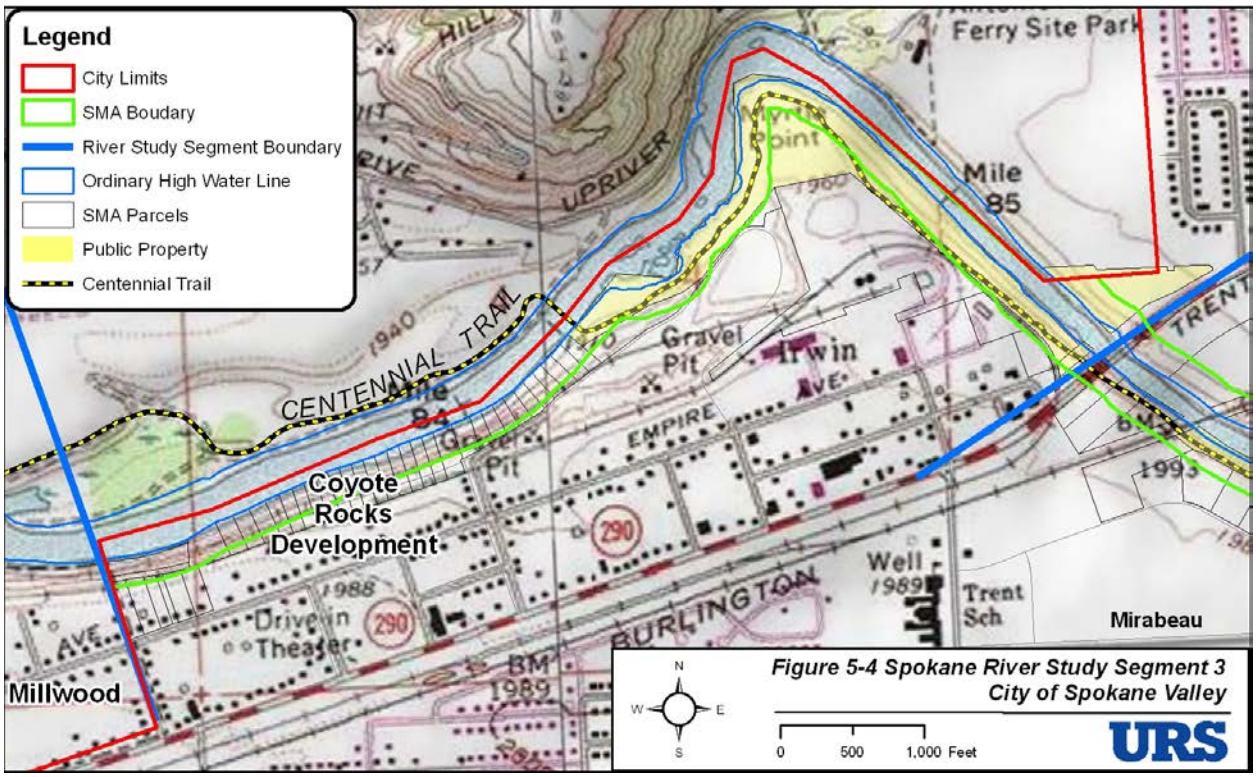


Figure 5-4 Spokane River Study Segment 3
City of Spokane Valley

5.1.3.1 SR-3 Land Use Summary

The City Comprehensive Plan shows that the land use within this river segment is composed of Parks/Open Space and Mixed Use. The zoning within this river segment is Parks/Open Space and Mixed Use. The land within the shoreline jurisdiction in this river segment is primarily open space, but less than the river segments upstream. The center of the Spokane River channel is the City boundary for the majority of this segment. The Coyote Rock development is private and is located in the western portion of this river segment. The SRCT crosses the river at RM 84.5.

Tables 5-12 and **5-13** show the land use and zoning within this river segment.

Table 5-12: Land Use SR-3

Land Use	Area (acres)	Percent of Total
Railroad ROW	0.4	1.0
Mixed Use	17.6	40.5
Parks/Open Space	25.4	58.5

Table 5-13: Zoning SR-3

Zoning	Area (acres)	Percent of Total
Public ROW	0.4	1.0
Mixed Use	17.6	40.5
Parks/Open Space	25.4	58.5

Table 5-14 provides a summary of the built structures, impervious surfaces, and development intensity within the shoreline jurisdiction for this river segment.

Table 5-14: Built Environment

Features	Area (acres)	Percent of Total
Rooftops	0.0	0
Pavement	0.7	1.6
Gravel Surfacing	6.8	15.7
Total Impervious	**7.5**	**17.3**

Recreational Use and Access
The SRCT is accessed from Plante's Ferry, located on the north bank of the river outside of the City, and at an informal gravel lot located at the northwest corner of the Trent Avenue Bridge. Limited, informal parking may be available at the Coyote Rock development, though it appears that public use will be restricted.

The City's Myrtle Point Conservation Area is located upstream of the SRCT Bridge. According to the Audubon Society this area provides excellent habitat for many important bird populations due its habitat diversity. This area is extensively used for recreational activities since it is along the SRCT, the shoreline is relatively flat and sandy, and the basalt outcroppings and small coves provide a popular area used for swimming and angling. An access point for boaters has been discussed with various groups during the inventory. The need for a boat take-out has been suggested at Coyote Rocks, Myrtle Point, or Plante's Ferry. A location is under discussion but has not been decided on.

Transportation
An abandoned portion of the Inland Empire Paper Company (IEPC) Railroad tracks are within the shoreline jurisdiction downstream of the Trent Avenue Bridge. Portions of Coyote Rock Road are also within the shoreline jurisdiction. The SRCT Bridge is located near the Coyote Rock Development.

Shoreline Modifications
The SRCT and the SRCT Bridge have modified the shoreline in this area. The preliminary development of Coyote Rock has resulted in the removal of vegetation, construction of roads, building lots, and utilities. No homes were constructed at the time of the inventory but it is anticipated that this development will be built out in the near future. Approximately 31 lots have direct access to the river. Development covenants provide for protection of the existing 75 foot shoreline buffer. Individual lot river access and docks are allowed in the development. A variety of permits will be needed if the individual lots develop river access through the protected shoreline buffer. Due to potential impacts on the river environment, the shoreline environment, the lack of public access and cumulative impacts to the shoreline plant communities and habitats it has been indicated that that permitting agencies will require a high level of analysis prior to approving permit applications for docks and shoreline alterations needed to access them.

The southern shore line across from Plante's Ferry Park is a flat bluff just above the OHWM. Several piers of river rock cemented together were observed in this area. The orientation of these structures is random and it is uncertain what they were used for. A few hundred feet downriver lay three concrete piers in a line parallel with the river. The two outer piers are equipped with steel hoops oriented towards the center pier. A large concrete pad is located west of these three piers. This pad is equipped with a large steel hoop directly inline with the center pier.

An old concrete structure was observed on the shoreline immediately downstream of the basalt outcroppings. This structure has three concrete walls parallel to the river on top of a concrete pad. Its use is unknown.

On the bluff above this area was located the International Portland Cement Plant. Documentation indicates that this entire area was covered with cement dust when the plant was operating. It was closed in the early 1970s. Work is currently being done by others to better characterize the environmental impacts to the area from the cement plant.

Utilities
Overhead power crosses the river at three locations in this river segment. A 12-inch culvert from the cement factory discharges to a 12-inch culvert under the SRCT and then down an eroded gulley to the Spokane River.

The Coyote Rock development has full utilities including sewer. A lift station has been constructed just outside of the shoreline jurisdiction. One foundation and daylight basement had been constructed at the time of the inventory.

Environmental
The Myrtle Point and Islands Lagoon metals clean up sites are both located within SR-3 (Ecology 2009). Remediation of these two sites was slated for 2009 by Ecology but has been delayed. Currently, characterization of the sites is being done in order to develop remediation plans. Depending on the direction that the cleanup takes, there is the potential to provide improvements to the shorelines for ecological function and/or public access.

Cultural/Archeological Resources
The WISAARD database identified several known sites throughout SR-3, including several around the railroad and the historic Plante's Ferry. None of the sites are listed on the National Register of Historic Places.

5.1.3.2 SR-3 Physical and Biological Characterization

The river channel contains a series of rapids with shallow pools. The stream bed is primarily composed of cobble and large gravels with fines beginning to drop out of the water column at the west end of SR-3 due to the decreasing flow rate associated with the Upriver Dam located west of town. Myrtle Point creates a large meander in the stream that dissipates flow energy and results in eddies and some associated erosion at the tail end of the river bend. Bedrock outcrops and large boulders characterize SR-3. The streambanks along the south side of the river (excluding the outcrops) are composed of unconsolidated, in-cohesive materials that are easily eroded but large boulders along the river edge provide sufficient energy deflection/dissipation to avoid significant bank erosion.

Hydraulics and Water Quality
The current is generally swift around Myrtle Point but slows at the west end of SR-3 as flow energy is dissipated by the in-stream rock outcrops and the backwater of Upriver Dam. The 2005 PFC study indicates that the channel is vertically and laterally stable. Large woody debris is lacking, but the rock outcrops within the channel provide complex stream hydraulics and associated habitats.

Biological Resources and Vegetation
Rainbow trout spawning surveys conducted by Parametrix in 2003 for the Avista relicensing effort documented radio-tagged trout and spawning areas (redds) within this study segment. Thirteen redds were documented around the SRCT Bridge (RM 84.2) during the 2003 surveys.

Wildlife noted within SR-3 during fieldwork associated with the 2005 PFC study includes mourning doves, chipmunks, magpies, red-tailed hawk, red-winged blackbird, and beaver, which was indicated by girdled cottonwoods (SCCD 2005). The rock outcrops between the SRCT Bridge and Myrtle Point provide unique habitat for neotropical songbirds resulting in high concentrations there. The PHS database identifies cliff habitat northwest of Myrtle Point, outside of the City on the north side of the river. Cliff-dwelling bats and birds are likely to use the river and riparian habitats in SR-3 for hunting and foraging. Few migration barriers exist throughout SR-3.

The following plant associations were observed within SR-3 (plant codes reference Table 5-1):

Table 5-15: Habitat Analysis

Plant Association	Area (acres)	Percent of Total
Black hawthorne-serviceberry-mallow nine-bark	1.68	3%
Developed/Landscaped	10.07	20%
Native Bunchgrass Prairie	1.38	3%
Non-native Grassland	7.19	14%
Ponderosa pine/ black hawthorne	16.00	32%
Black cottonwood	0.24	0%
Black cottonwood/ black hawthorne	5.92	12%
Black cottonwood/ coyote willow	4.36	9%
Douglas fir/ bitter cherry	1.92	4%
coyote willow	1.25	3%

The dominant plant association within SR-3 is Ponderosa pine/black hawthorne. This community is generally located along the southern shoreline in long, often fragmented stands above the river banks. Near the Trent Street Bridge, there is a mature stand of PIPO/CRDO. Northwest of this stand the corridor transitions into degraded non-native herbaceous vegetation with young pine saplings establishing. A remnant patch of native herbaceous prairie vegetation was noted within this degraded habitat. This patch is noted as "Native Bunchgrass Prairie" in the table above. High quality shrub habitat (CRDO-AMAL-PHMA) was noted continuously along the lower streambanks. Black cottonwoods dominate the habitat at the north end of Myrtle Point and along the lower shoreline to the west. The vegetation inventory included as **Appendix C** found that, although there was a high degree of variability between sample plots, native vegetation cover within SR-3 averaged 54% in the flooded zone, 76% in the riparian zone, and 17% in the upland zone.

A functioning wildlife corridor exists within SR-3 between Trent Ave. and River Mile 84. This habitat was noted as high bird value habitat by Audubon experts. West of River Mile 84, the shoreline has been affected by past transportation corridors and ongoing residential development. Specifically, the area contains debris piles, cleared areas, fill slopes, and a linear abandoned road corridor that is dominated by non-native trees and herbs.

Although not noted as "rare" by any state databases, the rock outcroppings west of Myrtle Point were noted to support edaphic vegetation that was not seen elsewhere in the study area. This includes buckwheat, lomatium, and sedum plants.

Where the shoreline extends west of the City boundary, it appears that a Douglas fir forest community provides cover for species migrating west into Millwood.

5.1.3.3 SR-3 Ecological Condition, Stressors, and Opportunities for Restoration or Conservation

The following characterization of baseline ecological conditions is based on the Proper Functioning Condition Study conducted by SCCD in 2005. This ecological baseline will be used to measure changes over time as the City works to achieve the No Net Loss of Ecological Functions goal (per WAC 173-26-186(8)).

Ecological Baseline
River study segment 3 includes the majority of Spokane River Reach 6 as classified by SCCD in the 2005 PFC study. SCCD Reach 6 begins at Mirabeau Point and continues west/downstream to the approximate City of Spokane Valley/Millwood boundary. SCCD Reach 6 was rated as being in Proper Functioning Condition but it was given a "poor-fair" ecological condition rating, presumably due to lack of adequate riparian vegetation around Plante's Ferry Park (north of the City) and the Coyote Rock area.

High Quality Conservation Areas
Portions of SR-3 around Myrtle Point, the SRCT Bridge, and areas in-between were noted as high quality shoreline in the PFC study (SCCD 2005). The high quality determination was based upon large, intact areas of Douglas fir, mature cottonwoods, hawthorn, willows, chokecherry, serviceberry, Plante's Ferry Park, recreational floating, and rainbow trout spawning.

URS noted a stand of mature pine trees just north of Trent Avenue, between SRCT and the river that provides high quality forest habitat as well as shade for pools within the river along the southern shoreline. URS also noted a small patch of native blue bunchgrass prairie with a high diversity of native forbs worthy of conservation and possible expansion. This small patch may be a good location for seed collection associated with upland prairie restoration projects.

URS also noted an area of slow-moving water and side-channel habitat associated with the eddy west of Myrtle Point. This area is likely to provide slow water refugia for fish when the river is at flood stage. Also, URS noted uncommon edaphic vegetation growing on the rock outcrops within the channel east of the SRCT Bridge. This vegetation is sensitive and easily disturbed by rock climbing, which appears to be a common recreational activity in the area.

Degraded Areas and Opportunities for Restoration
The 2005 PFC study ranked restoration potential as "fair to good" for SR-3, which fully contains SCCD Reach 6.

URS observed two degraded areas that would provide opportunities for enhancement of the riparian corridor within SR-3. One area is associated with historic shoreline disturbance that is evident between Trent Avenue and the Mirabeau Conservation Area. Disturbance includes concrete debris piles and cleared riparian vegetation areas east of a former industrial site. Areas east of this disturbed area were identified as high value bird habitat by the local Audubon Society.

A second degraded area was noted west of the SRCT Bridge, below the Coyote Rock housing development. This area is associated with an old road that has provided a vector for the spread of non-native herbaceous and woody plants. This area is likely to be highly impacted by forthcoming development associated with docks and/or other shoreline access features. This presents an opportunity to grant minor shoreline development permits with conditions specifying restoration of the old road to a

native corridor and, thereby, balance future development with restoration of degraded areas to achieve the goal of "no net loss of shoreline ecological functions."

Recommendations

Table 5-16 provides a summary of ecological issues relevant to the selection of an appropriate shoreline designation and to the goal of achieving no net loss of shoreline ecological functions.

Table 5-16: Summary of Ecological Issues SR-3

Ecological Issues	Local Stressors	Recommendations
Woody Cover	Recreational off-road traffic, camping, forthcoming development	Conserve/protect existing forest areas and native prairie remnants. Expand narrow bands of vegetation along the south bank east of Myrtle Point. Plant tall tree species south of spawning areas for shade. Condition development applications with riparian enhancement specifications for all new shoreline development proposals
Erosion (minor)	Concentrated flow from SRCT resulting in isolated bank erosion	Incorporate bioengineering concepts into maintenance of affected shoreline areas for visual and ecological benefits.
Invasive vegetation	Non-native herbaceous cover, particularly in herbaceous upland areas	Encourage landscaping with native plants. Control spread of knapweed. Support native herbaceous restoration projects
Diminishing native fish stocks	Warm summertime stream temperatures, low dissolved oxygen, competition from smallmouth bass, adjacent land development, recreational use.	Protect cold water refugia by restricting vegetation removal. Limit fishing of native trout. Avoid in-water activities near known spawning areas, particularly during spawning periods.
Contamination	Flora Road Metal Site	Ensure that clean up efforts are monitored and that replaced bed/shoreline cap materials are appropriate size for the local hydrologic regime.
Land Use Conflicts	Fence around Kaiser's water intake facility is fenced off resulting in wildlife barrier	Provide tunnel or walkway around facility

5.1.4 Segment 4- Millwood City Limits to Spokane City Limits

Spokane River Segment 4 (SR-4) includes only the south side of the river from the Town of Millwood boundary (RM 82.1) to the City of Spokane boundary (RM 81.6). Segment 4 is approximately 0.5 miles long and includes a total area of 11.8 acres of shoreland within the SMP jurisdiction. The land within the shoreline jurisdiction in this river segment is fully developed and private property extends to the OHWM. This area is entirely within the backwater of Upriver Dam.

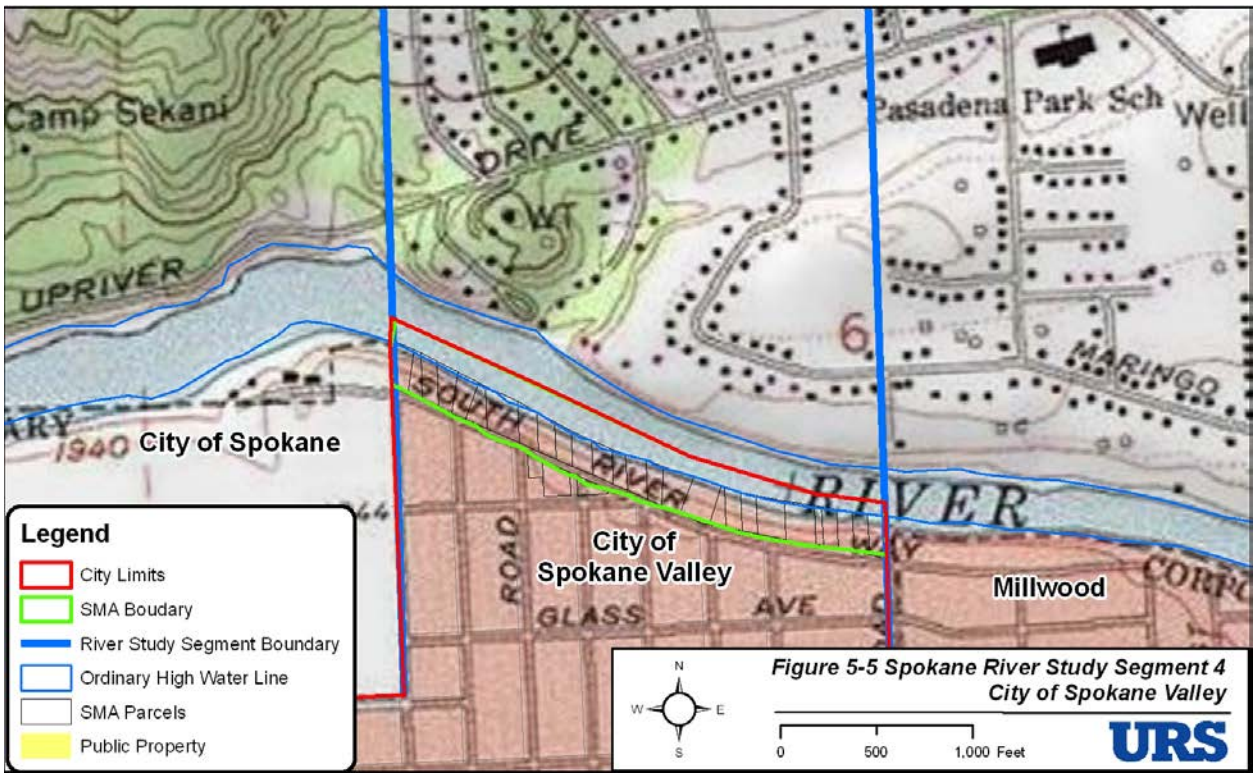


Figure 5-5 Spokane River Study Segment 4
City of Spokane Valley

5.1.4.1 SR- 4 Land Use Summary

The City Comprehensive Plan shows that the land use within this river segment is composed solely of Low Density Residential and is zoned as Single Family Residential. There appear three empty lots in this segment but the majority of this area is developed as single family residential with landscaped lawns. Many of the lots have bulkheads and docks.

Tables 5-17 and **5-18** show the land use and zoning within this river segment.

Table 5-17: Land Use SR-4

Land Use	Area (acres)	Percent of Total
Low Density Residential	11.8	100%

Table 5-18: Zoning SR-4

Zoning	Area (acres)	Percent of Total
R-2 (10,000 sf lots)	11.8	100%

The City Comprehensive Plan shows that the land use within this river segment is composed solely of Low Density Residential and is zoned as Single Family Residential.

Table 5-19 provides a summary of the built structures, impervious surfaces, and development intensity within the shoreline jurisdiction for this river segment.

Table 5-19: Built Environment SR-4

Features	Area (acres)	Percent of Total
Rooftops	1.6	13.6
Pavement	0.6	5.1
Gravel Surfacing	0.3	2.5
Total Impervious	**2.5**	**21.1**

Recreational Use and Access
Access to the Spokane River is through private property. Public access to the river is limited. This river segment is within the backwater of the Upriver. It is understood that the City of Spokane opens up the one boat ramp located near Upriver Dam twice a year so that residents can launch their boats in the summer and remove them in the fall.

Transportation
Portions of South Riverway Drive are within the shoreline jurisdiction. There are no bridges over the river within this river segment. On the north side of the river, outside the city jurisdiction is Boulder Beach, a popular swimming area.

Shoreline Modifications
The shoreline has been fully modified by residential development within this river segment. These modifications include the construction of bulkheads at the OHWM, landscaping, and docks. There are approximately 20 houses along the shoreline in this river segment.

Utilities
Portions of South Riverway are located within the shoreline jurisdiction. There may be utilities located within this ROW.

Environmental
There are no reported environmental sites in this segment.

5.1.4.2 SR-4 Physical, Biological, and Archeological Characterization

The stream bed materials are unknown as they are buried by sediment captured behind the dam. Streambanks, where not armored, consist of landscaped turf grass or ornamental landscaping on erodible soils. The stream channel is deeply entrenched and surrounded by bedrock outcrops, large boulder deposits, or bank armoring.

Hydraulics and Water Quality
Within SR-4, the river channel is backwatered by the Upriver HED. As a result, flow is minimal, water is deep, and most of the hydraulic forces exist as wave action upon the banks. The channel is both vertically and laterally stable (unlikely to migrate up or down, north or south). Flatwater areas behind the dam are subject to wake action from boating activities. Lots without adequate vegetation are suffering from streambank erosion.

Biological Resources and Vegetation
No rainbow trout spawning areas were observed by Parametrix in 2003 during their spawning surveys for the Avista relicensing effort. Trout populations are minimal to non-existent within this reach due to the

hydraulics and low dissolved oxygen. Local anglers report little to no fish within the backwater area behind Upriver Dam.

Due to the deep water characteristics of SR-4, the river is most notably used for wintering waterfowl habitat by ducks, geese, and great blue heron. When other local lakes and waterbodies freeze, the river in SR-4 provides important, unfrozen surface water habitat for waterfowl.

No native plant associations were observed in SR-4. Aside from a few cottonwoods, observed vegetation included landscaped ornamental plants, turf grass, or non-native, feral plant assemblages.

Cultural/Archeological Resources
The WISSARD database did not identify any sites within SR-4, likely because this area was not surveyed for the SRCT project.

5.1.4.3 SR-4 Ecological Condition, Stressors, and Opportunities for Restoration or Conservation

Ecological Baseline
River study segment 4 includes a small portion of Spokane River Reach 7 as classified by SCCD in the 2005 PFC study. SCCD Reach 7 was rated "functional-at-risk" due to the abundance of shoreline modifications/armoring and the lack of native riparian vegetation. The SCCD rated the ecological condition in Reach 7 as poor to fair habitat. These ratings are consistent with the conditions noted within SR-4 (a small portion of SCCD Reach 7).

High Quality Conservation Areas
No portion of SR-4 was noted as high quality conservation area. However, due to the wintering waterfowl habitat provided by the open water portion of SR-4, it does provide a regionally important function during times when other waterbodies freeze.

Degraded Areas and Opportunities for Restoration
The 2005 PFC study ranked restoration potential as "poor to fair" for SCCD Reach 7, which fully contains SR-4. Shorelands within SR-4 have poor restoration potential because they are fully developed. Due to the low fish presence within SR-4, aquatic habitat improvements are not likely to benefit fish populations.

Recommendations
The following Table provides a summary of ecological issues relevant to the selection of an appropriate shoreline designation and to the goal of achieving no net loss of shoreline ecological functions.

Table 5-20: Summary of Ecological Issues SR-4

Ecological Issues	Local Stressors	Recommendations
Riparian Vegetation Condition	Residential development and ornamental landscaping	Encourage shoreline residents to plant native shrub and tree species along the shoreline. Condition new shoreline (re)development permits with riparian enhancement specifications for all new shoreline development proposals (docks, remodels, etc.)
Waterfowl Habitat	Motorboats	Limit motor traffic during early spring and late fall/winter.
Local Contamination	Residential herbicides and fertilizers	Encourage shoreline residents to avoid use of chemical herbicides and fertilizers as these drain directly into the river.

5.2 Shelley Lake

Shelley Lake is a natural lake that is privately owned and managed by the Shelley Lake HOA. The lake is located south of Sprague Avenue between Barker and Sullivan Roads. Shelley has a shoreline length of 2.12 miles and includes 28.7 acres of land within the shoreline jurisdiction. The lake receives water seasonally from Saltese Creek and loses water by infiltration and evaporation. As a result, lake levels fluctuate.

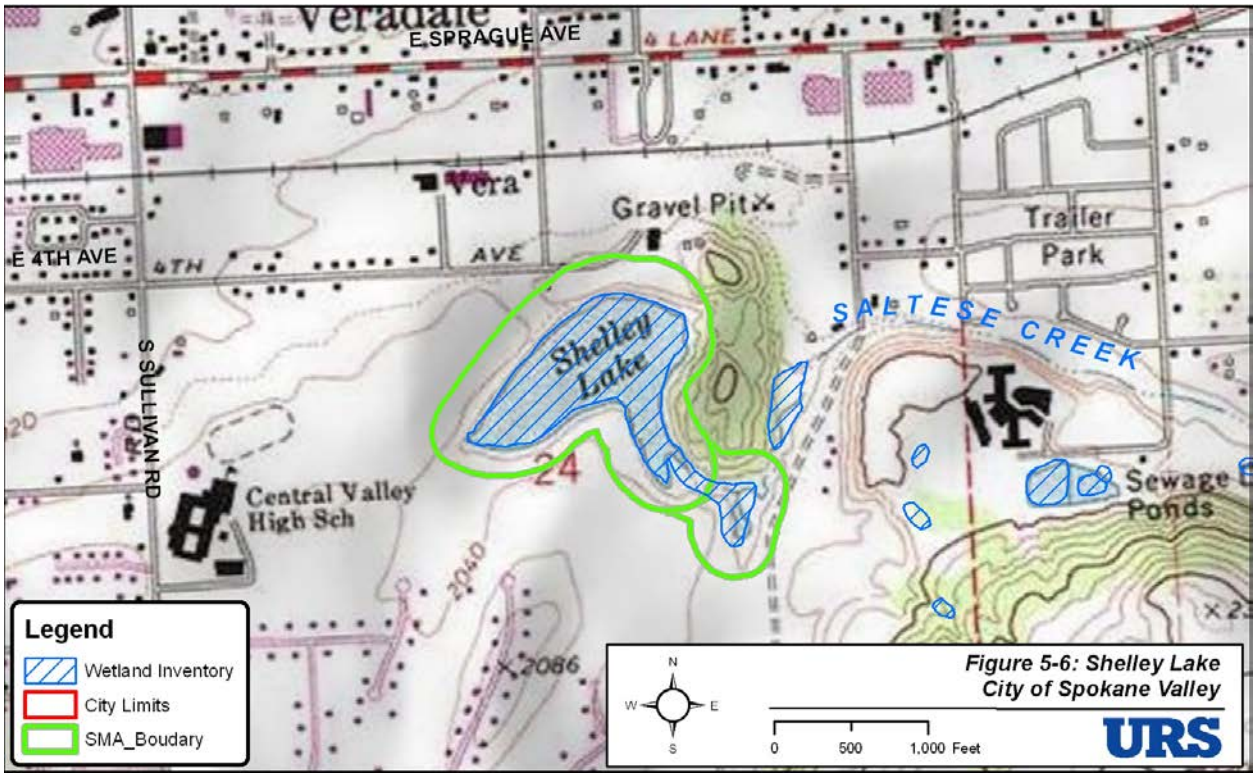


Figure 5-6: Shelley Lake
City of Spokane Valley

5.2.1 Land Use Summary

The land use around Shelley Lake is low density residential and is zoned R-3. R-3 zoning allows for 7,500 square foot lots. The entire lake shore is built out with the exception of the granite outcrop on the east side of the lake, where only one home is located. There is a potential for additional development on the east side of the lake. The area immediately around the lake is designated a common area and contains a paved pedestrian trail.

Tables 5-21 and **5-22** show the land use and zoning within this river segment.

Table 5-21: Land Use Shelley Lake

Land Use	Area (acres)	Percent of Total
Low Density Residential	28.7	100

Table 5-22: Zoning Shelley Lake

Zoning	Area (acres)	Percent of Total

R-3 (7,500 sf lots)	28.7	100

Table 5-23 provides a summary of the built structures, impervious surfaces, and development intensity within the shoreline jurisdiction for this river segment.

Table 5-23: Built Environment Shelley Lake

Features	Area (acres)	Percent of Total
Rooftops	3.7	43
Pavement	4.6	53
Gravel Surfacing	0.4	4.0
Total Impervious	**8.7**	**100**

Recreational Use and Access
Access to Shelley Lake is limited to residents and guests. The development covenants state specifically that the public has no right to use the lake. A paved pedestrian trail has been constructed around the lake in the common area. The trail is dirt and gravel on the west side along the granite outcropping. The trail includes benches and mooring areas for non-motorized boats. The lake and trail are used by residents for walking, observing wildlife and birds, fishing, and non-motorized boating.

Transportation
Residential collector streets are located with the shoreline jurisdiction. The streets are separated from the lake by single family residences and the common area. Drainage from the streets flows to bioswales for treatment. While the roadways are located within the shoreline jurisdiction, they do not directly impact the lake shore. There are two paved access paths to the lake.

Shoreline Modifications
Shoreline modifications within the common area include the paved trail around the lake, benches, three boat mooring areas, the culvert crossing/bridge at the lake inlet, and an irrigation system that covers most of the north and west shoreline. Most areas of the developed shoreline have steep gravely banks.

The shoreline jurisdiction also includes many of the residential lots and some of the residential streets area. Extensive modifications to these upland areas have been made in the form of houses, landscaping, driveways, and utilities.

Based on our understanding of the environment prior to the development, it is difficult to determine if the development has reduced or increased conditions for vegetation and habitat improvements.

Utilities
All utilities serving Shelley Lake Estates are underground and include: sanitary sewers owned by Spokane County, water service by Vera Water and Power, electric and natural gas by Avista Utilities, communications by Comcast Cable, AT&T Residential, and Qwest Residential.

Environmental
According to Ecology's database, there are no locations of concern at Shelley Lake. There are no water quality impairment listings on the 303(d) list. However, lake water quality is degraded during the summer months. There are many factors contributing to the poor water quality, including insufficient water quantity.

Two wells are listed in the Ecology well database within the development.

Cultural/Archeological Resources
No sites on either the local or state registers or the NRHP are contained within the shoreline buffer. Archaeological information may be obtained through the State Historic Preservation Office. There is a possibility of uncovering archeological resources along the shorelines of Shelley Lake.

5.2.1.1 Shelley Lake Physical and Biological Characterization

Excluding the granite outcrops and the Saltese Creek inlet areas, most of the shoreline is characterized by steep, gravely unvegetated banks. Shelley Lake is located over the SVRP aquifer. The lake was possibly formed as a scour hole during the Missoula floods related to the granite exposure on the east shore. Soils in the area are Garrison gravelly loams, which are free draining. However, the bottom of the lake is sealed, possibly due to fine grained sediments (PBS&J, 2009). Based on a preliminary evaluation done as part of the Saltese Flats Wetland Restoration Investigation, infiltration rates at Shelley Lake are estimated at an average value of 10 cfs. The calculated infiltration rate is much lower than found in the gravels of the SVRP aquifer.

Hydraulics
Annual flow to Shelley Lake has been modeled at between 2,613 and 4,090 acre-feet/year (Kahle and Bartolino, 2007). Lake levels have been measured in 2007 through 2009 by the Shelley Lake HOA. Measured lake levels range between 2000.9 feet (December 2007), and 2017 feet (April 2009). The OHWM elevation was determined to be 2013.7 feet by Ecology in 1993. Water generally flows into the lake from the spring melt, which is typically between mid-April through mid-June. Saltese creek is then blocked (dammed) by users along Saltese Flats. According to the Shelley Lake HOA the higher water level in 2008 created better conditions for fish and fauna and a decrease in algae and milfoil.

The lake has an average depth of about 25 feet (ShelleyLake.org). Shelley Lake has no outlet, and the lake level varies through evaporation and infiltration through the lake bottom. To prevent flooding, the upper lake elevation is maintained by diverting high flows in Saltese Creek to the Steen Road Gravel Pit. The drainage area is approximately 15,000 acres (USGS, Streamstats) and includes the north side of Mica Peak and Saltese Flats (Figure 3-2). The drainage area is located entirely within Washington State.

Water Quality
According to Ecology's database there are no locations of concern at Shelley Lake. There are no water quality impairment listings on the 303(d) list. However, lake water quality is degraded during the summer months. There are many factors contributing to the poor water quality, including insufficient water quantity. Two wells are listed in the Ecology well database within the development.

A limited amount of water quality data is available for Shelley Lake. The SCCD has information on conductivity, pH and DO from July and August 2007 collected through a volunteer sampling program. **Table 5-24** summarizes this information. The lake is categorized as eutrophic (overly nutrient-rich) and likely phosphorous limited since large amounts of nitrogen are available from farming on the Saltese Flats (PBS&J, 2009).

Table 5-24: Shelley Lake Water Quality Data

Depth	pH	Conductivity	Dissolved Oxygen		Depth(meters)		Temperature (°C)	
(meters)		(µmhos/cm)	mg/l	Percent	Secchi	Total	Air	Water
Jul-07								
Surface	9.17	191.1	8.83	108.2	2	6.4	25	22.5
1	9.12	193.8	5.42	68				23.4
2	9.16	192.5	5.25	64.6				22.6
3	9.1	193.9	5.11	61.1				21
4	8.45	208.3	3.28	37.6				19.1
5	7.66	214	1.47	16.2				17.1
6	7.42	219.4	1.25	13.7				17
Aug-07								
Surface	8.8	202.1	9.2	104	1.8	6.2	30	22.8
1	8.8	203.3	5.4	62.2				23.9
2	8.93	201.6	5.27	61.1				23.5
3	8.85	198.9	5.15	59.3				23
4	8.32	209.3	4.09	46				21.7
5	7.76	230.4	2.01	22				20.4
6	7.17	251.7	1.42	15.4				19.8

Samples taken at 10:00 am each sample day.

Water quality in the lake is impacted by activities along Saltese Flats and Saltese Creek, as well as lawn care practices in the residential lots adjacent to the lake. Stormwater runoff from roads is treated in bioswales and infiltrated into the ground. Stormwater runoff from the lake shore trail and yards drains directly into the lake. Due to the seasonal flow regime, fluctuating lake levels, and lack of inflow during the summer months maintaining lake water quality will be difficult.

The EIS for Shelley Lake (Ramm, 1994) says that water quality in Shelley Lake had been degraded prior to the development of Shelley Lake Estates by upstream and possibly on-site agricultural activities, as well as peat mining on the Saltese Flats.

Critical Areas

The City of Spokane Valley maps the following critical areas around Shelley Lake:

- Wetlands – associated with Saltese Creek at the southeast end of the lake
- Fish and wildlife habitat conservation area (per PHS, below)
- Critical aquifer recharge area (entire Spokane Valley)
- Special flood hazard area (includes the lake, associated wetland and Saltese Creek)

Priority Habitats & Species (PHS)

Saltese Creek between the Saltese Flats and Shelley Lake is mapped as a riparian corridor by the WDFW. There are no records of any state endangered, threatened, sensitive plants, or high quality native plant communities.

Biological Resources and Vegetation

The 1994 EIS (Ramm) reported the following species as observed or evidence of their presence was observed: Ring necked and cinnamon teal ducks, great blue heron, red tailed hawk, pheasant, quail, flycatchers, killdeer, swallows, robins, flickers, kestrels, wrens, chickadees, great horned owl, field mice, voles, squirrels, marmots, turtles, skunks, large mouth bass and perch. The Shelley lake HOA lists

Canadian geese, ducks, osprey, pheasant, quail, blue heron, white tail deer, marmots, rabbits, fish, frogs, turtles, and many other species as being present around the lake (ShelleyLake.org). Neighborhood sightings within the project area include hawk, owls, Oregon junco, magpies, meadowlark, hummingbirds, evening grosbeak, and rufous sided towhee.

Shelley Lake does not support a significant fish population due to fluctuating water levels and poor water quality. The wetland area was not reported to contain nesting opportunities for waterfowl. The lake does receive use by migrant and resident waterfowl, mostly during the breading season (Ramm, 1994).

The east side of the lake supports a ponderosa pine community along the granite exposure. The steep slopes and rocky areas also support native bunch grasses, perennial forbs, and small native shrubs. A seasonal wetland area in the northeast lake quadrant supports a stand of willows and quaking aspen (*Populus tremuloides*) as well as hawthorne and wild rose shrubs. This wetland, while small in area, has healthy dense vegetation. The second seasonal wetland located along Saltese Creek contains fine grained soils also supports a variety of sedges, although they are small in number. The southerly wetland has a limited water supply in the summer and is seasonally dry. The rest of the lake shore is steep, but stable, and appears to be mostly gravels typical of the Garrison soil series.

Three vegetation sample sites were established around the lake during the shoreline inventory. The sample plots showed a dominance of native species within the tree and shrub stratum and a dominance of non-native vegetation within the herbaceous stratum. Three non native Chinese elms are located along the trail and have the potential to spread and displace native vegetation. It is recommended that these trees be replaced with native or non-invasive trees.

Cultural/Archeological Resources
Neither the state register nor the NRHP identify historic resources within the SMP area around Shelley Lake. However, as with all areas around water bodies, there is a strong likelihood of uncovering historic resources along the shorelines of Shelley Lake.

5.2.1.2 Shelley Lake Ecological Condition, Stressors, and Opportunities for Restoration or Conservation

Ecological Baseline
Unlike the Spokane River, no proper functioning condition assessment was performed for the Shelley Lake shoreline areas. However, the following list provides a snapshot of the factors influencing the baseline ecological condition of the lake and surrounding shorelands.

- Upland habitats east of the lake appear to be in fair condition and functioning adequately for forage and migration; riparian plant species diversity is relatively low and competition with non-native herbaceous communities is high.
- The north, west, and south shorelines are completely developed and lack shade producing vegetation.
- Flows and lake levels are seasonally variable with very low summer flow. Upstream land uses around Saltese Creek have been altered by forestry and agriculture and likely increase the degree of flow variability. Along this reach the floodplain appears to be functioning adequately and the creek appears to be vertically and laterally stable.
- Large woody debris (LWD) was not observed in the lake or creek in sufficient amounts to create structured habitats.
- Water quality is dependent upon stream flow. During summer periods low dissolved oxygen and high temperatures are the predominant water quality issue.

- The Saltese Creek drainage basin collects pollutants such as sediment, deicing chemicals, animal wastes, oil and grease, heavy metals, pesticides, and fertilizers. These are carried down to the lake via seasonal flow.
- The sediment regime is characterized by very high sediment loads during flood flows resulting in shoreline conditions that hinder establishment of native shoreline vegetation.

The hydrology of the Saltese Flats/Shelley Lake system is typical for a western dryland environment. The hydrologic regime of the lake is not likely to have changed much since the Saltese Flats were drained for agricultural purposes. High spring flows fill the lake in a typical year. Evaporation and infiltration lower the water level throughout the summer. The lake level has been artificially maintained in years past from a nearby well. This may be an option in the future for improving summer time water quality.

High Quality Conservation Areas
The east side of the lake is a granite exposure that supports a ponderosa pine community. Due to the developed and unvegetated state of the remaining shoreline areas, this habitat provides important fish (shade) and wildlife habitat along the lake.

Degraded Areas and Opportunities for Restoration
Due to the lake's 16-foot seasonal water level fluctuation, the steep, gravelly shorelines support little vegetation. The Shelley Lake HOA has been planting the shorelines with native plants, but has not had significant success. The lake inlet (south side) has an associated seasonal wetland that would benefit from shade and increased species richness. The small wetland area located on the north side of the granite exposure would benefit from the removal of reed canarygrass and replacement with native lakeshore sedges that better suit waterfowl.

Prior to the development of Shelley Lake Estates, cattle grazing significantly disrupted native vegetation, and eliminated most of the high value habitat along the lake. Knapweed dominated much of the area. In 2007 the Shelley Lake HOA with assistance from SCCD, DOE, and WDFW began the multi-year "Shelley Lake Shoreline Habitat Enhancement Project." The project goal is to rehabilitate the shoreline with native grasses, shrubs, and trees to enhance native habitat while maintaining and enhancing the visual aspect of the lake for residents. In 2007 and 2008 the homeowners cleared noxious weeds from the shoreline and planted native plants. In 2009 high lake levels submerged and destroyed most of the plantings. As part of this project an irrigation system was installed along the paved trail. The Shelley Lake HOA is continuing to pursue establishing vegetation along the shoreline, but due to seasonal lake level fluctuation, establishing the plantings has been difficult. Stabilizing the lake level through either flow from Saltese Flats or pumping from the aquifer is should be considered to improve habitat and use by migratory birds populations.

Recommendations
Table 5-25 is a summary of ecological issues relevant to the selection of an appropriate shoreline designation and achieving the goal of no net loss of shoreline ecological functions.

Table 5-25: Summary of Ecological Issues Shelley Lake

Ecological Issues	Local Stressors	Recommendations
Riparian Habitat Quality	Residential development, ornamental landscaping	Conserve/protect existing plant communities along the east side of the lake. Plant riparian trees and shrubs around the wetland area southeast of the lake. Plant native shrubs and grasses along the upper periphery of the lake margin and encourage native landscaping on adjacent residential parcels.
Wetland Habitat Quality	Minimal summer flow, non-native vegetation	Enhance wetland habitat with native shade-producing trees or shrubs. Attempt to store more water via increased flow and/or hydraulic impoundment.
Invasive Cover	Presence of non-native herbaceous cover	Encourage landscaping with native plants. Continue native herbaceous restoration projects. Remove Chinese elm and reed canarygrass.
Water Temperature	Low water discharge during summer, lack of shade	Become involved in the Saltese Flats enhancement project to secure higher summer base flow support. Plant/maintain shade producing vegetation along the creek outlet and associated wetland areas.
Land Use Conflicts	Redevelopment potential along shoreline	Restrict shoreline development below walking trail. Condition future redevelopment with RHA improvement standards. Change granite exposure zoning to lesser density or conservation area.

It is possible that wetland habitat improvements will benefit water quality, and may even improve summer base flows. By increasing the residence time of stream flow in wetland areas upstream of the lake, the wetland may filter and adsorb nutrients, metals, etc. within the water column. The associated wetland has been disturbed on its eastern side by the construction of a gravel access road.

5.3 Park Road and Sullivan Road Gravel Pits

Under RCW 78.44.050 DNR is granted exclusive authority for regulating the reclamation of surface mines. Reclamation plans are developed as part of the surface mining approval process. Reclamation plans typically include sequential phasing of mining and revegetation which allows for reclamation of portions of the mine while still active. Reclamation must be completed within two years after abandonment of the mine. County or municipal approval for surface mining is an element of the permitting process. The reclamation plans for both the Park and Sullivan Road pits designate that the pits will be left as lakes and an area for wildlife habitat.

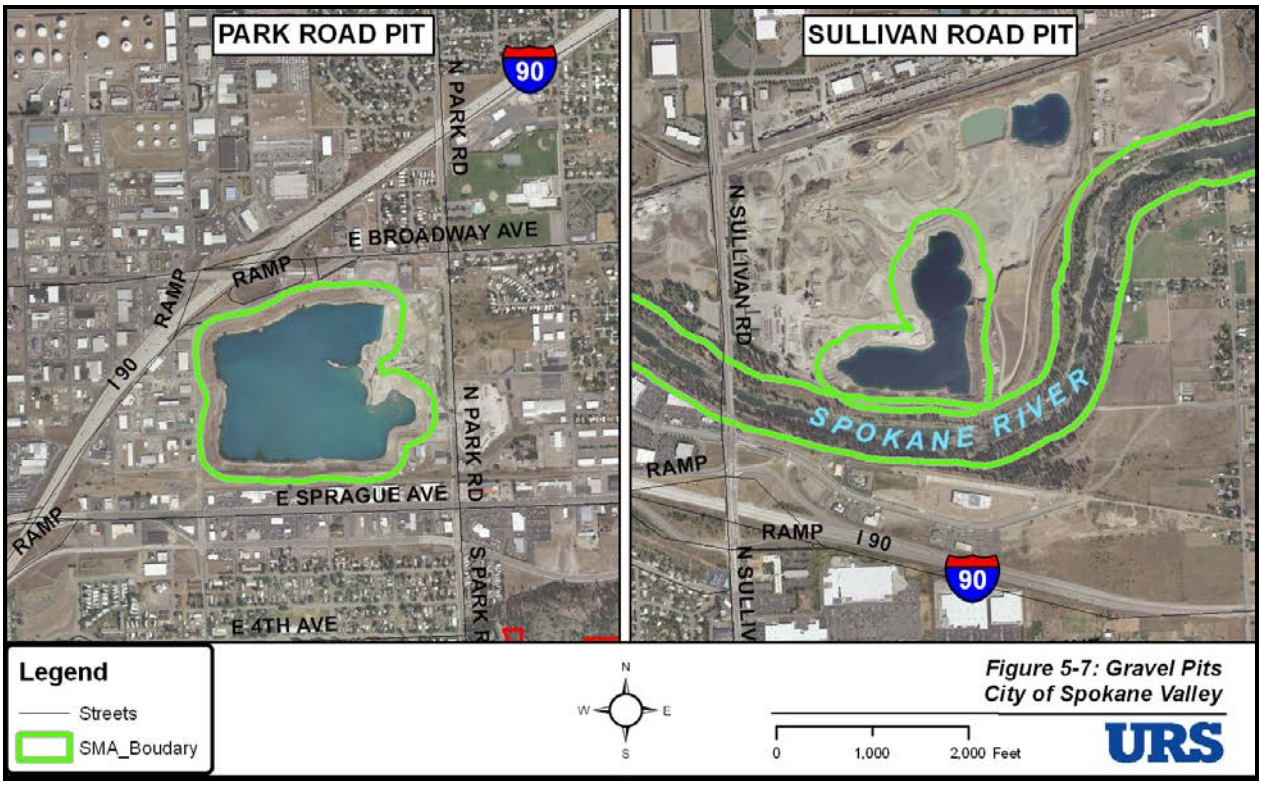


Figure 5-7: Gravel Pits City of Spokane Valley

5.3.1 Park Road Pit

The Park Road pit is located on 98 acres within the City of Spokane Valley between Park Road and Thierman Road in the SW ¼ S13, T25 N, R43 EWM. This pit is owned and operated by Central Pre-Mix. The Park Road pit is used for: sand and gravel mining, aggregate processing, ready-mix concrete production, occasional asphalt production, and other related activities.

The Park Road pit consists of a 69-acre water body with an irregular shape and no outlet. This water body is the result of the mining operation penetrating into the Spokane Rathdrum Valley Aquifer. The water surface elevation fluctuates between 1890 feet and 1900 feet above mean sea level. The shoreline is sloped at 2:1 and transfers to a 3:1 slope near the water surface for safety. The shoreline banks are generally 40 to 50 in height. Mining activities have been carried out to a depth of 160 feet below the water line to an elevation of 1740 feet.

5.3.1.1 Park Road Pit Land Use Summary

The entire Park Road pit has a current land use of Heavy Industrial with a zoning designation of Heavy Industrial (I-2).

Recreation Use and Access

This is an active surface mining site and there is no public access to the water body. The shoreline is composed of gravels at a slope of 2:1 which present a danger of falling to untrained persons. There is no intent to provide public access to the pit at this time. It is known that birders use the pit for the Christmas bird count.

Transportation

Thierman and E. Heacox Roads are located with the shoreline jurisdiction along the western and northern edge of the pit. Thierman changes to Heacox Road at the northwest corner of the Park Road Pit.

Utilities

Three septic tanks and associated drain fields are located within the shoreline jurisdiction. Overhead power is also located within the jurisdiction. Equipment including conveyors, dredges, sorting and washing facilities is located within the shoreline jurisdiction.

Shoreline Modifications

Sand and gravel mining have exposed the aquifer and created the existing shoreline. This is not a natural environment. Reclamation/vegetation of the shoreline will occur within two years after the mine is abandoned. Portions of the pit have become revegetated by natural colonization.

Environmental

According to Ecology's database this gravel pit is not a location of concern.

Archaeological/Historic Resources

No sites on either the local or state registers or the NRHP are noted within the shoreline jurisdiction. Specific archaeological sites have not been identified to our knowledge in this area.

5.3.1.2 Park Road Pit Physical and Biological Characterization

Geology and Soils

The soils at the Park Road Pit are composed of Garrison gravelly loam. The Garrison series is made up of somewhat excessively drained, gravelly or stony soils. Garrison gravelly loam is the dominant soil type in the City of Spokane Valley.

Water Quality

According to Ecology's database this gravel pit is not a location of concern

Critical Areas

The gravel pit is located over and in the SVRP aquifer critical area.

Biological Resources and Vegetation

Because the site is actively mined, the entire perimeter of the site is fenced. This limits wildlife use to birds and any fish that may have been stocked in the pit. Audubon representatives indicate that this pit is known to receive a high diversity and density of neotropical songbirds and waterfowl.

The shoreline of the Park Road pit is a constructed and not a natural shoreline environment. According to the 1995 reclamation plan, prepared by DEA, "Revegetation of graded slopes will utilize native plant materials to enhance the natural character of the grading plan, provide aesthetic appeal, and provide a diversity of habitat." The upland slopes of the site will be planted with Ponderosa Pine, Douglas Hawthorn, Western Chokecherry, and Serviceberry. Slopes near the water's edge will be planted with Black Cottonwood, Pacific Willow, Coyote Willow, and Red Osier Dogwood to create a riparian zone. Created wetland fringes will be constructed and planted with Bulrushes, Cattails, and Sedges.

Access was not permitted within the mine site during the 2009 inventory but off-site observation indicated that volunteer cottonwoods have already begun to colonize the lower shoreline around the water edge.

Priority Habitats & Species
There are currently no classifications for priority habitat or wildlife corridors at the Park Road pit.

Archaeological/Historic Resources
The WISSARD database has no records for this site.

5.3.1.3 Park Road Pit Ecological Condition, Stressors, and Opportunities for Restoration or Conservation

Ecological Baseline
The pit is a private operation that is not open to the public and has not been assessed using a quantifiable methodology such as Proper Functioning Condition. Based on offsite observations it would appear that the ecological conditions of the site are currently impaired by ongoing mining activities, as is expected. Conversations with local wildlife experts indicate that the area is used heavily by songbirds and waterfowl.

Degraded Areas and Opportunities for Restoration
Mining activities have created a new, expanding shoreline area. As such it can not be described as "degraded" because it was not a pre-existing, natural shoreline feature. In accordance with the 1995 revised reclamation plan, the shoreline is to be planted as the mining operations move to subsequent phases. Perpetual stewardship of the reclaimed shoreline environment is planned. There are not any known areas of degradation or erosion to the shoreline at this time.

Wildlife habitat enhancement has been included in the reclamation plan. These enhancements are slated to include the creation of shallow water habitat to encourage the growth of aquatic flora and promote use by aquatic fauna. Nesting boxes will also be placed amongst the upper portions of the shoreline.

5.3.2 Sullivan Road Pit

The Sullivan Road gravel pit is owned and operated by Central Pre-Mix. The Sullivan Road gravel pit has been an active sand and gravel mine since 1980. The pit is located on 235 acres north of the Spokane River between Sullivan Road and Flora Road. The Union Pacific railroad tracks are immediately to the north of the site. The Flora Pit Road transects the south end of the property. As a condition of the 1963 land acquisition agreement with the County; the Flora Pit Road has a County easement for access to the County Flora Shop site.

The revegetated shoreline will consist of varying slopes between a 5:1 to a 2:1. The water surface elevation will be at approximately 1940 feet and will have a depth of 150 feet.

5.3.2.1 Sullivan Road Pit Land Use Summary

The entire Sullivan Road pit has a current land use of Heavy Industrial with a zoning designation of Heavy Industrial (I-2). According to the reclamation plan a 130-acre lake will remain at the terminus of mining operation offset from the Spokane River by 250 feet. A 600-foot setback from Sullivan Road will be retained for future use.

Recreational Use and Access

This is an active surface mining site and there is no public access to the water body. The shoreline is composed of gravels at a slope of 2:1 which present a danger of falling to untrained persons. There is no intent to provide public access to the pit at this time.

Transportation

The Sullivan Road pit is bound by Sullivan Road to the west, Flora Road to the East, and the Union Pacific Railroad to the north. The Flora Pit Road transects the south of the site between the pit and the Spokane River. The County has an easement through the Flora Pit Road to the County facilities on the west side of Flora Road. Central Pre-Mix and the County made an agreement upon the land acquisition in 1963 that should Flora Pit Road be removed Central Pre-Mix would construct a 60-foot County roadway from Sullivan Road to the entrance of the County's Flora Road shop site.

Shoreline Modifications

Sand and gravel mining have exposed the aquifer and created the existing shoreline. It is not a natural surface water environment. Reclamation of the shoreline will follow the completion of each mining phase, or two years after the termination of mining activities. Perpetual stewardship of the site is planned to retain the site once remediation is complete. Remediation will provide native vegetation, as well as wildlife habitat.

Utilities

Septic tank, overhead power, natural gas, registered class A well. Equipment including conveyors, dredges, sorting and washing facilities is located within the shoreline jurisdiction.

Environmental

According to Ecology's database there are no locations of concern within the reach. There are no water quality impairment listings on the 303(d) list. Central Pre-Mix has an active water quality monitoring program at this site.

Cultural/Archaeological Resources

No sites on either the local or state registers or the NRHP are noted within the shoreline jurisdiction. Specific archaeological sites have not been identified to our knowledge in this area.

5.3.2.2 Sullivan Road Pit Physical and Biological Characterization

Geology and Soils

The soils at the Park Road Pit are composed of Garrison gravelly loam. The Garrison series is made up of somewhat excessively drained, gravelly or stony soils. Garrison gravelly loam is the dominant soil type in the City of Spokane Valley.

Priority Habitats and Species

There is currently no PH&S Mapping within the Sullivan Road Pit shoreline areas.

Biological Resources and Vegetation

Because the site is actively mined, the entire perimeter of the site is fenced. This limits wildlife use to birds and any fish that may have been stocked in the pit. Audubon representatives indicate that this pit is known to receive a high diversity and density of neotropical songbirds and waterfowl.

The shoreline of the Park Road pit is a constructed and not a natural shoreline environment. According to the 1995 reclamation plan, prepared by DEA, "Revegetation of graded slopes will utilize native plant materials to enhance the natural character of the grading plan, provide aesthetic appeal, and provide a diversity of habitat." The upland slopes of the site will be planted with Ponderosa Pine, Douglas Hawthorn, Western Chokecherry, and Serviceberry. Slopes near the water's edge will be planted with Black Cottonwood, Pacific Willow, Coyote Willow, and Red Osier Dogwood to create a riparian zone. Created wetland fringes will be constructed and planted with Bulrushes, Cattails, and Sedges.

Access was not permitted within the mine site during the 2009 inventory but off-site observation indicated that volunteer cottonwoods have already begun to colonize the lower shoreline around the water edge.

Priority Habitats & Species
There are currently no classifications for priority habitat or wildlife corridors at the Park Road pit.

Archaeological/Historic Resources
The WISSARD database has no records for this site.

Critical Areas
The gravel pits is located over and in the SVRP aquifer critical area.

5.3.2.3 Sullivan Road Pit Ecological Condition, Stressors, and Opportunities for Restoration or Conservation

Ecological Baseline
The pit is a private operation that is not open to the public and has not been assessed using a quantifiable methodology such as Proper Functioning Condition. Based on offsite observations it would appear that the ecological conditions of the site are currently constrained by ongoing mining activities, as is to be expected. Conversations with local wildlife experts indicate that the area is used by songbirds and waterfowl.

Degraded Areas and Opportunities for Restoration
Mining activities have created a new, expanding shoreline area. As such it can not be described as "degraded" because it was not a pre-existing, natural feature. Rather, it is a nascent waterbody created for industrial applications that may transition into a different land use in several decades.

Wildlife habitat enhancement has been included in the 1995 reclamation plan. These enhancements are slated to include the creation of shallow water habitat to encourage the growth of aquatic flora and promote use by aquatic fauna. Nesting boxes will also be placed amongst the upper portions of the shoreline. In accordance with the reclamation plan; the shoreline is to be planted as the current mining operations move to the next phase. Perpetual stewardship of the reclaimed shoreline environment is planned; the entire shoreline is targeted for riparian cover and conservation.

6.0 SHORELINE USE ANALYSIS

Updating an SMP requires a shoreline use analysis in order to estimate the future demand for shoreline space and identify potential land use conflicts. The following analysis includes a discussion of preferred shoreline uses and an evaluation of existing and planned land uses, total acreage available, and percentage vacant lands by zoning category within the 200-foot SMP jurisdiction along the City's shorelines.

Preferred shoreline uses are identified in the SMP Guidelines (WAC 173-26-201(2)(d)). Preferred uses are those that are unique to or dependent on a shoreline location. These include the following water orientated uses, in order of preference:

- Water Dependent – Cannot exist in a location that is not adjacent to water.
- Water Related – Not intrinsically dependent but whose economic viability is dependent upon a waterfront location.
- Water Enjoyment– Recreational or other use that requires public access.

When determining allowable uses or resolving use conflicts, the following criteria should be considered (truncated from WAC 172-26-201(2)(d)(i-v)):

- Provide appropriate areas for protection and restoration of ecological functions.
- Provide areas for water-dependent and associated water-related issues.
- Provide areas for water-related and water enjoyment uses that are compatible with ecological protection and restoration objectives.
- Locate single-family residential uses where appropriate and where development can occur without significant impact to ecological functions or displacement of water-dependent uses.
- Limit non-water-oriented uses to those locations where the above-described uses are inappropriate or where they demonstrably contribute to the objectives of the SMA.

6.1 Current Shoreline Use

Within the City, there are approximately 511 acres under the jurisdiction of the SMA. This accounts for approximately 3% of the 24,464 acres within City limits. Per **Table 6-1**, below, the majority of the shoreline zone (42%) is held in parks/open space. This is followed by Industrial zoning, which is associated with the gravel pits and Kaiser Aluminum. Low density residential zoning accounts for 16% of the shoreline zone. A combination of other zoning categories, including Mixed Use, Commercial, and Public ROW account for less than 10% of the shoreline zone, combined. Shoreline areas lacking a zoning designation include 287.46 acres of open water and 20 acres of public right-of-way.

Table 6-1: Summary of Zoning Categories within Areas Under SMA Jurisdiction

Zoning Category	Acreage	%
Industrial	153	32.3%
Mixed Use	29	6.1%
Parks/Open Space	201	42.4%
Low Density Residential	76	16.0%
Commercial	7	1.5%
Railroad ROW	8	1.7%

During the prior 20-year planning period, the majority of new development occurred within lands having a Residential, Mixed Use, or Commercial zoning designation.
The Spokane River currently receives moderate to high in-water recreational use due to the hydraulics of the Spokane River, which provides prized floating conditions for non-motorized boats, rafts, and kayaks (rapids, water play areas, moderate to rapid flow). The northern shoreland areas receive moderate hiking and angling uses at specific, publicly-accessible areas, particularly around Sullivan Park. Due to an abundance of public park land and access provided by the Spokane River Centennial Trail (SRCT), the southern shoreland areas receive a good deal of recreational use by bicyclists and pedestrians.

6.2 Projected Shoreline Use

The U.S. Census Bureau determined that 80,927 people lived in Spokane Valley on April 1, 2000. As of April 1, 2009, the Washington State Office of Financial Management estimate for Spokane Valley was 89,440. This figure represents an annual growth rate of approximately 1.5 percent, which is consistent with past estimated growth rates in the Spokane Valley area. Using this growth rate, the estimated 2025 population of Spokane Valley is 114,765, or an increase of 30,815 persons (Spokane Valley 2009).

Planners often estimate a regions ability to support additional growth by quantifying developable lands that are currently listed as "vacant" in the City Assessor's tax parcel database. Such a land quantity analysis (LQA) was conducted by the City of Spokane Valley Planning Department staff in 2009 to update their comprehensive plan. Using the LQA data, there are currently 48.95 acres of land categorized as "Vacant" within the City's shoreline zones (see Figure 6-1, *Spokane River Land Use Capacity Analysis*).

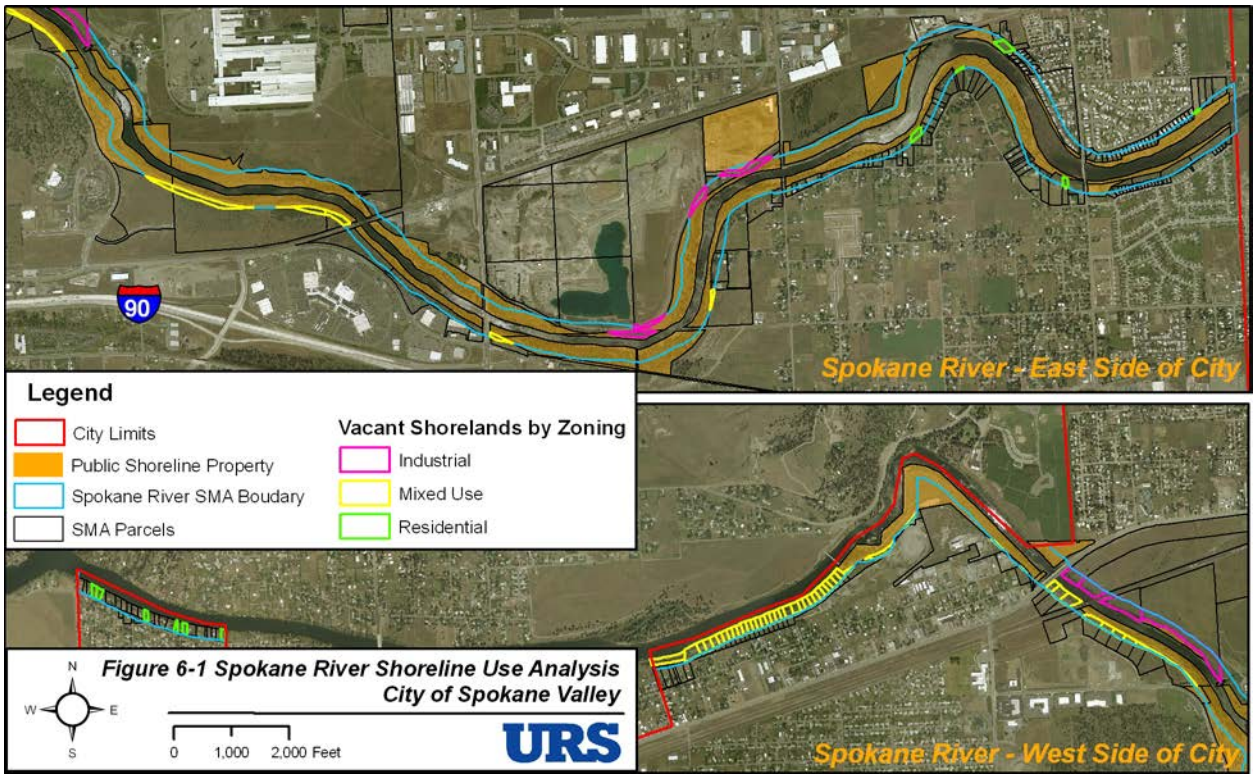


Figure 6-1 Spokane River Shoreline Use Analysis City of Spokane Valley

The majority of vacant land (57%) is associated with lands zoned as "Mixed Use Center" (MUC). The MUC zoning designation allows two or more uses on a site that can either be vertically or horizontally mixed and allows for employment, lodging, and retail along with higher density residential uses. Land with "Heavy Industrial" zoning accounts for the second largest vacant land zoning category within the

shoreline zone (34%). Vacant residential lands (8%) account for a small portion of the remaining developable vacant lands within the shoreline zone.

Table 6-2: Land Quantity Acreage Analysis

Zoning Designation	Acreage	%
Residential	4.15	8%
Heavy Industrial	16.72	34%
Mixed Use Center	28.08	57%
Total	**48.95**	**100%**

Based upon a review of vacant lands intersecting the shoreline zone, the bulk of future development potential lies within the area between the SRCT Bridge and Millwood (Coyote Rock development) and areas east of Trent Street on both sides of the river. Although zoned as Mixed Use Residential, the proposed Coyote Rock developments are all single family residential based on historic platting. However, areas east of Trent, on the southern shoreline, have a greater likelihood of being developed as high density residential with limited mixed commercial uses. Vacant industrial parcels east of Trent Street, on the north side of the river, have the potential to become developed in a manner that could affect the shoreline; however, access to these parcels is limited due to the railroad.

Additional areas with development potential are limited to dispersed fragments of parcels with industrial residential, or mixed use zoning designations. Many of these lack adequate access, utilities, or are otherwise constrained in a manner that limits development potential (such as by utility easements or lack of public access). The majority of areas under SMA jurisdiction within the City are either not developable (e.g. park land) or have already been developed. Some minor redevelopment and infill are expected within residential shoreland areas, particularly within SR-1; however, this would be restricted from infringing upon park lands and, as such, have little direct effect on the current state of shoreline ecosystem functions.

The primary effect on Spokane River's shorelines is expected to come from increased recreation. Due to the presence of the SRCT and widespread public park land throughout the river corridor, increased populations within the region have direct access to the majority of the river's shorelines through the City, particularly along the southern shoreline due to the SRCT. Additionally, the City is likely to expand access to the shoreline areas per the goals of the SMA and public input received thus far. Proper planning for increased access to identify appropriate areas and methods of access will be important to protect the shoreline ecosystem.

Within the City, the section of the Spokane River located between Barker Road and the Mirabeau Point Park is one of the most popular whitewater recreation stretches on the Spokane River. This stretch of the river is heavily used by rafters, kayakers, canoers, and inner tubers depending on water flow and air temperature. Within this reach are a number of natural whitewater features including Flora Rapids, Sullivan Hole, and the Zoo Wave that are used for park and play kayaking and surfing. In 2005 a siting evaluation for potential Whitewater Parks along the Spokane River from Post Falls Dam to Sandifur Bridge in the City of Spokane was prepared by Colorado based Recreation Engineering and Planning (REP). Within the COSV no potential whitewater park sites were identified in large part due to its relatively high gradient. However, the report did address potential recreation improvements in this stretch:

> "This site is an existing river run of approximately 2.5 miles in length, and runs through a residential area. The Barker to Sullivan Run features existing recreational amenities at Sullivan play hole rapid and Flora rapid. This site could be improved through less

> intrusive enhancements. Hardened access points at put-ins and take-outs would facilitate and improve access while limiting erosion." (Site Evaluation For Proposed Whitewater Park Venues in Spokane, Washington, Recreation, Engineering and Planning, 2005).

There are also recent efforts by members of the Spokane Canoe and Kayak Club to improve access and use at Sullivan Hole by re-opening the road on the north bank and making this area into a formal river access and "Whitewater Park." Current ideas are to focus on shoreline improvements only.

The Spokane River within the COSV boundary is very popular for fishing. This area is not stocked with hatchery fish but is fished for the native redband trout. State fishing rules allow catch and release fishing between the first Saturday in June until March 15. Selective gear rules apply where up to three unscented artificial flies or lures with one single point barbless hook can be used. In addition, there is a State Health Advisory to avoid eating any fish caught in this area of the river. During the summer much of the fishing is located below Sullivan Road where cool aquifer inflow maintains water temperatures and flow volumes within the river that are preferable for the native trout populations.

A proposal to establish a Spokane River Water Trail was unveiled at the Spokane River Forum held on March 22nd and March 23rd, 2010. As currently envisioned, the Water Trail would formalize and provide improved direct river access at many of the existing access points identified in this inventory. Improvements to access points may provide opportunity for restoration of vegetation and remediation of contaminated soils. Some of the access improvements, as currently envisioned, would provide for additional parking and extending paved or non-paved roads to the river in order to trailer and launch larger rafts and drift boats. This proposal, if developed would increase direct river use by the general public and also by anglers who reportedly have had difficulties legally accessing the river.

Additional development around Shelley Lake will also result in increased recreational use of the lake, albeit only from the private homeowners that live within the gated community (and guests thereof).

The Sullivan Pit is expected to continue functioning as a private industrial site throughout the foreseeable planning period (20 years). However, the Park Road Pit is nearing the end of active mining and will likely transition into a natural space land use over the course of the next 20 years, per the terms of the reclamation plan. It is expected that, under the SMA, access will be a goal of the future use of the Park Road Pit; however, this would likely only happen if the land became public. If the site remains private, access would be unlikely due to liability and insurance issues.

Based on this estimate of projected shoreline uses and current land availability, it appears that shorelines within the City will be able to accommodate future demand for shoreline development and recreational uses. Primarily due to the widespread state park land along the inner riparian shoreline areas, it appears that the current and projected balance of shoreline land uses, including recreation, residential, mixed use, and industrial uses are adequate to meet current and future demands while maintaining valuable shoreline ecosystem functions.

6.3 Potential Conflicts

Primary conflicts will arise from the attempt to balance recreational river use with the protection and conservation of priority habitats (riparian conservation) and species (red-band trout). Growing use of shoreline areas is likely to result in additional informal access trails, which result in habitat fragmentation and erosion, as is seen along the river banks between the Sullivan Park and the beach below. Additionally, informal camp sites and litter will likely have a negative effect on existing habitat quality via clearing and spread of noxious weeds. This process can be currently witnessed along the southern shoreline in SR-2.

Residential growth in the Coyote Rock development area will likely further degrade a historically disturbed shoreline area due to increased shoreline access pressure. Such pressure would likely result in both formal and informal access route construction. The shoreline will likely experience high intensity shoreline use, including potential dock construction. Dock construction and associated watercraft use would result in a conflict between fish & wildlife habitat conservation, water quality, and recreation due to the potential for increased bank erosion, petroleum pollution, and removal of vegetation cover. Because this area lacks the buffer provided elsewhere along the shoreline by public park land, this area has the potential to resemble the residential area west of Millwood in SR-4. The risk of high intensity shoreline use also conflicts with the potential for improved wildlife migration corridor functions. Due to higher quality riparian habitats to the east and west of the development area, the degraded shorelines through the Coyote Rock development area provide opportunities for shoreline habitat restoration, yet they have the potential to become further degraded by ongoing development. The City should take care to evaluate all shoreline development proposals to ensure that they include compensatory habitat improvements so that migration corridor and shoreline habitat functions are maintained. Such a balance between development and restoration can be achieved with fairly simple riparian vegetation enhancements but proposals must include monitoring requirements to ensure follow-through and maintenance.

Future development of the MUC-zoned vacant lands and infill or redevelopment of low density residential areas along the southern shoreline are likely to occur above the SRCT and, as such, have little direct affect on the high quality riparian forest/shrub habitats. Impacts are more likely to affect degraded grassland communities along the upper river banks. There is also a strong potential to affect the visual/aesthetic quality of the shoreline as experienced from recreational users of the river corridor. These likely impacts provide an impetus for native grassland conservation and restoration in order to achieve no net loss of ecological shoreline functions. Additionally, as with new shoreline residential development, new construction in this area is likely to result in impacts associated with increased shoreline access pressure.

New industrial development east of Trent Street, along the northern shoreline, has the potential to result in conflicting “shoreline dependent” development, recreation, and wildlife habitat uses. This area is already highly degraded by historic shoreline alterations, including old railroad infrastructure, utilities, maintenance roads, and drainage infrastructure. Future development may affect recreational values by clearing vegetation and constructing incongruous development in an otherwise scenic area.

As mentioned above, the Park Road Pit is likely to transition from industrial land uses to open space/natural area conservation land uses. This may result in potential conflicts that are inherent with any attempt at natural resource conservation when proposed within a matrix of high intensity land uses. For example, the area is surrounded by industrial and commercial development and interstate transportation corridors, thus not an ideal conservation area for terrestrial wildlife. The area has the potential to provide important wintering waterfowl habitat, as well as general songbird habitat but the value of such habitat is limited by the movement, noise, glare, and pollution sources located around this pit. Additionally, the use of such an area for recreation conflicts with avian habitat goals and may not be appropriate without safety improvements.

6.4 Management Recommendations

In addition to the recommendations provided in Section 5, this section provides a summary of general recommendations related to the goals of the SMA. Future shoreline developments, including infill and redevelopment proposals, have the opportunity to be allowed in a manner that balances growth with shoreline enhancements to maintain no net loss of ecological functions. This balance would occur through the issuance of shoreline substantial development or conditional use permits, which can be granted with special conditions requiring native plant establishment or similar enhancement activity.

Similarly, future capital improvement projects undertaken by the City in shoreline zones can be tailored to fit the goals of public access, restoration of degraded shoreline habitats, and avoidance of high-quality riparian areas.

6.4.1 Recommendations for the Spokane River

Under RCW 90.58.020, the legislature declared that the development of SMPs for shorelines of statewide significance, shall give preference to shoreline uses in the following order:

1. Recognize and protect the statewide interest over local interest;
2. Preserve the natural character of the shoreline;
3. Result in long term over short term benefit;
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.

The following recommendations provide a means for implementing these preferential uses for the Spokane River, a shoreline of statewide significance.

Protecting Statewide Interest
The City is currently supporting statewide interests for the Spokane River. Regional plans for the Spokane River identify improved recreational use, improved water quality, and support for native fish stocks as regional goals- an appropriate surrogate for statewide interest. Presence of the SRCT throughout most of the City is emblematic of the regional recreation corridor that the City of Spokane Valley supports. Impacts to water quality from Industrial point sources and combined sewer overflows are very limited within the City, despite being a large population center. Regarding support for native fish stocks, the City has little ability to affect the changes that are most necessary for improving native fish runs.

Preserving the Natural Shoreline Character
The city's greatest shoreline asset with regard to preserving the natural shoreline character is the large area of public land under the ownership of the Washington State Parks and Recreation Commission. It is recommended that the City consider establishing shoreline designations for these areas that protect their natural character and functions. These areas provide important shoreline ecological functions and should be conserved and protected in perpetuity to meet the SMA goals of No Net Loss of Shoreline Ecological Function.

Areas where historic land uses cleared vegetation and introduced roads or other infrastructure should be slated for restoration where feasible, particularly near the shoreline. Areas prone to uncontrolled river access result in bank erosion. This is particularly notable below Sullivan Park in SR-2. By establishing formal access points in high intensity use areas, such erosion may be limited. This may require coordination with the State Parks and Recreation Department. Ecology should also be consulted to determine if these sites have environmental issues associated with them. The City should participate in the planning process and evaluate opportunities to combine the goals of conservation, restoration, and public access at these sites.

Uses resulting in Long Term Benefits
Similar to preserving the natural shoreline character, the large, linear tracts of park land along the City's shorelines provide long term conservation of riparian habitats and high-quality visual aesthetics and ecological functions that support enhanced habitat functions for wildlife and recreational opportunities. Therefore long term conservation, protection and restoration (where applicable) of these areas is seen as the best way to result in long term benefits.

New development in shoreline areas should be allowed in a manner that includes a provision for the improvement of shoreline ecological functions. This would allow growth in a manner that balances the future development impacts with the goals of "No Net Loss of Shoreline Ecological Function." The City could accomplish this balance in two ways. It could require applicants to submit and implement shoreline restoration plans commensurate with the level of proposed impact. Alternately, it could collect revenues through property taxes on new development or through shoreline substantial development permits and use this money to fund shoreline restoration projects and project monitoring within the City.

Protecting Shoreline Resources and Ecology
The ecological relationship of shoreline resources, including wildlife, fisheries, invertebrates, and amphibians, all receive benefits from mature & diverse shrub and forest habitats within the riparian zone. Avian resources also depend on diverse shrub and prairie habitats. Therefore, protection, conservation, and restoration of these habitats are the easiest way to benefit multiple shoreline resources and protect the existing ecological conditions within the City. Special emphasis is recommended on the protection of existing trees and the addition of new trees to forest areas along southern shoreline south of pool habitats to provide thermoregulation. Additionally, the fence below the Sullivan Road Bridge on the north side of the river provides a wildlife migration barrier that may force wildlife up onto the road. Alteration of the fence to allow wildlife passage is recommended.

Enhancements aimed at benefitting fish, beyond increased riparian functions (shade, benthic macroinvertebrate production) would require greater effort, particularly with regard to permitting and design. It is recommended that the City work with WDFW and Trout unlimited to secure funding for fisheries enhancement opportunities within the City. Opportunities include enhancement and protection of the unique aquifer interchange area between SR-1 and SR-2. The reemergence of cold groundwater makes this area a likely cold water refuge for fish, particularly during the summer.

Additionally, the existing stormwater treatment facilities in SR-2 provide an opportunity for improved habitat diversity and shading. Such improvements would provide native vegetation cover for small wildlife and improved bird habitat.

Increase Public Access to Publicly-Owned Shorelines and Increase Recreational Opportunities for the Public
Access to the southern shoreline throughout the city is abundant via the SRCT. However, input gathered thus far indicates that additional parking and access to the shoreline from adjacent city streets is desirable at various locations. This includes improved access at Barker Road Bridge. This location provides a logical spot for non-motorized watercraft users to park and access the river. It is also a good bicycle entry point. Additionally, formal non-motorized access to the river from Eden Road would improve public access.

Park land located south of the Kaiser aluminum plant and west of the railroad bridge is a popular destination for hikers. The area contains trails through a mature pine forest with a diverse herbaceous shoreline plant community. Large boulders along the shoreline make the area attractive to rock jumpers. Access to this area is currently gained from Sullivan Park, which is approximately a half mile to the east. For this reason it appears that the public occasionally trespasses through an unimproved dirt road located west of the railroad. This area is, therefore, a logical location for improving public access. The old water

treatment facility, privately owned by Pentzer Venture Hodlings, may provide an opportunity to improve parking. This access improvement is dependent upon land availability.

In addition to creating a wildlife migration barrier, the fence below the Sullivan Road Bridge on the north side of the river provides a barrier to hikers using the otherwise contiguous parklands along the shoreline. Alteration of the fence to allow pedestrian passage is recommended. Also, public input includes requests to improve the dirt road located northeast of the Sullivan Road Bridge to allow access to the river for drift boats.

Lastly, the park land/beach area just west of Myrtle Point is another popular recreation destination. Users can currently access the area via the undeveloped portions of Coyote Rock. However, as the area is developed, access will become limited. This area provides a potential take out location for watercrafts as most users end their runs at this location. It is recommended that the City work with the Washington State Parks and Recreation Commission (WSPRC) to provide access for the take out of non-motorized watercrafts and associated public parking at this location.

Provide for any other element as defined in RCW 90.58.100 deemed appropriate or necessary
Other elements described in RCW 90.58.100 include support for, and appropriate placement of, shoreline-dependent economies and the protection of single family residences against shoreline erosion. Due to the presence of dams, freight mobility and other shoreline dependent industry factors are not applicable within the City. Therefore, there are very few "shoreline dependent" uses that apply to the Spokane River with the City, other than river recreation. Gravel mining is one of the largest industrial land uses in the City; however, it is not shoreline dependent. It is recommended that future gravel mining be restricted to areas outside of the Spokane River's shoreline zone.

Residential structures within the City are located above the floodway and are currently protected against erosive flood events by the dams, which damper flood energy. Shoreline erosion was noted in areas where concentrated stormwater runoff occurred or where off-trail foot traffic resulted in bare soil. Neither is currently posing a threat to upslope residential structures. Native shoreline vegetation establishment/restoration efforts located below residential properties will reduce the risk of erosion.

6.4.2 Shelley Lake

Shelley Lake is expected to remain a private area, thus goals of the SMP related to public access are not applicable. However, goals related to protection of the shoreline ecological functions are applicable. These present the greatest management challenge because there is no public land around Shelley Lake that the City can target for affecting ecosystem enhancements, yet additional development is anticipated around the lake that will add intensified shoreline use pressure. One property remains along the eastern boundary of the lake that includes functioning riparian and wetland habitats and a unique granite outcropping. These natural areas account for much of the wildlife diversity observed at the lake. It is recommended that this area be conserved formally, either through shoreline designation or a conservation easement.

It is recommended that the open space associated wetlands around Saltese Creek near the lake inlet be brought under the SMP and zoned for conservation. Where possible, the City should support enhancements to this area. Such enhancements may include native plantings, hydraulic modifications to store more water, and/or placement of habitat features (woody debris piles).

As a purely residential environment, it will be important to provide policies in the SMP that allow for utility maintenance and other ongoing activities within the shoreline zone. Restrictions that disallow normal, ongoing maintenance activities will either be ignored or will provide bureaucratic difficulty for residents and City staff.

The Saltese Flats Wetland Restoration Investigation has the potential to affect Shelley Lake. The draft report for restoration of Saltese Flats indicates that potential benefits of wetland restoration include improved flow conditions in Saltese Creek and summer lake levels in Shelley Lake. Restoring Saltese Flats to a seasonal, shallow lake/wetlands system is an option that has been of interest to several state and local agencies. The flats have the potential to provide seasonal storage, which would improve summer base flow support. They also have the potential to provide open space and attenuate winter flood water. Water releases later in the summer will help increase the hydroperiod in wetlands associated with Saltese Creek, which will enhance water quality functions in those wetlands.

6.4.3 Gravel Pits

The Park Road Pit is an active gravel mining operation that is approaching the end of its operating life. The land is private property, zoned heavy industrial, and surrounded by an urban road network. The Sullivan Road Pit is not expected to discontinue operations in the foreseeable planning period. As stated in Section 5 (Local Characterization), both pits play an important regional role in providing habitat for waterfowl. It has also been reported that the pits have been informally stocked with fish and, if managed correctly, may provide habitat that would support a cold water fishery. Discussions have been had with representatives of the gravel pits about potential future uses but it appears that little work has been done to address future uses beyond implementing the DNR approved reclamation plans that include wildlife habitat enhancement elements. It is reasonable to anticipate that if the pits remain privately owned public access will remain limited due to potential liability and environmental degradation issues.

In the event that that pits become publicly owned, it is likely that they would be converted to public parklands, conservation areas, or a mix of private residential and park land. Public ownership would have the potential to provide education about the SVRP aquifer and to provide areas for conservation and protection for wintering and migratory wildfowl. There are challenges with transferring ownership to the City, a state agency, or to a third party conservation group. Major issues the costs associated with purchasing the properties, constructing public safety improvements, and continued operations and maintenance. If these pits are converted to future parkland, natural open space, and/or conservation areas, it is recommended that the existing structural facilities be converted to public uses or removed and revegetated. The narrow and steep upland banks should then be upgraded with a walking trails, safety improvements (guard rail), and viewing platforms. Habitat improvements should focus on avian support. Fishery enhancements may also be a popular public use, though easy access to the water surface will require substantial modifications to the banks. The Sullivan Road Pit is located adjacent to the Spokane River corridor and presents an opportunity to improve habitat diversity through this segment of the river. The Park Road Pit is more isolated due to the surrounding urban road network. At the Park Road Pit, increasing/improving habitat for amphibians and terrestrial wildlife may be problematic beyond the confines of the pit due to high intensity vehicular traffic; it may result in frequent road kill. It is anticipated that the future, post-industrial use of these properties will not be determined for several years due to the relative abundance of other recreational opportunities within the city and corresponding low current pressure to develop these areas into public park facilities.

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GLOSSARY

1. **100-year flood**. The terms "10 year," "50 year", "100 year", and "500 year" floods are used to describe the estimated probability of a flood event happening in any given year. Their primary use is for determining flood insurance rates in flood hazard areas. A 10 year flood has a 10 percent probability of occurring in any given year, a 50 year event a 2 percent probability, a 100 year event a one percent probability, and a 500 year event a 0.2 percent probability.
2. **Aquifer Recharge Areas**. Geological formations where rainwater or seepage actually enters an aquifer to replenish or recharge it. Aquifers typically consist of gravel, sand, sandstone, or fractured rock. In recharge areas, water is able to move from the surface down into the aquifer to replenish groundwater supplies, but contaminants may also enter the aquifer at the surface level.
3. **Bank Armoring**. Protective covering, such as rocks, vegetation, or engineering materials used to protect stream banks, or fill or cut slopes from flowing water. Stream bank and channel armoring is done to prevent erosion of channel banks and bottoms during runoff events. In some hydrologic systems stream banks are a major source of sediment.
4. **Bio-infiltration** (208) swales combine grasses and soils to remove stormwater pollutants by percolation into the ground. Their pollutant removal mechanisms include filtration, soil adsorption, and uptake by vegetated root zones.
5. **Bio-stabilization**. Biological shore protection techniques comprised of living and/or organic materials, such as native grasses and sedges; live stakes and posts; jute netting; and coir fiber rolls and mats.
6. **Channel Aggradation.** The accumulation of sediment in rivers and nearby landforms, which occurs when sediment supply exceeds the ability of a river to transport the sediment. The increase in sediment is caused by a decrease in soil binding that results from plant growth being suppressed.
7. **Channelization**. The process of reconstructing the natural course of a stream in order to make it flow into a restricted path.
8. **Combined Sewer Overflows** (CSOs) and stormwater point discharges. Combined sewers convey both sanitary and stormwater flows.
9. **Conservation Areas**. Conservation areas define areas of undeveloped land primarily left in its natural condition. These areas may be used for passive recreational purposes, to create secluded areas, or as buffers in urban areas.
10. **Critical Areas**. The Washington Growth Management Act (GMA) requires cities and counties to designate and protect the functions and values of critical areas, and these are defined as: 1) Wetlands; 2) Areas with a critical recharging effect on aquifers for potable water (CARAs); 3) Frequently flooded areas; 4) Geologically hazardous areas, and 5) Fish and wildlife habitat conservation areas. Recent changes to GMA further require that cities and counties use "best available science" (BAS) when designating and protecting these critical areas.
11. **Cumulative impacts.** Prospective impacts from a proposed action that may be indirectly or directly related to the action and, when taken together, may constitute or result in short-term or long-term impacts.
12. **Ecological Condition Ratings.** Ratings reflect the current structural diversity, density, and continuity of native plant communities. Riparian vegetative communities trap sediments and nutrients from surface runoff and provide a matrix of root systems that serve as effective filters, minimize streambank erosion and flooding damage, assist streamflow maintenance, and moderate temperatures.
13. **Ecological Function Assessment.** For each of the inventory reaches in this document describes the eight processes and functions identified in the SMA as summarized in Section 3.2.
14. **Footprint** (building). The shape and orientation of the ground floor of a structure on the lot.
15. **Frequently Flooded Areas**. These areas of special flood hazard have been identified by the Federal Insurance Administration in the Flood Insurance Rate Maps.

16. **Geologically hazardous areas**. Geologically hazardous areas include both erosion and landslide hazard areas.
17. **Geomorphic processes**. Induced by the hydrology create the in-stream structure that aquatic species have adapted to. Pools, riffles, glides, cover, and off-channel refugia are created through the movement of water at various flows. Each of these habitat elements together provides the complexity in a stream system that is necessary for the various species and life stages of aquatic organisms.
18. **Habitat Fragmentation**. The separation or breakup of a habitat area into smaller sections or habitat blocks by activities, such as development, logging, and agriculture, often resulting in degraded habitat due to blocked migration corridors and decreased access to water and feeding areas. It can also create isolated populations of wildlife and a decrease in their genetic diversity.
19. **Habitat**. The sum total of all the environmental factors of a specific place that is occupied by an organism, population, or a community. 1) High species diversity; 2. High vulnerability to habitat alteration; 3) High wildlife density; 4) Important movement corridors; 5) Important wildlife breeding habitat; 6) Important wildlife seasonal ranges; 7) Limited availability.
20. **Hydrologic functions** (shoreline). Include the transport of water and sediment across the natural range of flow variability; attenuating flow energy; developing pools, riffles, gravel bars, and the recruitment and transport of large woody debris and other organic material.
21. **Hyporheic.** Within a shoreline this zone provides the following functions: removing excessive nutrients and toxic compounds; water storage; support of vegetation and invertebrates; sediment storage; and maintenance of base flows. The subsurface habitat, or hyporheic zone, is the interstitial habitat beneath the streambed that is the interface between surface water and the adjoining groundwater. Vertical and lateral dimensions of subsurface water movements are controlled by geologic structure, such as the relative permeability of underlying strata.
22. **Invasive Plant Species**. Invasive plants can alter and disrupt natural habitats and reduce biodiversity. They are most threatening in ecosystems such as wetlands and fire prone areas. Invasive plant species thrive where the continuity of a natural ecosystem is breached and are abundant on disturbed sites like construction areas and road cuts.
23. **Large Woody Debris**. (LWD). Large woody debris including tree boles, root wads, and large branches, has been recognized as an important structural component of stream systems for both stream stabilization and habitat restoration.
24. **Lucustrine**. The environment of a lake.
25. **Meander**. A bend in a river, also known as an oxbow loop. A stream or river flowing through a wide valley will tend to form a *meandering* stream course as it alternatively erodes and deposits sediments along its course. The result is a *snaking* pattern as the stream meanders back and forth across its floodplain. When a meander gets cut off from the main stream body, an oxbow lake is formed
26. **Native Aquatic and Shoreline-Dependent Wildlife Habitat.** The shoreline provides habitat for a variety of species. Habitat functions may include but are not limited to: space or conditions for reproduction; resting, hiding and migration; and food production and delivery.
27. **Native Plant Community**. The collective product of individual plants indigenous to a particular locale responding to shared habitats.
28. **Neotropical birds**. Account for 340 of the 600 species of birds that breed and nest in North America. These birds migrate each fall to warmer climates in tropical regions of Mexico, Central America, South America, and the Caribbean.
29. **No Net Loss**. Ecological functions recognize that any ecological system is composed of a variety of interacting physical, chemical, and biological components, that are interdependent in varying degrees and scales, and that produce the landscape and habitats as they exist at any time." When more development is proposed than can be reasonably expected to have impacts not anticipated and mitigated by the regulations of the SMP, the resources that may be affected must be identified and mitigated sufficiently to assure no net loss of shoreline ecological functions.

30. **Ordinary High Water Mark**. The OHWM is a line usually identified by examining the bed and banks of the water along the shore to determine where action of the water has created a distinct mark upon the soil with respect to upland vegetation
31. **Palustrine**. Palustrine systems include any inland wetland which lacks flowing water.
32. **PCB's.** A group of man-made chemicals historically used as insulating fluids or coolants and lubricants in transformers, capacitors and other electrical equipment. They have also been used in hydraulic oils, fluorescent lights, inks, carbonless paper, and other uses. Manufacture of PCBs stopped in the U.S. in 1977 (Ecology 2005).
33. **Priority Habitats**. Are habitat areas determined by WDFW to have unique or significant value to many species and that meet one or more of the following criteria:
34. **Properly Functioning Condition (PFC).** Represents the physical ability of a reach to withstand a 25-30 year hydrological event. Properly functioning reaches have characteristics such as: well established riparian vegetation; an active floodplain; and stable channels. Sites considered to be properly functioning may not provide other important ecological or biological values and functions.
35. **Reach**. An expanse, or widening, of a stream or river channel. This commonly occurs after the river or stream is dammed. A reach is similar to an arm.
36. **Riparian function.** The interaction of various hydrologic, geomorphic, and biotic processes across a range of spatial and temporal scales within the riparian environment. As a result, riparian function encompasses a variety of processes that determine the character of the riparian zone and exert influence on the adjacent aquatic and terrestrial environment. The flow of sediment, water, wood, and energy into and out of the riparian zone is controlled by climatic, geologic, topographic, vegetative, and management-related factors.
37. **Riparian Zone.** The riparian zone provides important stream shading through canopy closure over the shoreline, habitat for invertebrates that provide forage for fish and wildlife, habitat for terrestrial species, surface water runoff filtering, and structural stability of stream banks.
38. **Riverine**. Associated with a river.
39. **Scree slopes**. Broken rock that appears at the bottom of crags, mountain cliffs or valley shoulders, forming scree slopes. The term scree is generally used interchangeably with talus, though scree often refers to rocks that are smaller than a volley ball).
40. **Sessile** aquatic species. Sitting on stem.
41. **Shoreland.** The area 200-feet horizontally landward from the Ordinary High Water Mark (OHWM).
42. **Shoreline vegetation.** Both within the riparian zone and the adjacent upland areas, serves the following functions: maintaining temperature; removing excessive nutrients and toxic compound; sediment removal and stabilization; attenuation of flow energy; and providing large woody debris and other organic matter.
43. **Shorelines of Statewide Significance.** For rivers east of the Cascade Mountain Range crest, "those natural rivers or segments thereof where the mean annual flow is two hundred cubic feet per second (cfs) or more; or the portion of the rivers downstream from the first three hundred square miles of drainage area, whichever is less."
44. **Shorelines of the State.** Shorelines of streams or rivers having a mean annual flow of 20 cfs or greater.
45. **Shorelines**. Include all upland areas called 'shorelands', which is the area 200-feet horizontally landward from the Ordinary High Water Mark (OHWM); floodway and contiguous floodplain areas; and all associated wetlands and river deltas (RCW 9.58.030(2)(f)).
46. **Surficial Geology Study (USGS**). Surficial geology is concerned with the description of the types and distributions of unconsolidated sediments across the landscape. This information is collected and maintained primarily in maps and databases. It is useful to hazard assessment, and land use planning.
47. **Total Maximum Daily Load (TMDL**). The maximum amount of any number of a variety of pollutants that a waterbody can assimilate without violating state water quality standards.

48. **Underground Storage Tank** (UST). And **Leaking Underground Storage Tank** (LUST). About 640,000 underground storage tanks (USTs) nationwide store petroleum or hazardous substances that can harm the environment and human health if the USTs release their stored contents. Leaking USTs (LUSTs) can leave considerable clean-up problems.
49. **Water Resource Inventory Area** (WRIA). Ecology was given responsibility for the development and management of these administrative and planning of these watershed boundaries.
50. **Watershed**. A drainage basin or catchment, meaning the region of land whose water drains into a specified body of water.
51. **Wetlands**. Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Appendix A
Data Inventory List

Appendix B
Spokane River Inventory Data Tables

Appendix C
Vegetation Inventory

Appendix D
Wildlife and Bird Information

Appendix E
Technical Review Group Comments

Appendix F
Map Portfolio

Appendix G
Centennial Property Management – Shoreline Assessment