Section 2
Watershed Characteristics

2.1 Regional Setting

The Middle Snake River Watershed (WRIA 35) occupies 2,250 mi^2 in southeastern Washington along the Idaho border to the east and Oregon border to the south, and the Palouse Watershed (WRIA 34) to the north, and the Walla Walla (WRIA 32) and Lower Snake (WRIA 33) to the west. Exhibit 2-1 shows the regional location of the WRIA 35. The Middle Snake Watershed encompasses portions of Asotin, Whitman, Garfield, and Columbia Counties within Washington. It should be noted that approximately 340 square miles of the lower Grande Ronde Watershed is located within WRIA 35 boundaries but is not part of the planning effort. Diamond Peak, located in the headwaters of the Tucannon River, is the highest point in the basin with an elevation of 6,380 feet, while the confluence of the Snake and Tucannon Rivers is the lowest point at approximately 540 feet. The City of Clarkston and towns of Starbuck, Pomeroy, and Asotin are also located within the WRIA.

2.2 Delineation of Implementation Areas

For purposes of this assessment, WRIA 35 was divided into four subbasins, each based on prominent surface water features: Asotin Creek, Middle Snake River, Pataha Creek, and Tucannon River (see Exhibit 2-2). These four subbasins were also defined in this manner because they are generally consistent with the subbasins delineated under the limiting factors analysis conducted by the Washington Conservation Commission, subbasin plans prepared under the Bonneville Power Association/Northwest Power Planning Council and the Salmon Recovery Programs. The intent is to prepare this Level 1 assessment and ultimately the Watershed Plan for WRIA 35 to be consistent with the other planning efforts being conducted in this watershed.

Furthermore, these subbasins are being termed “Implementation Areas” in this Level 1 Assessment and is intended to be carried through to the Watershed Plan. Implementation areas are based on the concept that characteristics of these subbasins are similar enough such that implementation considerations to be developed under the Phase 3 watershed plan can be grouped by these implementation areas. Of course there will be some issues (e.g. ground water related) that will not fit into the implementation area format. Implementation considerations regarding interbasin issues will be addressed outside of this structure.

The intent of separating the watershed into subbasins/implementation areas is to define a basic scale for the collection of information that will allow for adequate resolution in the overall assessment effort. In this approach, comparisons can be made with regards to the adequacy of available data on a subbasin scale. The utility of this delineation is found in organizing the data with respect to specific hydrologic basins. The implementation areas are defined by various locally prominent surface water elements. Although some information is not limited

Insert Exhibit 2-1

Insert Exhibit 2-2

geographically by implementation area boundaries (e.g. selected groundwater data), assessment by implementation area offers a more refined scale for conducting the data collection and review, enabling greater detail information for use in the planning phase.

In addition, a portion of area within the WRIA 35 boundary was not included in this assessment (see Exhibit 2-2). The southern portion of the basin draining to the Grande Ronde River drains directly into the Snake River. Because runoff from this area does not impact water quantity, quality, or habitat issues in most of WRIA 35 and the area has limited local management oversight input, the Planning Unit decided to exclude this area from the WRIA 35 Level 1 Watershed Assessment.

The following are brief geographic descriptions of the four implementation areas. Each of the implementation areas are described further in Sections 3 through 6.

2.2.1 Asotin Creek Implementation Area

The Asotin Creek Implementation Area has two major drainages, the mainstem and George Creek. The mainstem drains 119,000 acres and flows into the Snake River at the City of Asotin. Major tributaries to the mainstem include Charley Creek, North Fork of Asotin Creek, South Fork of Asotin Creek, and Lick Creek. George Creek drains 89,000 acres and its major tributaries include Pintler Creek, Nims Gulch, Ayers Gulch, Kelly Creek, Rockpile Creek, and Coombs Canyon. Primary jurisdictions in the Asotin Implementation area include Asotin County, Garfield County, City of Asotin, and the Nez Perce Tribe. Pasture and rangeland, cropland, and forestland are the predominant land uses within the Asotin Creek Implementation Area.

2.2.2 Middle Snake River Implementation Area

The Snake River flows across a major physiographic region of the Pacific Northwest known as the Snake River Plateau and along the southern portion of the Columbia Plateau. The Middle Snake River portion generally drains the area between the City of Clarkston and Little Goose Dam (RM 70). Only a relatively small amount of runoff occurs along the Middle Snake River downstream of the Clearwater River confluence with contribution primarily from the Tucannon River. Other major tributaries to the Middle Snake River include Aklali Flat Creek, Deadman Creek, and Alpowa Creek. The Middle Snake River implementation area is composed of portions of Columbia, Whitman, Garfield and Asotin counties. This implementation area includes the City of Clarkston, the largest population center in the watershed. The Lewiston-Clarkston area represents the majority of industrial, commercial, and residential development in the watershed. However, there is minimal other development in the implementation area. Agriculture in the implementation area is dominated by non-irrigated farming in the uplands, irrigated farming in the lower valleys, and cattle ranching. Little forestry activity occurs in this area.

2.2.3 Pataha Creek Implementation Area

The Pataha Creek Implementation area drains approximately 114,166 acres (185 mi^2) and flows into the Tucannon River at RM 11.2. In other studies (including Subbasin Planning), Pataha Creek is included as part of the Tucannon River implementation area. Major tributaries of Pataha Creek are seasonal streams that include Dry Pataha Creek, Sweeney Gulch, Balmaier Gulch, Linville Creek, Tatman Gulch, and Dry Hollow. Almost all of Pataha Creek implementation area lies within Garfield County. Crop, rangeland, and pasture comprise over 90 percent of the watershed, with grazed rangeland being the primary land use.

2.2.4 Tucannon River Implementation Areas

The Tucannon River has two major drainages, the mainstem and Pataha Creek. The mainstem drains 207,734 acres (318 mi^2) and flows into the Snake River at RM 62.2, three miles upstream of Lyons Ferry State Park, near the mouth of the Palouse River. Major tributaries to the mainstem Tucannon (besides Pataha Creek) include Willow Creek, Kellogg Creek, Cummings Creek, Little Tucannon River, Panjab Creek, Sheep Creek, and Bear Creek. The majority of the Tucannon River implementation area lies within Columbia County and is also within the treaty territory of the Nez Perce Tribe. The major land uses in the Tucannon River watershed are related to agricultural purposes (SCS 1991). Crop, forest, rangeland, pasture, and hay comprise over 90 percent of the watershed, with grazed rangeland being the majority of the land use. Dry and irrigated cropland produces winter wheat, barley, peas, and bluegrass. The Tucannon River drains the Blue Mountains in its headwaters where most of the upper third of the implementation area is forest covered.

2.3 Geology and Hydrology

The descriptions provided here are general and apply to the basin as whole. Additional information and description on the hydrology is provided for each implementation area in Sections 3 through 6, while Section 7 includes further description of the ground water resources.

The Blue Mountains in southeast Washington were formed approximately 110 million years ago when volcanic islands and the sea floor from the Pacific Ocean rode up onto the western edge of the North American continent. As the Earth's crust stretched along this seam molten rock flowed up through fissure in the ground and buried the sea floor and volcanic islands. The ancient fractured and folded lava flows comprise the basaltic rocks that make up the geology of the basin. The basalt flows that covered the region, which are thousands of feet thick, diverted the Columbia River northward and westward to its present location and are largely responsible for the topography of the Columbia Basin. Each basalt formation accumulated from individual flows ranging in thickness from 10-300 feet. The current topography of the region results from a combination of erosion and underlying structural deformation of the basalt.

The Columbia River Basalt flows were separated by long stretches of erosion and deposition of porous material. Plateau tops and shoulder slopes are characterized by silt loams moderately to

well drained and highly erosive. Within the last 35 to 40 million years, dry climate and outwash from receding ice glaciers created vast quantities of fine-grained sediments deposited throughout the region. This sediment was carried by wind and deposited throughout the basin. The mountain and plateau soils are dominated by these wind-blown silt (loess) deposits.

Primary surface water resources in WRIA 35 include the Snake River, the Tucannon River, and Asotin Creek. Other major tributaries include Pataha Creek, Alpowa Creek, Deadman Creek, and George Creek. The Tucannon River headwaters begin in the Blue Mountains. It is the largest Snake River tributary within WRIA 35 and drains Pataha Creek as well. Asotin Creek begins in the forested uplands in the Blue Mountains and enters the Snake River just below the City of Asotin.

Groundwater in the basin exists primarily within the underlying basalt aquifer, which underlies the entire Middle Snake River Basin. The shallower basalt aquifer has significant hydraulic continuity with the surface streams. Comprised of a series of interconnected lava flows, the basalt aquifer may range in thickness from several hundred to thousands of feet and cover as much as 2500 square miles extending across and beyond the boundaries of the basin.

Precipitation and runoff and direct ground water discharge are the source of water to surface streams. Stream measurements in several of the streams suggest that virtually all of the base flow comes from ground water discharge. Summer thundershowers elevate stream flow for only short periods of time. Melting snow in the Blue Mountains of the Umatilla National Forest provides much of the annual runoff in the Pataha Creek watershed, producing peak flows in May or June. Severe runoff events lead to sediment problems in Pataha Creek and lower Tucannon River. Precipitation is discussed further in the following section.

2.4 Climate

The Middle Snake Watershed is semi-arid. The climate of WRIA 35 is largely influenced by the Cascade Mountains to the west, the Pacific Ocean, and the prevailing westerly winds. Wet westerly air masses move from the Pacific Ocean over the Cascade Mountain range where they drop a majority of their moisture, leaving the northern portion of WRIA 35 in an arid rain shadow. This rain shadow effect contributes to the semiarid shrub steppe conditions of the Palouse Region that extends to the Blue Mountains and occupies the northern majority of WRIA 35.

Regional climate depends greatly on elevation and varies from warm and semiarid in the northern lowlands to cool and relatively wet at higher elevations in the Blue Mountains. Refer to Exhibit 2-3 for the elevation changes within the basin. The Blue Mountains, which occupy the southern part of WRIA 35, have maximum elevations of about 6,000 feet. This increased elevation causes mean annual precipitation rates to exceed 40 inches per year in some areas while elevations may be as low as 500 feet to the north and receive 10-15 inches per year.

Much of the precipitation occurs from November to January and at higher elevation falls as snow that persists as snow pack until March or April. Snowfall at lower elevations (below 1500 feet)

seldom remains more than a few weeks. In addition, the annual spring snowmelt may provide substantial stream flow for a limited period.

Air temperatures vary distinctly from cooler mean temperatures at higher elevations in the Blue Mountains to much warmer mean temperatures at lower elevations in the Palouse. In January, mean monthly temperatures range from 25 degrees Fahrenheit at the Anatone Gauging Station (3500 feet) to 35 degrees at the WaWaWai Gauging Station (700 feet). In July, mean monthly temperatures range from 63 degrees Fahrenheit at the Anatone Gauging Station to 74 degrees at the WaWaWai Gauging Station

2.4.1 Climatological Data Sources

Data was collected from the Hydrosphere data retrieval service, which annually compiles climatological data from the National Climatological Data Center (NCDC) onto compact disk media. Working from Hydrosphere's CLIMATEDATA ™ "NCDC Summary of the Day", monthly climatological data was retrieved for applicable stations located either within WRIA 35 or close to the WRIA boundaries. The search identified many climate gauges in southeastern Washington including all gauges within WRIA 35

In addition to the NCDC climatological data, isopluvial coverages of annual mean precipitation from the Washington Department of Ecology (DOE) GIS database were obtained. Exhibit 2-3 shows the distribution of mean annual precipitation throughout the Asotin, Lower Snake Mainstem, Pataha and Tucannon implementation areas, which make up WRIA 35. The locations of the significant gauging stations used in the analysis are also shown in Exhibit 2-4. This data indicates a wide range of mean annual precipitation throughout the region, with a low of 10-12 inches annually in portions of the Snake River and Grande Ronde Valleys to a high of 60-70 inches annually in the Tucannon Wilderness of the Blue Mountains.

2.4.2 Analysis of Climatological Data

Many gauges within or near WRIA 35 had short and/or broken periods of record and other gauges had incomplete data sets, these gauges were excluded from the climate analysis. The criteria used for selecting a gauge for further study are that the gauge must have a minimum of 15 years of recorded data, be located within or near to the WRIA boundaries and be of a representative sampling elevation. This process yielded four gauging stations with adequate periods of record and representative sampling elevations for monthly air temperature, precipitation and snow pack data. The stations used in this study are Anatone, Pomeroy, Dayton 1WSW and WaWaWai. These four gauging stations were sorted by elevation prior to analysis because precipitation, snow depth and air temperature are commonly associated with elevation. Tables 2.4-1 through 2.4-4 show the period of record and elevation of each station, along with mean monthly air temperature, precipitation and snow depth data. It should be noted that the periods of record for each gauging station vary considerably among the stations. The longest period of record may be found at Dayton Gauging Station (1931-2002) and the shortest at WaWaWai Gauging Station (1948-1965).

Table 2.4-1
Summary of Climate Data for WaWaWai Station

Elevation 702 ft

Period of Record : 1948-1965

Monthly Temperature WAWAWAI (1948-1965) (Fahrenheit)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Monthly Means	35.268	40.961	45.700	54.164	61.328	67.778	74.376	72.231	66.110	55.107	43.424	38.020
Monthly Std Dev	6.841	4.046	2.285	2.474	2.602	2.744	2.299	3.15	2.783	2.692	3.929	4.026

Annual Mean	54.539
Annual Std Dev.	3.323
Annual Max	57.029
Annual Min	52.449

Monthly Precipitation WAWAWAI (1948-1965) (inches)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Monthly Means	2.214	1.756	1.721	1.106	1.175	1.420	0.307	0.470	0.808	1.439	2.830	2.459
Monthly Std Dev	1.771	1.044	0.711	0.721	0.729	1.072	0.471	0.505	0.731	1.035	1.141	1.281

Annual Mean	17.705
Annual Std Dev.	0.934
Annual Max	22.100
Annual Min	11.330

Monthly Snow depth WAWAWAI (1948-1965) (inches)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Monthly Means	0.667	0.470	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.667
Monthly Std Dev	1.658	1.486	1.874	0.280	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.309

Annual Mean	1.804
Annual Std Dev.	0.634
Annual Max	5.000
Annual Min	0

Table 2.4-2
Summary of Climate Data for Dayton 1WSW Station

Elevation 1557 ft

Period of Record : 1931-2002

Monthly Temperatures DAYTON 1 WSW (1931-2002) (Fahrenheit)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Monthly Means	32.682	37.354	43.36	49.851	56.976	63.584	71.802	69.763	62.042	51.539	40.653	34.631
Monthly Std Dev	6.422	4.359	2.535	2.739	2.682	2.744	2.31	2.696	2.884	2.38	3.698	3.986

Annual Mean	51.186
Annual Std Dev.	1.328
Annual Max	54.407
Annual Min	47.136

Monthly Precipitation DAYTON 1 WSW (1931-2002) (inches)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Monthly Means	2.374	1.813	2.026	1.603	1.481	1.306	0.471	0.513	0.857	1.672	2.467	2.552
Monthly Std Dev	1.316	0.899	0.841	0.873	0.959	0.800	0.536	0.597	0.686	1.064	1.240	1.209

Annual Mean	19.135
Annual Std Dev.	3.832
Annual Max	29.660
Annual Min	12.070

Monthly Snow depth DAYTON 1 WSW (1931-2002) (inches)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Monthly Means	6.964	3.414	1.455	0.040	0.000	0.000	0.000	0.000	0.000	0.067	1.224	4.882
Monthly Std Dev	8.278	4.747	2.310	0.171	0.000	0.000	0.000	0.000	0.000	0.301	2.543	5.059

Annual Mean	18.046
Annual Std Dev.	11.845
Annual Max	57.8
Annual Min	0

Table 2.4-3
Summary of Climate Data for Pomeroy Station

Elevation: 1900 ft

Period of Record : 1948-2002

Monthly Temperatures Pomeroy (1948-2002) (Fahrenheit)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Monthly Means	32..335	37.569	42.654	49.299	56.405	63.635	70.402	69.541	61.804	50.903	40.264	33.727
Monthly Std Dev	6.425	3.737	2.882	3.023	2.831	3.143	2.693	3.093	3.051	2.475	3.733	4.065

Annual Mean	52.382
Annual Std Dev.	1.392
Annual Max	53.341
Annual Min	48.071

Monthly Precipitation Pomeroy (1948-2002) (inches)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Monthly Means	2.100	1.44	1.56	1.212	1.335	1.18	0.534	0.672	0.773	1.248	1.831	2.079
Monthly Std Dev	1.332	0.784	0.676	0.729	0.694	0.917	0.499	0.653	0.651	0.880	1.023	1.069

Annual Mean	15.964
Annual Std Dev.	3.051
Annual Max	24.980
Annual Min	11.140

Monthly Snow depth Pomeroy (1948-2002) (inches)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Monthly Means	4.263	0.920	0.655	0.039	0.000	0.000	0.000	0.000	0.000	0.044	0.719	3.133
Monthly Std Dev	5.852	1.849	1.874	0.280	0.000	0.000	0.000	0.000	0.000	0.277	1.778	4.841

Annual Mean	9.773
Annual Std Dev.	9.571
Annual Max	32.900
Annual Min	0

Table 2.4-4
Summary of Climate Data for Anatone Station

Elevation: 3573 ft

Period of Record: 1948-1981

Monthly Temperature Anatone (1948-1981) (Fahrenheit)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Monthly Means	25.431	31.574	35.155	41.985	49.421	56.374	63.762	63.441	55.896	46.103	35.328	29.202
Monthly Std Dev	6.378	3.65	2.839	2.706	2.506	2.909	2.273	3.171	3.273	2.907	3.352	3.665
Annual Mean	44.473											
Annual Std Dev.	3.302											
Annual Max	46.508											
Annual Min	48.071											

Monthly Precipitation Anatone (1948-1981) (inches)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Month	01	02	03	04	05	06	07	08	09	10	11	12
Monthly Means	2.345	1.598	1.883	1.672	2.198	1.996	0.845	0.943	1.017	1.535	2.152	2.094
Monthly Std Dev	1.526	0.988	0.734	1.019	1.255	1.067	0.782	0.932	0.737	1.21	1.385	1.41
Annual Mean	20.278											
Annual Std Dev.	1.087											
Annual Max	26.920											

Monthly Snow depth Anatone (1948-1981) (inches)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Monthly Means	18.090	10.741	8.880	1.259	0.572	0.000	0.000	0.000	0.000	0.478	8.034	15.904
Monthly Std Dev	14.266	10.424	7.844	2.206	1.699	0.000	0.000	0.000	0.000	1.658	10.661	14.226
Annual Mean	63.958											
Annual Std Dev.	5.249											
Annual Max	126.000											
Annual Min	27.215											

2.4.3 Summary of Climate Data

Temperature Trends

The temperatures within WRIA 35 vary with yearly climatic cycles, geographic location and elevation. Based on historical data, peak temperatures occur through June and start to decrease in late August, and winter low temperatures occur November through January. Typically, summer mean monthly high temperatures (90 - 96^0 F) in the WRIA are associated with the lower elevations. Winter mean monthly low temperatures (18 – 27^0 F) are associated with higher elevations and mountainous geography. Tables 2.4-1 through 2.4-4 show maximum, minimum and mean temperatures for the four selected climate stations.

Precipitation Trends

Precipitation patterns may inversely reflect temperature gradients as precipitation rates increase progressively southeastward and higher in elevation toward the Blue Mountains. Exhibit 2-4 uses isopluvial areas to show mean annual precipitation gradients throughout the WRIA. Precipitation, like temperature, usually varies with yearly climatic cycles, geographic location and elevation. The lower northern areas average significantly less than the higher elevations of the Blue Mountains in the southwestern portion of WRIA 35. Most of the precipitation occurs from November through March. Tables 2.4-1 through 2.4-4 show the annual maximum, minimum and mean precipitation values for the four selected climate stations. There is a slight increasing trend in annual precipitation totals for the WaWaWai and Pomeroy climate stations; however, the annual precipitation totals for the Anatone and Dayton stations remained relatively steady through the period of record.

Snow Pack Trends

Regular snow pack accumulation in WRIA 35 increases from the northern lowlands to higher elevations in the Blue Mountains in the southwest. Just as temperature decreases and precipitation increases with increasing elevation, mean snow pack also increases with increasing elevation. Snow does not often accumulate to a depth of more than 1 foot in lowland areas, but it may collect to depths of several feet in the higher elevations of the Blue Mountains during an average winter. Tables 2.4-1 through 2.4-4 show maximum, minimum and mean annual snow pack depths for four selected climate stations.

Precipitation and snow pack trend analyses were performed for WRIA 35 using data from the four gauging stations, see Exhibits 2-4 through 2-7. Trend analysis indicates a general decrease in annual snow pack, particularly at elevations less than about 2000 feet and showing slight increases of snow depth at elevations of about 3600 feet. Total annual precipitation appears to be increasing or remaining constant all elevations. It is important to note that climate data was gathered from points below 3573 feet and the highest elevation within WRIA 35 is approximately 6000 feet and so this analysis may not accurately represent climate trends above elevations of 3600 feet.

Exhibit 2-4
WaWaWai Climate Trends

Elevation 702 ft

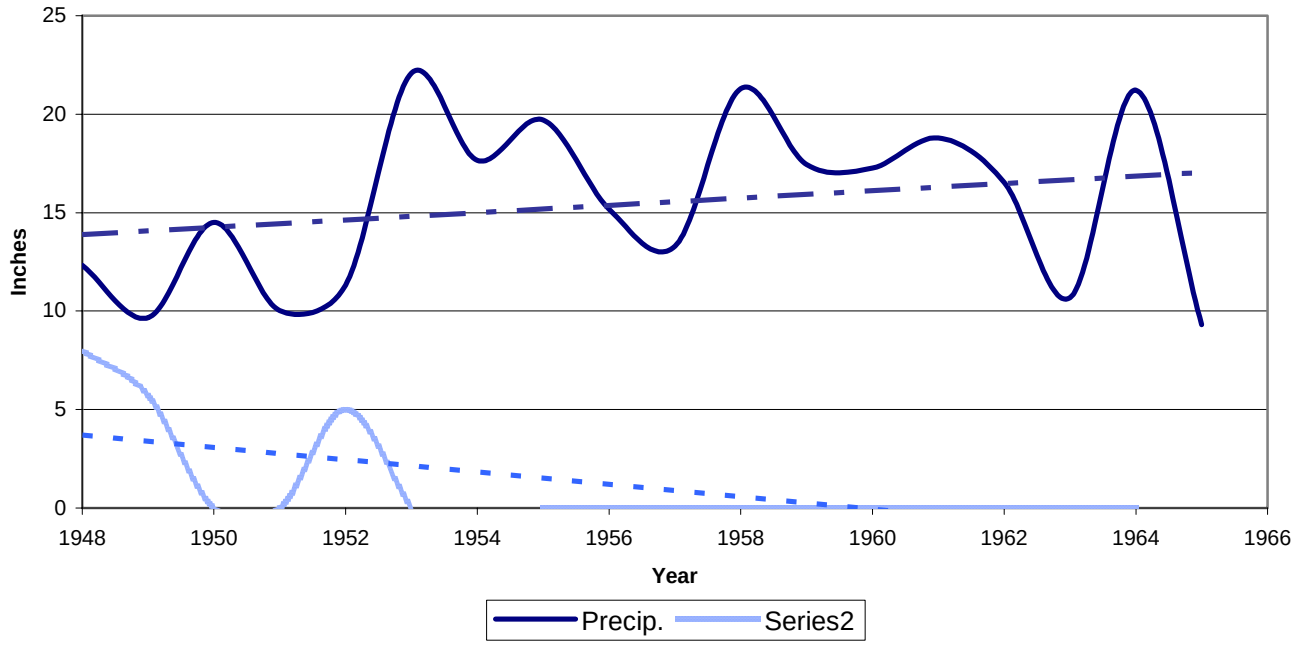


Exhibit 2-5
Dayton 1 WSW Climate Trends

Elevation 1557 ft.

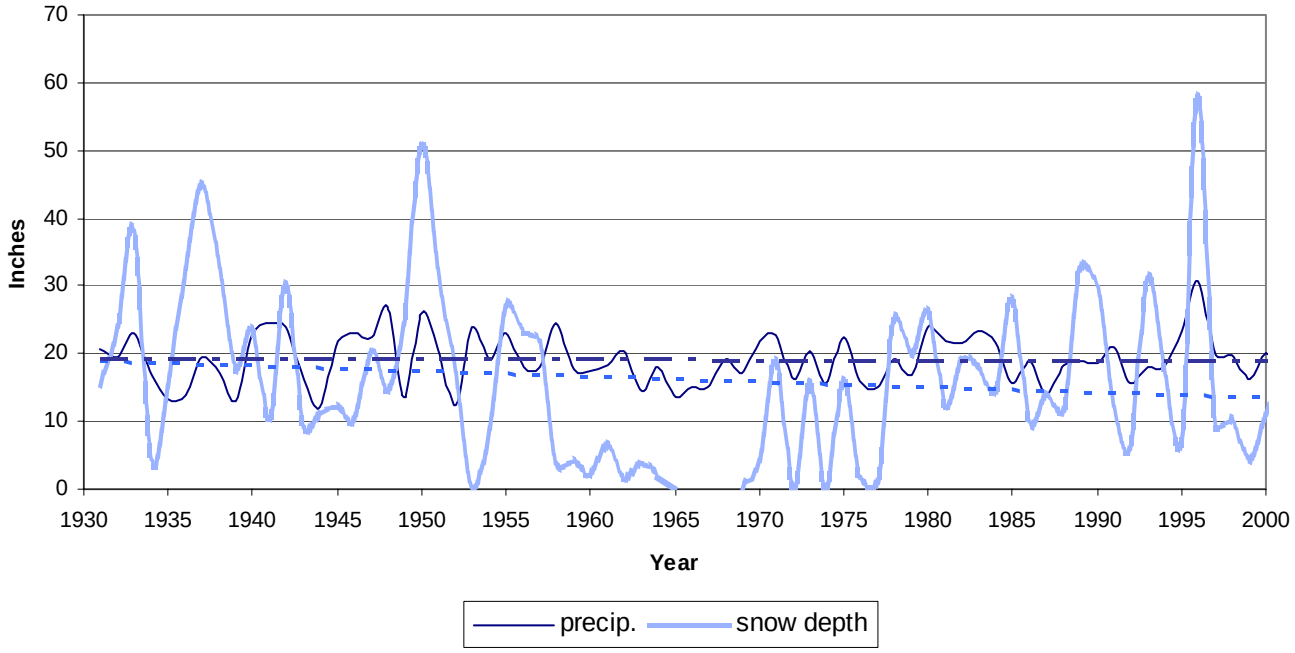


Exhibit 2-6
Pomeroy Climate Trends

Elevation 1900 ft

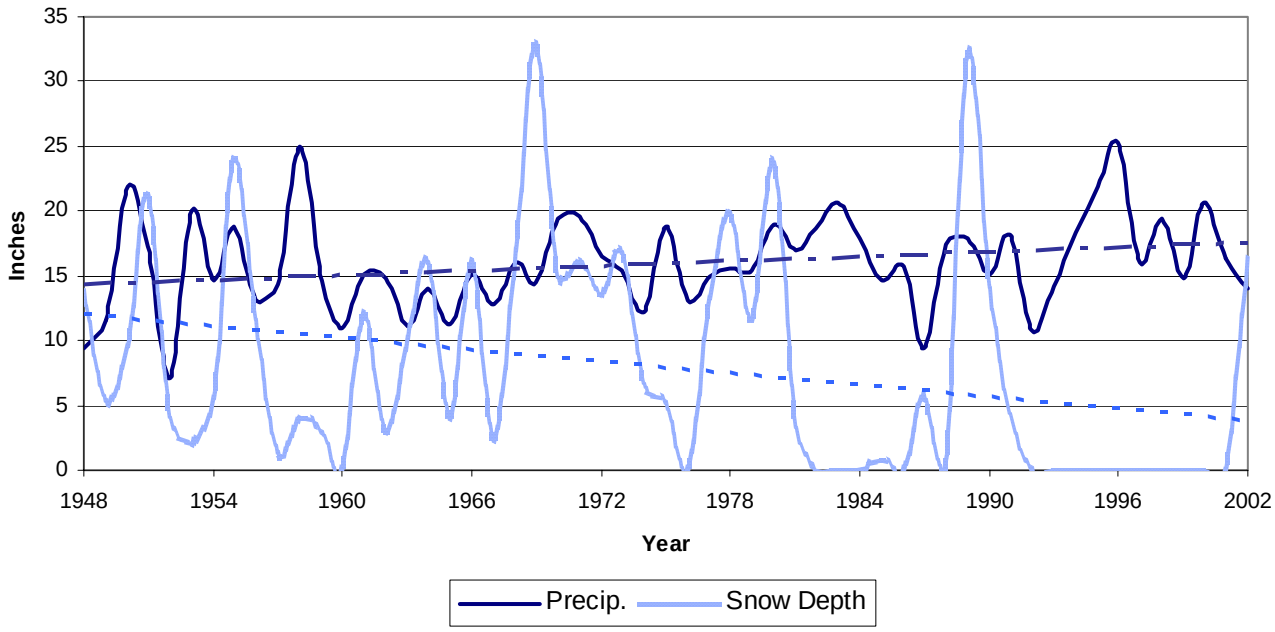
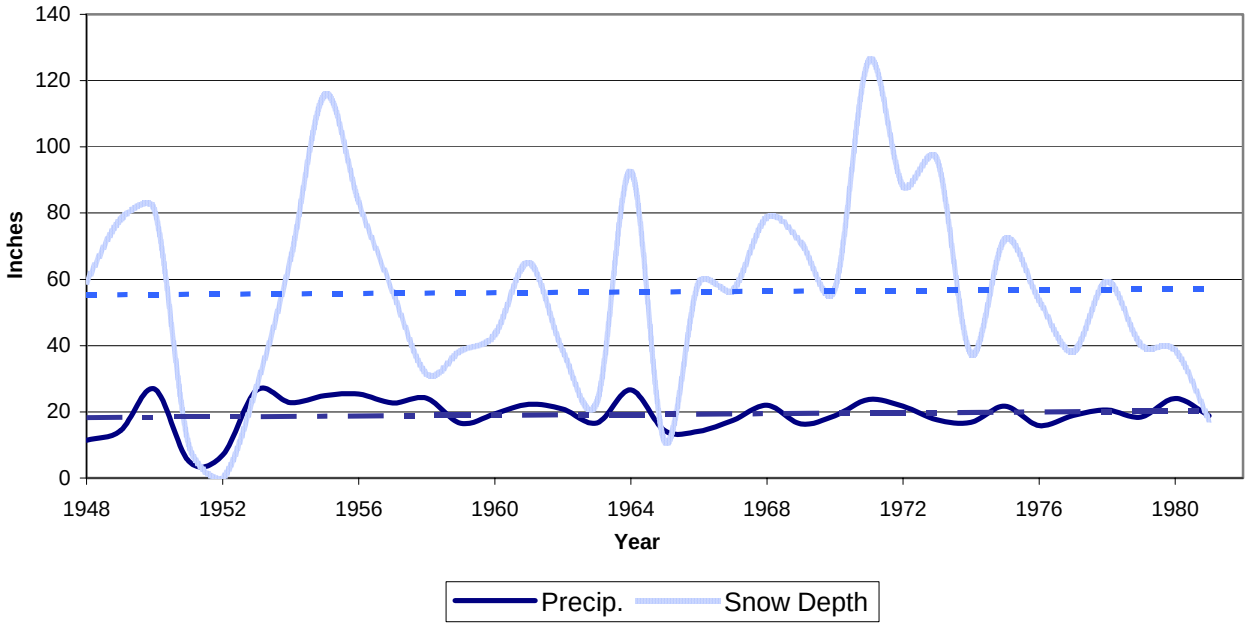


Exhibit 2-7
Anatone Climate Trends

Elevation 3573 ft.



2.5 Land Use

A review of land use and land cover practices is necessary to understand their potential impacts on both the quantity and quality of water resources in the watershed. In general, the quantity of detailed information concerning historical and present land use across WRIA 35 is limited. Nevertheless, available information shows that physical and biological features of the Middle Snake River Basin today are substantially altered from pre-development conditions. Pre-development conditions are not fully documented, nonetheless significant alterations can be identified that affect water resources. These include, among others:

- Modification of the original land cover due to logging, agriculture, grazing, urban development, and other land uses;
- Modification of the floodplain due to construction of permanent roadways, railroads, gravel pits and other features;
- Alteration of the Snake River hydrograph due to management of the river system for power-supply purposes;
- Alteration of forested areas from timber harvest and other activities;
- Effects of land use, wastewater discharges and other activities on water quality.

For current or post-developed conditions, information was found regarding larger scale delineations of land use statewide. In particular, useful data sets were obtained from the archives of Natural Resource Conservation Service (NRCS) and the Department of Ecology which has a database of the national land cover data (NLCD) derived from aerial and satellite imagery collected in 1992. The data is somewhat dated, but general land cover is not expected to be significantly different in 2004. Summaries of that information for WRIA 35 is shown in Exhibit 2-8 and tabulated in Table 2.5-1.

Depicted in this data are several numerous identified land use types that have been grouped into major categories as listed in Table 2.5-1. Based on the 1992 land cover data, the predominant land covers within WRIA 35 are agriculture land cover totaling more than 475,000 acres (33 percent) of the watershed; pasture and grassland that covers almost 300,000 acres (21 percent); and scrubland which covers slightly more than 400,000 acres (28 percent) of the watershed. The majority of forestland is in the Umatilla National Forest and is managed by the USFS for multiple uses including timber management, livestock grazing, outdoor recreation, mining, and water management. The state of Washington and non-industrial private forestland owners manage the remaining forestland. The amount of developed land within WRIA 35 is minimal with less than 10,000 acres (1 percent) of the watershed. Table 2.5-2 lists the major land use categories by implementation area.

Table 2.5-1 Summary of Land Cover in WRIA 35		
Land Cover Type	**Areas (Acres)**	**National Land Cover Data Code**
Open Water	21,430	1
Low intensity residential	4,320	11
High Intensity residential	0.22	21
Commercial/Industrial /transportation	3,825	22
Bare rock/sand/clay	1,482	23
Barren transitional	11,978	31
Deciduous forest	8,275	33
Evergreen forest	191,555	41
Mixed forest	17,707	42
Scrubland	409,892	43
Grassland/herbaceous	287,634	51
Pasture/hay	8,457	71
Small grains	332,824	81
Fallow	139,690	83
Urban/recreational grasses	569	84
Woody wetlands	69	85

Table 2.5-2 Summary of Major Land Uses by Implementation Area			
Implementation Area	**Pasture and Rangeland**	**Cropland**	**Forest**
Asotin Creek	90,390 (43%)	54,960 (26%)	62,260 (30%)
Tucannon River (includes Pataha Creek)	120,650 (37%)	119,000 (37%)	68,165 (22%)
Middle Snake			
Deadman Creek	43,000 (33%)	86,000 (66%)	N/A
Alpowa Creek	51,000 (61%)	27,000 (33%)	4,000 (5%)
Along Snake River	422,000 (47%)	310,000 (35%) 82,000 (9% - irrigated)	3,000 (0.3%)

Agriculture Land Use

The United States Department of Agriculture (USDA) provides a periodic census of agriculture crop and livestock on a county basis throughout the State. It should be noted that this data is referenced in units of acres harvested, which does not account for fallow fields or fields that are not harvested due to poor crop production or poor market values. Therefore, high variability should be expected between harvest years as a result of crop rotations and seasonal climate changes. Summary agriculture data for the counties in WRIA 35 is depicted in Table 2.5-3. It should also be noted that the acreages are for the counties as a whole, while the watershed boundaries are generally a portion of the county areas. Whitman County is not included in Table 2.5-3 because most of the county is not located within WRIA 35. Most of the Whitman County portion of the watershed is rangeland.

Agriculture in the basin and surrounding region is dominated by non-irrigated farming in the uplands, irrigated farming in the lower valleys, and cattle ranching. The primary agricultural activities in WRIA 35 include wheat and barley and small grains/alfalfa with summer fallow every two to three years. Most fields are non-irrigated as indicated in Table 2.5-3. The wheat and barley use dryland farming, while the alfalfa, small grains, and pasture are located in the irrigated bottomlands. In Asotin Creek Implementation Area, livestock are generally wintered in the lower portions of the implementation area from December through March. After calving, most cattle graze lower canyon slopes until forest grazing is available in June or July.

Conversion of perennial bunchgrass prairies to production annual crops has led to widespread and large quantities of fine sediment erosion and deposition in the streams. Most of the fine sediment depositions occur in the lower ends of receiving streams. However, no-till/direct seed farming is being employed on additional acreage each year throughout southeast Washington, which reduces soil erosion and improves infiltration of precipitation to soil. Furthermore, approximately 30 percent of cropland in Asotin Creek Implementation Area is enrolled in the Conservation Reserve Program (CRP).

Table 2.5-3
Summary of Crop Type Acreage by County

Crop	Asotin	Garfield	Columbia
Harvested cropland	36,126	114,645	109,607
Harvested cropland-Irrigated	217	536	2,869
Corn for grain or seed	-	-	51
Wheat for grain	21,110	71,689	77,511
Wheat for grain-Irrigated	-	-	229
Barley for grain	10,205	36,082	17,547
Barley for grain - Irrigated	-	-	(D)
Hay-alfalfa, small grain, wild, grass	4,515	2,310	2,806
Hay-alfalfa, small grain, wild, grass - Irrig	156	516	1,372
Vegetables harvested	-	-	1,787
Vegetables harvested Irrigated	-	-	-
Land in orchards	74	-	-
Land in orchards - Irrigated	67	-	-

"-" Not quantified or not present

Urban Land Use

Formal urban land use data is limited for WRIA 35. Columbia and Garfield counties are full planning counties under the Growth Management Act and are required to develop a comprehensive plan with land use and zoning, while Asotin and Whitman counties are only required to have the critical areas and resource lands (CARL) designation portion of the GMA. Columbia and Garfield counties are in the process of developing their comprehensive plan and as a result, have limited available data regarding urban and rural land uses or projected land use changes. Table 2.5-4 lists the main urban and suburban/developed areas in WRIA 35.

Table 2.5-4
Urbanized Areas in WRIA 35

Urban Area	Implementation Area	County
Clarkston	Middle Snake River	Asotin
Asotin	Asotin Creek	Asotin
Pomeroy	Pataha Creek	Garfield
Starbuck	Tucannon River	Columbia

2.6 Vegetation

The following description of vegetation in the watershed is based primarily on information from the Habitat Limiting Factors Analysis completed by the Washington Conservation Commission. Historically, the Middle Snake River watershed was covered by prairie and canyon grasslands and shrub steppe vegetation. This was predominantly in the lower to middle elevations. Forests dominated in the higher elevations near and within the Blue Mountains. Presently, much of the grasslands and prairies have been converted to crop and livestock production. Non-irrigated row crops, primarily wheat, cover approximately 37 percent of the vegetative cover land, while grass-forb plant covers over 30 percent of the vegetative cover. Coniferous forest covers about 20 percent, while shrublands cover 7 percent of the vegetative cover. The remaining vegetation is a mix of various vegetation classes.

Western white pine, whitebark pine, ponderosa pine, western larch, aspen, cottonwood, riparian willows, bitterbrush, mountain mahogany, and bluebunch wheatgrass were the historically dominant trees, shrubs and grasses in the Interior Columbia Basin. Today, much of the forest cover is homogeneous mid-seral stands dominated by thick stands of firs, because harvest of larger fire-resistant trees, fire suppression, and heavy grazing.

2.7 Fish and Aquatic Habitat Resources

The Planning Unit has identified habitat as one of the components to be addressed as part of the watershed planning process for WRIA 35. However, the approach relies on using the Subbasin Planning work to complete the habitat portions of the assessment and planning phases. Thus, information regarding fish and habitat in the Basin is referred to the Subbasin Plans prepared for the Asotin Creek Implementation Area, Tucannon River and Lower Snake River implementation areas, and in the Salmon Recovery Plan under development. Subbasin Plans were completed in May 2004. This information will be used ultimately in developing the habitat component of the watershed plan under the Planning Phase.

2.8 Population

This section documents the current and projected population within WRIA 35 and for each of the four implementation areas. The total population of Asotin County in 2000 was 20,551. Of this

total 19,256 lived in the cities of Asotin or Clarkston and surrounding areas. No major population centers are present in the Whitman County portion of the WRIA. The city of Pomeroy was the most populated area in Garfield County with 1,517 residents. The largest town in the Columbia County portion of the WRIA was Starbuck with a population of 130 in year 2000. Private land comprises 1,711 square miles (76%) of the WRIA, while the federal government manages 436 square miles (19%), and the state of Washington manages 103 square miles (~5%).

As discussed in the implementation area discussions (Sections 3 though 6), the population projections are used as a means to estimate future water demand. The approach to project population in the unincorporated areas of WRIA 35 relies on county data published by Washington State's Office of Financial Management (OFM). OFM's population forecasts included a high, medium, and low range of future population from 2002 to 2025. Because the planning unit had no reason to believe the populations would increase at a higher or lower rate of the population growth than the medium rate of growth, the planning unit used OFM's medium population forecast.

Unlike Garfield and Asotin counties, a portion of Whitman and Columbia counties fall within WRIA 35. Therefore, a percentage of total unincorporated county population was attributed to the portions of each county within WRIA 35. This percentage was based on total county acreage versus acreage of each county within WRIA 35. Since WRIA 35 is further divided into sub-basins, a similar apportionment of unincorporated population was performed for each sub-basin. Finally, the estimated population within the Grande Ronde sub-basin was removed from the results since the Planning Unit has decided not to include the Grande Ronde subbasin in this assessment.

Table 2.8-1 shows the unincorporated county population (noted with the term "rural") by sub-basin and the incorporated populations. Since population estimates were not readily available for the unincorporated (rural) areas of the counties prior to 2000, these rows were left blank in Table 2.8-1.

In Table 2.8-1, future population data for incorporated areas, including the cities of Asotin, Pomeroy, Starbuck, and the Clarkson urban area, was based on each area's average growth rate from 1990 to 2000. It should be noted that although unincorporated population changes in future years are based on the OFM forecast, the OFM forecasts were modified as follows. In the cases where OFM showed population decreases in future years in the unincorporated areas, the planning unit held the population constant as a means to ensure the water demand forecast described in the implementation area discussions (Sections 3 through 6) results in conservative demand estimates for planning purposes.

Note that for Table 2.8-1, the population estimates for rural Whitman County were modified to account for a greater proportion of the rural population being in the northeast portion of the county. Specifically, total unincorporated populations projected by OFM for the county mask the fact that a greater rural population density exists near the Cities of Pullman and Spokane. Since WRIA 35 northern boundary skirts the southern portion of the county, the planning unit believes rural population density is approximately 25 percent less than the density of northern

portion of the county. As a result, the number of rural residents for Whitman County reflected in Table 2.8-1 was reduced by 25 percent.

Table 2.8-1
Population Projection for WRIA 35

	City of Asotin	Rural Asotin Co.	Rural Garfield Co.	Clarkson Urban Area	Rural Asotin Co.	Rural Columbia Co.	Rural Garfield Co.	Rural Whitman Co.	City of Pomeroy	Rural Columbia Co.	Rural Garfield Co.	City of Starbuck	Rural Columbia Co.	Rural Garfield Co.	WRIA 35 Total Population
1990	981	-	-	16,096	-	-	-	-	1,393	-	-	170	-	-	-
1995	1,072	-	-	17,447	-	-	-	-	1,491	-	-	165	-	-	-
2000	1,095	576	815	18,661	432	479	815	945	1,517	479	815	165	479	815	**28,085**
2005	1,137	507	819	19,629	380	470	819	946	1,536	470	819	165	470	819	**28,986**
2010	1,195	572	819	20,597	429	470	819	952	1,591	470	819	165	470	819	**30,187**
2015	1,256	541	819	21,565	406	470	819	948	1,647	470	819	165	470	819	**31,215**
2020	1,320	497	819	22,643	373	470	819	948	1,706	470	819	165	470	819	**32,338**
2025	1,388	352	819	23,797	264	470	819	948	1,766	470	819	165	470	819	**33,366**

Projections do not include the Grande Ronde Subbasin

2.9 Water Rights and Claims

This section includes a discussion of the surface and ground water rights and claims in WRIA 35. The discussion here focuses on a basin-wide description. Characterization of specific water rights quantities and types of use for each implementation area in WRIA 35 are included in Sections 3 through 6.

2.9.1 Surface Water Rights

This section addresses surface water rights in the WRIA 35 basin. Water rights in the State of Washington fall into two major categories. One category is water rights obtained through the application process specified in the State Water Code (Chapter 90.03 RCW). The other category consists of "claims" for water based on the filing of water right claims during the time periods specified in State law for filing such claims. A claim may represent a perfected water right, but it is not confirmed as valid until the extent and validity is determined in a general water right adjudication (a legal proceeding). This section provides a summary of the surface water rights appropriated in WRIA 35 under the State Water Code in the form of permits and certificates. Additionally, a discussion on streams closed to further appropriations within the Basin is included. Also provided is a summary of the adjudications of claims that have taken place in the basin. The section concludes with a discussion of potential illegal uses of surface water, and a characterization of the amount of water available in the basin for further appropriation, with respect to the State Water Code.

It should be emphasized that the quantities of water presented in this section represent the amount of water that has been legally appropriated throughout the basin. These quantities do not present an accurate picture of the amount of water actually being utilized throughout WRIA 35. Additional discussion regarding actual water uses (as distinct from water rights) is presented in Sections 3 through 6 for each implementation area.

Summary of Appropriated Surface Water Right Permits and Certificates

The Washington State Department of Ecology (Ecology) has the responsibility for administering water rights in the State, via the application and review process set forth in the State Water Code. Ecology maintains paper files for each water right application submitted. These paper files serve as the complete record for each water right. Information from these files has also been entered into a digital database, the Water Rights Application Tracking System (WRATS).

WRATS Database Organization and Terminology

The WRATS database does not contain all of the information contained in the paper files[1]. Moreover, in transferring data from paper files to WRATS, data entry errors can occur with respect to individual records. However, in analyzing a large number of rights,

[1] For instance, the paper files often contain detailed, legal information regarding the Place of Use identified for water rights; whereas, the WRATS database is unable to include such detailed data.

it is far more cost-effective to extract information from WRATS than from the voluminous paper files. It should be noted that it is unknown from analysis of the WRATS database which water rights are currently being used and to what extent.

This information includes approximately 192 records for surface water certificates, permits, and applications for the WRIA 35 basin. The database also includes over 1,791claims for surface water in WRIA 35. No quantities are included or analysis is provided for the claims listed in the WRATS database for WRIA 35 since the evaluation of the validity of these water right claims through the adjudication process has not been performed.

Information from WRATS that was used in this Watershed Assessment includes the following:

Type of Record. A "record" is simply one entry in the database. A record may represent an application for a water right, a permit to develop a water right, a certificate indicating that the water right has been perfected (i.e., put to use); or an application for change or transfer of a certificated water right. In general terms, a record for an "active permit" or "active certificate" indicates the holder has the right to put the water to use. Therefore, these records offer a convenient tool for estimating the total amount of water that has been authorized for appropriation in the WRIA 35 basin.

A "change" record generally indicates that either the place of use, point of diversion or withdrawal, or purpose of use has been changed. In most cases a change does not indicate that the quantity of water associated with a water right has been changed. An "application" record indicates an applicant has requested water, but a decision approving, modifying, or denying the application for a water right has not been made by Ecology. The number of application records serves as an indication of the number of water right applications awaiting action in the administrative process.

The date an application is filed with Ecology is the priority date for the application and any water right issued under the application. Water rights are based on "first in time is first in right" which means that earlier water rights have priority over later ones, if regulation between uses is necessary.

Quantity. The WRATS database indicates both the instantaneous quantity (Q_i), expressed in cubic feet per second (cfs) for surface water and gallons per minute (gpm) for ground water, and the maximum annual quantity of water (Q_a) that was approved for appropriation, expressed in acre-feet per year (afy). For purposes of analyzing total amounts of water rights in the basin, the annual quantity is the most useful measure.

Location. The "place of use" associated with a water right is a specifically-defined land area where the water can be used. Place of use is often given as a legal description of a parcel, or the service area of a public water system. The WRATS database does not list the place of use. However, it does include the Township, Range, and Section (TRS) of the well location, point of withdrawal, or point of diversion. TRS identifies a single, one-square-mile area within the WRIA 35 basin. For surface water rights, the place of use is

typically near an intake or diversion structure. Therefore, at the scale of the entire WRIA 35 planning area, analysis based on TRS provides a reasonable approximation of the location of the place of use for the water right, to within a unique square mile section of the WRIA 35 basin.

Purpose of Use. Each water right is granted for a specific purpose, such as irrigation, stock watering, domestic use, municipal use, industrial use, etc. In many cases, a single water right is granted for multiple uses. For example a water right may permit use of the water for irrigation, stock watering, and domestic use.

Primary and Supplemental Uses. Water rights can be granted as either a "primary" or a "supplemental" right. A primary right can stand alone; but a supplemental right is always associated with a primary right. A supplemental water right typically contains a provision that the total annual quantity to be used cannot exceed the amount previously awarded for the primary right. As an example, a given water right-holder may have a primary right for diversion from a stream and a supplemental right for withdrawal from a well. In a dry year, water may not be available from the stream, but the right-holder can pump the well to replace that water up to the amount shown on the supplemental right. Because of this relationship, supplemental rights are not additive to primary rights. In other words, in calculating the total amount of water appropriated in the WRIA 35 basin, supplemental rights are not to be added to the primary rights, but are calculated separately.

Summary of Surface Water Rights Data from WRATS Database

Table 2.9-1 and Exhibits 2-9 and 2-10 provide a summary of the surface water rights information contained in the WRATS database for the WRIA 35 basin. Certificate and permit data is sorted by purpose of use by summing the number of records, and instantaneous and annual quantities for the different purposes of use. Two key distinctions are made in the presentation of this data. Primary water rights are depicted separately from supplemental water rights, and summations are made independently regarding water rights for consumptive versus non-consumptive uses. The definition of supplemental water rights, relative to primary water rights, is provided above. Non-consumptive use differs from consumptive use in that although water may be used for beneficial purposes, it is not ultimately consumed, but is returned to the water source and is available for other uses. Examples of non-consumptive use include hydropower generation, fish propagation, and recreation. In these cases, water is "set aside" for certain uses, but it is not ultimately consumed. Examples of consumptive use include municipal, irrigation, and stock watering. Some of the water rights have multiple purposes of use. These rights are only considered once in the analysis, such that any water right with an irrigation use is included with the "irrigation" category. The totals for the other categories only include the specific type of use shown.

In the WRIA 35 basin there are a total of 182 surface water right permits and certificates. Of these, 173 are primary water rights. The total annual and instantaneous quantities associated with primary surface water rights for WRIA 35 are 10,371.8 afy and 203.37 cfs, respectively. The majority of surface water rights in the basin have, by far, been

Insert Exhibit 2-9

Insert Exhibit 2-10

appropriated for irrigation purposes. In total, irrigation surface water rights account for 9,605 afy of the total annual quantity and 81.09 cfs of the total instantaneous quantity.

There is one water right shown for municipal supply for 6.24 cfs with no annual quantity shown. This specific water right was researched and it was found that this water right certificate was issued to Washington Water Power Company for municipal supply for the City of Clarkston. This water right did not include an annual quantity, nor did any of the file material mention an annual quantity. Without an annual quantity shown on the water right, this means that the 6. 24 cfs is authorized on a continuous basis which could result in as much as 4,518 afy if the 6.24 cfs was diverted continuously.

Other categories of use representing sizeable appropriations of instantaneous quantity include domestic supply, and fish & wildlife propagation uses.

A total of 1,542 afy is associated with supplemental surface water rights in the WRIA 35 basin. As noted on Table 2.9-1, quantities of water associated with water right claims are not included. There is a total of 1,791 surface water claims filed for the planning area.

Table 2.9-1 also shows totals for the number of pending applications for new water rights. Instantaneous and annual quantities are not shown for pending applications since these have not been approved. Totals for applications are also not included in the consumptive or non-consumptive use totals. There are a total of 10 pending applications for new surface water rights in the WRIA 35 basin, excluding applications for transfer or change of existing rights.

Table 2.9-1 Summary of Surface Water Rights[1] for WRIA 35			
Purpose of Use [2]	**Number of Records**	**Annual Quantity, Qa (afy)**	**Instantaneous Quantity, Qi (cfs)**
Consumptive Use			
Irrigation	106	9,605	81.09
Stock Watering	11	10.3	0.18
Municipal	1	N.A. [8]	6.24
Domestic	25	439.5	62.02
Commercial	2	131.6	0.95
Non-Consumptive Use			
Fish & Wildlife Propagation	36	183.4	52.87
Recreation	1	2	0.02
Sub-Total Consumptive [3]	**145**	**10,186.4**	**150.48**
Sub-Total Non-Consumptive [4]	**37**	**185.4**	**52.89**
Total (Primary) [5]	**182**	**10,371.8**	**203.37**
Total (Supplemental) [6]	**9**	**1,542**	**5.81**
Water Right Applications [7]	**10**	**---**	**---**

NOTES:

1 The detailed summary by Purpose of Use only includes data pertaining only to water right permits and certificates, as listed in the Department of Ecology Water Rights Application Tracking System (WRATS) database (February 4, 2004). Quantities of water associated with claims and water right applications are not included in this table. There are no annual or instantaneous quantities associated with water right applications, because they are not appropriated rights since they have not yet been approved.

2 Includes only Primary water right permits and certificates. Some rights have multiple purposes of use. Such rights are only considered once in this analysis. Water rights with irrigation use are all included with the "irrigation" category.

3 Consumptive sub-total includes rights associated with permits and certificates for out-of-stream consumptive uses (i.e., irrigation, stock watering, municipal, domestic, and commercial).

4 Non-consumptive sub-total includes rights associated with permits and certificates for instream non-consumptive uses (i.e., fish & wildlife propagation, recreation).

5 Total (Primary) is the total number of Primary water rights appropriated in WRIA 35.

6 Supplemental water rights have conditions of use associated with them which state that these rights are to be used as an alternate or supplemental source of supply to Primary water rights and can not be considered as being additive to Primary water rights.

7 Number of pending water right applications for WRIA 35, as listed in WRATS.

8. No annual quantity is specified on this surface water right, which was issued to Washington Water Power for municipal supply. If this instantaneous quantity is diverted continuously, this would result in an annual consumptive quantity diverted of 4,518 afy.

Surface Water Source Limitations

Under an administrative procedure with the Washington Department of Fish and Wildlife, and their predecessor agencies, the Department of Ecology has established Surface Water Source Limitations (SWSLs) on surface water sources throughout the state, which has resulted in the establishment of minimum flow requirements or closure periods to further appropriations on specific river reaches, including WRIA 35. Adjudications of water rights discussed below also result in limitations to the further issuance of water rights. Basins that have been adjudicated that have resulted in SWSLs are also listed in Table 2.9-2 which is a summary of the SWSLs that are currently in place within WRIA 35.

Table 2.9-2
Surface Water Source Limitations*

Stream Name	Effective Date	Limitation
Alkali Flat Creek	4-18-1952	Low flow All year
Asotin Creek	12-11-1956	Low flow All year
Pataha Creek	10-29-1968	Low flow All year
Tucannon River	12-12-1972	Low flow All year
Alpowa Creek	3-26-1923	Adjudication
Deadman Creek	1-24-1929	Adjudication
Meadow Gulch Creek	6-6-1922	Adjudication
Penawawa Creek	6-17-1952	Closure
South Meadow Creek	8-12-1952	Bypass Flow
WaWaWai Canyon	3-3-1931	Adjudications

Section 9 includes further discussion of SWSLs. Under current operating procedures by Ecology, these low flow restrictions have been applicable only to surface waters. However, new appropriations of ground water may be required by the Department of Ecology to locate wells outside of the zone of direct hydraulic continuity between these surface water sources and the ground water aquifer.

Surface Water Right Adjudications

Adjudication is the legal process whereby the validity and extent of claims to a given water body are determined. There have been four surface water adjudications in the basin, Alpowa Creek, Deadman Creek, Meadow Gulch Creek, and Wawawai Canyon, with the decrees issued for all of these between 1922 and 1931. A total of 146 adjudicated surface water right certificates have been issued in these basins, and are included in the water right certificates shown in Table 2.9-1. It is important to note that like other water rights that have been issued, these quantities of water do not represent estimates of the actual amount of water used; rather, these quantities refer to the amount of water legally allocated to the users through the adjudication process.

Potential Illegal Uses of Surface Water

The previous section provided a summary of the legal uses of surface water within the WRIA 35 basin. There is a potential that additional, illegal uses of water may occur. Any use of surface water that is occurring and is not associated with a certificate, permit, or claim could be considered to be an illegal use of surface water. Unlike the Ground Water Code (see Section 2.9.2), there are no exemptions in the Surface Water Code for even minimal uses of surface water. This means that even minimal uses of surface water such as for domestic supply from a spring must be substantiated by a water right in order to be considered a legal use of surface water.

Another instance where potential illegal use of surface water can occur is if the use of water is occurring under a valid water right but in excess of the amounts or conditions of use specified on a water right. Waste of water in addition to the amount beneficially used, could also be considered an illegal use of water.

In the WRIA 35 basin there has been no quantification of the amount of surface water used illegally, or if any is being used illegally. Ecology is the State agency responsible for regulation of all uses of surface water and ground water.

Surface Water Present in Context of Chapter 90.82 RCW

Surface water present is defined for this assessment as the total quantity of water stored in reservoirs, present in snow pack, and present in rivers and streams in the WRIA 35 basin. The quantity of surface water present can be described with units such as cubic feet, acre-feet, acre-feet per year (afy), or cubic feet per second (cfs).

The volume of surface water present varies substantially on a seasonal and annual basis due to changes in precipitation, snowmelt, water demands, storage and other factors. The variation in water present can be described through the use of estimates for “normal,” “dry,” and “wet” years, as represented by different percentiles in the historical record for the planning area.

Sections 3 through 6 provide detailed discussions of the quantities of surface water resources present in the WRIA 35 basin, as used in developing the basin water balance.

Surface Water Available in Context of Chapter 90.82 RCW

Surface water available is defined for this assessment as the portion of the surface water present that is available for off-stream uses. Off-stream uses include irrigation, municipal and industrial, off-stream hydropower, and other uses that may be either consumptive or non-consumptive. The difference between surface water present and available is the quantity of water that is set aside for instream uses. Instream uses include flows desired for fisheries or other needs. The amount of surface water available is then constrained by the quantity of water present and the quantity of water set aside for instream flows. The quantity of surface water available also varies seasonally and annually depending on the volume of water present and the required instream flow for a particular period of time.

Instream flow requirements have not been formally adopted for the WRIA 35 basins (see Section 9 for further discussion of instream flow needs).

Surface Water Available for Further Appropriation in Context of Chapter 90.82 RCW

Surface water available for further appropriation is defined for this assessment as the surface water available for diversion that is in excess of that required to meet instream flow needs while not impairing existing water rights. Since further appropriations need to be approved by Ecology, it is useful to present the four tests Ecology uses in reviewing water right applications. The four tests are (RCW 90.03.290):

- Water will be put to beneficial use;
- No impairment to existing, or senior rights;
- Water is available for appropriation; and
- Issuance of the requested water right will not be detrimental to the public's welfare.

The application of these four tests is highly site-specific. In addition, in making water right decisions, Ecology gives consideration to areas with basin assessments or basin management plans, stream closures, instream flow set by state regulations, hydraulic continuity (surface water interconnected to ground water), and the availability of alternative water supplies.

A precise determination of the quantity of surface water available for further appropriation cannot be completed for this assessment, due to the fact that instream flows have not been formally adopted for the WRIA 35 basin. Section 8 presents the WRIA 35 water balance, which includes an analysis of the amount of surface water present, the current demands exerted upon those resources, and the amount of surface water potentially available for future use. This, however, does not take into account the element of water rights or water right claims that have not been evaluated for validity. Without specific quantifications of legal instream flow requirements, the amount of water legally available for further appropriation cannot be calculated; however, the water balance analysis offers a reasonable approximation of this quantity.

2.9.2 Ground Water Rights

This section addresses ground water rights in the WRIA 35 basin. Ecology has the responsibility for administering ground water rights in the State, via the application and review process set forth in the State Water Code. Ecology maintains paper files for each water right application submitted. These paper files serve as the complete record for each water right. Information from these files has also been entered into the WRATS digital database. This section provides a summary of the ground water rights appropriated in WRIA 35 under the State Water Code in the form of permits and certificates. The section concludes with a discussion of potential illegal uses of surface water, and a characterization of the amount of water available in the basin for further appropriation, with respect to the State Water Code.

It should be emphasized that the quantities of water presented in this section represent the amount of water that has been legally appropriated throughout the basin. These quantities do not present an accurate picture of the amount of water actually being utilized throughout WRIA 35. Additional discussion regarding actual water uses (as distinct from water rights) is presented in Sections 3 through 6.

Summary of Ground Water Rights Data from WRATS Database

Table 2.9-3 provides a summary of the ground water rights information contained in the WRATS database for the WRIA 35 basin (also see Exhibit 2-11). Certificate and permit data is sorted by purpose of use. Pertinent information regarding the number of records, and instantaneous and annual quantities, is provided. Two key distinctions are made in the presentation of this data. Primary water rights are depicted separately from supplemental water rights, and summations are made independently regarding water rights for consumptive versus non-consumptive uses. The relationship of supplemental water rights to primary water rights is provided in Section 2.8.1 above. Non-consumptive use differs from consumptive use in that although water may be used for beneficial purposes, it is not ultimately consumed, but is returned to the water source and is available for other uses. Examples of non-consumptive use include fish propagation and recreation. In these cases, water is “set aside” for certain uses, but it is not ultimately consumed. Examples of consumptive use include municipal, irrigation, and stock watering. Some of the water rights have multiple purposes of use. These rights are only considered once in the analysis, such that any water right with an irrigation use is included with the “irrigation” category. The totals for the other categories only include the specific type of use shown.

In the WRIA 35 basin there are a total of 225 ground water right permits and certificates. Of these, 205 are primary water rights. The total annual and instantaneous quantities associated with primary ground water rights for WRIA 35 are 28,290 afy and 43,836 gpm, respectively. The majority of ground water rights in the basin have, by far, been appropriated for irrigation purposes. In total, irrigation ground water rights account for 15,423 afy of the total annual quantity and 24,402 gpm of the total instantaneous quantity. Other categories of use representing sizeable appropriations of instantaneous quantity include commercial, municipal, and domestic uses.

Insert Exhibit 2-11

Table 2.9-3
Summary of Ground Water Rights [1] for WRIA 35

Purpose of Use [2]	Number of Records	Annual Quantity, Qa (afy)	Instantaneous Quantity, Qi (gpm)
Irrigation	60	15,423	24,402
Commercial	19	4,080	5,803
Municipal	6	1,991	3,919
Domestic	116	5,350	8,612
Railway Maintenance	1	6	100
Fish & Wildlife Propagation	2	1,440	900
Mining	1	NA	100
Sub-Total Consumptive [3]	**203**	**26,850**	**42,936**
Sub-Total Non-Consumptive [4]	2	1,440	900
Total (Primary) [5]	**205**	**28,290**	**43,836**
Total (Supplemental) [6]	**20**	**22,102**	**18,672**
Water Right Applications [7]	**17**	**---**	**---**

NOTES:

(1) The detailed summary by Purpose of Use only includes data pertaining only to water right permits and certificates, as listed in the Department of Ecology Water Rights Application Tracking System (WRATS) database (February 4, 2004). Quantities of water associated with claims and water right applications are not included in this table. There is no feasible means of evaluating the validity, or documenting the amount of, water associated with claims. There are no annual or instantaneous quantities associated with water right applications, because they are not appropriated rights, since they have not been approved.
(2) Includes only Primary water right permits and certificates. Some rights have multiple purposes of use. Such rights are only considered once in this analysis. Water rights with irrigation use are all included with the "irrigation" category.

(3) Consumptive sub-total includes rights associated with permits and certificates for consumptive uses (i.e., irrigation, municipal, domestic, commercial, railway maintenance, mining).

(4) Non-consumptive sub-total includes rights associated with permits and certificates for non-consumptive uses (i.e., fish & wildlife propagation).

(5) Total (Primary) is the total number of Primary water rights appropriated in WRIA 35.
(6) Supplemental water rights have conditions of use associated with them which state that these rights are to be used as an alternate or supplemental source of supply to Primary water rights and can not be considered as being additive to Primary water rights.

(7) Number of pending water right applications for WRIA 35, as listed in WRATS.

A total of 22,102 afy is associated with supplemental ground water rights in the WRIA 35 basin. As noted on Table 2.9-3, quantities of water associated with water right claims are not included. There are a total of 1,054 ground water claims filed for the planning area.

Table 2.9-3 also shows totals for the instantaneous quantities of water associated with pending applications for water rights. Annual and instantaneous quantities are not shown for pending applications since they have not been approved. Totals for applications are also not included in the consumptive or non-consumptive use totals. There are a total of 17 pending applications for ground water rights in the WRIA 35 basin.

Exempt Wells

Under RCW 90.44.050 of the State's Ground Water Code, no public ground water can be withdrawn after the effective date of the Ground Water Code, June 6, 1945, unless the user files an application and obtains an authorized permit. However, certain types of ground water use are exempted from this requirement. Under these exemptions, a valid ground water right can be established without applying for a permit for:

- Stock-watering up to 5,000 gallons per day;
- Watering a lawn or non-commercial garden up to one-half acre in size;
- Domestic uses (single or group domestic) up to 5,000 gallons per day; and
- Industrial purposes up to 5,000 gallons per day.

Ground water withdrawals (i.e., wells) installed under this provision of the law are commonly referred to as "exempt wells". The law further indicates the State may require, from time to time, these users to provide information on the means for withdrawal and the quantity of the withdrawal. Yet, because no permit is issued, exempt wells are not formally tracked by the State (other than by the necessity to authorize a permit for drilling the well and filing an associated well driller's log). Hence, quantifying the total amount of water dedicated to this use within this WRIA is a difficult exercise.

In some areas of the State, the use of exempt wells has been exploited for the development of expanded rural housing. The 5,000 gallon per day exclusion for domestic use can support approximately 6 homes with potable water (i.e., the so-called "six-pack" option). Hence, developers have used the exclusion as a means outside the normal permitting process to obtain the water necessary for new housing, creating a situation wherein a number of new small, local water systems have been established throughout the state. The extent to which this exclusion has impacted water use in WRIA 35 is unknown.

Potential Illegal Uses of Ground Water

Like surface water, there is a potential for ground water to be used illegally. There are several ways that such withdrawals may be occurring, including:

- Use without a valid water right permit or certificate from the State (i.e., for uses that the law requires to have a water right);

- Use from a so-called exempt well that exceeds the conditions of that exemption (e.g., using more than 5,000 gallons per day for domestic purposes; watering a commercial garden; etc.)

- Use from a so-called exempt well/wells for multiple domestic supply for a single development (project) that exceeds the legislative intent of the 5,000 gallons per day exemption for domestic purposes

- Use in violation of the conditions of a standing water right permit or certificate (e.g., use beyond what the original water right allows either with regards to point of diversion, place of use, or beneficial use).

In WRIA 35, the quantity of illegally used ground water is not known. Such an estimate may require substantial resources both in terms of time and potential fieldwork. Determination of this quantity may require either direct or indirect measurement of the quantities of water actually being used at specific locations, with comparisons being made with individual rights and/or the conditions associated with exempt wells.