LITTLE SPOKANE RIVER NATURAL AREA (LSRNA) WILDLIFE REVIEW AND RECOMMENDATIONS

PREPARED FOR: WASHINGTON STATE PARKS & RECREATION COMMISSION
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Summary
The Little Spokane River Natural Area (LSRNA) was established by the Washington State Parks Recreation Commission to be conserved in a largely undeveloped condition while allowing for low-impact recreation. Although recreational use is increasing, limited data are available to empirically evaluate if and how recreation or other human activities may be affecting natural resources. The objective of this project was to summarize available information and datasets in order to inform needs for future monitoring activities and management actions. Specifically, the objectives were to 1) review and summarize existing literature relevant to the LSRNA, 2) identify unanalyzed data sets, 3) collect limited new wildlife data, and 4) develop a draft LSRNA management recommendations table.

Seventy-four documents, consisting of 4,722 pages and dated from 1975 and 2022 were reviewed and summarized in an annotated bibliography as well as in review document format. Public databases including the Washington Department of Ecology Environmental Information Management database and the Global Biodiversity Information Facility (GBIF) were queried for datasets. GBIF data along with data from other published datasets were compiled to develop a species list for the LSRNA. An array of six remote cameras was deployed across the LSRNA and three environmental DNA (eDNA) samples were collected and analyzed to record limited new species occurrence data. A draft management objectives table was developed by taking into consideration the literature review, available data, and new data.

Documents reviewed were diverse and included technical reports, draft reports, management plans, PowerPoint presentations, and communications such as faxes and emails. Documents were summarized into the following categories: cultural importance, recreation management, aquatic ecosystems, water quality, and terrestrial ecosystems. Database queries were categorized into water quality (n = 19 databases), recreation (n = 1 database), and species observations (n = 2 data bases). The GBIF database query alone returned 10,681 species observations of which the 96% were bird species (n = 10,278). The camera array resulted in the detection of eight species of birds (n = 1) and mammals (n = 7). The eDNA survey detected ten fish species. The final species list identifies 472 species which have documented observations on the LSRNA. The primary need for setting management goals for the LSRNA appears to be establishing ecosystem response variables to human activity along with adaptive management actions. Collaborative development of a monitoring and adaptive management plan with partner organizations is the most immediate need of the LSRNA. The management objectives presented in this document should be considered a draft starting point for collaborative plan development.

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INTRODUCTION

The Little Spokane River Natural Area (LSRNA) was established by the Washington State Parks Recreation Commission (State Parks) to be conserved in a largely undeveloped condition while allowing for low-impact recreation (WSPRC 2021). The 639.6 acre parcel was acquired between 1984 and 1991 and is adjacent to the city of Spokane (Figure 1, WSPREC 2021). The central feature of the LSNRA is an approximately seven nautical mile section of the Little Spokane River (Little Spokane) which stretches approximately from Dartford Creek to the confluence with the Spokane River. Radiating out from the river corridor, diverse terrestrial habitats range from forested wetlands to shrubsteep and ponderosa pine forest.

The LSRNA is managed as part of Riverside State Park (Riverside). Nearby and adjoining properties include a wide range of management objectives which influence the LSRNA. Conservation properties include the Waikiki Springs Nature Preserve and Waikiki Spring Wildlife Area which are managed by the Inland Northwest Land Conservancy and Washington Department of Fish and Wildlife respectively (Richardson et al. 2020, Richardson 2020). Private homes are located adjacent to the LSNRA and along the river, two golf courses are located upstream, and growing residential neighborhoods are located on all sides of the LSNRA.

Camping, biking, and dogs are not allowed (WAC 352-32-15001) while hiking on trails, birding, and non-motorized boating is allowed. River use has been managed by State Parks since 1998 (WSPRC 2021). Although recreational use is increasing, limited data are available to empirically evaluate if and how recreation or other human activities may be affecting natural resources. The objective of this project is to summarize available information and datasets in order to inform needs for future monitoring activities and management actions. Specifically, the objectives are to 1) review and summarize existing literature relevant to the LSRNA, 2) identify unanalyzed data sets, 3) collect limited new wildlife data, and 4) develop a draft LSRNA management objectives plan table.

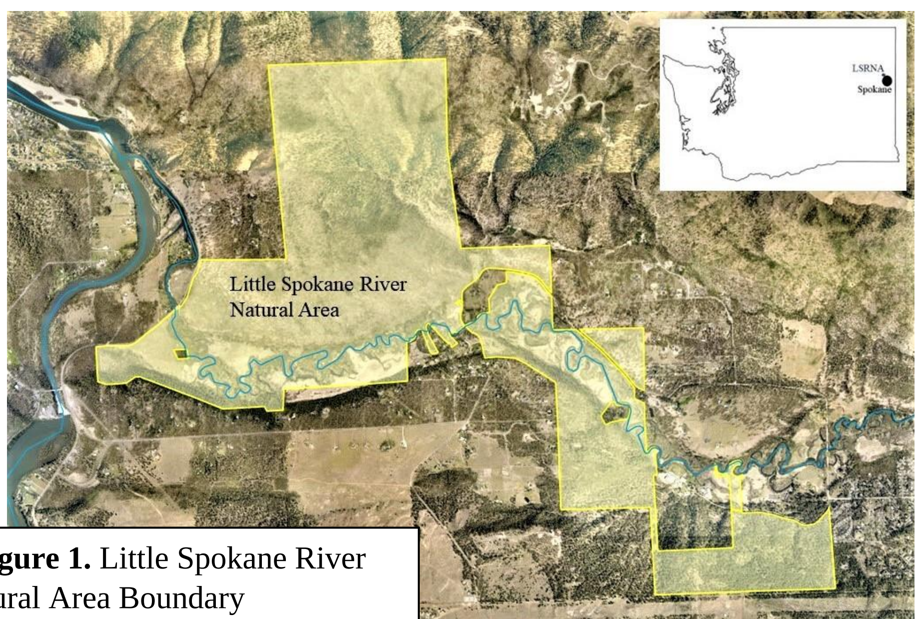


Figure 1. Little Spokane River Natural Area Boundary

METHODOLOGY

Literature Review

State Parks provided a file with the majority of documents (n = 65) at the beginning of the project. Staff from other relevant organizations were contacted to find additional files. Files were provided by the Inland Northwest Land Conservancy (INLC, n = 2), Washington Department of Fish and Wildlife (WDFW; n = 4), and the Spokane Tribe of Indians (Spokane Tribe, n = 3). Each document was reviewed and relevant information was summarized as both a written review and an Annotated Bibliography (Appendix I). The more relevant documents were summarized in the written review. The Annotated Bibliography was developed in order to provide summaries of individual documents and because some files were only marginally relevant to the study (such as old PowerPoint® presentations). In order to allow quick access to relevant file information, the bibliography is organized by file name instead of as a traditional literature cited section.

Unanalyzed Data Sets

A search for unanalyzed data sets was conducted by reaching out to staff at relevant partner organizations and conducting public database queries. The datasets were organized into Microsoft Excel® files. Additionally, published datasets (McLellan et al. 2003, Morrison et al. 2009, Slichter 2010) were summarized as part of the LSRNA species list (see below).

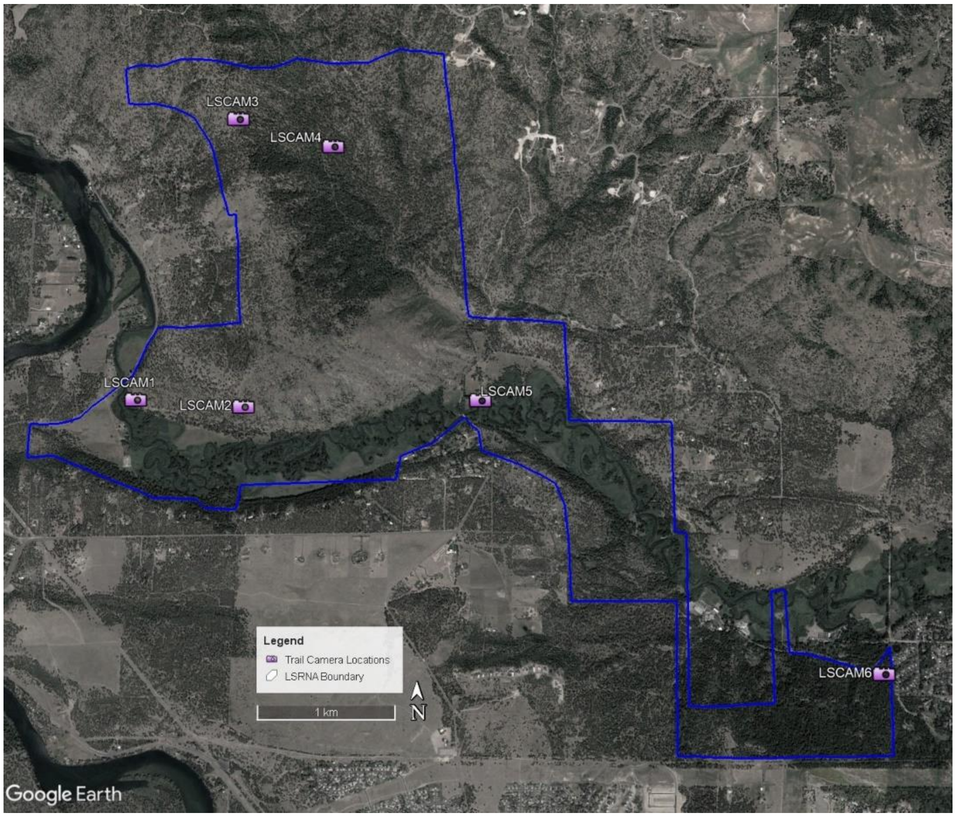
A Google Earth® kml file of the outer boundary of the LSRNA (Figure 2) was developed to define the bounds of the species observation queries. The small areas of private land surrounded by the LSRNA (Figure 1) were not excluded from the search parameters. A rare species information request was submitted to the Washington Natural Heritage Program. The Global Biodiversity Information Facility (GBIF) was queried for all species observations within the defined bounds.

GBIF is an international network and data infrastructure system which serves as a clearinghouse for a wide range of datasets. These include data sources such as iNaturalist®, eBird®, and museum collections. GBIF was queried for all research grade observations within the LSRNA boundary [GBIF.org (12 November 2022) GBIF Occurrence Download https://doi.org/10.15468/dl.hvm2fc]. The data are provided both as a raw download and organized into the LSRNA species list. Published reports, public database queries, and new field data (see below) were used to develop the LSRNA species list (Appendix II).

New Wildlife Data

Remote Cameras

An array of six Reconyx® PC900 HyperFire Professional trail cameras with replicated settings (Table 1) was deployed across the LSRNA (Figure 2). Cameras were deployed on 26 September 2022 or 7 October 2022. All cameras were collected on 26 November 2022. Two cameras (LSCAM1 and LSCAM2) failed during deployment resulting in a shorter active period. Images were reviewed and categorized to species using Timelapse 2.0 (Greenberg and Godin 2012) image processing software. Observations were considered unique by 24 hour period. Therefore, multiple observations of a species were only recorded if animals could be differentiated from one another. For example, two genders of Mule Deer (*Odocoileus hemionus*) or two Coyotes (*Canis latrans*) in the same image frame.



Motion Sensor	On
Sensitivity	High
Pics per Trigger	3
Picture Interval	Rapidfire
Quiet Period	No Delay
Resolution	3.1 MP
Night Mode	Balanced
Illuminator	On

Table 1. Settings for cameras deployed on the LSRNA.

Figure 2. Locations of trail cameras deployed on the LSRNA in the fall of 2022.

Environmental DNA (eDNA)

Organisms consistently shed cells into their surrounding environment. For example, fish shed cells as they move through water. These cells contain DNA which can be sequenced and identified to species and is typically known as environmental (eDNA). As a pilot project to demonstrate the type of information eDNA can produce, sampling kits from the commercial environmental DNA laboratory Jonah Ventures (https://jonahventures.com/ accessed 12 December 2022) were used to collect samples. Kits were $89 each and included sampling materials, laboratory work, bioinformatics analysis, and results files. Larger projects would cost less per sample.

Two water samples were collected at the Saint George and Painted Rocks parking areas and one White-tailed Deer (*Odocoileus virginianus*) scat was sampled near Painted Rocks (Table 2). Water samples were analyzed for presence of fish species and the scat sample was analyzed for plant species. Water samples were collected using a 50 ml syringe to draw water. The water was then forced through a filter in the syringe until the filter clogged. Samples were shipped to Jonah Ventures Next Generation Sequencing laboratory then processed via standard laboratory protocols. For water samples portions of hyper-variable regions of the mitochondrial 12S ribosomal RNA gene were PCR amplified from each genomic DNA sample using the MiFishUF (GTCGGTAAAACTCGTGCCAGC) and MiFishUR (CATAGTGGGGTATCTAATCCCAGTTTG) (Miya et al. 2015) primers with spacer regions. For the scat sample a portion of the chloroplast trnL intron was PCR amplified from each genomic DNA sample using the c (CGAAATCGGTAGACGCTACG) and h

(CCATTGAGTCTCTGCACCTATC) trnL primers. Jonah Ventures performed the bioinformatics analysis which included a Basic Local Alignment Search Tool search to compare the sequences produced to known species. Results included in this report are limited to sequences with a 90-100% match to a single known species sequence on GenBank (https://www.ncbi.nlm.nih.gov/genbank/, accessed 12 December 2022). Additional raw data files are provided along with the unanalyzed datasets located from other sources for this project.

SampleID	Latitude	Longitude	Date	Site	Type*	Volume/Species**
ARGVC45E	47.76809	-117.46409	10/23/2022	LSeDNA1	Water	600ml
E89TR67X	47.78117	-117.49466	10/23/2022	LSeDNA2	Water	300ml
AC5Q3EEZ	47.78108	-117.49454	10/23/2022	LSeDNA3	Diet	White-tailed Deer

Table 2. Location and type (*water or diet) of eDNA samples collected. **Volume of water forced through filter or species the scat sample originated from.

Draft LSRNA Management Recommendations Plan Table

The draft plan was developed by taking into consideration the literature review, available data, and new data. Areas of adequate work and planning were identified, data needs were outlined, and the draft objectives were developed from the identification of areas where adequate work and planning are taking place and where data needs are identified.

RESULTS AND DISCUSSION

Literature Review

Seventy-four documents, consisting of 4,722 pages, dated from 1975 and 2022 were reviewed. Files were diverse and included technical reports, draft reports, management plans, PowerPoint® presentations, and communications such as faxes and emails. The annotated bibliography is presented as Appendix I and the written review, organized by management category, is below:

Cultural Importance

The confluence of the Little Spokane and Spokane Rivers is one of the most important historical and prehistoric sites in Spokane County (Patton and Herberck 1973). This was an important village and gathering site for the Spokane Indians and was used until the late 1880s when indigenous peoples were forced to leave (Patton and Herberck 1973). Early fur traders established the first trading post here, Spokane House, in 1810 by the Canadian Northwest Company. Hundreds of artifacts, rock fish traps, and a burial ground have been discovered in the area. Petroglyphs estimated to be 200 years old (prior to European settlement) can still be viewed at the Painted Rocks Trailhead (Clifton 1972, Patton and Herberck 1973).

Petroglyphs at Painted Rock Trailhead

During the late 1800s and early 1900s the area became popular with elite Spokane community leaders and a variety of historic structures still stand today. Birchwood Farms was built and used as a vacation home by a part-owner of the Spokane Hotel. Montvale Farms is a farmhouse, caretaker cottage, and log cabin constructed in

1898. The Pine-Boyd Residence was built in 1924 by a co-owner of one of Spokane's first car dealerships. Glen Tana Farms, one of the earliest and largest farms in the area, was built by Spokane's first wholesale grocer. The Log Barn was used by native farmers for threshing grain but it is unclear if it was built by Europeans or indigenous peoples (Patton and Herberck 1973).

QR code based interpretive sign.

Recreation Management

The popularity of the LSRNA continues to present day as it serves as an important recreation site. However, recreation data are limited and an empirical evaluation of potential negative ecological impacts is lacking. Upland habitat includes an extensive trail network which is popular with hikers, birders, and runners (Collins 2018). Early management recommendations included dis-allowing motorized watercraft and capping all recreation until a 'human carrying capacity' could be established which would maintain ecosystem integrity and improve water quality (LSRMPC, year unknown, likely 1990s). The LSRMPS (year unknown, likely 1990s) concludes that the following types of recreation will negatively affect water quality via direct or indirect inputs: swimming, fishing, canoeing, kayaking, and golfing (via chemical runoff from golf courses). Recently, the Washington State Parks and Recreation Commission developed a draft plan to assess recreation impacts (WSPRC 2021). There is a self-guided QR code based interpretive guide along the Painted Rocks Trail.

Aquatic Ecosystems

Fish have been stocked in the Little Spokane basin for over 120 years (McLellan and O'Connor 2003) and electroshocking surveys beginning in the 1980s began to document the fish community. Mountain Whitefish (*Prosopium williamsoni*) were the most abundant species (56.1% of 228 fish captured) captured in a 1988 Little Spokane survey that detected eight species (Pfeiffer 1988). Due to a lack of spawning habitat, rainbow trout (*Oncorhynchus mykiss gairdneri*) comprised only 0.05% of the total catch and Pfeiffer (1988) recommended implementing trout habitat improvement work. A follow-up survey detected the same suite of species with similar abundance with the exception of Largemouth Bass (*Micropterus salmoides,* Johnson 1995) which had been 3.9% of the 1988 sample (Pfeiffer 1988).

An electroshocking survey in 2000 at Elokia Lake (upstream of the LSRNA) documented twelve warmwater fish species (Divens et al. 2001) and identified aquatic vegetation management as a priority action. Due to Elokia Lake being connected to the greater watershed, the report recommends mechanical weed control be prioritized over chemical control (Divens et al. 2001).

From 2001-2003, WDFW conducted baseline habitat and fish surveys on free flowing portions of the Middle Spokane and Little Spokane Rivers including tributaries (McLellan and O'Connor 2002, 2003, & 2004). The Little Spokane was divided into 41 reaches of which 21 were surveyed between September 3 and October 1, 2003. The reaches within the bounds of the LSRNA (reaches 39, 40, and 41) were not included in the survey due to access issues. The report states that the reaches were not surveyed because access was not gained from private land owners (McLellan and O'Connor 2004). Of the 21 upstream reaches surveyed the mean wetted depth was 47 cm and mean wetted depth was 47 cm. The predominate substrate type was sand (43%) followed by organic (12%), silt (12%), cobble (10%), boulder (8%), gravel (6%), rubble (6%), muck (2%), and bedrock (<1%). The predominate habitat type was run (74%) followed by riffle (24%), and pools (2%) (McLellan and O'Connor 2004).

The Little Spokane had more fish species detected (n = 19) than tributaries or the Middle Spokane and was identified as the best angling opportunity within the watershed (McLellan et al 2002, 2003, & 2004). Genetics work indicated Rainbow Trout (*Oncorhynchus mykiss*) in the Little Spokane are not influenced by hatchery fish and are native Redband Rainbow Trout (*Oncorhynchus mykiss gairdneri*) (McLellan and O'Connor 2004). At the time of the survey there were two fish passage barriers on the Little Spokane. A concrete railroad culvert located at river km 68.7 is considered a potential partial barrier while a 4.27 m high waterfall at river km 69.4 was considered a complete barrier. Recommended management actions included habitat restoration, identification of life history strategies for Little Spokane fish populations, and evaluation of human constructed fish passage barriers for potential removal (McLellan and O'Connor 2004).

Historically, the Little Spokane watershed was important spawning habitat for Chinook Salmon (*Oncorhynchus tshawytscha*) and although once abundant in the watershed neither Chinook Salmon or Steelhead (*Oncorhynchus mykiss*) were detected in the aforementioned surveys. This

State Parks staff kayaking the Little Spokane.

is presumably because human constructed barriers have dis-allowed migration and spawning. An analysis of potential habitat for stream-type Chinook and Steelhead within the U.S. portion of the blocked area of the upper Columbia River found, for both species, the Spokane Subbasin had the greatest amount of rated habitat (Giorgi 2018). Within the subbasin, Hangman Creek and the Little Spokane had the most habitat for both species (Giorgi 2018). Nearly half (150.5 miles) of 347.3 miles of highly rated potential Steelhead habitat lies within the Spokane subbasin (Giorgi 2018). Most (138.1 miles) of the highly rated potential spring Chinook habitat (186 miles) occurs within the Spokane subbasin (Giorgi 2018). There is moderate potential for summer Steelhead reintroduction but substantial potential for summer/fall Chinook reintroduction in the Spokane River which could support over 6,700 adult summer/fall Chinook (ICF 2018).

On August 6, 2021 fifty adult Chinook Salmon were released at the Waikiki Springs Wildlife Conservation Area (Giorgi 2022). Twenty-nine of the fish were implanted with radio tags

(Giorgi 2022). Immediately after release eight fish regurgitated their tags and tags were recovered from three dead fish (Giorgi 2022). Of the remaining tagged fish (n = 18), the majority remained in the lower Little Spokane between Haynes Estate Conservation Area to the Waikiki Springs Wildlife Area and three fish moved downstream to the Spokane River confluence (Giorgi 2022). In October, 2021 nine redds (clusters of Chinook Salmon eggs) were located near Dartford Creek. Future monitoring will include an environmental DNA project with North Central High School (Giorgi 2022).

The only record found of non-fish aquatic ecosystem surveys within the LSRNA is that Saint George's school fourth grade classes have been conducting benthic macroinvertebrate surveys for approximately six years (Melanie Mildrew, personal communication, 26 October 2022). However, those data were not available to be included in this report. Limited benthic macro-invertebrate surveys have been conducted in upstream portions of the drainage. Benthic Index of Biotic Integrity (BIBO) scores were calculated for samples collected at Deadman and Dragoon Creeks for which macroinvertebrate community overall health was rated as poor to fair (Table 3, https://benthos.kingcounty.gov/Biotic-Integrity-Scores.aspx?Stream-Area=WRIA+55+-+Little+Spokane accessed 21 November, 2022).

Survey Date	Site	Latitude	Longitude	Overall BIBO*	BIBO Rating
9/23/2010	Deadman Creek	47.781539	-117.261587	27.7	Fair/Poor-Poor
10/15/2019	Dragoon Creek (Lower)	47.886193	-117.384	53.9	Good/Fair - Fair
8/5/2019	Dragoon Creek (Upper)	48.020273	-117.519494	26.7	Fair/Poor-Poor

Table 3. Benthic Index of Biotic Integrity *(BIBO) scores and ratings for sites sampled in the Little Spokane Watershed. (https://benthos.kingcounty.gov/Biotic-Integrity-Scores.aspx?Stream-Area=WRIA+55+-+Little+Spokane accessed 21 November, 2022).

Hydrology, Water Quality, and Watershed Management

Ecology divides the state into 62 Watershed Resource Inventory Areas (WRIAs) (https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-availability/Watershed-look-up accessed 21 November 2022). The Little Spokane watershed is called WRIA-55 and is often managed in concert with the Middle Spokane River, WRIA-57.

The Little Spokane Basin covers 679 square miles (Kahle et al. 2013) and is part of the recharge area of the Spokane Valley-Rathdrum Prairie Aquifer which supplies water to the greater City of Spokane area along with metropolitan communities in northern Idaho (Drost et al. 1978). The relationship between the aquifer and the Little Spokane and Spokane Rivers is dynamic and the Little Spokane gains water primarily from aquifer influx (Kahle et al. 2005). Ground-water influx to the Little Spokane is not well understood (Hsieg et al. 2007) but the Little Spokane is one of five major locations where aquifer water is discharged to (Kahle et al. 2007). Models simulating increased water level use from 1977 levels (to 454 simulated cfs) predicted leakage from the aquifer to the Little Spokane to decrease 10 csf (Bolker and Vaccaro 1981). Nearly all late season streamflow in the Little Spokane is from the aquifer and this serves to reduce water temperatures near the Waikiki Springs area just upstream from the LSRNA (Joy and Jones 2012). In 1994 depth to water was 0-250 feet below land surface in the Spokane area (Berenbrock et al. 1995). The geology of the LSRNA is primarily recent (Holocene) non-glacial sediment along the river corridor while upland areas are primarily older (Pleistocence) catastrophic flood gravel deposits (Kahle et al. 2005).

The US Geological Survey (USGS) manages two gauging stations on the Little Spokane. As of 2005, station 12431000 had been active 62 total years (1929-32, 1947-2005) and 12431500 had been active 12 total years (1948-52, 1998-2005, Hortness and Covert 2005). Statistically significant monthly mean stream flows for the months of September and October of the Little Spokane showed a decreasing trend from 1930-2002 (Hortness and Covert 2005). Base flows for the Little Spokane were established in 1986 (WRPLSRB 1986).

The Little Spokane is listed on the 303(d) list under the authority of the federal Clean Water Act (Joy and Jones 2012). Waterways listed under 303(d) are considered impaired or threatened by the Environmental Protection Agency because they do not meet pollution metrics. The Clean Water Act requires states to set priorities for cleaning up 303(d) listed waters by establishing a total maximum daily load (TMDL) for water quality metrics for each listed water body (Joy and Jones 2012). Joy and Jones (2012) evaluated Little Spokane water quality metrics for fecal coliform bacteria, temperature, and turbidity. Seven of thirty sites evaluated for fecal coliform bacteria met the target standard of *extraordinary primary contact recreation* criteria (therefore 23, or 77%, did not meet objectives). Temperature goals for all parts of the watershed are designated for *core summer salmonid habitat* protection: a 7-day average daily maximum (7-DADMax) temperature not to exceed 16° C (Joy and Jones 2012). Joy and Jones (2012) determined that few reaches of the Little Spokane would meet the 16 ºC temperature criterion during high air temperature and low-flow summer critical conditions, even if all system-potential shade were present (Joy and Jones 2012). Turbidity and total suspended solids (TSS) pollutants were evaluated at 29 sites of which 18 require TSS load reduction between 35% and 95%. A 75% TSS reduction is necessary to limit the effects of TSS on fish and other aquatic life at the mouth of the LSR (Joy and Jones 2012). In 2016 lower levels of polychlorinated biphenyls (PCBs) than objectives were found in sediments and water (Friese et al. 2016). However, PCB concentrations in Rainbow Trout, Mountain Whitefish, and Northern Pikeminnow (*Ptychocheilus oregonensis*) tissue exceeded the National Toxic Rule human health criteria (Friese et al. 2016). Additional TDMLs were developed in 2020 to address low dissolved oxygen

Little Spokane River

and high pH impairment on surface waters in the Little Spokane watershed and to address phosphorous load allocation in the mouth of the Little Spokane (Johnson et al. 2020).

To improve water quality tributaries of the Little Spokane and river portions upstream of the LSRNA require 11% to 61% increases in system-potential riparian shade. However, the portion of the Little Spokane flowing through the LSRNA needs minimal (0-2%) shade increase (Joy and Jones 2012). It stands to reason reduction in temperature upstream combined with cool groundwater influx would result in cooler water conditions in the LSRNA. Additionally, residents and responsible parties in other parts of the watershed need to implement best management practices to control nonpoint sources of fecal coliform bacteria, heat, turbidity, and TSS (Joy and Jones 2012). Improvements to meet TMDLs for dissolved oxygen, pH, and phosphorous load include increasing riparian vegetation, reducing sediment-linked nutrients from crop production and erosion, nutrients from livestock, stormwater, and septic systems, runoff from residential areas, groundwater nutrients, and permitted point sources such as the Spokane Hatchery (Johnson et al. 2020).

Category	Water Quality Metric
Fecal coliform bacteria	≤50 colonies/100ml and ≤10% samples used for geometric mean >100 colonies/100 ml
Temperature	7-day mean daily max temperature <16°C
Turbidity	≤5 NTU* over background turbidities of ≤50 NTU or have >10% increase in turbidity when the background turbidity is > 50 NTU.
Dissolved oxygen	>9.5 ml/L.
pH	6.5-8.5

Table 4. Spokane County water quality metrics for the Little Spokane (SCWRS 2020).
*Nephelometric Turbidity Unit (NTU)

Spokane County developed specific water quality measure metrics for the Little Spokane to serve as a baseline in the Net Ecological Benefit (NEB) of WRIA 55 (Table 4, SCWRS 2020). An initial watershed assessment was conducted in 1995 to evaluate existing data on water in the Little Spokane watershed and make decisions about 43 pending water right applications (Dames & Moore and The Langlow Associates 1995). This assessment found stream flows in the Little Spokane and its tributaries often do not meet flow requirements during the summer and fall months. In addition, changes in land use and increases in ground water pumping may cause further declines in streamflow which would adversely affect water quality and aquatic habitat. Because of these findings, the Little Spokane watershed is classified as “high risk” by Ecology. Water rights decisions must consider additional adverse impacts to existing water rights and instream resources (Dames & Moore and The Langlow Associates 1995).

In 2006 Spokane County developed a management plan for the Little Spokane Watershed which addressed two of four possible components of a watershed management plan (LSRMSRPU 2006a). The plan addresses water quantity and instream flow but does not address water quality or (fish) habitat (LSRMSRPU 2006a) as the plan determines that instream flow is adequate for target protection species rainbow trout and mountain whitefish (LSRMSRPU 2006a). The plan recommends minimum flows of 90 cfs at the Dartford gauge along with additional study of fish spawning, migration and rearing habitat for resident species (LSRMSRPU 2006a). Spokane County is the lead agency for plan implementation with cooperating organizations Stevens County, Pend Oreille County, City of Spokane, Whitworth Water District, and Vera Water and Power (LSRMSRPU 2006b).

In 2008, Ecology developed a detailed implementation plan which outlined 107 actions to address water issues in the Little and Middle Spokane River Basins but only one action specific to the Little Spokane which was to maintain minimum flow of at least 90 cfs at the Dartford gauge (WWIT 2008). Also in 2008, an implementation plan for watershed management on the West Branch of the Little Spokane (upstream of the LSRNA) was published which recommended a wide range of recommended actions to occur upstream of the LSRNA (Golder Associates 2008).

Several opportunities for watershed improvement were identified in 2009 although none were specific to the LSRNA. PBS&J (2009a) identified water storage opportunities including existing dams (n = 8), natural lakes, potential new dams (n = 2) and infiltration using existing lakes or depressions. They concluded the best option to increase water storage would be the improvement of the Eloika Lake control structure to increase the lake level (PBS&J 2009a). The same group identified 136 potential wetland restoration or creation sites which would cover about 6,000 acres. Four of these were identified for in-depth evaluation (PBS&J 2009b). Those four sites total 1,087 acres are called Diamond North (295 acres), Eloika Southeast+South (99 acres), Newman North (586), and Chester Creek (107 acres) (PBS&J 2009c). Additional evaluation is necessary including wetland delineations, site surveys, water table monitoring, and land owner willingness to participate (PBS&J 2009c).

A watershed plan addendum was developed in 2020. The addendum first reviews the actions that planning units determine to be necessary to offset potential impacts to instream flows associated with permit-exempt domestic consumptive water use. Additionally, the addendum evaluates whether the plan updates will result in a NEB to instream resources within the WRIA. The addendum concluded that all proposed actions are in compliance with RCW.90.94.020 and will result in a NEB (Covert ad Pacheco 2020). The addendum was adopted by DOE in 2021 (Watson 2021).

Terrestrial Ecosystems

The LSRNA has long been recognized as important habitat for terrestrial and aquatic wildlife including birds, aquatic mammals, reptiles, and a Great Blue Heron (*Ardea herodias*) rookery which occurred on the property at one time (Jones 1975). Historical vegetation consisted of Ponderosa Pine (*Pinus ponderosa*) forests, Douglas-fir (*Pseudotsuga menziesii*) forests, riparian forest, shrubland, and wetlands (Morrison et al 2009). An initial effort to map plant communities at Riverside was made in 1997 with a more substantial effort in 2009 (Morrison et al. 2009) but those efforts did not include the LSRNA. Morrison et al. (2009) mapped 352 vegetation community polygons within Riverside (but excluding LSRNA). Twenty-nine percent (n = 120) of the 410 vascular plants identified on Riverside by Morrison et al (2009) were not native.

The first effort to document vascular plant species on the LSRNA occurred in 2010 at the Painted Rocks Trailhead from which the Washington Native Plant Society developed a list of 135 plant species (101 native, 34 introduced) identified at the trailhead (Appendix II, Slichter 2010). In the spring of 2017 Morrison et al. (2017) used similar methodology to Morrison et al. (2009) to conduct spring vascular plant surveys on 140 polygons across approximately 2,300 acres of Riverside including large portions of the LSRNA. The survey documented 164 vascular plant species including 10 tree species, 25 shrubs, 103 herbs, 23 grasses/sedges/rushes, and 3 ferns/horsetails. Morrison et al. (2017) provides a list of plant species observed in the survey but does not provide observation locations. Therefore, the Morrison et al. (2017) species list is not incorporated in to the species list developed for this report (Appendix II) because it is difficult to discern if they were observed within the bounds of the LSRNA or other surveyed Riverside polygons.

Morrison et al. (2017) determined noxious weed cover in surveyed LSRNA polygons ranged from 0-50% and that low elevation disturbed areas had a higher percentage of noxious weeds than less disturbed areas. The ecological condition of LSRNA surveyed polygons was rated from poor to good. No rare plants were observed by Morrison et al. (2017) but the limited time-frame of the survey (only occurring in spring) limited rare plant detectability. Three rare plant species are known to occur on Riverside (Morrison et al. 2009) but have not been documented on LSRNA: prairie cordgrass *(Spartina pectinata*), gray stickseed (*Hackelia cinerea)* and small-leaf pussytoes (*Antennaria parvifolia*) (Jasa Holt, Washington Natural Heritage Program, personal communications 22 November, 2022).

Morrison et al. (2017) identified 19 plant community types on the LSRNA. The 19 plant communities identified by Morrison et al. (2017) included three non-native groups:
<u>IRPS:</u>
Yellowflag Iris (*Iris pseudacorus*),
<u>PHAR3:</u>
Reed Canarygrass (*Phalaris arundinacea*)
<u>Weedy/Disturbed</u>

The 19 plant communities identified by Morrison et al. (2017) also included five NatureServe ranked global or state imperiled communities:
<u>*PIPO/PSSP6*</u>:
Ponderosa pine (*Pinus ponderosa*)/Bluebunch Wheatgrass (*Pseudoroegneria spicata)* G4/S1
<u>*PIPO/CARU*</u>:
Ponderosa pine (*Pinus ponderosa*)/Pinegrass (*Calamagrostis rubescens*) G2Q/S1
<u>*PIPO/SYLA*</u>:
Douglas fir (*Pseudotsuga menziesii*)/Pacific Ninebark (*Physocarpus malvaceus*): G2/S1
<u>*PIPO/PHMA5*</u>:
Ponderosa pine (*Pinus ponderosa*)/Idaho Fescue (*Festuca idahoensis*): G4/S2
<u>*POBALT/SYAL*</u>:
Black Cottonwood (*Populus balsamifera* ssp. *trichocarpa*)/Common Snowberry (*Symphoricarpos albus*) G2/S1-S2

High priority terrestrial management needs for the LSRNA include adaptive weed management (McKinney 2002, Morrison et al. 2009, Morrison et al. 2017), a full vascular plant species inventory (Morrison et al. 2017), additional rare plant surveys (Morrison et al. 2017), and restoration (Morrison et al. 2017).

Historically, a Great Blue Heron rookery was a prominent wildlife feature which occurred along the river on the LSRNA. Recreation has been speculated to cause the herons to abandon the rookery as of at least 2004 (Boese 2004). Specifically, canoers were blamed in a fax from R. Boese representing Spokane County to Mike Mikkleson representing RSP (Boese 2004). R. Boese stated that canoers drop a canoe off at a launch site and jog back to the canoe as part of a 'physical exercise routine' on a weekly basis (Boese 2004). The document speculates this activity on its own caused the Great Blue Herons to abandon the rookery (Boese 2004). The fax was low quality and difficult to read, therefore, the name "Boese" may be misspelled.

Birds are the primary group of terrestrial animals which have had been targeted for habitat or survey work. Two bird studies were conducted in 1996. In one study birds (n = 362 birds, n = 33 species) were banded on the LSRNA (Appendix II, Ferguson 1996). A second study documented waterfowl occurrence and habitat associations on the Little Spokane and Long Lake during the 1996 breeding season. The Little Spokane constituted two of five survey transects each of which was survey weekly from May 1 to July 31, 1996. Ten species were observed with broods [Mallard (*Anas platyrhynchos*), Canada Goose (*Branta canadensis*), Wood Duck (*Aix sponsa*), Western Grebe (*Aechmophorus occidentalis*), Hooded Merganser (*Lopgodytes cucullatus*), Green-winged Teal (*Anas carolinensis*), Pied-billed Grebe (*Podilymbus podiceps*), Common Merganser (*Mergus merganser*), American Coot (*Fulica americana*), Cinnamon Teal (*Spatula cyanoptera*)]. Thirteen species were observed without broods [Common Loon (*Gavia immer)*, Horned Grebe (*Podiceps auratus*), Red-necked Grebe (*Podiceps grisegena*) , Eared Grebe (*Podiceps nigricollis*), Blue-winged Teal (*Spatula discors*), Northern Shoveler (*Spatula clypeata*), Gadwall (*Mareca strepera*), American Wigeon (*Mareca americana*), Redhead (*Aythya americana*), Ring-necked Duck (*Aythya collaris*), Lesser Scaup (*Aythya affinis*) , Common Goldeneye (*Bucephala clangula*), Barrows Goldeneye (*Bucephala islandica*)].

Ponderosa Pine on Knothead Hiking Trail Loop

Over the last several decades, a variety of bird nest boxes have been established and maintained on the LSRNA. The Spokane County Parks Department deployed fourteen Wood Duck nest boxes in 1986 (Mack 1994). In 1989, those boxes were repaired and additional wood duck (n = 5) and screech owl (n = 6) nest boxes were deployed on the LSRNA (Mack 1994). All Wood Duck (n = 19) and screech owl (n = 6) nest boxes were monitored from 1989-1993 (Mack 1994). During the five year monitoring period wood duck use of the next boxes increased from 21% to 33% while there was no sign of owl use of any nest boxes (Mack 1994). Currently, twelve Wood Duck boxes are monitored and maintained at least annually by students from Saint George's School [(SGS), (Figure 3), (Melanie Mildrew, personal communication, 26 October 2022)].

In the mid-1990s a cost estimate for a wildlife and habitat carrying capacity was developed (LSSRNAC 1995). Targets included establishing baseline habitat/vegetation conditions, mammal inventory, bird inventory, and amphibian inventory (LSSRNAC 1995). A follow-up document was produced with an implementation plan but was not available for review for this report and no evidence was found that the plan was implemented (Dr. Margaret O'Connell, personal communication 8 November 2022).

Figure 3. Locations of Wood Duck nest boxes maintained at least annually by students at Saint George's School. Image courtesy of SGS.

Unanalyzed Data Sets
Three types of data sets were found: water quality, recreation, and species observations. Data sets are organized into folders and files which are identified and described below:

Water Quality Data Sets
Folder>File Name:
Spokane Riverkeepers>
lsr.locations for EIM.xls
lsr master all data.xlx

Saint George's School>
SGS Water Data 2015-2019.xls

The Spokane Riverkeepers deployed water temperature data loggers at two locations in 2020. Water temperature is logged every 30 minutes year-round at the two locations. Spokane Riverkeepers plans to keep the loggers deployed as long as funding is available. Data are archived in the Washington State Department of Ecology Environmental Information Management System. Additionally, volunteers float the Little Spokane annually and record temperatures as they float. However, the float temperature data are not attached to a GPS (Jules Schultz, Spokane Waterkeepers, personal communication 25 October, 2022). From 2015-2019

Saint George's School students conducted a water quality project in which they collected temperature, turbidity, and nutrient data at three locations (Melanie Mildrew, Saint George's School, personal communication, 26 October, 2022).

Washington State Department of Ecology
Ecology Environmental Monitoring Data>
EIMDiscreteResults_2022Nov30_21613.xls
EIMLocationDetails_2022Nov30_18.xls
EIMStudyDetails_2022Nov30_17.xls
EIMSummarizedTimeSeriesResults_2022Nov30_35881.xls

The query of Washington State Department of Ecology Environmental Information Management System for datasets with data from the Little Spokane resulted in 17 datasets. The datasets include 299,948 water or air temperature readings and 21,614 measurements of other water quality variables including pH, flow, and dissolved oxygen.

Recreation Data Sets
Folder>File Name:
State Parks>
Summer 2022 Little Spokane put-in data.xls

In 2022 recreation users and vehicle parking was monitored at the Painted Rocks take-out (John Ashley, State Parks, personal communication, 21 November, 2022). Unanalyzed data are available in the files above.

Species Observations
The Washington Natural Heritage Information System has no record of rare plants, rare nonvascular species, or rare/high-quality common ecological communities within the LSRNA defined by the boundaries of the kml submitted (Figure 2, Jasa Holt, Washington Natural Heritage Program, personal communication, 22 November, 2022).

WDFW>
Little Spokane River Data_03
This file contains raw fish observation and habitat variables collected by WDFW from 2001-2003 (McLellan et al. 2001, McLellan et al. 2002, McLellan et al. 2003).

GBIF>
LSRNA GBIF data.xls
LSRNA Species List.xls

The GBIF query [GBIF.org (12 November 2022) GBIF Occurrence Download https://doi.org/10.15468/dl.hvm2fc] resulted in 10,681 species level observations from nine data sources. Ninety-four percent of the GBIF observations were from eBIRD (n = 10,053), 5% of observations were from iNaturalist (n = 578), with the remaining seven datasets comprising the remaining 1% of observations (n = 50) (Table 5).

Dataset	n
NCSM Mollusk Collection	1
Charles R. Conner Museum Vertebrate Collection	5
iNaturalist Research-grade Observations	578
Xeno-canto-Bird sounds from around the world	4
EOD - eBIRD Observation Dataset	10,053
The New York Botanical Garden Herbarium (NY)	3
U. of British Columbia Herbarium - Lichen Collection	18
Pl@ntNet automatically identified occurrences	13
U. of British Columbia Herbarium - Bryophytes Collection	6

Table 5. Dataset sources of GBIF species observations.

GBIF observations were comprised by 387 fungus (n = 20), plant (n = 89), and animal (n = 278) species. Of all animal species, bird (60%, n = 168) and insect (33%, n = 92) observations were the most common. Other animal species included amphibians (n = 1), spiders (n = 5), bivalves (n = 1), land snails (n = 1), mammals (n = 6), and reptiles (n = 4) (Table 6). The GBIF database has photos available for many of the species observed on the LSRNA (Figure 4).

Kingdom	n Species	n Observations
Fungus	20	25
Plantae	89	154
Animalia	278	10,502
Total	**387**	**10,681**
Animal Class		
Amphibia	1	3
Arachnida	5	9
Aves	168	10,278
Bivalva	1	1
Gastropoda	1	1
Insecta	92	188
Mammalia	6	16
Reptilia	4	9
Total	**278**	**10,505**

Table 6. Classification of GBIF species observations.
Top: Species and observations by kingdom.
Bottom: Species and observations of animals by class.

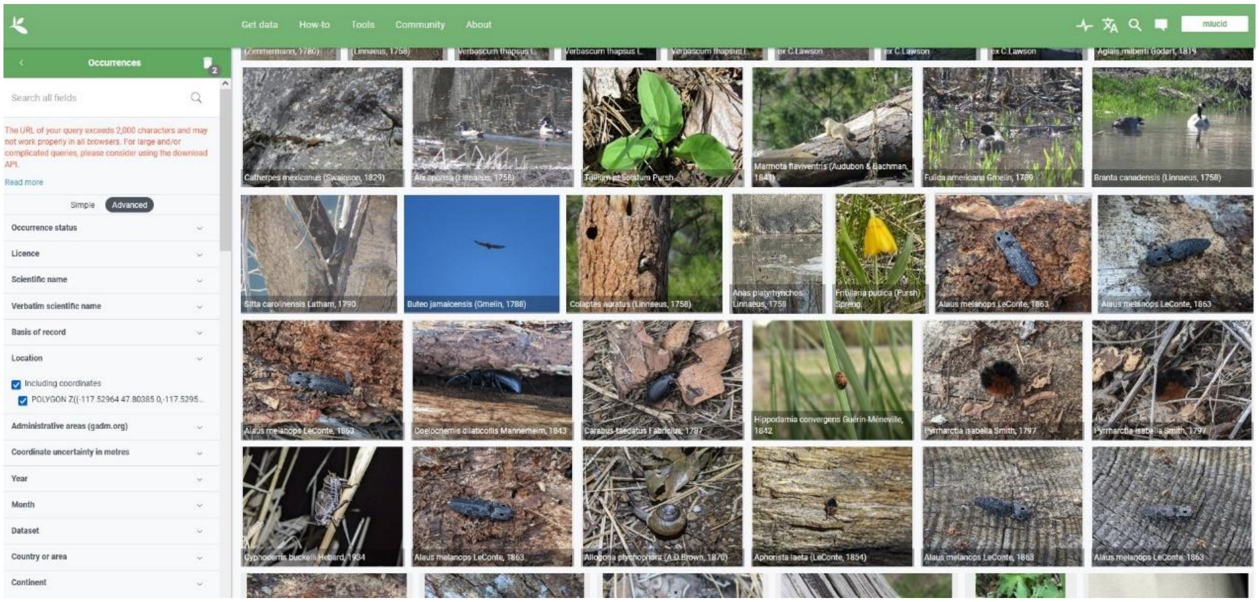


Figure 4. Screenshot of GBIF PhotoGrid of species observed on the LSRNA.

LSRNA Species List

Beyond the GBIF observations, other datasets reported 194 additional species (Davis 1997, Ferguson 1996, Giorgio 2021, Johnson 1995, Pfeiffer 1988, Slichter 2010, McLellan et al. 2003, this study). Total number of species observed include amphibians (n = 1), birds (n = 178), fish (n = 25), mammals (n = 11), reptiles (n = 4), spiders (n = 5), gastropods (n = 2), insects (n = 92), fungus (n = 20), and plants (n = 134). Therefore, the total number of species documented on the LSRNA to date is 472 (Appendix II).

New Wildlife Data

Remote Cameras

Cameras detected seven species over the course of 265 total trap nights (Table 7, Figure 5). White-tailed Deer (n = 95 observations, 59%) and Mule Deer (n = 16, 10%) were the most commonly detected species. Coyotes (n = 15, 10%), Moose (*Alces alces*, n = 4%), Snowshoe Hare (*Lepus americanus*, n = 6, 4%), Racoon (*Procyon lotor*, n = 2, 1%), and Wild Turkey (*Meleagris gallopavo*, n = 4, 2%) were also detected. Although all of these species are commonly known to occur on the LSRNA; these findings represent the first verifiable observations of Moose, Snowshoe Hare, Coyote, and Racoon on the LSRNA. Cameras deployed by Parks employees in the past have detected Black Bears (*Ursus americanus*) and Mountain Lions (*Puma concolor*) (John Ashley, State Parks, personal communication 12 December, 2022). However, those records are not available in queried reports or databases so are not included in the total species list. The camera array was deployed for a relatively short amount of time and skewed toward the western portion of the LSRNA. More equal stratification and longer deployment would likely have results in more species detections.

Camera	Latitude	Longitude	Elev (m)	Deploy Date	End Date	TN	WTD	MD	Coyote	Moose	Hare	Racoon	Turkey
							Species Detected						
LSCAM1	47.78119	-117.52902	471	9/26/2022	10/10/2022	15	8	0	0	0	0	2	0
LSCAM2	47.7807	-117.51806	498	9/26/2022	11/10/2022	46	7	1	1	0	4	0	0
LSCAM3	47.79981	-117.51839	735	10/7/2022	11/26/2022	51	3	10	0	2	2	0	0
LSCAM4	47.79829	-117.50948	590	10/7/2022	11/26/2022	51	7	2	0	0	0	0	0
LSCAM5	47.78112	-117.49451	473	10/7/2022	11/26/2022	51	67	3	5	4	0	0	0
LSCAM6	47.76308	-117.45549	505	10/7/2022	11/26/2022	51	3	0	9	0	0	0	4
					Total	**265**	**95**	**16**	**15**	**6**	**6**	**2**	**4**

Table 7. Remote cameras deployed on the LSRNA, trap nights (TN) active and species detected including White-tailed Deer (WTD) and Mule Deer (MD).

Figure 5. Remote camera images. Clockwise from upper-left: White-tailed Deer, Mule Deer, Coyote, Moose.

Environmental DNA (eDNA)
Ten fish species were identified from the two aquatic samples, three of which were new species for the LSRNA (Table 8). Prior to this study no records were found for Brook Stickleback (*Culaea inconstans*), Cutthroat Trout (*Oncorhynchus clarkia*), or Lahontan Redside (*Richardsonius egregious*) on the LSRNA. Five plant species were identified in the White-tailed Deer scat. Four of the plants identified are non-native species which are either common landscaping plants (n = 3) or invasive (n = 1). Plant species identified were not included in the LSRNA species list (Appendix II). This is because White-tailed Deer likely are moving on and off of the LSRNA and the diet sample does not necessarily indicate the species consumed were on the LSRNA.

Raw eDNA data are available in the following folder:
Folder>LSRNA Data and References:
LSRNA Data>
>eDNA

Latin Name	Common Name
Fish (water samples)	
Acrocheilus alutaceus	Chiselmouth
Culaea inconstans	Brook Stickleback*
Esox americanus	American Pickerel
Oncorhynchus clarkii	Cutthroat Trout*
Perca flavescens	Yellow Perch
Prosopium williamsoni	Mountain Whitefish
Rhinichthys cataractae	Longnose Dace
Richardsonius balteatus	Redside Shiner
Richardsonius egregius	Lahontan Redside*
Salmo trutta	Brown Trout
Plants (diet sample)	
Berberis aristata	Indian Barberry**
Berberis fortunei	Chinese Mahonia**
Lotus unifoliolatus	American Bird's Foor Treefoil
Lythrum salicaria	Purple Loosestrife**
Veronica undulata	Wavy-leaved Water Speedwall**

Table 8. Species identified from eDNA samples with >90% sequence match to known samples.
*Fish species for which no previous species record was found for the LSRNA
**Non-native plant species.

Draft LSRNA Management Recommendations (Table 9)
The management needs of the LSRNA can be broadly defined as water quality and micro-climate, cultural resources, recreation, aquatic ecosystems, and terrestrial ecosystems. Key to addressing all areas of management would be improvement of available geospatial data. A formal boundary survey was identified as a management need by Morrison (2009) and an easily accessible precise boundary layer of the LSRNA remains unavailable. Additional data to develop

new layers would also be useful for managing recreation along with aquatic and terrestrial ecosystems.

Water quality is the most comprehensively covered management objective. Ecology, along with partner organizations, have extensive water quality datasets (https://apps.ecology.wa.gov/eim/download/selkirkwildlife819606.zip, accessed 30 November 2022) along with long term monitoring and implementation programs (LSRMSRPU 2006a, SCWRS 2020, Watson 2021, WWIT 2008). Continuing to support partners in following established conservation actions and implementation plans is the primary water quality recommendation.

Micro-climate management falls within water quality and aquatic ecosystem management but is also applicable for terrestrial ecosystem management. The primary micro-climate need identified is to maintain water temperatures (7-DADMax ≤16°C) cool enough for salmonid species summer month persistence (Joy and Jones 2012). Improving upstream riparian shading (Joy and Jones 2012, Johnson et al. 2020) will support this goal. Although ground water seepage serves to cool the Little Spokane segment in the LSRNA (Joy and Jones 2012, Johnson et al. 2020), additional planning should be undertaken to identify other mitigation measures that may reduce future stream temperatures. For example, increasing underground waterflow. Multiple groups have water temperature monitoring projects underway. Supporting and organizing these efforts, along with the addition of terrestrial air temperature monitoring, would support aquatic and terrestrial ecosystem management.

Aquatic ecosystems have received more monitoring and conservation effort than terrestrial ecosystems on the LSRNA. However, additional data and monitoring would be useful in developing management goals. Relatively robust fisheries data are available (i.e. McLellan et al. 2003) and re-introduction of native species is underway (Giorgi 2021). However, there is not an established fish monitoring program (aside from monitoring released Chinook Salmon) and there are scant data for non-fish species. Including species groups such as benthic invertebrates in a monitoring program would provide a more robust representation of ecosystem health and could target Washington SGCN (WDFW 2015).

Planning for formal monitoring of terrestrial ecosystems has occurred (LSRNA 1995) but was not implemented. Implementation of developed noxious weed management plans (McKinny 2002) is recommended. Despite the lack of a formal monitoring program, there are much available observation data on bird species primarily due to eBIRD observations [GBIF.org (12 November 2022) GBIF Occurrence Download https://doi.org/10.15468/dl.hvm2fc]. Formal data for other species groups are somewhat lacking. For example, long-toed salamanders (n = 3 observations) are the only amphibian with a verifiable observation on the LSRNA and not a single bat observation was found. Notable species groups lacking data include amphibians, small mammals, mollusks, and insects. The LSRNA is an important wildlife corridor in an area of increasing human use. Rural Route 5, which bisects the LSRNA, has high traffic volume which will likely increase in the future. Addressing wildlife passage across the road should be considered. For instance, based on sign observed in the field, large mammals appear to be crossing the road between the Painted Rocks Trailhead and Saint Georges Trailhead.

The same area appears to be an issue for recreationists to access the Saint George's Trail from the Painted Rocks Trailhead. Currently, hikers must walk along the busy Rural Route 5 from the parking lots. This involves walking near the guardrail and then across the narrow sidewalk across the bridge. Addressing wildlife and human safety in this area is recommended. Despite the popularity of the LSRNA for recreation, little data exist on number, frequency, and trend of use. Continuation of recreation monitoring, such as occurred in 2022, is recommended.

The primary need for setting management goals for the LSRNA appears to be establishing ecosystem response variables to human activity along with adaptive management actions. Collaborative development of a monitoring and management plan with partner organizations is the most immediate need of the LSRNA. The management objectives table should be considered a draft which is a starting point for collaborative plan development.

Mule Deer on Knothead Loop Trail

Table 9. Draft LSRNA Management Recommendations

Strategies	Actions
Objective 1: Geospatial Data - Improve or develop spatial layers that identify boundaries of features integral to LSRNA management to include habitat, recreation, water quality, and climate.	
Strategy 1.1: Resolve outstanding LSRNA boundary issues.	1.1.1: Conduct a formal survey of LSRNA property boundaries (Morrison et al. 2009, 2017).
Strategy 1.2: Classify and map terrestrial and aquatic habitat types.	1.2.1: Create spatial layers from aquatic and habitat products developed under Objectives 2&3.
Objective 2. Aquatic Ecosystems - Maximize resilience of terrestrial ecosystems to human impact and climate change.	
Strategy 2.1: Identify aquatic ecosystem resources.	2.1.1: Characterize aquatic habitat types in the Little Spokane and incorporate into geospatial products in strategy 1.2 (LSRMSRPU 2006).
	2.1.2: Conduct a baseline survey for benthic macroinvertebrates including aquatic mollusks.
Strategy 2.2: Minimize the impact of human activity on aquatic ecosystems.	2.2.1: Develop and implement a monitoring and adaptive management plan which identifies triggers and management responses to recreation, water quality, and climate variables.
	2.2.2: Include regular fish community monitoring as part of 2.2.1 LSRMSRPU 2006)
Strategy 2.3: Implement management practices which promote ecosystem integrity and climate resiliency.	2.3.1: Implement actions identified in Objective 5.
Strategy 2.4: Support programs which restore native species to the ecosystem.	2.4.1: Support partners in chinook salmon recovery efforts.
	2.4.2: Support partners in other native species reintroduction projects which are collaboratively agreed upon
Objective 3. Terrestrial Ecosystems - Maximize resilience of terrestrial ecosystems to human impact and climate change.	
Strategy 3.1: Identify terrestrial ecosystem resources.	3.1.1: Conduct targeted rare plant surveys as recommended by Morrison et al. (2017) and incorporate into strategy 1.2.
	3.1.2: Identify taxonomic groups for monitoring to comprise species likely to respond to stressors or identified as SGCN in the Washington SWAP (WDFW 2015)
	3.1.3: Conduct a baseline survey for taxonomic groups identified in 3.1.2.
Strategy 3.2: Minimize the impact of human activity on terrestrial ecosystems.	3.2.1: Develop and implement a monitoring and adaptive management plan which identifies triggers and management responses to recreation, water quality, and climate variables.
Strategy 3.3: Implement management practices which promote ecosystem integrity and climate resiliency.	3.3.1: Control Class A noxious weeds and invasive noxious weeds (Morrison et al. 2009, 2017) by updating and implementing the management plans for 18 noxious weeds developed by McKinny (2002).

	3.3.2: Restore a natural fire regime to ponderosa pine habitat by developing and implementing a prescribed burn program (Morrison et al. 2009).
	3.3.3: Implement actions identified in Objective 5.
Strategy 3.4: Evaluate and potentially improve wildlife passage along the river corridor.	3.4.1: Conduct a study to determine areas along Rural Route 5 with high terrestrial wildlife road use.
	3.4.2: Develop strategies and implementation options to address areas of wildlife use to include underpass or overpass structures.
Strategy 3.5: Address the historic Great Blue Heron rookery.	3.5.1: Conduct a literature review to determine options for rookery recovery.
	3.5.2: Work with partners to determine if and how rookery could be recovered.
Objective 4. Recreation Management - Develop practices which allow recreation while prioritizing natural resources and human safety.	
Strategy 4.1: Determine current recreation levels.	4.1.1: Continue river recreation surveys begun in 2022.
	4.1.2: Implement surveys to determine use levels by hikers on developed trails.
	4.1.3: Continue to document current parking area use levels.
	4.1.4: Develop and implement a recreation monitoring plan.
Strategy 4.2: Minimize the impact of recreation activities on natural resources.	4.2.1: Incorporate actions to address recreation levels if they trigger response variables identified in the aquatic or terrestrial adaptive management plans.
	4.2.2: Develop a recreation map (including hiking trails) for the LSRNA.
Strategy 4.3: Prioritize human safety in recreation activities.	4.3.1: Determine if future access points or parking are needed for recreational access. If needed and desired, improve capacity or manage quantity of summer vehicle parking (LSRMSRPU 2006a, WWIT 2008).
	4.3.2: Improve human access to Saint George Trailhead from Painted Rocks Trailhead.
Objective 5. Water Quality and Micro-climate Management.	
Strategy 5.1: Support partners in managing water quality for Net Ecological Benefit (NET).	5.1.1: Support partners in the implementation of actions identified by the Spokane Water Resources Staff to meet or exceed water quality metrics identified in SCWRS (2020) and Watson (2021). Summarized in Table 4 of this document.
	5.1.2: Maintain a minimum flow of 90 cfs at the Dartford gage (LSRMSRPU 2006a, WWIT 2008).
	5.1.3: Work with golf course managers, including the Kalispel Tribe, to minimize nutrient runoff (Collins 2018).
	5.1.4: Work with residential neighborhood associations to reduce nutrient runoff.
Strategy 5.2: Minimize summer water temperatures.	5.2.1: Support partners in efforts to increase riparian shade upstream of the LSRNA (Joy and Jones 2012, Johnson et al. 2020).
	5.2.2: Identify riparian areas on the Little Spokane where shade could be increased. Plant vegetation in those areas.

	5.2.3: Conduct a literature review identifying other potential mitigation measures to decrease Little Spokane water temperature. 5.2.4: Conduct a literature review to determine if recommended temperature maximums (7-DADMax ≤16°C) is adequate for non-salmonoid species.
Strategy 5.3: Monitor micro-climate variables.	5.3.1: Support and organize partners to continue efforts to monitor water temperature.
	5.3.2: Design and implement a micro-climate monitoring program for water and air temperature variables.
Objective 6. Partnerships - Collaborate with organizations and individuals to achieve LSRNA management goals.	
Strategy 6.1: Maintain and foster collaborative working relationships with applicable organizations.	6.1.1: Facilitate bi-annual meetings of applicable partners.
	6.1.2: Summarize all partner activity in a single annual report.
Strategy 6.2: Maintain collaborative relationships with neighboring property owners.	6.2.1: Maintain a collaborative relationship with the Inland Northwest Land Conservancy and provide input into management of the Waikiki Springs Nature Preserve.
	6.2.2: Work with WDFW to resolve ownership issues of the Waikiki Springs Area property.
	6.2.3: Work with private property owners who control river access to secure more permanent right-of-way in the form of Conservation Easements or other tools.
Object 7. Cultural Resources - Continue protection of cultural resources.	
Strategy 7.1: Maintain protections for cultural resources.	7.1.1: Continue enforcement activities.
	7.1.2: Improve Painted Rocks protection structure and increase interpretive signage.
	7.1.3: Promote the QR coded 'virtual tour' on the Painted Rocks trail including the petroglyphs QR post.
Objective 8. Management Plan - Work with internal and external partners to finalize LSRNA monitoring and management plan.	
Strategy 8.1: Work collaboratively to identify and implement priorities, resources, and objectives. Develop a single adaptive management and monitoring plan which includes products from strategies 1.2.1, 2.2.1, 3.2.1, and 4.1.4.	8.1.1: Work collaboratively to develop a LSRNA monitoring/management/implementation plan which refines the actions and objectives of this management table and refines recommended actions.

Appendix I. Annotated bibliography of LSRNA related documents. Items are organized by folders and file names. Folders and sub-folders are red, files names are green, and citations are blue. Text summarizing each document is in black.

FOLDER: From AThorpe>External Documents

Sub-Folder: 2009 PBS&J Spokane Co Wetland Restoration Studies

2009 Spokane County West Branch Little Spokane Wetland Restoration and Recharge Opportunities.pdf

PBS&J. 2009a. Surface Water storage investigation, West Branch Little Spokane River, wetland restoration and recharge opportunities, WRIA 55&57. Spokane Valley, WA. 23 p.

Identifies non-wetland water storage options for the West Branch Little Spokane River. Storage opportunities include existing dams (n = 8), natural lakes, potential new dams (n = 2), and infiltration using existing lakes or depressions. Concludes the best options to increase water storage are improvement of the Eloika Lake control structure to increase lake level and in-depth evaluation of selected wetland improvement opportunities.

2009 Spokane County WRIA 55 Potential Wetland Project Sites.pdf

PBS&J. 2009b. Potential wetland project sites, WRIAs 55 and 57. Spokane Valley, WA. 26 p.

Identifies potential wetland restoration and creation project sites in the Little Spokane and Middle Spokane Water Resource Inventory Areas. One-hundred and thirty potential wetland restoration or creation sites covering approximately 6,000 acres were identified. Identifies four potential wetland sites for in-depth evaluation.

2009 Spokane County WRIA 55 Wetland Restoration Studies.pdf

PBS&J. 2009c. In-depth wetland restoration studies, WRIA 55 & 57. Spokane Valley, WA. 98 p.

Summarizes in-depth evaluation of the four potential wetland project sites identified by PBS&J (2009b). The sites total 1,087 acres are called Diamond North (295 acres), Eloika Southeast+South (99 acres), Newman North (586), and Chester Creek (107 acres). Additional evaluation is necessary including wetland delineations, site surveys, water table monitoring, and land owner willingness to participate.

Sub-Folder: Kayak Rental Data

Kayak Rentals Surveys July 2021.pdf

Griffin, R. 2021. Outdoor survey results, kayak rentals on the Little Spokane River. City of Spokane Parks and Recreation, Spokane, WA. 15 p.

Survey conducted on 3 August 2021. Document appears to be individual responses to a survey conducted for a kayak rental program. There is no text in the document explaining the survey methodology or summarizing results.

Rental Kayak Data city of Spokane.doc

This appears to be a summary of the information presented in Griffin (2021). Fifteen kayak renters responded to the survey. There is no information on methodology or the program being analyzed.

Shuttle Service Surveys July 2021 Spokane Parks & Recreation.pdf
Griffith, R. 2021b. Shuttle service season pass Little Spokane River. City of Spokane Parks and Recreation, Spokane, WA. 13 p.
Survey conducted on 3 August 2021. Document appears to be individual responses to a survey conducted for a shuttle service. There is no text in the document explaining the survey methodology or summarizing results.

LSR Shuttle & Rental Report 2022.pdf
Summary of shuttle riders and kayak renters for summer 2022.

Sub-Folder: Spokane County Little Spokane Watershed Management Plan
2006 Spokane County Little Spokane Watershed Management Plan.pdf
Little Spokane River and Middle Spokane River Planning Unit (LSRMSRPU). 2006. Watershed Management Plan: Water Resource Inventory Area 55 – Little Spokane River & Water Resource Inventory Area 57 – Middle Spokane River. Spokane County, WA. 120 p.
Watershed management plan for the Little Spokane River. Plan addresses two or the four possible component of a watershed management plan. It addresses water quantity and instream flow. It does not address water quality or (fish) habitat. Determined that instream flow is adequate for target protection species rainbow trout and mountain whitefish. Does not assess other species.

Recommends:
-Promote management practices, when feasible, that maintain minimum flows of at least 90 cfs at the “At Dartford” gage for Pine River Park and 32 cfs at Elk Park to support existing and future recreational activities. (Work Group 12/04/03, approved 1/21/2004, confirmed 6/2/2004)
-Promote management practices, when feasible, that maintain minimum flows of at least 90 cfs at the “At Dartford” gage in the Lower Little Spokane River (Little Spokane River Natural Area) to support current and future recreational activities. (Work Group 12/04/03 & 5/26/2004, approved 6/2/2004, confirmed 6/29/2004).
-Additional study of fish spawning, migration and rearing habitat for resident species in tributaries led by WDFW.

Outlines many additional objectives and strategies.

2006 Spokane County Little Spokane Watershed Management Plan Appendices.pdf
Little Spokane River and Middle Spokane River Planning Unit. 2006. Appendix A WRIA 55&57 Memorandum of Agreement. Spokane County, WA. 81 p
MOU between the following governments to implement the management plan: Spokane County (lead agency), Stevens County, Pend Oreille County, the City of Spokane, Vera Water and Power, and Whitworth Water District.

2008 DOE Little Spokane Detailed Implementation Plan.pdf
WRIA 55/57 Watershed Implementation Team (WWIT). 2008. Detailed implementation plan: Little and Middle Spokane River Basins, Water Resource Inventory Area 55/77. 187p.
This document is outlines 107 recommendations to address issues to water resource management in the Little and Middle Spokane River Basins. Issues addressed fall into the general categories

of: water conservation, reclamation, and reuse; instream flow needs for the Middle and Little Spokane Rivers; domestic exempt wells; water rights and claims; and strategies for river baseflow and ground water recharge augmentation, as well as approaches to plan implementation.

Recommendation III.B.04.a is the only recommendation to specifically address the LSRNA: "Promote management practices, when feasible, that maintain minimum flows of at least 90 cfs at the "At Dartford" gauge in the Lower Little Spokane River (Little Spokane River Natural Area) to support current and future recreational activities.

2008 Little Spokane River Watershed Implementation Plan

Golder Associates Inc. 2008. West Branch Little Spokane River watershed implementation plan. Golder Project Number 073-93025.000. Coeur d'Alene, ID. 94 p.

Implementation plan for the 2006 Spokane County Little Spokane Watershed Management Plan on the West Branch of the Little Spokane. The West Branch is identified as occurring entirely upstream of the LSRNA and the document does not specifically mention the LSRNA. Lists the following priority recommended actions and implementation as of 2006 (sixty six additional lower priority actions are listed in the appendix of the document):

ACTION WB.SW2-2: Prepare a comprehensive streamflow and lake level gaging strategy for the WB LSR Watershed.
ACTION WB.SW4-1: Assess the culvert at the outlet of Eloika Lake and determine if the culvert elevation contributes to lowered lake levels in Eloika Lake.
ACTION WB.WQ1-1: Prepare and implement integrated aquatic plant management plans for Horseshoe Lake and Eloika Lake.
ACTION WB.WQ10-1: Recommend creation and enforcement of no wake zones for all lakes and river reaches during high water in a letter to the County Commissioners and for inclusion in the Pend Oreille County Shoreline Master Program.
ACTION WB.SW1-1: Conduct wetland delineation and restoration studies.
ACTION WB.SW4-2: Review existing studies, consider feasibility and, if feasible, install a water control structure at the outlet of Eloika Lake.
ACTION WB.WQ9-2: Install sewer and treatment lagoons (in particular for areas of existing high development density where flooding / high water occurs).
ACTION WB.SW3-2: Identify options for flood control at Sacheen Lake in addition to beaver tubes.
ACTION WB.SW3-4: Conduct a study to assess if sediment and / or vegetation removal from the channel of the West Branch of the Little Spokane River between Fertile Valley Road and Harworth Road would be feasible and would meet the objective of increasing flows downstream of Sacheen Lake.
ACTION WB.WQ4-1: Conduct a sediment study and a feasibility assessment for removing debris from Sacheen, Eloika and Diamond Lakes (where log floating has occurred in the past) to reduce biological oxygen demand and address any other relevant contaminant issues.
ACTION WB.WQ11-1: Complete proper functioning condition stream inventory and assessment for the WB LSR in Pend Oreille County and provide information on high quality stream reaches and prioritized projects to Counties for incorporation into Shoreline Master Programs.
ACTION WB.WQ12-4: Assess the impacts to the stream channel below Sacheen Lake associated with past beaver dam removal, beaver tube installations and beaver dam maintenance.
ACTION WB.WQ14-1: Review existing studies and confirm sediment source(s) to Eloika Lake.
ACTION WB.H1-2: Conduct a barrier survey in the WBLSR watershed and prioritize barrier removals / upgrades.
ACTION WB.ED1-1: Develop a bi-annual publication on the web site listing public processes and contacts ongoing / planned in the WB LSR watershed.

Additionally, the plan identifies specific Beaver Mitigation strategies as follows:
-Management of Deceivers / Levelers at Dam Nos. 1, 2 and 3 below Sacheen Lake (Note that this is currently being implemented by the Sacheen Lake Sewer District);
-Cross sectional surveys and installation of water level loggers in pools above and below Dam Nos. 1, 2 and 3 below Sacheen Lake (Note that the Spokane County Conservation District operates a level logger at the outlet of Sacheen Lake above Dam No. 1);
-Bank stabilization and revegetation sites at Sacheen Lake; and,
-Beaver trapping at Diamond Lake and Horseshoe Lake in Spring 2009, and potentially at other sites in the watershed.

Sub-Folder: USGS 1977_Spokane Valley-Rathdrum Prairie Aquifer

Drost, B.W. and H.R. Seitz. 1978. Spokane Valley-Rathdrum Prairie Aquifer, Washington and Idaho. U.S. Department of the Interior Geological Survey. Open-File Report 77-829. Tacoma, WA. 85 pp.

Document summarizing characteristics of the Spokane Valley-Rathdrum Prairie aquifer. Concludes the quality of water in the aquifer is generally good. States alternative water sources include the Spokane and Little Spokane Rivers, lakes adjacent to the aquifer, and other aquifers. Concludes these potential sources are less desirable than the Spokane-Valley-Rathdrum Prairie aquifer because of insufficient supplies, poor water quality, and/or remoteness from the areas of need. Ten plate files of the aquifer are attached as follows:

U.S. Geological Survey. 1977. Spokane Valley-Rathdrum Prairie Plate Files. Open-file report 77-829, Plates 1-10.

1977 Plate 1 Spokane Valley-Rathdrum Prairie Aquifer

Map showing the parts of the Spokane River basin and the Pend Oreille River basin, Washington, Idaho, and Montana which are recharge area for the Spokane Valley-0Rathdruve Prairie aquifer.

Remaining plates show a Map of Spokane Valley-Rathdrum Prairie aquifer with various attributes:

1977 Plate 2 Spokane Valley-Rathdrum Prairie Aquifer

Aquifer boundaries, water-level altitudes, generalized ground-water flow directions and water-level observation-well locations.

1977 Plate 3 Spokane Valley-Rathdrum Prairie Aquifer

Distribution of transmissivities in the aquifer.

1977 Plate 4 Spokane Valley-Rathdrum Prairie Aquifer

Estimated average rates of recharge to and discharge from the aquifer.

1977 Plate 5 Spokane Valley-Rathdrum Prairie Aquifer

Soils overlying the aquifer.

1977 Plate 6 Spokane Valley-Rathdrum Prairie Aquifer

Human populations distribution overlying the aquifer.

1977 Plate 7 Spokane Valley-Rathdrum Prairie Aquifer

Land surface use overlying the aquifer.

1977 Plate 8 Spokane Valley-Rathdrum Prairie Aquifer

Estimated volumes of water pumped from the aquifer in 1976.

1977 Plate 9 Spokane Valley-Rathdrum Prairie Aquifer

Wastewater and solid-wasters disposal sites overlying the aquifer.

1977 Plate 10 Spokane Valley-Rathdrum Prairie Aquifer
Surface water quality sites, summary of ground water quality data, and locations where ground water quality has exceeded chemical standards.

Sub-Folder: USGS 2005 Spokane Valley Geologic Hydrologic Ground-water Flow Modelling
2005 Spokane Valley Geologic Hydrologic Ground-water Flow Modelling.pdf
Kahle, S.C., R.R. Caldwell, and J. R. Bartolino. 2005. Compilation of Geologic, Hydrologic, and Ground-Water Flow Modeling Information for the Spokane Valley–Rathdrum Prairie Aquifer, Spokane County, Washington, and Bonner and Kootenai Counties, Idaho. US Geological Survey, Scientific Investigations Report 2005-5227, 64 p.
This report is a summary of knowledge of the Spokane Valley-Rathdrum Prairie Aquifer. Discusses relationship between the aquifer and the Little Spokane and Spokane Rivers, which can be dynamic. The Little Spokane River gains water primarily from the aquifer.
Identifies data needs including: "frequent measurement of ground-water levels in existing and new monitoring wells along the entire length of the Spokane and Little Spokane Rivers."

2005 Plate 1 Spokane Valley Geologic Hydrologic Ground-water Flow Modelling.pdf
Kahle, S.C., R.R. Caldwell, and J. R. Bartolino. 2005. Areal distribution of ground-water and surface-water measurement sites, Spokane Valley-Rathdrum Prairie Aquifer, Washington and Idaho, 2005. Plate 1 From Scientific Investigations Report 2005-5227.
Map of water measurement sites withing the aquifer area. Identifies nine sites withing the LSRNA including surface -water sites (n = 3) and ground-water sites (n = 6).

2005 Plate 2 Spokane Valley Geologic Hydrologic Ground-water Flow Modelling.pdf
Kahle, S.C., R.R. Caldwell, and J. R. Bartolino. 2005. Simplified surficial geology, generalized hydrogeologic sections, and surface geophysical transects, Spokane Valley-Rathdrum Prairie Aquifer, Washington and Idaho, 2005. Plate 1 From Scientific Investigations Report 2005-5227.
Map of geologic zones for the aquifer area. LSRNA is primarily recent (Holocene) non-glacial sediment along the river corridor while upland areas are primarily older (Pleistocene) catastrophic flood gravel deposits.

2005 USGS Spokane River-Tribs Streamflow Analysis.pdf
Hortness, J.E., and Covert, J.J., 2005, Streamflow trends in the Spokane River and tributaries, Spokane Valley/Rathdrum Prairie, Idaho and Washington: U.S. Geological Survey Scientific Investigations Report 2005-5005, 17 p.
Summary of the state of knowledge of river and aquifer dynamics withing the Spokane Valley-Rathdrum Prairie aquifer area. Identifies resource of two gauging stations on the Little Spokane River. Stations are both located at (station #12431000) or near (station #12431500) Dartford, WA. At time of report 12431000 had been active 62 total years (1929032, 1947-2005) and 12431500 had been active 12 total years (1948-52, 1998-2005). Statistically significant monthly mean stream flows for the months of September and October of the Little Spokane showed a decreasing trend from 1930-2002. No trends were detected for other months. September and October trends did not correlate with precipitation data. Nearly all streamflow in the Little Spokane during summer and autumn is from ground-water discharge from the aquifer.

Sub-Folder: USGS 2007 Spokane Valley Ground-water Flow Modelling

2007 USGS Spokane Valley Ground-water Flow Modeling.pdf

Hsieh, P.A., Barber, M.E., Contor, B.A., Hossain, Md. A., Johnson, G.S., Jones, J.L., and Wylie, A.H., 2007, Ground-water flow model for the Spokane Valley-Rathdrum Prairie Aquifer, Spokane County, Washington, and Bonner and Kootenai Counties, Idaho: U.S. Geological Survey Scientific Investigations Report 2007-5044, 78 p.

Presents modelled ground water flow in the Spokane Valley-Rathdrum Prairie aquifer. The primary purpose of the model is to serve as a tool for analyzing aquifer inflows and outflows, simulating the effects of future changes in ground-water withdrawals from the aquifer, and evaluating aquifer management strategies. The scale of the model and the level of detail are intended for analysis of aquifer-wide water-supply issues. Model simulated ground-water flows from 1990-2005.

2007 USGS Hydrogeologic-Ground Water Budget Spokane Valley.pdf

Kahle, S.C., and Bartolino, J.R., 2007. Hydrogeologic framework and ground-water budget of the Spokane Valley-Rathdrum Prairie aquifer, Spokane County, Washington, and Bonner and Kootenai Counties, Idaho: U.S. Geological Survey Scientific Investigations Report 2007-5041, 48 p., 2 pls.

Summary of ground water available in the Spokane Valley-Rathdrum Prairie aquifer. Recharge or inflow to the SVRP aquifer occurs from six main sources: the Spokane River, lakes, precipitation over the aquifer, tributaries, infiltration from landscape irrigation and septic systems, and subsurface inflow. Total estimated mean annual inflow to the aquifer is 1,471 cubic feet per second. Discharge or outflow from the SVRP aquifer occurs from five main sources: the Spokane River, the Little Spokane River, pumpage, underflow to Long Lake, and infiltration of ground water to sewers.

2007 Plate 1 USGS Hydrogeologic-Ground Water Budget Spokane Valley.pdf

Kahle, S.C., and Bartolino, J.R. Map showing location and hydrogeologic unit of project wells in the Spokane Valley-Rathdrum Prairie aquifer study area, Spokane County, Washington, and Bonner and Kootenai Counties, Idaho. U.S. Geological Survey Scientific Investigations Report 2007-5041, Plate 1.

2007 Plate 2 USGS Hydrogeologic-Ground Water Budget Spokane Valley.pdf

Kahle, S.C., and Bartolino, J.R. 2007. Map and hydrogeologic sections showing location of wells, surficial geology, and hydrogeologic units in the Spokane Valley-Rathdrum Prairie aquifer study area, Spokane County, Washington, and Bonner and Kootenai Counties, Idaho. U.S. Geological Survey Scientific Investigations Report 2007-5041, Plate 1.

Sub-Folder: WA State Wildlife Action Plan

WDFW State Wildlife Action Plan.pdf

Washington Department of Fish and Wildlife. 2015. Washington's State Wildlife Action Plan: 2015 Update, Chapter 4. Washington Department of Fish and Wildlife, Olympia, Washington, USA. 115 p.

Document provides guidance on Habitats of Greatest Conservation Need including threats, recommended conservation actions, and associated Species of Greatest Conservation Need. Document does not specifically address the LSRNA but does address several habitats which occur on the LSRNA: Flooded and swamp forest, North American arid west emergent marsh, and open water.

WDFW State WL Action Plan Stressors and Actions for Freshwater Aquatic Vegetation.jpg
Table summarizing stressors and actions for North American Arid West Emergent Marsh
Stressors: roads and development, alteration of hydrology, agricultural side effects, climate change, invasive species
Actions: water management, invasive species control, grazing/farm management, water rights, research or surveys, land use planning, private lands incentives

WDFW State WL Action Plan Stressors and Actions for Open Water.jpg
Table summarizing stressors and actions for Open Water habitat.
Stressors: roads and development, alteration of hydrology, dams and diversions, climate change, habitat loss/degradation
Actions: partner/stakeholder engagement, water management, research or surveys, restoration, land use planning, private lands incentives

Documents in Main Folder (following sub-folders):
Bolker, E.L. and J.J. Vaccaro. 1981. Digital-model Simulation of the hydrologic flow system, with emphasis on ground water, in the Spokane Valley, Washington and Idaho. U.S. Geological Survey Water Resources Investigations Open-File Report 80-1300. Tacoma, WA. 54 pp
Summarizes a computer-simulated model of how the Spokane Valley-Rathdrum Prairie Aquifer would respond to increased use. Determined the current (1977) levels of water use (227 cubic feet per second has no appreciable effect on the Spokane Valley-Rathdrum Prairie Aquifer water levels. Model simulation doubling that rate (simulated 454 cubic feet per second) for a one year simulation period resulted in a predicted three feet aquifer water level lowering, REDUCTION IN Spokane River discharge of 150 cubic feet per second in summer and 50 cubic feet per second during the remainder of the year. The simulation resulted in leakage from the aquifer to the Little Spokane River of a decrease of less than 10 cubic feet per second.

Frost. T.P. 1994. Teacher's guide and geologic field trip guide, Little Spokane River-Dartford Area, Spokane County, Washington. U.S. Department of the Interior U.S. Geological Survey. Prepared for Midway Elementary School Mead School District, Spokane, Washington. Open-File Report 94-636, Spokane, WA. 28 pp.
Guide prepared as a teachers aid for fourth grade science classes. Emphasis is on geology. Includes sections on basics of geology and field trip activities specific to the Little Spokane River area. This is a five-day curriculum. The first four days are classroom activities with the fifth being a field trip to the Little Spokane. Field trip day includes six stops which are likely still usable in 2023.

1994 USGS Spokane Valley Depth to Water Map.pdf
Berenbrock, C., M.D. Bassick, T.L. Rogers, and S.P. Garcia. 1995. Depth to water. 1991, in the Rathdrum Prairie, Idaho; Spokane River Valley, Washington; Moscow-Lewiston-Grangeville area, Idaho; and selected intermontane valleys, east-central Idaho. U.S. Department of the Interior, U.S. Geological Survey. Prepared in cooperation with the Idaho Department of Health and Welfare. Water-resources investigations report 94-4087. Denver, CO. 1 p.

Presents results of the USGS's effort to map depth to water in selected area in Idaho and eastern Washington. Water levels measure in 1991 were used to define the depth-to-water zones. Document is primarily a map of depth to water zones. Depth to water was 0-250 feet below land surface in the Spokane area.

1995 Little Spokane River Watershed Initial Assessment-Draft.pdf
Dames & Moore, Inc. and The Langlow Associates, Inc. 1995. Little Spokane River Watershed Initial Assessment. WR-95163 8 pp.
Assessment to evaluate existing data on water in the Little Spokane watershed to make decision about pending water right applications.
Outlined current (1995) water allocation issues:
-At time of writing Washington Department of Ecology was making decisions on 43 pending applicant for new water rights.
-Water levels in the Little Spokane River do not meet Department of Ecology instream flow requirements for about 15% of each year.
-Declines in stream flow due in part to increased consumption and reduced precipitation.
-Nonpoint pollution is increasingly affecting water quality.
-A river management plan is being developed to preserved natural character of the lower eight-mile reach (which is a Scenic River Corridor).
-Development in the lower part of the watershed are increasing demand for water.
This assessment found stream flows in the Little Spokane and its tributaries often do not meet flow requirements during the summer and fall months. In addition, changes in land use and increases in ground water pumping may cause further declines in streamflow which would adversely affect water quality and aquatic habitat. Because of these findings, the Little Spokane watershed is classified as "high risk" by Ecology. Water rights decisions must consider additional adverse impacts to existing water rights and instream resources.

Outlines potential actions that could be taken:
-Encourage water conservation, changes and transfers of water rights, water reuse, and pipeline-interconnections to allow-efficient
Use of water.
-Approve applications for new water rights where accepting limits on proposed and impairment of senior water-rights would not occur.
-Encourage regional watershed planning and coordinate with growth planning.

2000 WDFW Warmwater Fisheries Survey-Eloika Lake Spokane County.pdf
Divens, M., H. Woller, and L. Phillips. 2001. 2000 Warmwater fisheries survey of Eloika Lake (Spokane County). Washington Department of Fish and Wildlife. Spokane, WA. 41 p.
Elokia Lake, a moderately sized (267 ha) shallow (mean depth = 3 m) water body, lies on the west branch of the Little Spokane River which flows through the lake as both the inlet and outlet. Aquatic vegetation management is identified as a management need. Considering the lake is not a closed system the report rules out biological vegetation control and suggests mechanical control as the primary management option. Chemical vegetation control should be approached with caution, but, the report does not rule it out as an option.

Twelve species of fish were detected in the survey: Largemouth bass (*Micropterus salmoides*), pumpkinseed sunfish (*Lepomis gibbosus*), and black crappie (*Pomoxis nigromaculatus*) were the most abundant game fish species. Tench (*Tinca tinca*) were the most abundant species by weight and number. Yellow perch (*Perca flavescens*), brown bullhead (*Ameiurus nebulosus*), yellow bullhead (*Ameiurus natalis*), black bullhead (*Ameiurus melas)*, green sunfish (*Lepomis cyanellus*), rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), and grass pickerel (*Esox americanus*) were also collected.

2009 Riverside State Park Provisional Rare Plant and Vegetation Survey.pdf
Morrison, P.H., G. Wooten, J. Rhodes, R. O'Quinn, H.M. Smith. 2009. Rare plant and vegetation survey of Riverside State Park. Pacific Biodiversity Institute, Winthrop, WA. 433 p.
Morrison et al. mapped 352 vegetation community polygons within RSP. These polygons were categorized into 32 specific plant associations or one of approximately 8 generalized land cover types. The most urgent restoration need identified was the reintroduction of a natural fire regime via prescribed burns to the ponderosa pine forests throughout RSP. A primary management recommendation for the park was to resolve ownership boundary issues with and action to conduct a proper survey of the entire property. 120 of 410 vascular pant taxa identified were non-native and a key restoration objective recommended was to continue aggressive noxious week monitoring and management. Three rare plant species were detected at RSP: prairie cordgrass *(Spartina pectinata*), gray stickseed (*Hackelia cinerea)* and small-leaf pussytoes (*Antennaria parvifolia*). All of these are state-listed sensitive plants. None of these species observations were new park records but the new surveys located significant new populations within the park.

2012 DOE Little Spokane Water Quality Improvement Report.pdf
Joy, J. & J. Jones. Little Spokane River watershed fecal coliform bacteria, temperature, and turbidity total maximum daily load. Water quality improvement report. Washington Department of Ecology publication number 11-10-075. Spokane, WA 256 p.
The Little Spokane River has been listed on the 303(d) list for fecal coliform, temperature, and turbidity. The federal Clean Water Act requires states to set priorities for cleaning up 303(d) listed waters by establishing a total maximum daily load (TMDL) for each. 30 sites were evaluated for fecal coliform levels of which seven met the target standard of *extraordinary primary contact recreation* criteria. Temperature goals for all parts of the watershed are designated for *core summer salmonid habitat* protection: a 7-day average daily maximum (7-DADMax) temperature not to exceed 16° C. Few reaches of the LSR would meet the 16 ºC temperature criterion during high air temperature and low-flow summer critical conditions, even if system-potential shade were present. Tributaries require 11% to 61% increases in system-potential riparian shade but lower LSR needs minimal (0-2%) shade increase. Cool groundwater influx in the Lower LSR sub-watershed currently decreases maximum water temperatures, but not below the 7-DADMax criterion of 16 °C. Turbidity and total suspended solids (TSS) pollutants were evaluated at 29 sites of which 18 require TSS load reduction from 35% to 95%. A 75% TSS reduction is necessary to limit the effects of TSS on fish and other aquatic life at the mouth of the LSR

The Middle LSR sub-watershed from RM 10.1 at Dartford to RM 31.8 at Deer Park-Milan Road bridge exhibits the most effects of poor water quality. Although all portions of the LSR watershed need some restoration or protection, this section will require the most implementation actions to remove sources of bacteria, increase riparian shade, and reduce sources of TSS. Large volumes of groundwater inflow into the lower ten miles of the LSR through deep canyons and wetland areas have kept urban development back from riparian areas, allowing water quality to recover. Despite these positive factors, residents in the many other parts of the watershed need to (1) restore riparian vegetation and (2) implement best management practices (BMPs) to control nonpoint sources of fecal coliform bacteria, heat, turbidity, and TSS.

The implementation strategy (1) describes the roles and authorities of cleanup partners and programs and (2) provides a strategy to achieve the water quality standards for fecal coliform bacteria, TSS, and temperature. Because of regional interest in reducing the Little Spokane's phosphorus contribution to the Spokane River, the implementation strategy also includes strategies to reduce nutrients. The development of this plan was a collaborative effort by a diverse group of interests in the watershed.

2013 USGS Hydrogeology of Little Spokane River Basin.pdf
Kahle, S.C., Olsen, T.D., and Fasser, E.T., 2013, Hydrogeology of the Little Spokane River Basin, Spokane, Stevens, and Pend Oreille Counties, Washington: U.S. Geological Survey Scientific Investigations Report 2013–5124, 64 p., http://pubs.usgs.gov/sir/2013/5124/
The Little Spokane River Basin includes 679 square miles. Report summarizes the eight hydrogeologic units of the basin.

2016 DOE Little Spokane PCBs Screening Survey of Water, Sediment and Fish Tissue.pdf.
Friese, M. and R. Coots, 2016. Little Spokane River PCBs: Screening Survey of Water, Sediment, and Fish Tissue. Washington State Department of Ecology, Olympia, WA. Publication No. 16-03-001. https://fortress.wa.gov/ecy/publications/SummaryPages/1603001.html 40 p.
The lower section of the Little Spokane River was listed as Category 5 of the 303d list as being water quality-impaired for polychlorinated biphenyls (PCBs). This study found lower PCB levels in sediment and water than objectives. However, PCB concentrations in rainbow trout, mountain whitefish, and northern pikeminnow tissue still exceeded the National Toxic Rule human health criteria. Based on PCB concentrations in fish tissue samples, the report recommends the Little Spokane River should remain on Category 5 of the 303(d) list.

2018 middle-of-the-little-spokane-river-scoping-study.pdf
Collins, D. 2018. "Middle of the Little" Little Spokane River conservation and trails development. Seattle, WA 26 p.
Scoping document to determine how the Middle LSR (upstream of LSRNA) can be managed to meet human community and ecological needs.

2018 Spokane County WRIA 55 Watershed Mgmt Plan Update
Hermanson, M. 2018. WRIA 55 PCW 90.94 watershed plan update. AWRA 2018 Conference – October 16, 2018. .ppt presentation,13 slides
PowerPoint presentation update on the watershed plan.

WRIA 55 Plan Addendum Technical Review.pdf

Covert J. & J. Pacheco. 2020. Watershed plan addendum, Little Spokane Basin (WRIA 55). Water Resources Program, Washington State Department of Ecology, Olympia, WA 30 pp.

This document reviews the actions that planning units determine to be necessary to offset potential impacts to instream flows associated with permit-exempt domestic consumptive water use and evaluates whether the plan updates will result in a Net Ecological Benefit to instream resources within the WRIA. It concludes all proposed actions are in compliance with RCW.90.94.020 and will result in a Net Ecological Benefit.

2020 DRAFT WRIA 55 LSR Current Aquatic Habitat Conditions.pdf

Spokane County Water Resources Staff (SCWRS). 2020. WRIA – Little Spokane River watershed current aquatic habitat conditions for RCW 90.94 net ecological benefit evaluation. Spokane, WA 40 p.

Compilation report of existing information related to aquatic habitat and water quality that is intended to serve as a baseline in the Net Ecological Benefit (NEB) determination for WRIA 55. Outlines specific water quality measure metrics for the Little Spokane River for the following categories:

Fecal coliform bacteria: Levels shall both not exceed a geometric mean value of 50 colonies/100 mL, and not have more than 10% of all samples obtained for calculating the geometric mean value exceeding 100 colonies/100 mL.

Temperature: Shall not exceed a 7-day average daily maximum temperature of 16 ºC due to human activities. When natural conditions exceed, or are within 0.3 ºC of the criterion, cumulative human-caused activities will not raise temperatures more than 0.3 ºC.

Turbidity: Shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10% increase in turbidity when the background turbidity is more than 50 NTU.

Dissolved oxygen: Shall exceed 9.5 mg/L. When natural conditions exceed, or are within 0.2 mg/L of the criterion, cumulative human-caused activities will not decrease the dissolved oxygen more than 0.2 mg/L

pH: Shall be within the range of 6.5 to 8.5 standard units with a human-caused variation within the range of less than 0.5 units.

Specific conditions in the Dartford Creek (LSRNA) portion of the river are outlined. Nine species of fish were identified by WDFW in 2003. Genetic work indicate the rainbow trout in this stretch of river are not influenced by hatcher fish and are native redband rainbow trout (McLellan 2005). Aquatic habitat is a mix of riffles and runs and is the only segment where the streambed substrate is not dominated by sand.

2021 DOE Adoption of WRIA 55 Watershed Plan.pdf

Watson, L. 2021. Department of Ecology’s order adopting the updated watershed plan for water resources inventory area 55 (Little Spokane River Basin). 3 p.

The Washington Department of Ecology adopts the Watershed Plan Update for WRIA 55 with one condition: Ongoing compliance with RCW 90.94.020(5). Planning unit government will continue to fulfill the requirements of RCW 90.94.020(5), which include recording relevant restriction on titles, and recording and reporting the number of building permits issued by the County, after Ecology’s adoption of the Updated Plan for WRIA 55.

Water Availability Focus Sheet – WRIA #55

State of Washington Department of Ecology. 2021. Water availability focus sheet – WRIA #55. Publication 20-11-055. Olympia, WA 8 p.

Fact sheet about water rights in WRIA #55, the Little Spokane Watershed or Water Resource Inventory Area.

Ecology TMDL Report and Implementation Plan 2020.pdf

Johnson, C., T. Stuart, and P. Pickett. 2020. Little Spokane River dissolved oxygen, pH, and total phosphorus total maximum daily load, water quality improvement report and implementation plan. State of Washington Department of Ecology. Spokane, WA 228 p.

Section 303(d) of the Federal Clean Water Act requires states to develop a Total Maximum Daily Load (TMDL) for impaired water bodies such as the Little Spokane River. The EPA approved TMDLs for fecal coliform bacteria, temperature, and turbidity impairments (Joy and Jones 2012). This report presents 1) TMDLS to address low dissolved oxygen (DO) and high pH impairments in surface waters in the Little Spokane watershed and 2) total phosphorous load allocations for the mouth of the Little Spokane River. Activities which need to be implemented to meet set goals include many of those identified for other TMDLs (Joy and Jones 2012) including increasing streamside shade, reduction of nutrient sources, and reducing erosion and runoff.

The primary use to be protected by this TMDL is the aquatic life use of core summer salmonid habitat. This TMDL will protect aquatic life uses by lowering instream water temperature by increasing shade, and by decreasing the loading of phosphorus and nitrogen into the water bodies. The sources of pollutants in the Little Spokane River watershed are detailed in the Implementation Plan section of the document, as well as the Land use and potential pollutant sources section of Appendix A. These sources include lack of riparian vegetation, sediment-linked nutrients from crop production and erosion, nutrients from livestock, stormwater, and septic systems, runoff from residential areas, groundwater nutrients, and permitted point sources such as the Spokane Hatchery.

Little Spokane River Links.doc

List of seven websites relevant to the Little Spokane River.

LSR Rec article Rich Landers 2015.doc

Landers, R. 2017. Hikers relish Little Spokane River Natural Area, new trail additions. Spokesman Review. 15 June 2017. 4 p.

Article about recreation opportunities on the LSRNA.

RiversideVegetationReport2018Jan11.pdf

Morrison, P.H. and K.J. Bartowitz. 2017. Riverside State Park Vegetation Survey Report. Pacific Biodiversity Institute, Winthrop, Washington. 92 p.

Summarizes 2017 spring surveys of small parcels in RSP. 140 polygons were surveyed across approximately 2,300 acres include large portions of the LSRNA. Surveys used similar protocols to Morrison et al. (2009). The survey found 23 distinct plant associations, including forested, shrubland, grassland, and wetland associations. A list of the 164 vascular plant species observed includes 10 tree species, 25 shrubs, 103 herbs, 23 grasses/sedges/rushes, and 3 ferns/horsetails.

No rare plants were observed but the limited time-frame of the survey (only occurring in spring) limited rare plant detectability. Noxious weed cover in surveyed polygons ranged from 0-50%. Low elevation disturbed areas had a higher percentage of noxious weeds than less disturbed areas. The ecological condition of surveyed polygons was rated from poor to good. Based on the results of these surveys, management recommendations include noxious weed control, additional rare plant surveys, and restoration.

Nineteen plant community types were identified on the LSRNA.
These included three non-native groups:
IRPS:
Yellowflag Iris (*Iris pseudacorus*),
PHAR3:
Reed Canarygrass (Phalaris arundinacea)
Weedy/Disturbed

These also included five NatureServe ranked global or state imperiled communities:
PIPO/PSSP6:
Ponderosa pine (*Pinus ponderosa*)/Bluebunch Wheatgrass (*Pseudoroegneria spicata)* G4/S1
PIPO/CARU:
Ponderosa pine (*Pinus ponderosa*)/Pinegrass (*Calamagrostis rubescens*) G2Q/S1
PIPO/SYLA:
Douglas fir (*Pseudotsuga menziesii*)/Pacific Ninebark (*Physocarpus malvaceus*): G2/S1
PIPO/PHMA5:
Ponderosa pine (*Pinus ponderosa*)/Idaho Fescue (*Festuca idahoensis*): G4/S2
POBALT/SYAL:
Black Cottonwood (*Populus balsamifera* ssp. *trichocarpa*)/Common Snowberry (*Symphoricarpos albus*) G2/S1-S2

Spokane Tribe Comments WRIA 55 2019.pdf
Flanagan, C. 2019. Spokane Tribal Natural Resources. 26 March 2019 letter addressed to Aspect Consulting LLC. 2 p.
Identifies concerns regarding the Little Spokane River watershed planning efforts (WRIA 55). Specifically concerns that growth rates used for home building underestimate the actually growth rate in the watershed.

Washington Native Plant Society Painted Rocks plant list.pdf
Slichter, P. 2010. Vascular plant list: Painted Rocks, Spokane County, Washington. 4 p.
List of 135 plant species (101 native, 34 introduced) identified at Painted Rocks Trailhead (47.779456, -117.515416). The list represents the work of one or more Washington Native Plant Society (WNPS) members. Its accuracy and completeness has not been verified by WNPS. We offer the list to individuals as a tool to enhance the enjoyment and study of native plants.

Riparian Ecosystems, Volume 2: Management Recommendations.pdf
Rentz, R., A. Windrope, K. Folkerts, and J. Azerrad. 2020. Riparian Ecosystems, Volume 2: Management Recommendations. Habitat Program, Washington Department of Fish and Wildlife, Olympia. 80 p.
Document provides guidance to protect and/or restore healthy, intact, and functioning riparian ecosystems for the purpose of providing clean water, healthy salmon populations, and climate resilient watersheds. Document provides management guidelines but does not identify or prioritize specific riparian areas on which to focus restoration effort.

FOLDER: From AThorpe>Internal Documents
Integrated Weed Management Plan for Riverside State Park 2002-2005 Prepared by Steve McKinney Draft 10.14.2002.pdf
McKinney, S. 2002. Integrated Weed Management Plan for Riverside State Park 2002-2005. 370 p.
Outlines adaptive management approach for weed management on RSP.
Identifies 18 noxious weeds which occur in RSP along with a specific control plan for each species.

Little Spokane Impact Review Plan 202107.doc
Washington State Parks and Recreation Commission (WSPRC). 2021. Little Spokane River Natural Area Recreation Impacts Review Project Plan (draft). Olympia, WA. 6 p.
Plan to develop plan for recreation management on the LSRNA. Was supposed to be completed May 2022 but there are no follow-up documents available.

Little Spokane Outline.doc
No citation data available. 1 p.
Appears to be an outline for WSPRS (2021) listed above.

LSRNA Access & Habitat Improve 1999 – Specifications.pdf
Washington State Parks. 1999. Specifications for Little Spokane River Access and Habitat Improvements at Riverside State Park in Spokane County. Olympia, WA 140 p.
Document requesting bids for LSRNA river access and habitat improvements including shoreline stabilizations, river access point construction, and riparian area revegetation at two sites.

LSRNA Bird Studies.pdf (contains 2 documents)
Mack, S.P. 1994. Cavity Nester Habitat Program – 5 Year Report, 1989-1993, Request for Permit Extension. Washington Water Power. Spokane, WA 284 pages. Summarizes maintenance and monitoring of 25 nest boxes on the LSRNA in addition to a program on Nine Mile (NM) as part of Washington Water Power's ongoing natural resource program. Fifty-two owl (n = 15) and wood duck (n = 37) nest boxes were established and monitored from 1989-1993. Monitoring comprised 207 nest box visits and revealed wildlife use at 85% (n = 176) of visits. Wood duck use was 18% and owl use was 1%. Other species documented include red squirrels (29%), non-wood duck waterfowl (21%), bees (10%), flying squirrels (3%), flickers (1%), swallows (<1%), raccoons (<1%), and unknown wildlife species use (10%). Wood duck use of nest boxes increased over time both at LSRNA (21% in 1989 to 33% in 1993) and Nine Mile (21% in 1989

to 33% in 1993). LSRNA had 5 wood duck and 6 screech owl boxes installed. NM had 18 wood duck and 9 screech owl boxes installed.

Davis, R. 1997. Waterfowl utilization of Long Lake and the Little Spokane River. Washington State University, Pullman, WA. 38 p.
Waterfowl occurrence and habitat associations were observed on the Little Spokane River and Long Lake during the 1996 breeding season. The Little Spokane River constituted two of five survey transects each of which was survey weekly from May 1 to July 31. Ten species were observed with broods (mallard, Canada goose, wood duck, western grebe, hooded merganser, green-winged teal, pied-billed grebe, common merganser, American coot, cinnamon teal) and thirteen species (common loon, horned grebe, red-necked grebe, eared grebe, blue-winged teal, northern shoveler, gadwall, American wigeon, redhead, ring-necked duck, lesser scaup, common goldeneye, barrows goldeneye) were observed without broods.

LSRNA Cultural Resources Survey Inventory.pdf
Patton, S. and T.E. Herberck. 1973. LSRNA Cultural Resources Survey Inventory. Washington Archaeological Research Center. Pullman, WA. 100 p.
Summarizes cultural resources on and near the LSRNA:
Spokane House: Cultural inventory of middle Spokane Indian Village Site. Located at confluence of Little Spokane and Spokane Rivers. One of the most important historical and prehistoric sites in Spokane County. Traditional gathering place for the Spokane Indians which was used in to the late 1880s when the Indians were forced to leave. Early fur traders established trading posts nearby. The first was established in 1810 by the Canadian Northwest Company. This post was the first in Washington and name Spokane House. Hundreds of artifacts, rock fish traps, and a burial ground have been found in the area.
Indian Rock Paintings: Identifies rock paintings as examples of Indian petroglyphs which were done prior to European contact. Paintings were found by fur traders and believed to be about 200 years old.
Log Barn: Unclear of structure was built by natives or Europeans. However, it is believed to have been used by native farmers for grain threshing and storage. Primary crops were wheat and oats.
Birchwood Farms: Located just east of the mouth of the Little Spokane. Home built by Ben Norman in 1883. Small one room building used as a vacation home. Norman's permanent residence was in Spokane. Norman was manager and part-owner of the prestigious Spokane Hotel.
Montvale Farms: Farmhouse, caretaker cottage, log cabin constructed in 1898.
Glen Tana Farms One of the earliest and largest farms in the area. First home located near the present-day Saint George's school. Built by Thomas Griffith, Spokane's first wholesale grocer.
The Pine – Boyd Residence: Built in 1924 as a home for Guy Riegel, co-owner of Riegal Brothers, an early car dealership in Spokane.

LSRNA Recreation Impacts Review Project Plan.doc

Dupuis, D., P. Herzog, R. Layton, and M. Posner. 2021. Little Spokane River Natural Area recreation impacts review project plan, updated September 2021. Washington State Parks and Recreation Commission. Olympia, WA, 6 p.

Draft plan to assess recreation impacts to the LSRNA. Includes phases to gather information, document baseline data, evaluate management options, and make management recommendations. Timeline indicates work should be completed by May, 2022 but no follow-up documents are available.

LSRUA Bird Banding 1996.pdf

Ferguson, H.L. 1996. Spokane MAPS Bird Banding Results for Summer 1996. Washington Department of Fish and Wildlife. Spokane, WA 96 p.

Summary of bird banding at LSRNA and Mount Spokane in 1996. Birds were banded at LSRNA (n = 362 birds, n = 33 species) and Mt. Spokane (n = 69 birds, 16 species).

LSRUA Fish Studies.pdf (contains 2 documents)

Pfeiffer, D. 1988. Electroshocking Little Spokane River. Washington Water Power. Spokane, WA. 1 p.

Electroshocking survey of Little Spokane. 228 fish captured in 75 minutes of shocking time. Eight species detected. Mountain whitefish most abundant (56.1%) followed by all suckers (27.6%). Existing habitat and food availability I concert with low predator densities (primarily squawfish) consistent with quality trout habitat. However, lack of adequate spawning habitat appears to be limiting trout population in size (rainbow trout were 0.05% of the catch). Recommends promoting whitefish population as gamefish until suitable trout habitat improvement techniques are available/decided upon.

Johnson, E. 1995. Fish Populations in Spokane and Little Spokane Rivers. Washington Water Power. Spokane, WA 8 pages.

Another electroshocking survey. Same species detected w similar abundance except largemouth bass was not detected in this survey. Largemouth bass were 3.9% of the sample in 1988.

P-088 LSRNA Management.pdf (contains 17 documents, 414 p.)

Washington State Senate. 1989. Substitute Senate Bill No. 5807. Olympia, WA 15 p.

Makes law that any person who knowingly disturbs or damages any cairn or grave of any native Indian or any glyptic or painted record of any tribe or peoples is guilty of a class C felony.

Clifton R.J. 1972. Indian Rock Painting Restoration and Protection Memorandum. 6 p. (pages 17-23).

Description of WSPRC responsibility to restore and protect Indian Rock Paintings in three areas: Yakima, Spokane, and Horsethief Lake. Includes information on trials of techniques in how to clean vandalized portions of the paintings.

Water Resources Program in the Little Spokane River Basin (WRPLSRB), WRIA-55. 1986. Washington Department of Ecology, Olympia, WA. 8 p. (pages 25-32)

Establishes base flows for the Little Spokane River for specific dates and stream management units, future allocations, priority of future water rights, water bodies closed to future consumptive appropriations, and effects on prior rights.

Spokane County Shoreline Program. Year. Spokane County, Spokane, WA. 4 p. (pages 33-36).
Description of county shoreline management program as it relates to the natural area.

Dames and Moore, Inc. 1995. Initial Watershed Assessment Water Resources Inventory Area 55, Little Spokane River Watershed, Open-File Technical Report 95-15. Dames and Moore, Inc. and Cosmopolitan Engineering Group. Los Angeles, CA and Tacoma, WA. 145 p. (pages 37-181).
Report documenting the status of surface and ground water resources in the LSR watershed and an evaluation of the available information to addressing regulatory concerns. Report takes into consideration the four regulatory concerns which must be met for the Department of Ecology to grant use permits: 1) the use will be beneficial, 2) use will be in the public interest, 3) water is available, and 4) use will not impair senior water users.

Includes a fish species list for Little Spokane River Watershed (WARIS 1994). List is for watershed, not just the Little Spokane Report makes the recommendations to:
-Establish/re-establish streamflow gages at minimum flow compliance points as specified WAC 173-555.
-Re-establish select streamflow monitoring locations within the existing Ecology network for tributary streams in the WRIA as permanent gaging stations.
-Establish a ground water level and water quality monitoring network for the WRIA.
-Develop a methodology to track the quantity of water actually used in the watershed in order to distinguish natural fluctuations in flow with those affected by consumptive use.

Riverside State Park – Classification, Acquisition, and Management Plan (CAMP) Project. 1998. Washington State Parks and Recreation Commission, Olympia, WA (page 183-278).
Recommends management options with balance ‘recreation emphasis’ and ‘natural/cultural emphasis’ management options. Includes proposed modifications to the permanent park boundary including the recommendation to include the Little Spokane River Area within the permanent park boundary. Table 1 (page 187) describes the Little Spokane River sub-area as a dominate natural area with some heritage orientation. Recommends sub-area be managed for natural orientation but allow an equestrian corridor. Includes a summary description and recommendations for the Little Spokane River Sub-area (Page 208). Includes summary of existing recreation uses (kayaking, cross country skiing, wildlife viewing), cultural resources, natural resources (wetlands, riparian areas), land classifications (heritage, recreation, and natural), capital projects, planned maintenance projects, park policies, law enforcement activities, and long-term acquisition priorities. Includes scans and summary of public comment on the CAMP plans (pages 243-276). No public comments were submitted in direct relation to the Little Spokane Natural Area sub-area.

Spokane County, Boese (unreadable spelling), R. Recreation on the Little Spokane River. 2004. 3 p. (pages 277-279).

Fax send from R. Boese (guessing on spelling, handwriting not legible) representing Spokane County to Mike Mikkleson of RSP. Summarizes some recreation uses of park sub-areas. Specifically, this document blames the loss of the Great Blue Heron Rookery on canoers who drop a canoe off at a launch site and jog back to the canoe. It reports some single canoers are doing this as part of a 'physical exercise routine' on a weekly basis. Report suggests this activity on its own caused the herons to abandon the rookery.

Little Spokane River Management Plan Committee (LSRMPC). Year Unknown, likely 1990s. Final Report Little Spokane River (LSR). – Recreational Impacts on Water Quality. 24 p. (Pages 281-304).

Report attempts to determine the possible harmful impacts of recreation on the various parameters of water quality in the LSR. Outlines adverse impacts of recreation use including swimming, fishing, canoe/kayaking, and golfing (i.e. chemical runoff from nearby golf courses). Concludes that recreational activities will have an adverse impact on water quality due to direct and indirect inputs. I.e.: "Auto exhaust doesn't just blow away, it goes somewhere, and that somewhere is in part the LSR" (page 299).

Recommendations:

-Do not allow increase in human recreation until a human carrying capacity can be established which maintains ecosystem integrity and improves water quality.
-Do not convert Conservation Futures Land to public use.
-Implement mitigation practices where decreased water quality is documented.
-Increase monitoring of water quality.
-Regulate recreational activities.
-Do not exchange LSR parcels. Keep in natural state.
-Construct riffle habitat.
-Increase funding for state agencies to monitor water quality.
-Do not allow motorized craft on the LSR.
-Public officials should encourage private property owners to have restrictive public use open space designations placed on their property.

Spokane County Parks Department. 1987. Interagency Cooperative Agreement, Little Spokane Natural Area. 8 p. (Pages 305-312).

40 year agreement for management of LSRNA.

Washington State Parks and Recreation Commission. Year. Little Spokane Natural Area/Scenic River. 32 p. (pages 313-344).

Outlines seven categories of responsibilities required in the Little Spokane area of RSP:

-Monitoring and Maintenance of the Health and Habitat of the Little Spokane Recreation and Natural Area.
-Coordination and Implementation of the Adopted Management Plan
-Communication with Interested Citizens and the Little Spokane Advisory Council
-Care and maintenance of Facilities
-Education
-Public Relations/Law Enforcement
-Planning

Little Spokane Scenic River and Natural Area Council. 1995. Lower Little Spokane Wildlife and Habitat Carrying Capacity Study. 3 p. (Pages 344-346).
A draft of cost estimate and personnel identified to complete tasks toward long term biological monitoring of the watershed. Targets include habitat/vegetation, mammal inventory, bird/amphibian inventory, establish a 'base carrying capacity' (does not indicate carrying capacity for what).

Stewardship of the Little Spokane Scenic River. 1992? (difficult to read date). 12 p. (Pages 347-358).
Document that outlines action plans for six categories of concern for the care of the river area: 1) Recreation, 2) Wildlife & Vegetation, 3) Education, 4) Land Use, 5) Economic, 6) Water Quality and Hydrology

Tveten, J. 1985. E-5 Riverside State Park – Spokane County – Little Spokane River Natural Area – Requested Action. Olympia, WA. 12 p. (pages 359-368).
Memorandum from WSPRC Director Jan Tveten to the Washington State Parks and Recreation Commission to Request the following actions:
-Receive staff's 'Determination of Non-Significance' that the proposed action is minor and environmental effects are not significant.
-Find that Spokane County owned land in the Lower Little Spokane Valley can best be managed State Parks.
-Formally proclaim lands in the Little Spokane River Valley and any future additions be officially classified as "Natural Area" and that this area of RSP be named "Little Spokane River Natural Area".
-Direct staff to include future operating and development costs for the 1987-89 budgets.

Gardner, B. 1990. Executive Order 90-04: Protection of Wetlands. Olympia, WA. 10 p. (pages 369-378).
Governor's executive order to protect wetlands in the state of Washington.

Washington State Parks and Recreation Commission. 1990. Agency Response to Executive Orders 89-10 and 90-04. Olympia, WA. 10 p. (Pages 379-388).
Acknowledgement of executive orders, the importance of wetlands, and agreement the agency will continue to prevent or minimize negative impacts to wetlands.

Heiser, D. 1985. Riverside State Park – Little Spokane Natural Area – Agenda Item – SEPA Response. Olympia, WA. 12 p. (Page 391-402).
Comments regarding a 1985 letter from the Spokane County Planning Department to the Washington State Parks and Recreation Commission. Spokane County raises zoning issues in the letter but Mr. Heiser believes they do not warrant response as the courts have said the state is not subject to local zoning.

Washington State Parks and Recreation Commission. 1970? National Register of Historic Places Inventory – Nomination Form: Spokane House Site. 12 pages (Pages 403-414).
Nomination form to add Spokane House Site to National Register of Historic Places

Recreational and Resource value of the Lower Reach of Little Spokane River.pdf
Jones, G.R. 1975. Original Study of Little Spokane River Natural Area. Jones and Jones, Seattle, WA, 100 p.
The original study of the Little Spokane River Natural Area make the following findings and recommendations:
-Little Spokane is unique in the region.
-The river corridor is close to the Spokane urban center.
-The river and associated habitat are more biological diverse than surrounding areas.
-The river and surrounding areas offer extensive recreation opportunities.
-Private lands should be acquired and managed as part of the Little Spokane area.
-Spokane County and partners should acquire more property on and around the river corridor.
-Heavy recreation should not be allowed in the river corridor.
-Spokane County should prioritize agriculture and recreational use as the primary uses of the river corridor.
-The Lower Spokane Valley should be designated a 'State Trail Corridor'.
-Suitable sites should be developed for recreation.

Folder: Salmon Release
LS Chinook Findings Memo.pdf
Giorgi, C. 2022. Findings from the 2021 Chinook Salmon Release. 2 p.
Letter summarizing release and follow-up monitoring of the 50 adult Chinook Salmon released at the Waikiki Springs Wildlife Conservation Area on 6 August, 2021. Twenty-nine of the fish were implanted with radio tags. Immediately after release eight fish regurgitated their tags and tags were recovered from three dead fish. Of the remaining tagged fish (n = 18), the majority remained in the lower Little Spokane river between Haynes Estate Conservation Area to the Waikiki Springs Wildlife Area. Three fish moved downstream to the Spokane River confluence. In October, 2021 nine redds were located near Dartford Creek. Future monitoring will include an environmental DNA project with North Central High School.

ICF-2018-Reindroduction-Potential-for-Spokane-and-Roosevelt.pdf
ICF. 2018. Anadromous Reintroduction Potential for the Spokane River and Select Lake Roosevelt Tributaries Using the Ecosystem Diagnosis and Treatment Model. Final version. April. ICF 00281.17 Seattle, WA. Prepared for Spokane Tribe of Indians, Wellpinit, WA. 88 p.
An assessment evaluating the Spokane River subbasin and select tributary watersheds to determine current habitat suitability for steelhead and Chinook. There is moderate potential for summer steelhead reintroduction to these watersheds estimating the subbasin could support approximately 1200 adult steelhead if manmade passage barriers are addressed. There is substantial potential for summer/fall Chinook reintroduction in the Spokane River which could support over 6700 adult summer/fall Chinook. Spring Chinook habitat suitability is relatively modest for the Spokane River which could support about 250 adult spring Chinook.

Giorgi-2018-Potentail-Habitats-for-Reintroduction.pdf
Giorgi, C. 2018. Identification of potential habitats for blocked area reintroduction. Project # 2016-003-00. Spokane Tribal Fisheries, Wellpinit, WA. 41 p.
Report on an intrinsic potential stream habitat model to identify spawning and early rearing tributary habitats available to stream-type Chinook and steelhead within the U.S. portion of the

blocked area of the upper Columbia River. For both species, the Spokane Subbasin had the greatest amount of rated habitat. Within the subbasin Hangman Creek and the Little Spokane River had the most habitat for both species. Nearly half (150.5 miles) of 347.3 miles of highly rated potential steelhead habitat lies within the Spokane subbasin. Most (138.1) highly rated potential spring Chinook habitat (186 miles) occurs within the Spokane subbasin. About 60% of positively rate habitat in the study area is blocked by anthropogenic barriers. Salmon and steelhead migrating to the Little Spokane River would need to pass Little Falls and Long Lake dames.

Folder: Waikiki Springs

2020_287_WSNP_BaselineResourceReport1

Richardson, R., T. Dunfield, and C. DeForest. Waikiki Springs Nature Preserve (287), 2020-2025 Land Use Management Plane. Inland Northwest Land Conservancy, Spokane, WA 38 p.

Report documenting baseline conditions of the Waikiki Springs Nature Preserve including existing land uses, biological information, and conservation values associated with the property at time of purchase (October 15, 2020). Property was acquired to promote conservation both by habitat improvement/protection and increase education and recreation opportunities for the public. The 95 acre property was acquired by the Inland Northwest Land Conservancy on October 15, 2020 to further the goals of conservation, fish habitat enhancement, youth education, open space preservation and improved public access in North Spokane. Long term management goals are to improve ecological integrity while providing educational and recreational opportunities to the public. Management will be broken into five-year time periods with the first time period (2020-2025) priority being property clean-up.

2020_287_WSNP_ManagementPlan1

Richardson, R. 2020. Baseline Resource Report Preserve, 287 – Waikiki Springs Nature Preserve. Inland Northwest Land Conservancy, Spokane, WA 28 p.

Management plan for Waikiki Springs Nature Preserve which describes conservation values, identifies management concerns, assigns a time frame to management projects, describes key partnerships, and identifies ways to instill a stewardship ethic within management partners, public land users, and the Fairwood community.

Folder: WDFW Fisheries

2003 JSAP WDFW AR_Final.pdf

McLellan, J.G. and D. O'Conner. 2004. 2003 WDFW annual report for the project: Resident fish stock status above Chief Joseph and Grand Coulee Dams. Washington Department of Fish. Olympia, WA. 191 p.

Summary of baseline fish distribution data on the free flowing portions of the middle Spokane and Little Spokane River drainages including tributaries. The greatest diversity of fish was in the Little Spokane River (19 species). With the exception of the Little Spokane River and Deadman Creek, angling opportunities were limited due to lack of legal length trout, lack of trout, and limited access. DNA analysis indicated there were several independent populations of rainbow trout within the greater Spokane River and hybridization appeared minimal.

2002 JSAP WDFW AR_Final.pdf

McLellan, J.G. and D. O'Conner. 2003. 2002 WDFW annual report for the project: Resident fish stock status above Chief Joseph and Grand Coulee Dams. Washington Department of Fish. Olympia, WA. 153 p.

Little Spokane River tributaries surveyed were Beaver, Dragoon, Little Deer, Spring, and West Branch Dragoon Creeks. Lowest fish diversity was in Little Deer Creek (2 species) and highest was in Dragoon Creek (13 species). DNA analysis indicated 11 populations of rainbow trout which were distinct from hatchery strains and had not hybridized with nearby coastal strains. The Little Spokane River was not surveyed in 2002, just the aforementioned tributaries.

2001 JSAP WDFW AR_Final.pdf

McLellan, J.G. and D. O'Conner. 2002. 2001 WDFW annual report for the project: Resident fish stock status above Chief Joseph and Grand Coulee Dams. Washington Department of Fish. Olympia, WA. 169 p.

Objective was to survey nine tributaries of the Little Spokane River as part of a multi-year effort to survey the entire drainage. The following tributaries were surveyed: Bear, Beaver, Buck, Deer, Dry, Heel, Otter, Spring Heel, and West Branch Little Spokane River. The greatest diversity was in West Branch Little Spokane (13 species) with lowest diversity in Heel Creek (1 species).

Appendix II. List of species with documented observations within the LSRNA boundary.
*Global Biodiversity Information Facility
** Pfeiffer (P) 1988, Johnson (J)1995, McLellan and O'Conner (Mc&O'C) 2003

Latin Name	Common Name	Reference
Animals - Vertebrates		
Amphibians		
Ambystoma macrodactylum	Long-toed Salamander	GBIF 2022
Birds		
Acanthis flammea	Common Redpoll	GBIF 2022
Accipiter cooperii	Cooper's Hawk	GBIF 2022
Accipiter gentilis	Northern Goshawk	GBIF 2022
Accipiter striatus	Sharp-shinned Hawk	GBIF 2022
Actitis macularius	Spotted Sandpiper	GBIF 2022
Aechmophorus occidentalis	Western Grebe	Davis 1997
Aegolius acadicus	Northern Saw-whet Owl	GBIF 2022
Aeronautes saxatalis	White-throated Swift	GBIF 2022
Agelaius phoeniceus	Red-winged Blackbird	Ferguson 1996
Aix sponsa	Wood Duck	GBIF 2022, Davis 1997
Anas acuta	Northern Pintail	GBIF 2022
Anas americana	American Wigeon	Davis 1997, GBIF 2022
Anas carolinensis	Green-winged Teal	GBIF 2022, Davis 1997
Anas clypeata	Northern Shoveler	GBIF 2022
Anas crecca	Eurasian Teal	GBIF 2022
Anas cyanoptera	Cinnamon Teal	Davis 1997, GBIF 2022
Anas discors	Blue-winged Teal	Davis 1997, GBIF 2022
Anas platyrhynchos	Mallard	GBIF 2022, Davis 1997
Anas strepera	Gadwall	GBIF 2022, Davis 1997
Anthus rubescens	Buff-bellied Pipit	GBIF 2022
Aquila chrysaetos	Golden Eagle	GBIF 2022
Archilochus alexandri	Black-chinned Hummingbird	GBIF 2022
Ardea herodias	Great Blue Heron	GBIF 2022
Aythya affinis	Lesser Scaup	GBIF 2022, Davis 1997
Aythya americana	Redhead	GBIF 2022, Davis 1997
Aythya collaris	Ring-necked Duck	GBIF 2022, Davis 1997
Bombycilla cedrorum	Cedar Waxwing	GBIF 2022, Ferguson 1996
Bombycilla garrulus	Bohemian Waxwing	GBIF 2022
Bonasa umbellus	Ruffed Grouse	GBIF 2022
Branta canadensis	Canada Goose	Davis 1997, GBIF 2022
Bubo virginianus	Great Horned Owl	GBIF 2022
Bucephala albeola	Bufflehead	GBIF 2022
Bucephala clangula	Common Goldeneye	Davis 1997
Bucephala islandica	Barrow's Goldeneye	Davis 1997, GBIF 2022
Buteo jamaicensis	Red-tailed Hawk	GBIF 2022
Buteo lagopus	Rough-legged Hawk	GBIF 2022
Buteo platypterus	Broad-winged Hawk	GBIF 2022
Calidris mauri	Western Sandpiper	GBIF 2022
Calidris minutilla	Least Sandpiper	GBIF 2022
Callipepla californica	California Quail	GBIF 2022
Cardellina pusilla	Wilson's Warbler	Ferguson 1996, GBIF 2022
Cathartes aura	Turkey Vulture	GBIF 2022

Catharus fuscescens	Veery	Ferguson 1996, GBIF 2022
Catharus guttatus	Hermit Thrush	GBIF 2022
Catharus ustulatus	Swainson's Thrush	Ferguson 1996, GBIF 2022
Catherpes mexicanus	Canyon Wren	GBIF 2022
Certhia americana	Brown Creeper	GBIF 2022
Chaetura vauxi	Vaux's Swift	GBIF 2022
Charadrius vociferus	Killdeer	GBIF 2022
Chondestes grammacus	Lark Sparrow	GBIF 2022
Chordeiles minor	Common Nighthawk	GBIF 2022
Cinclus mexicanus	American Dipper	GBIF 2022
Circus cyaneus	Hen Harrier	GBIF 2022
Cistothorus palustris	Marsh Wren	GBIF 2022
Colaptes auratus	Northern Flicker	GBIF 2022
Columba livia	Common Pigeon	GBIF 2022
Contopus cooperi	Olive-sided Flycatcher	GBIF 2022
Contopus sordidulus	Western Wood Pewee	Ferguson 1996, GBIF 2022
Corvus brachyrhynchos	American Crow	GBIF 2022
Corvus corax	Common Raven	GBIF 2022
Cyanocitta stelleri	Steller's Jay	GBIF 2022
Cygnus columbianus	Tundra Swan	GBIF 2022
Dryobates pubescens	Downy Woodpecker	GBIF 2022, Ferguson 1996
Dryocopus pileatus	Pileated Woodpecker	GBIF 2022
Dumetella carolinensis	Gray Catbird	GBIF 2022, Ferguson 1996
Empidonax difficilis	Pacific-slope Flycatcher	GBIF 2022
Empidonax hammondii	Hammond's Flycatcher	GBIF 2022
Empidonax minimus	Least Flycatcher	GBIF 2022
Empidonax oberholseri	American Dusky Flycatcher	GBIF 2022
Empidonax oberholseri	Dusky Flycatcher	Ferguson 1996
Empidonax traillii	Willow Flycatcher	Ferguson 1996, GBIF 2022
Empidonax wrightii	Gray Flycatcher	GBIF 2022
Euphagus cyanocephalus	Brewer's Blackbird	GBIF 2022, Ferguson 1996
Falco columbarius	Merlin	GBIF 2022
Falco sparverius	American Kestrel	GBIF 2022
Fulica americana	American Coot	Davis 1997, GBIF 2022
Gallinago delicata	Wilson's Snipe	GBIF 2022
Gavia immer	Common Loon	Davis 1997
Geothlypis tolmiei	MacGillivray's Warbler	GBIF 2022, Ferguson 1996
Geothlypis trichas	Common Yellowthroat	Ferguson 1996
Glaucidium gnoma	Mountain Pygmy Owl	GBIF 2022, Davis 1997
Haemorhous cassinii	Cassin's Finch	GBIF 2022
Haemorhous mexicanus	House Finch	GBIF 2022
Haliaeetus leucocephalus	Bald Eagle	GBIF 2022
Hesperiphona vespertina	Evening Grosbeak	GBIF 2022
Hirundo rustica	Barn Swallow	GBIF 2022
Icteria virens	Yellow-breasted Chat	Ferguson 1996, GBIF 2022
Icterus bullockii	Bullock's Oriole	GBIF 2022
Ixoreus naevius	Varied Thrush	GBIF 2022
Junco hyemalis	Dark-eyed Junco	GBIF 2022, Ferguson 1996
Lanius borealis	Northern Shrike	GBIF 2022
Larus californicus	California Gull	GBIF 2022

Larus delawarensis	Ring-billed Gull	GBIF 2022
Leiothlypis celata	Orange-crowned Warbler	GBIF 2022
Leiothlypis ruficapilla	Nashville Warbler	GBIF 2022
Leuconotopicus albolarvatus	White-headed Woodpecker	GBIF 2022
Leuconotopicus villosus	Hairy Woodpecker	GBIF 2022
Leucosticte tephrocotis	Gray-crowned Rosy Finch	GBIF 2022
Lophodytes cucullatus	Hooded Merganser	GBIF 2022, Davis 1997
Loxia curvirostra	Red Crossbill	GBIF 2022
Megaceryle alcyon	Belted Kingfisher	GBIF 2022
Megascops kennicottii	Western Screech Owl	GBIF 2022
Melanerpes lewis	Lewis's Woodpecker	GBIF 2022
Meleagris gallopavo	Wild Turkey	GBIF 2022
Melospiza lincolnii	Lincoln's Sparrow	GBIF 2022, Ferguson 1996
Melospiza melodia	Song Sparrow	Ferguson 1996, GBIF 2022
Mergus merganser	Common Merganser	Davis 1997
Molothrus ater	Brown-headed Cowbird	GBIF 2022, Ferguson 1996
Myadestes townsendi	Townsend's Solitaire	GBIF 2022
Nucifraga columbiana	Clark's Nutcracker	GBIF 2022
Pandion haliaetus	Osprey	GBIF 2022
Parkesia noveboracensis	Northern Waterthrush	Ferguson 1996
Passer domesticus	House Sparrow	GBIF 2022
Passerculus sandwichensis	Savannah Sparrow	GBIF 2022
Passerella iliaca	Fox Sparrow	GBIF 2022
Passerina amoena	Lazuli Bunting	GBIF 2022, Ferguson 1996
Petrochelidon pyrrhonota	Cliff Swallow	GBIF 2022
Phalacrocorax auritus	Double-crested Cormorant	GBIF 2022
Phasianus colchicus	Ring-necked Pheasant	GBIF 2022
Pheucticus melanocephalus	Black-headed Grosbeak	GBIF 2022, Ferguson 1996
Pica hudsonia	Black-billed Magpie	GBIF 2022
Picoides arcticus	Black-backed Woodpecker	GBIF 2022
Pinicola enucleator	Pine Grosbeak	GBIF 2022
Pipilo maculatus	Spotted Towhee	Ferguson 1996, GBIF 2022
Piranga ludoviciana	Western Tanager	GBIF 2022
Podiceps auritus	Horned Grebe	GBIF 2022, Davis 1997
Podiceps nigricollis	Eared Grebe	Davis 1997
Podilymbus podiceps	Pied-billed Grebe	GBIF 2022, Davis 1997
Poecile atricapillus	Black-capped Chickadee	GBIF 2022, Ferguson 1996
Poecile gambeli	Mountain Chickadee	GBIF 2022
Poecile rufescens	Chestnut-backed Chickadee	GBIF 2022
Pooecetes gramineus	Vesper Sparrow	GBIF 2022
Porzana carolina	Sora	GBIF 2022
Rallus limicola	Virgina Rail	GBIF 2022
Red-necked Grebe	Red-necked Grebe	Davis 1997
Regulus calendula	Ruby-crowned Kinglet	GBIF 2022
Regulus satrapa	Golden-crowned Kinglet	GBIF 2022
Riparia riparia	Sand Martin	GBIF 2022
Salpinctes obsoletus	Rock Wren	GBIF 2022
Sayornis saya	Say's Phobe	GBIF 2022
Selasphorus calliope	Calliope Hummingbird	GBIF 2022
Selasphorus rufus	Rufous Hummingbird	GBIF 2022

Setophaga coronata	Yellow-rumped Warbler	Ferguson 1996, GBIF 2022
Setophaga petechia	American Yellow Warbler	GBIF 2022
Setophaga ruticilla	American Redstart	GBIF 2022
Setophaga townsendi	Townsend's Warbler	GBIF 2022
Sialia currucoides	Mountain Bluebird	GBIF 2022
Sialia mexicana	Western Bluebird	GBIF 2022
Sitta canadensis	Red-breasted Nuthatch	GBIF 2022, Ferguson 1996
Sitta carolinensis	White-breasted Nuthatch	GBIF 2022
Sitta pygmaea	Pygmy Nuthatch	GBIF 2022
Sphyrapicus nuchalis	Red-naped Sapsucker	Ferguson 1996
Spinus pinus	Pine Siskin	Ferguson 1996
Spinus psaltria	Lesser Goldfinch	GBIF 2022
Spinus tristis	American Goldfinch	GBIF 2022, Ferguson 1996
Spizella passerina	Chipping Sparrow	GBIF 2022, Ferguson 1996
Stelgidopteryx serripennis	Northern Rough-winged Swallow	GBIF 2022
Streptopelia decaocto	Eurasian Collared Dove	GBIF 2022
Sturnella neglecta	Western Meadowlark	GBIF 2022
Sturnus vulgaris	Common Starling	GBIF 2022
Tachycineta bicolor	Tree Swallow	GBIF 2022
Tachycineta thalassina	Violet-green Swallow	GBIF 2022
Thryomanes bewickii	Bewick's Wren	GBIF 2022, Ferguson 1996
Tringa melanoleuca	Greater Yellowlegs	GBIF 2022
Tringa solitaria	Solitary Sandpiper	GBIF 2022
Troglodytes aedon	House Wren	GBIF 2022
Troglodytes pacificus	Pacific Wren	GBIF 2022
Turdus migratorius	American Robin	GBIF 2022, Ferguson 1996
Tyrannus tyrannus	Eastern Kingbird	GBIF 2022, Ferguson 1996
Tyrannus verticalis	Western Kingbird	GBIF 2022
Vireo cassinii	Cassin's Vireo	GBIF 2022
Vireo gilvus	Warbling Viero	Ferguson 1996, GBIF 2022
Vireo olivaceus	Red-eyed Vireo	GBIF 2022
Xanthocephalus xanthocephalus	Yellow-headed Blackbird	GBIF 2022
Zenaida macroura	Mourning Dove	GBIF 2022
Zonotrichia albicollis	White-throated Sparrow	GBIF 2022
Zonotrichia atricapilla	Golden-crowned Sparrow	GBIF 2022
Zonotrichia leucophrys	White-crowned Sparrow	GBIF 2022
Fish		
Acrocheilus alutaceus	Chiselmouth	P. 1988, J. 1995, Mc.&O'C. 2003*
Ameiurus natalis	Yellow Bullhead	Mc.&O'C. 2003
Catostomus catostomus	Longnose Suckers	P. 1988, J. 1995
Catostomus columbianus	Bridgelip sucker	Mc.&O'C. 2003
Catostomus macrocheilus	Largescale Sucker	P. 1988, J. 1995, Mc.&O'C. 2003
Cottus cognatus	Slimy Sculpin	P. 1988, J. 1995
Culaea inconstans	Brook Stickleback	Lucid 2022
Esox americanus	American pickerel	Mc.&O'C. 2003
Lepomis gibbosus	Pumpkinseed	Mc.&O'C. 2003
Lepomis macrochirus	Bluegill	Mc.&O'C. 2003
Micropterus salmoides	Largemouth Bass	P. 1988, Mc.&O'C. 2003
Oncorhynchus clarkii	Cutthroat Trout	Lucid 2022
Oncorhynchus mykiss	Rainbow Trout	P. 1988, J. 1995, Mc.&O'C. 2003

Oncorhynchus tshawytscha	Chinook Salmon	Giorgio 2021
Perca flavescens	Yellow Perch	McLellan, J.G. and D. O'Conner 2003
Prosopium williamsoni	Mountain Whitefish	Mc.&O'C. 2003
Ptychocheilus oregonensis	Northern Pikeminnow	Mc.&O'C. 2003
Rhinichthys cataractae	Longnose Dace	Mc.&O'C. 2003
Rhinichthys osculus	Speckled Dace	Mc.&O'C. 2003
Richardsonius balteatus	Redside Shiner	P. 1988, J. 1995
Richardsonius egregius	Lahontan Redside	Lucid 2022
Salmo trutta	Brown Trout	Mc.&O'C. 2003
Salvelinus fontinalis	Eastern Brook Trout	Mc.&O'C. 2003
Tinca tinca	Tench	Mc.&O'C. 2003
Mammals		
Alces alces	Moose	Lucid 2022
Canis latrans	Coyote	Lucid 2022
Lepus americanus	Snowshoe Hare	Lucid 2022
Marmota flaviventris	Yellow-bellied Marmot	GBIF 2022
Odocoileus hemionus	Mule Deer	GBIF 2022
Odocoileus virginianus	White-tailed Deer	GBIF 2022
Ondatra zibethicus	Muskrat	GBIF 2022
Ondatra zibethicus	Muskrat	GBIF 2022
Procyon lotor	Racoon	Lucid 2022
Tamias amoenus	Yellow-pine Chipmunk	GBIF 2022
Tamiasciurus hudsonicus	American Red Squirrel	GBIF 2022
Reptiles		
Chrysemys picta	Painted Turtle	GBIF 2022
Pituophis catenifer	Gopher Snake	GBIF 2022
Plestiodon skiltonianus	Western Skink	GBIF 2022
Thamnophis sirtalis	Common Garter Snake	GBIF 2022
Animals - Invertebrates		
Arachnids		
Araneus gemmoides	Jewel Spider	GBIF 2022
Araneus trifolium	Shamrock Orbweaver	GBIF 2022
Araniella displicata	Sixspotted Orbweaver	GBIF 2022
Bassaniana utahensis	A Bark Crab Spider	GBIF 2022
Ebo iviei	Ivie's Running Crab Spider	GBIF 2022
Gastropods		
Allogona ptychophora	Idaho Forestsnail	GBIF 2022
Gonidea angulata	Western Ridged Mussel	GBIF 2022
Insects		
Acossus populi	Aspen Carpenterworm	GBIF 2022
Acronicta hasta	Forked Dagger Moth	GBIF 2022
Acronicta radcliffei	Radcliffe's Dagger Moth	GBIF 2022
Aethalura intertexta	Four-barred Gray	GBIF 2022
Aglais milberti	Milbert's Tortoiseshell	GBIF 2022
Alaus melanops	Western Eyed Click Beetle	GBIF 2022
Anastrangalia laetifica	Dimorphic Flower Longhorn Beetle	GBIF 2022
Antheraea polyphemus	Polyphemus Moth	GBIF 2022
Anthocharis julia	Southern Rocky Mountain Oragetip	GBIF 2022
Aphorista laeta	Black-backed Handsome Fungus Beetle	GBIF 2022

Aplocera plagiata	Treble-bar Moth	GBIF 2022
Autographa ampla	Large Looper	GBIF 2022
Bellura obliqua	Cattail Borer	GBIF 2022
Boisea rubrolineata	Western Boxelder Bug	GBIF 2022
Bombus nevadensis	Nevada Bumblebee	GBIF 2022
Bombylius major	Greater Bee Fly	GBIF 2022
Campaea perlata	Pale Beauty	GBIF 2022
Camponotus semitestaceus	An Ant	GBIF 2022
Carabus nemoralis	Wood Ground-beetle	GBIF 2022
Carabus taedatus	A Beetle	GBIF 2022
Caradrina montana	Civil Rustic Moth	GBIF 2022
Celastrina ladon	Spring Azure	GBIF 2022
Chalcophora angulicollis	Western Sculptured Pine Borer	GBIF 2022
Coelocnemis dilaticollis	California Broad-necked Darkling Beetle	GBIF 2022
Coenonympha california	California Ringlet	GBIF 2022
Cosmosalia chrysocoma	A Longhorn Beetle	GBIF 2022
Cucujus clavipes	Flat Bark Beetle	GBIF 2022
Cycloneda polita	Western Polished Lady Beetle	GBIF 2022
Cyphoderris buckelli	Buckell's Grig	GBIF 2022
Digrammia neptaria	Dark-bordered Granit Moth	GBIF 2022
Drasteria ochracea	A Moth	GBIF 2022
Drasteria sabulosa	A Moth	GBIF 2022
Drepana arcuata	Arched Hooktip	GBIF 2022
Egira perlubens	Brown Woodling Moth	GBIF 2022
Eresia aveyrana	A Brush-footed Butterfly	GBIF 2022
Everes amyntula	Western Tailed-blue	GBIF 2022
Furcula scolopendrina	A Moth	GBIF 2022
Harmonia axyridis	Asian Lady Beetle	GBIF 2022
Hemileuca eglanterina	Sheep Moth	GBIF 2022
Hippodamia convergens	Convergent Lady Beetle	GBIF 2022
Hyalophora euryalus	Ceanothus Silkmoth	GBIF 2022
Hyles gallii	Bedstraw Hawk-moth	GBIF 2022
Ischnura perparva	Western Forktail	GBIF 2022
Libellula quadrimaculata	Four-spotted Chaser	GBIF 2022
Lomographa semiclarata	Blueish Spring Moth	GBIF 2022
Lophocampa maculata	Yellow-spotted Tussock Moth	GBIF 2022
Malacosoma disstria	Forest Tent Caterpillar Moth	GBIF 2022
Mantis religiosa	European Mantis	GBIF 2022
Melanoplus bivittatus	Two-striped Grasshopper	GBIF 2022
Microtheoris ophionalis	Yellow-veined Moth	GBIF 2022
Mischocyttarus flavitarsis	Western Paper Wasp	GBIF 2022
Neoterpes trianguliferata	Canary Thorn	GBIF 2022
Nicrophorus nigrita	Black Burying Beetle	GBIF 2022
Noctua pronuba	Large Yellow Underwing	GBIF 2022
Nymphalis antiopa	Mourning Cloak	GBIF 2022
Nymphalis californica	California Tortoiseshell	GBIF 2022
Ochlodes sylvanoides	Woodland Skipper	GBIF 2022
Odonteus obesus	Stout Earth-boring Scarab Beetle	GBIF 2022
Pachysphinx modesta	Modest Sphinx	GBIF 2022

Paonias excaecata	Blinded Sphinx	GBIF 2022
Papilio eurymedon	Pale Swallowtail	GBIF 2022
Papilio rutulus	Western Tiger Swallowtail	GBIF 2022
Pero mizon	Crambid Moth	GBIF 2022
Petrophila confusalis	Confusing Petrophila Moth	GBIF 2022
Phyllodesma americana	American Lappet Moth	GBIF 2022
Plusia nichollae	A Moth	GBIF 2022
Polyphylla crinita	A Lined June Beetle	GBIF 2022
Prionus californicus	California Root Borer	GBIF 2022
Pseudothyatira cymatophoroides	A Moth	GBIF 2022
Pyrrharctia isabella	Isabella Tiger Moth	GBIF 2022
Raphia frater	Brother Moth	GBIF 2022
Reduvius personatus	Masked Hunter	GBIF 2022
Rheumaptera meadii	Barberry Geometer Moth	GBIF 2022
Saucrobotys fumoferalis	Dusky Saucrobotys Moth	GBIF 2022
Scoliopteryx libatrix	Herald	GBIF 2022
Scopula junctaria	Simple Wave	GBIF 2022
Scudderia furcata	Fork-tailed Bush Katydid	GBIF 2022
Scythropus californicus	Rusty Pineneedle Weevil	GBIF 2022
Sideridis rosea	Rosewing	GBIF 2022
Sinodendron rugosum	Rugose Stag Beetle	GBIF 2022
Spargaloma sexpunctata	Six-spotted Grey	GBIF 2022
Sphinx drupiferarum	Wild Cherry Sphinx	GBIF 2022
Sphinx vashti	Vashti Sphinx	GBIF 2022
Spilosoma virginica	Yellow Wooly Bear	GBIF 2022
Sympistis greyi	A Moth	GBIF 2022
Trichocnemis spiculatus	Ponderosa Borer Beetle	GBIF 2022
Trichodes ornatus	Ornate Checkered Beetle	GBIF 2022
Trimerotropis pallidipennis	Pallid-winged Grasshopper	GBIF 2022
Xestoleptura crassicornis	Flower Lonhorned Beetle	GBIF 2022
Zale lunata	Lunate Zale	GBIF 2022
Zale minerea	Colorful Zale	GBIF 2022
Zosteropoda hirtipes	V-lined Quaker Moth	GBIF 2022
Fungus		
Bilimbia rubricosa	A Lichen	GBIF 2022
Buellia badia	A Button Lichen	GBIF 2022
Candelariella efflorescens	Powdery Goldfleck Lichen	GBIF 2022
Cladonia coniocraea	Powderhorn Cup Lichen	GBIF 2022
Coprinus comatus	Shaggy Mane	GBIF 2022
Gallowayella fulva	A Fungus	GBIF 2022
Hypogymnia amplexa	A Lichen	GBIF 2022
Inoderma epigaeum	A Lichen	GBIF 2022
Lecanora reagens	A Lichen	GBIF 2022
Letharia vulpina	Wolf Lichen	GBIF 2022
Melanelixia fuliginosa	A Lichen	GBIF 2022
Ophioparma ventosa	Alpine Bloodspot Lichen	GBIF 2022
Parmelia barrenoae	A Lichen	GBIF 2022
Platismatia wheeleri	A Lichen	GBIF 2022
Schaereria dolodes	A Lichen	GBIF 2022
Strangospora moriformis	A Lichen	GBIF 2022

Trapeliopsis flexuosa	A Lichen	GBIF 2022
Trapeliopsis glaucopholis	A Lichen	GBIF 2022
Vulpicida canadensis	Brown-eyed Sunshine Lichen	GBIF 2022
Xylographa trunciseda	Curveyd Woodscript Lichen	GBIF 2022
Plants		
Achillea millefolium	Yarrow	Slichter 2010
Acmispon nevadensis	Nevada deervetch	Slichter 2010
Amelanchier alnifolia	Serviceberry	Slichter 2010
Antennaria howellii	Field pussy-toes	Slichter 2010
Antennaria microphylla	Rosy pussy-toes	Slichter 2010
Apocynum androsaemifolium	Spreading dogbane	Slichter 2010
Arceuthobium campylopodum	Western dwarf mistletoe	Slichter 2010
Arctium minus	Common burdock	Slichter 2010
Asclepias speciosa	Showy milkweed	Slichter 2010
Astragalus miser	Weedy milk-vetch	Slichter 2010
Balsamorhiza sagittata	Arrow-leaf balsamroot	Slichter 2010
Brodiaea	Brodiaea	Slichter 2010
Bromus tectorum	Cheat grass	Slichter 2010
Carex douglasii	Douglas' sedge	Slichter 2010
Carex filifolia	Thread-leaf sedge	Slichter 2010
Chaenactis douglasii var. douglasii	Dusty maidens	Slichter 2010
Chamaenerion angustifolium	Fireweed	Slichter 2010
Chenopodium album	Pigweed	Slichter 2010
Cirsium undulatum	Wavy-leaved thistle	Slichter 2010
Cirsium vulgare	Bull thistle	Slichter 2010
Claytonia perfoliata	Miner's lettuce	Slichter 2010
Clematis ligusticifolia	Virgin's bower	Slichter 2010
Collinsia parviflora	Small-flowered blue-eyed Mary	Slichter 2010
Collomia grandiflora	Large-flowered collomia	Slichter 2010
Cornus stolonifera	Red-osier dogwood	Slichter 2010
Crataegus douglasii	Black hawthorn	Slichter 2010
Dactylis glomerata	Orchard grass	Slichter 2010
Danthonia unispicata	Few-flowered wild oatgrass	Slichter 2010
Delphinium nuttallianum	Upland larkspur	Slichter 2010
Dianthus armeria	Grass pink	Slichter 2010
Dichanthelium oligosanthes	Scribner witchgrass	Slichter 2010
Dodecatheon conjugens	Desert shooting star	Slichter 2010
Draba verna	Spring whitlow-grass	Slichter 2010
Drymocallis glandulosa	Sticky cinquefoil	Slichter 2010
Echium vulgare	Blueweed	Slichter 2010
Eleocharis erythropoda	Bald spike-rush	Slichter 2010
Elodea canadensis	Canadian waterweed	Slichter 2010
Erigeron divergens	Spreading daisy	Slichter 2010
Erigeron pumilus	Shaggy fleabane	Slichter 2010
Eriogonum niveum	Snow buckwheat	Slichter 2010
Eriophyllum lanatum	Oregon sunshine	Slichter 2010
Erodium cicutarium	Filaree	Slichter 2010
Fragaria virginiana	Woods strawberry	Slichter 2010
Frangula purshiana	Cascara	Slichter 2010
Fritillaria pudica	Yellow bell	Slichter 2010

Gaillardia aristata	Common blanket-flower	Slichter 2010
Galium aparine	Cleavers	Slichter 2010
Geranium viscosissimum	Sticky geranium	Slichter 2010
Grindelia hirsutula	Columnia River gumweed	Slichter 2010
Hesperostipa comata	Rip-gut	Slichter 2010
Heuchera cylindrica	Lava alumroot	Slichter 2010
Holodiscus discolor	Ocean spray	Slichter 2010
Holosteum umbellatum	Jagged chickweed	Slichter 2010
Hypericum formosum	Western St.John's-wort	Slichter 2010
Hypericum perforatum	Klamath weed	Slichter 2010
Ipomopsis aggregata	Skyrocket	Slichter 2010
Ipomopsis congesta	Ballhead gilia	Slichter 2010
Iris missouriensis	Western blue flag	Slichter 2010
Iris pseudacorus	Yellow flag	Slichter 2010
Lactuca serriola	Prickly lettuce	Slichter 2010
Lemna minor	Common duckweed	Slichter 2010
Leymus cinereus	Giant rye grass	Slichter 2010
Linaria dalmatica	Dalmatian toad-flax	Slichter 2010
Lithophragma glabrum	Smooth woodland-star	Slichter 2010
Lithophragma parviflorum	Small-flowered prairie-star	Slichter 2010
Lithospermum ruderale	Columbia puccoon	Slichter 2010
Lomatium triternatum	Nine-leaf lomatium	Slichter 2010
Lonicera ciliosa	Orange honeysuckle	Slichter 2010
Lupinus sericeus	Silky lupine	Slichter 2010
Lupinus sulphureus	Sulphur lupine	Slichter 2010
Lysimachia nummularia	Moneywort	Slichter 2010
Lythrum salicaria	Purple loosestrife	Slichter 2010
Mahonia aquifolium	Tall Oregongrape	Slichter 2010
Mahonia repens	Creeping Oregongrape	Slichter 2010
Maianthemum racemosum	False Solomon's seal	Slichter 2010
Maianthemum stellatum	Star-flowered Solomon's seal	Slichter 2010
Melilotus albus	White sweet-clover	Slichter 2010
Mentzelia laevicaulis	Blazingstar	Slichter 2010
Mertensia longiflora	Small bluebells	Slichter 2010
Moehringia lateriflora	Bluntleaf sandwort	Slichter 2010
Myosotis stricta	Blue forget-me-not	Slichter 2010
Myosurus minimus	Common mousetail	Slichter 2010
Penstemon speciosus	Showy penstemon	Slichter 2010
Phacelia hastata	White-leaf phacelia	Slichter 2010
Phacelia heterophylla	Varileaf phacelia	Slichter 2010
Philadelphus lewisii	Mock-orange	Slichter 2010
Phlox longifolia	Long-leaf phlox	Slichter 2010
Physaria geyeri	Geyer's twinpod	Slichter 2010
Physocarpus malvaceus	Mallow ninebark	Slichter 2010
Pinus ponderosa	Ponderosa pine	Slichter 2010
Plantago lanceolata	English plantain	Slichter 2010
Plantago major	Common plantain	Slichter 2010
Plantago patagonica	Candleweed	Slichter 2010
Poa bulbosa	Bulbous bluegrass	Slichter 2010
Populus angustifolia	Narrow-leaved cottonwood	Slichter 2010

Populus tremuloides	Quaking aspen	Slichter 2010
Potentilla gracilis	Graceful cinquefoil	Slichter 2010
Prunella vulgaris	Self-heal	Slichter 2010
Prunus virginiana	Chokecherry	Slichter 2010
Pseudotsuga menziesii	Douglas fir	Slichter 2010
Pterospora andromedea	Pinedrops	Slichter 2010
Pyrrocoma carthamoides	Large-flowered goldenweed	Slichter 2010
Ranunculus acris	Meadow buttercup	Slichter 2010
Ranunculus glaberrimus	Sagebrush buttercup	Slichter 2010
Ranunculus macounii	Macoun's buttercup	Slichter 2010
Ranunculus repens	Creeping buttercup	Slichter 2010
Ranunculus uncinatus	Little buttercup	Slichter 2010
Ribes aureum	Golden currant	Slichter 2010
Ribes cereum	Wax currant	Slichter 2010
Rubus leucodermis	Blackcap	Slichter 2010
Rumex acetosella	Sheep sorrel	Slichter 2010
Salix amygdaloides	Peachleaf willow	Slichter 2010
Salix bebbiana	Bebb willow	Slichter 2010
Scutellaria angustifolia	Narrow-leaved skullcap	Slichter 2010
Senecio hydrophiloides	Sweet-marsh butterweed	Slichter 2010
Silene douglasii	Douglas' silene	Slichter 2010
Silene menziesii	Menzies' silene	Slichter 2010
Sisymbrium altissimum	Jim Hill mustard	Slichter 2010
Solanum dulcamara	Bittersweet nightshade	Slichter 2010
Spiraea douglasii	Hardhack	Slichter 2010
Spiraea lucida	Birch-leafed spirea	Slichter 2010
Symphoricarpos albus	Common snowberry	Slichter 2010
Taraxacum officinale	Common dandelion	Slichter 2010
Toxicodendron radicans	Poison ivy	Slichter 2010
Tragopogon dubius	Oysterplant	Slichter 2010
Trifolium dubium	Least hop clover	Slichter 2010
Trifolium pratense	Red clover	Slichter 2010
Trifolium repens	White clover	Slichter 2010
Trillium petiolatum	Purple trillium	Slichter 2010
Urtica dioica	Stinging nettle	Slichter 2010
Valerianella locusta	European corn salad	Slichter 2010
Vicia americana	American vetch	Slichter 2010
Vicia sativa	Common vetch	Slichter 2010
Vicia villosa	Hairy vetch	Slichter 2010