SILVIES SUB-BASIN ASSESSMENT

Written by Erin Maupin
For the Harney County Watershed Council

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This project was funded in part by the Oregon Watershed Enhancement Board

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CHAPTER ONE

INTRODUCTION

The purpose of this document is to provide a basis for future watershed management plans. The Silvies Sub-basin Assessment will serve as a planning tool for the Harney County Watershed Council (HCWC) and others.

This assessment was developed as an agreed upon action with the Oregon Watershed Enhancement Board (OWEB) as outlined in a grant to the HCWC.

The Council enjoys the active involvement of the following entities: private land owners, Oregon Water Resources Department, Harney County Court, USDI Bureau of Land Management, Burns Paiute Tribe, OWEB, USDA Forest Service, Izaak Walton League, Malheur National Wildlife Refuge, Oregon Department of Environmental Quality, U.S. Fish and Wildlife Service, USDA Farm Service Agency, Oregon Department of Fish and Wildlife, Harney Soil and Water Conservation District, Oregon State University, USDA Natural Resources Conservation Service, USDA Agriculture Research Service, and the Malheur Lake Basin Working Group.

The purpose of the Harney County Watershed Council is to address issues and concerns about watershed health in Harney County and to promote existing good and beneficial conditions. The Council will provide a framework for education, coordination, and cooperation among all interested parties for the development and implementation of watershed action plans beneficial to the people and the environment.

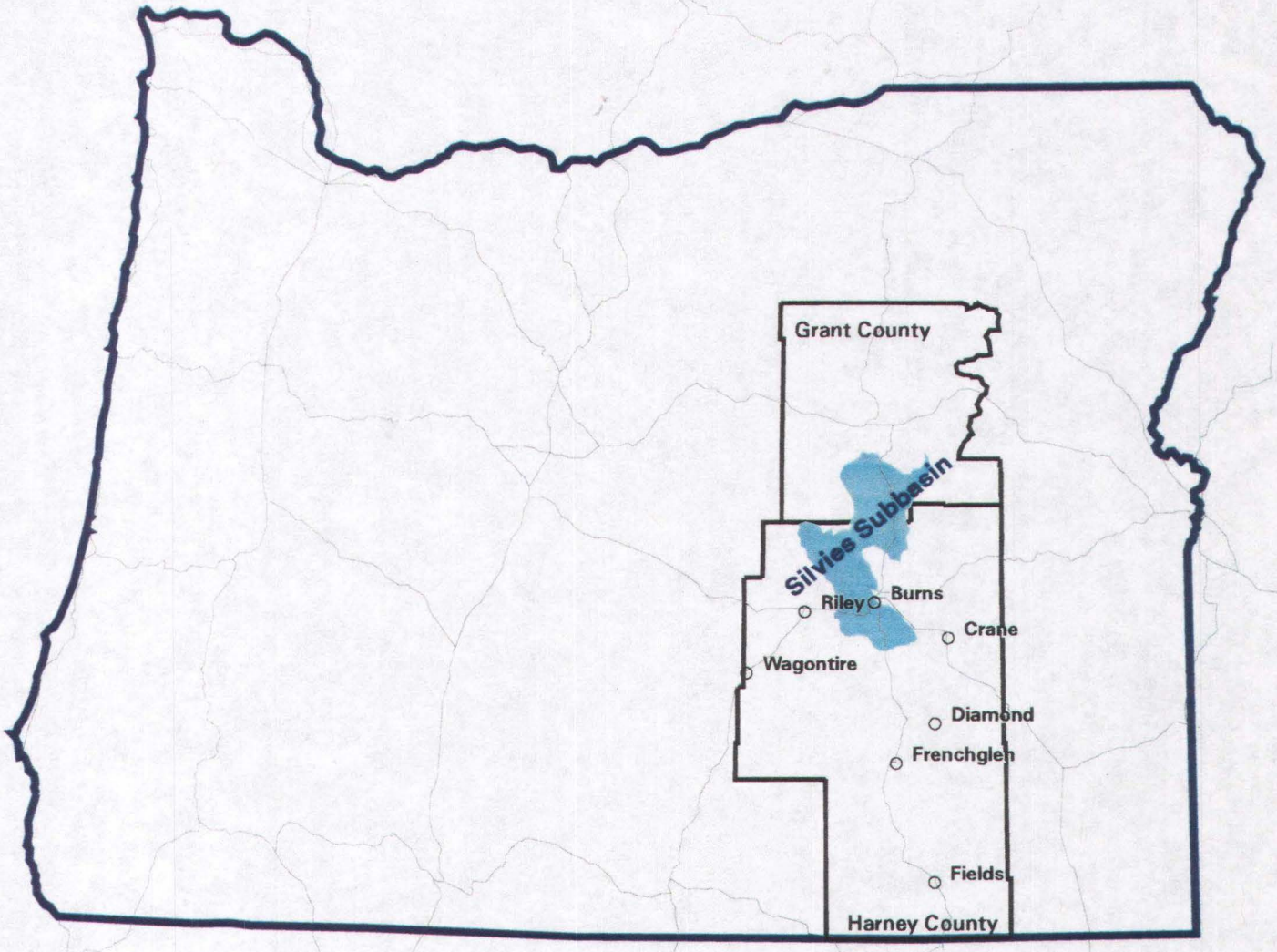
The Council recognizes that local economic and ecological prosperity is dependant upon the current and future availability and quality of water; therefore, the Harney County Watershed Council is committed to this three-part goal:

1. Determine the health of individual watersheds or watershed segments.
2. Retain the health of high quality watersheds.
3. Restore and enhance those watersheds, or portions thereof, that can be improved.

SUB-BASIN DESCRIPTION

The Silvies Sub-basin is located in northern Harney County, Oregon and in southern Grant County, Oregon (Map #1). The sub-basin is 844,976 acres in size with 555,708 acres in Harney County and 289,268 acres in Grant County. It is approximately 60 miles long and 23 miles wide. Silvies sub-basin (4th field HUC) is contained in the Malheur Lake Basin (3rd field HUC) and is designated by USGS Hydrologic Unit Code (HUC) #17120002. This sub-basin is comprised of 12 watersheds (5th field HUC), they are: #1712000212, #1712000211, #1712000210, #1712000209, #1712000208, #1712000207, #1712000206, #1712000205, #1712000204, #1712000203, #1712000202, #1712000201. (BLM Ecological Site Index) (Map #2)

OWNERSHIP (Map #3)	**ACRES**	**% OF TOTAL ACREAGE**
Public Lands Managed By:		
USDA Forest Service	371,635	44%
Bureau of Land Management	135,121	16%
State of Oregon	5,924	0.70%
Burns Paiute Tribe	768	0.09%
Private Land	330,845	39%



MAP #1
SILVIES SUBBASIN
VICINITY MAP

Date: 02-OCT-2001, Pam Keller, vicinity11x8.aml/silviesvic.ps

Scale: 1 inch = 56.8 miles

HARNEY COUNTY GIS
In cooperation with the
U.S. Bureau of Land Management
Burns District Office; Burns, Oregon

MAP #3 - SILVIES SUBBASIN - BASE MAP

- Private Lands - 313,906 acres
- BLM Lands - 144,954 acres
- State Lands - 6,594 acres
- Indian Lands - 1,453 acres
- USFS Lands - 388,620 acres
- USFWS Lands - none in subbasin

- Subbasin Boundary
- County Line
- Major Roads
- Perennial Streams
- Intermittent Streams

Acres in Grant Co.: 289,268
Acres in Harney Co.: 566,277
Total in subbasin: 855,545

0 1 2 3 4 5 6 MILES
Scale: 1 inch = 5.2 miles

Note: No warranty is made by Harney County or the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

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Burns District Office; Burns, Oregon

Date: 03-OCT-2001, Pam Keller, subbasin11x17.aml/silviesbase.ps

ERRATA: Acres corrected from previous (8/24/00) map.

MAP #2 - SILVIES SUBBASIN - HYDROLOGIC UNITS LEVEL FIVE

Silvies Subbasin (HUC 4)

Watersheds (HUC 5)

Subbasin Boundary

County Line

Major Roads

Perennial Streams

Intermittent Streams

0 1 2 3 4 5 6 MILES

Scale: 1 inch = 5.2 miles

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Date: 03-OCT-2001, Pam Keller, subbasin11x17.aml/silvieshuc5.ps

CHAPTER TWO

HISTORY OF THE SILVIES SUB-BASIN

Before European settlement, this area was occupied by the Northern Paiute Indian Tribe. Their original homeland encompassed portions of southeastern Oregon, northern Nevada, southwestern Idaho and northeastern California. (USDA and USDI, 1997) The Paiute people used the land for hunting and gathering. They moved through and lived in areas on a seasonal basis, which was oriented around abundant plant resources. They also hunted both small and big game. (USFS, 1997) They occupied this area from approximately 10,000 years ago until about 1872. In 1872 the Northern Paiute Indians were placed on the Malheur Indian Reservation, which was 1.8 million acres in size. By 1876, the reservation had been encroached upon by white settlers. In 1878 the Malheur Indian Reservation was terminated. The land was made public domain and the Northern Paiutes were sent to Fort Simcoe, Washington and then to a reservation in Yakima, Washington. In 1972 the United States Government transferred 762 acres approximately 2 miles northwest of Burns to the Paiute tribe, which is now the Burns Paiute Indian Reservation.

What is now known as Harney and Grant Counties were first visited by European explorers and fur traders. The Silvies Valley was once described by explorers as a vast marshland filled with beaver dams. (Armstrong, Arntz, et. al., 1989) The abundance of beaver is what attracted many fur traders to the sub-basin. Muskrat, mink, badger, coyote and bobcats were also trapped to a much lesser degree.

In the 1870's ranchers from John Day (Grant County) began trailing their cattle to Bear Valley, Silvies Valley and surrounding areas in search of more abundant feed. Because of severe winters in Silvies Valley, many ranchers wintered their cattle in Harney Valley. The expanding cattle industry in the 1870's was the catalyst for white settlement, beginning with military camps, in Harney County. With the winter of 1888, a succession of severe winters followed that decimated cattle herds. (Hatton, 1988) This resulted in the arrival of many sheep that would utilize the vacant forage supply. After the arrival and establishment of sheep ranches, the cattlemen and the sheepmen would compete for feed and space creating conflict between the two groups.

The city of Burns was established in 1883 and was voted the Harney County seat in 1889. In 1885 wagon trails ran through southeastern Oregon and in 1909 the Revised Homestead Act resulted in promotional literature that brought hundreds of settlers into the area. The influx of homesteaders lasted approximately 10 years, after which many had become poverty-stricken due to harsh conditions and moved on.

With the establishment of domestic livestock operations came the need to produce winter feed in the form of hay. Many native meadows within the flood plain of the Silvies River became hay meadows that were irrigated by diverting flows from the Silvies and surrounding streams. Dams and ditches were eventually constructed in order to more efficiently irrigate the fertile soils. Arrival of cheap electricity in the 1950's and 1960's made it possible to pump ground water and develop farmland on previously un-irrigated lands to raise alfalfa and some cereal grains for livestock feed.

Drought years accompanied by the depression of 1930 led to the U.S. government taking control of a large portion of land within the sub-basin. (Hatton, 1988) In 1934 the Taylor Grazing Act was passed. This act closed all remaining public lands to homesteading and began to limit and control the grazing of domestic livestock on public lands. The Grazing Service was established to administer this act, and has become the present day Bureau of Land Management.

In 1906 President Theodore Roosevelt established the Blue Mountain Forest Reserve that later became the Malheur National Forest in 1908. Until 1921 the Forest Service was primarily concerned with fighting fire and grazing administration. In 1919 citizens of Harney and Grant Counties petitioned the Malheur Forest for the sale of timber to be harvested and sent to a lumber mill in Harney County. (Armstrong, Arntz, et. al., 1989)

Timber was harvested on a small scale at the turn of the century. Large-scale logging began in the late 1920's and early 1930's with peaks in the late 1970's and through the 1980's. In the late 1920's the Hines Lumber Co. was constructed, and as a result the city of Hines was established. Electricity was generated by the mill and used by residents of Hines. Around the same time, Hines Lumber Co. also opened a mill in Seneca, which is no longer in operation. In 1983 Snow Mountain Pine Lumber Co. bought Hines Lumber Co. mill in Hines. Snow Mountain Pine operated through the peak timber

production years but has since been out of business. Louisiana Pacific now owns and operates a lamination plant on a portion of the property that was once Snow Mountain Pine in Hines.

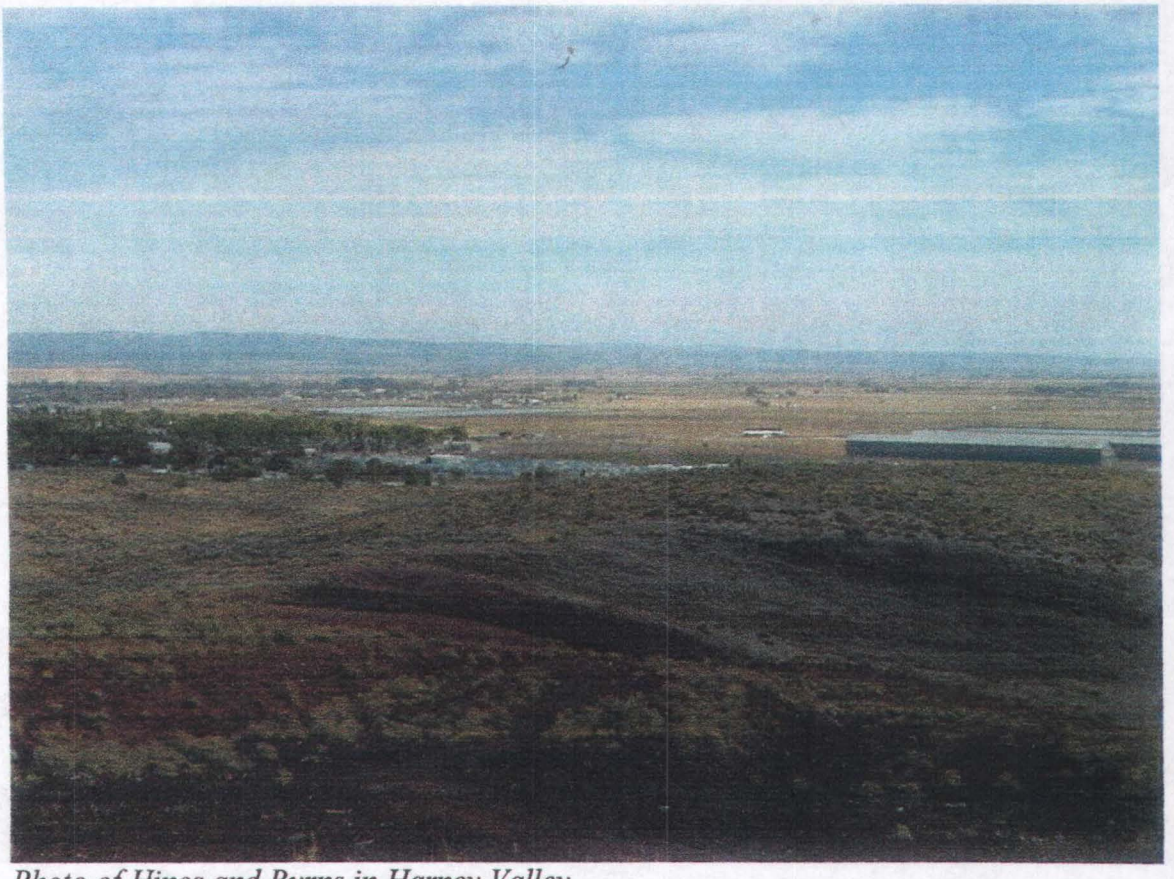


Photo of Hines and Burns in Harney Valley

Fire, an integral part of the sub-basin, has been modified throughout the history of this area. Before white settlement, natural fires and fires set by native peoples were common. Because of intensive grazing practices at the turn of the century followed by rigorous fire suppression, natural fire occurrence has significantly decreased in the past 50, or more, years.

CLIMATE

The climate in the Silvies Sub-basin is semi-arid with long, rather severe winters and short summers. This area has a high proportion of clear, sunny days and wide diurnal temperature ranges especially during the summer months. The growing season varies between 72-98 days in the lower valleys

and is shorter in the upper valleys. (State of Oregon Department of Environmental Quality, 1976)

A large percentage of the precipitation occurs in the form of snowfall, which accumulates from the month of November through the month of March. The snow pack usually remains all winter on the high timbered mountain slopes, but often melts after each snowstorm in the valleys and lower elevations. The annual precipitation ranges from less than 10 inches in the lower elevations to more than 40 inches in the headwaters. (Yockim and Smith, 1996)

There are two climatological stations located in the sub-basin. One is located near Burns at an elevation of 4,151 feet, the other is close to Seneca at an elevation of 4,666 feet. The mean temperature is 3 to16 degrees cooler in Seneca than in Burns. The average maximum monthly temperatures range from an average of 35.3° F in January to 85.3° F in July at Burns and 34.0° F in January and 80.7° F in July at Seneca. The average minimum monthly temperatures range from an average of 15.6° F in January and 51.9° F in July at Burns and 9.8° F in January and 37.4° F in July at Seneca. (Figures #1 and #2) The average annual precipitation at Burns is 11.55 inches and it is 13.17 at Seneca (Figures #1 and #2). The average monthly precipitation for Burns ranges from a low of 0.34 inches in July and a high of 1.73 in January. The average monthly precipitation for Seneca ranges from a low of 0.52 inches in July to a high of 1.67 inches in December. (Graphs #1 and #2)

Figure #1

BURNS WSO CITY, OREGON (351176)

Period of Record Monthly Climate Summary

Period of Record : 1/ 1/1939 to 4/30/1980

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	35.3	41.8	48.4	57.6	66.6	74.5	85.3	83.2	75.0	62.8	47.3	37.9	59.7
Average Min. Temperature (F)	15.6	21.2	25.1	30.6	38.3	44.8	51.9	49.8	41.1	32.4	24.4	19.0	32.8
Average Total Precipitation (in.)	1.73	1.23	1.01	0.68	0.92	0.80	0.34	0.46	0.51	0.80	1.37	1.69	11.55
Average Total SnowFall (in.)	13.6	7.2	5.9	1.6	0.2	0.0	0.0	0.0	0.0	0.7	4.8	11.3	45.3
Average Snow Depth (in.)	4	3	0	0	0	0	0	0	0	0	0	2	1

Percent of possible observations for period of record.
Max. Temp.: 99.7% Min. Temp.: 99.7% Precipitation: 99.8% Snowfall: 99.4% Snow Depth: 99.3%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

Figure #2

SENECA, OREGON (357675)

Period of Record Monthly Climate Summary

Period of Record : 6/ 1/1949 to 4/30/2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	34.0	39.2	44.8	53.4	61.6	70.5	80.7	80.5	71.8	59.9	44.1	35.5	56.3
Average Min. Temperature (F)	9.8	13.8	19.6	25.5	31.2	35.9	37.4	35.1	27.6	21.6	18.9	12.4	24.1
Average Total Precipitation (in.)	1.46	1.08	1.19	1.03	1.47	1.13	0.52	0.70	0.64	0.87	1.41	1.67	13.17
Average Total SnowFall (in.)	13.9	10.2	7.6	2.4	0.8	0.0	0.0	0.0	0.0	1.0	6.5	15.3	57.8
Average Snow Depth (in.)	5	5	2	0	0	0	0	0	0	0	1	3	1

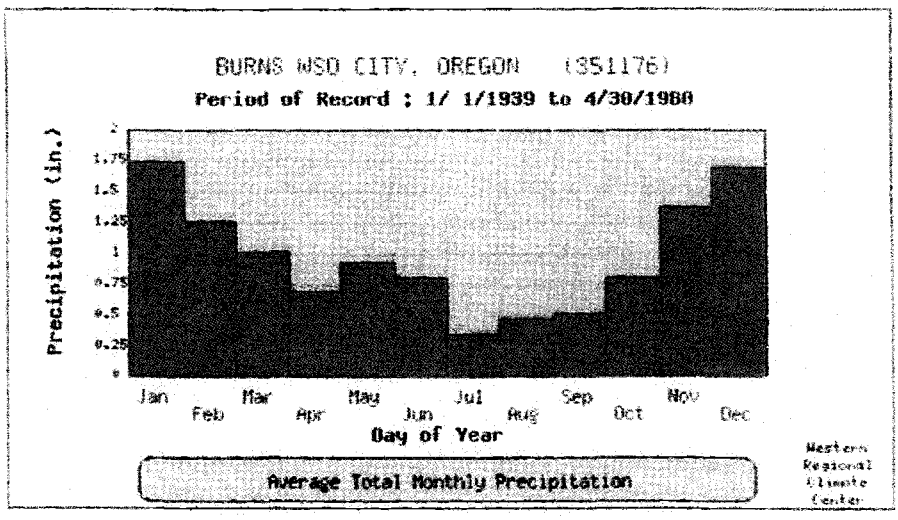
Percent of possible observations for period of record
Max. Temp.: 94.2% Min. Temp.: 94.2% Precipitation: 96.3% Snowfall: 91.2% Snow Depth: 90.4%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

Graph #1

BURNS WSO CITY, OREGON

POR - Monthly Average Total Precipitation

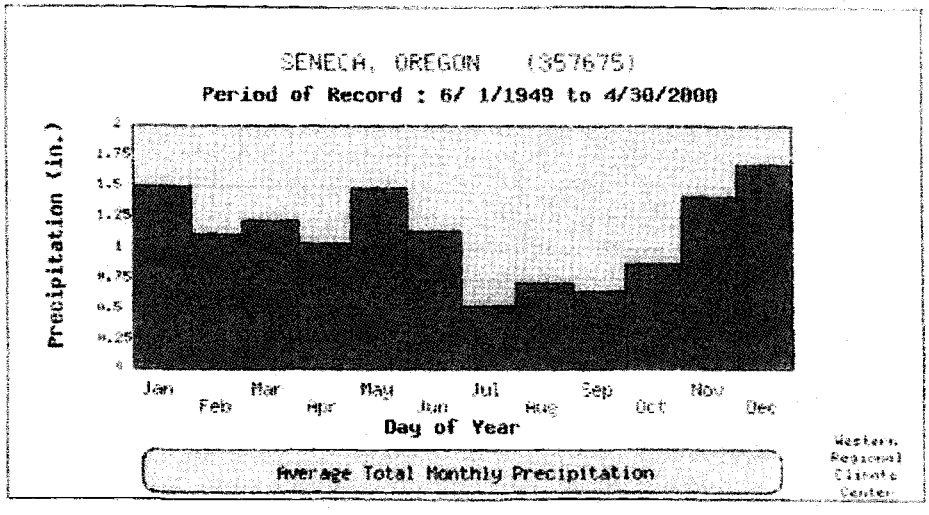


- Average precipitation recorded for the month.

Graph #2

SENECA, OREGON

POR - Monthly Average Total Precipitation



- Average precipitation recorded for the month.

GEOLOGY

The northern portion of the Silvies Sub-basin is located in the Blue Mountains Physiographic Province and the southern portion of the sub-basin lies within the High Lava Plains Physiographic Province. (Orr, Orr and Baldwin, 1992)

The rock units in this area are primarily three extensive Pliocene (5-10 million years old) ash flow sheets separated and overlain by sediments. The northeastern portion of the sub-basin, which lies within the Blue Mountains Physiographic Province, is composed of late Miocene (16 million years old) basalt lava flows that underlie the ash flow sheets.

The source vents that produced the ash flow tuffs are found in the High Lava Plains, specifically in the vicinity of Burns, Harney Lake and Malheur Lake. Evacuation of the ash flow magma caused the magma chamber to collapse and form low areas. As a result, the overall structure of Harney Valley is that of a bowl that dips toward the south.

Some anticlines and synclines fold the rock layers in the higher elevation north of Highway 20. Faulting primarily trends northwest over most of the sub-basin with north/south faulting on the east side of the sub-basin.(Brown, Mclean and Black, 1980) The sub-basin is capped with Mt. Mazama ash (Walker and Macleod, 1991). This ash flow event occurred approximately 7,000 years ago and has enhanced the fertility of the residual soils in the area.

HYDROLOGY

The Silvies Sub-basin drains approximately 1,350 square miles (Map #3). The Silvies River originates in the Blue Mountains and flows approximately 180 river miles to Malheur Lake. In the late Pleistocene (last 11,000 years), Malheur Lake drained through a gap just southwest of what is now Princeton, Oregon into the Malheur River, which flows into the Snake and Columbia Rivers. The outlet was blocked by Pleistocene lava flows and subsequently the Silvies Sub-basin is now a closed basin system. (Yockim and Smith, 1998)

The headwaters of the Silvies River are located in Grant County approximately 15 miles northeast of the town of Seneca. Bear Creek, a

major tributary to the Silvies River has its source approximately 15 miles northwest of Seneca and drains 85 square miles. Bear Creek winds its way through Bear Valley and joins the Silvies River just above Seneca. Little Bear Creek, Van Aspen Creek, Gerry Creek, Keller Creek, Scotty Creek and Little Scotty Creek are other tributaries located north of Seneca.

Photo of Bear Creek

The Silvies River then follows a fairly narrow corridor along Highway 20 until the topography opens up into Silvies Valley. The confluence of Camp Creek is located at the northern most end of Silvies Valley. Jump Creek, Bridge Creek, House Creek, Newell Creek, Mountain Creek, Dog Creek, Trout Creek, East Creek, Fuga Creek, Strawberry Creek, Low Creek, Jump Creek and Hall Creek are all tributaries that join the Silvies River in Silvies Valley. After exiting Silvies Valley, the river enters the largely inaccessible Silvies Canyon with high steep sidewalls. The confluences of Myrtle Creek, Emigrant Creek and Landing Creek are downstream of Silvies Canyon.

Photo of Silvies Valley

Emigrant Creek is one of the largest tributaries in the sub-basin. The runoff equals about one-quarter of the total flow of the Silvies River. (Bond, Cole, Klingemen, et.al., 1971) The channel substrate of the majority of Emigrant Creek is fine gravel and silts with some cobble and larger rock.(USFS 1997) Hay Creek, West Fork Hay Creek, Yellow Jacket Creek, Skull Creek, Sawtooth Creek, Cricket Creek, Spring Creek, Stinger Creek, Spring Canyon Creek, Bear Canyon Creek and Crowsfoot Creek are all tributaries of Emigrant Creek.

Below the mouth of Myrtle Creek there is a reduction in stream gradient and the Silvies River becomes wide with long deep pools. From about 10 miles above Burns, to the city of Burns, the river has a channel slope of 2.5 feet per mile. (Bond, Cole, Klingemen, et.al., 1971) Beginning at the confluence of Myrtle Creek, down river to the mouth of the Silvies, the channel substrate is very silty for the most part, and lacks rock armoring. This causes the river channel to be susceptible to erosion and cut banks are common.

Five Mile Dam, approximately five miles northwest of the city of Burns, is typical of many irrigation diversion dams along the river. Curry Gordon Creek and Thousand Spring Creek are tributaries of the Silvies River that are located northwest of Five Mile Dam. At Five Mile Dam, the Silvies River begins to open up into Harney Valley. There are many sloughs and other wetland areas in Harney Valley, which can be attributed to irrigation practices, spring runoff and fluctuating lake levels within the closed sub-basin. Foley Slough has its intake point approximately one-half mile

downstream of Five Mile Dam. This slough traverses southeasterly for about nine miles where it passes under Highway 78. Foley Slough joins Embree Slough through a series of irrigation canals at approximately four miles southeast of Burns. Embree Slough flows to the southeast and empties into the East Fork of the Silvies River about ten miles southeast of Burns. (Bond, Cole, Klingemen, et.al., 1971)

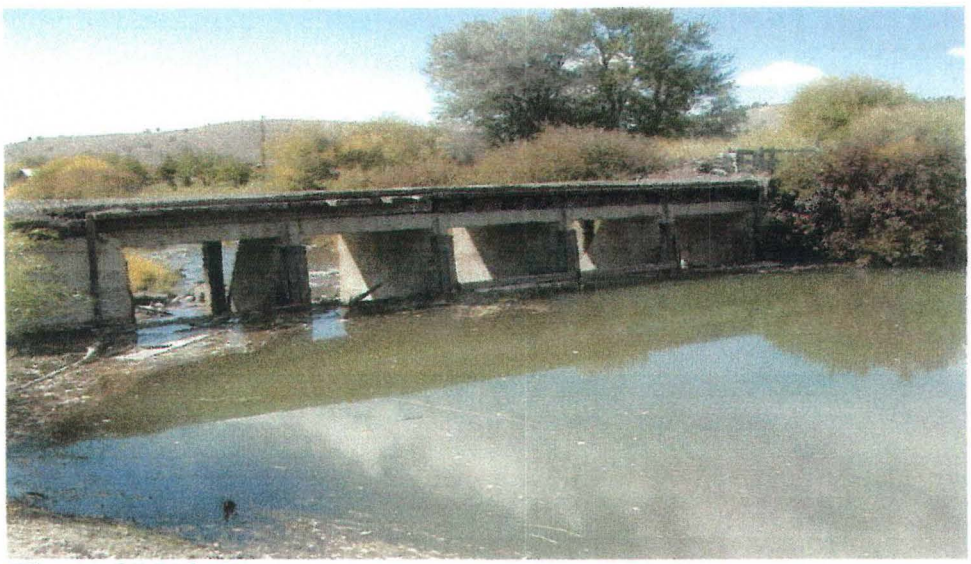


Photo of 5 Mile Dam

East of the fairgrounds in Burns, at the Pat Culp Ranch, the river splits into the East and West Forks of the Silvies River. The channel slope of both the East and the West Forks average approximately 2 feet per mile. (Bond, Cole, Klingemen, et.al., 1971) The East and the West Forks historically meandered across Harney Valley, but have become somewhat confined through man-made efforts to control the water. The gradient becomes extremely flat as the Silvies nears Malheur Lake. Because of this, and the low natural channel capacities, both the East Fork and the West Fork form several distributaries that flow into Malheur Lake.

Willow Creek and Sagehen Creek are tributaries of the Silvies River that flow into the south end of Harney Valley.

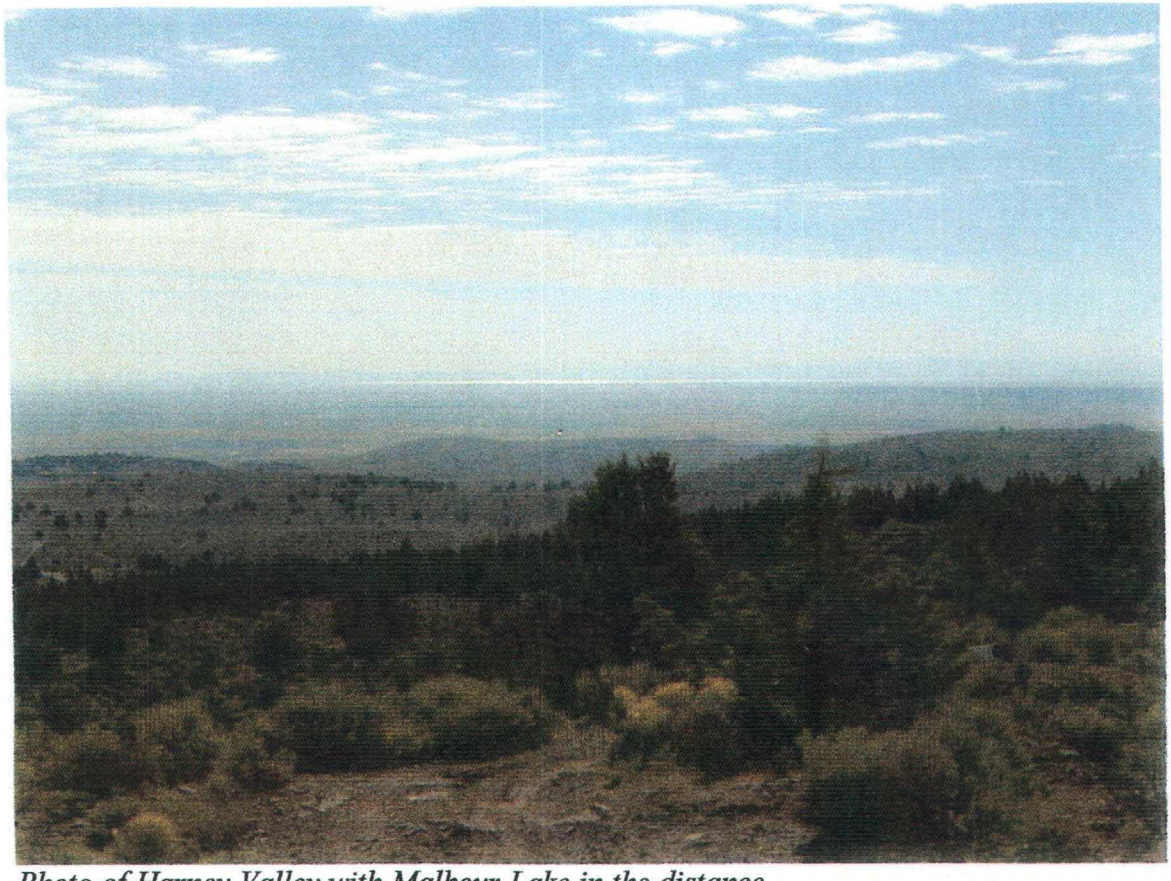


Photo of Harney Valley with Malheur Lake in the distance

Malheur Lake levels fluctuate depending on the total runoff available from the Silvies River, the Donner und Blitzen River that flows in from the south, and other tributaries. When Malheur Lake levels are above 4,091.5 feet in elevation overflow discharge flows into Mud Lake at the "Narrows" on Highway 205. When the elevation of Malheur Lake reaches 4,093 to 4,098 feet, water may flow from Mud Lake southwest into Harney Lake. The area of Malheur Lake varies from an average minimum of 25,000 acres to an average maximum of 45,000 acres. Malheur Lake at normal stages is no more than 7 feet deep. Harney Lake is deeper than Malheur Lake and has comparatively steeper shores. The surface area of Harney Lake varies around an average of 30,000 acres. (State Water Resources Board, 1967)

Both prehistorical features and historical record indicate that Malheur Lake levels have fluctuated greatly through time. Wave cut terraces and other geomorphic features over two hundred feet higher than the present level indicate much higher lake levels in the past. Tree rings found in tree stumps at the bottom of Malheur Lake indicate climatic variations over the years. The years of 1790-1792, 1802-1825, and 1907-1913 were exceptionally wet

years. In 1842-1849 and 1918-1934 Harney and Malheur Lakes were almost completely dry. In relatively recent years, in 1977, lake levels were very low but beginning in 1981 Burns weather station recorded 46.77 inches of precipitation which was 154% of normal. Water levels steadily rose each spring in subsequent years. Because Malheur Lake is so shallow, each 1-inch rise in lake levels equals an additional 8,500 acres that is covered by water. Finally in 1985, Malheur, Harney and Mud Lakes covered 170,000 acres, or 265 square miles, this is perhaps the largest the lakes have been in 150 years. Major flood damage occurred as a result. Approximately thirty ranchers were flooded out and Highway 78 southeast of Burns and a portion of Highway 205 between Burns and Frenchglen were under water.(Hatton, 1988) In 1986, Malheur Lake water levels were nearly sufficient for the lake to drain through the prehistoric outlet near Princeton. In years since, lake levels have slowly receded. A surface level elevation of 4,115 feet is necessary before the ancient outlet can be reached. It is estimated that the last time the outflow occurred was 3,200 to 3,800 years ago.(Yockim and Smith, 1996)

GROUND WATER

Alluvium washed into Harney Valley by several streams over time has created scattered ground water reservoirs, which can locally be economically retrieved and utilized. Additional ground water is available from bedrock sources adjacent to the basin fill alluvium. The alluvium consists of finer grained silt and clay and is considerably less permeable towards Malheur Lake. As the distance increases from Malheur Lake, the sand and gravel becomes much more coarse. Water bearing beds are discontinuous and vary in water yielding capacity.(State Water Resources Board, 1967) Various wells have tapped into groundwater resources throughout the sub-basin. (Appendix F)

WATER SUPPLY

There is one gauging station to measure stream flow within the Silvies Sub-basin. This gauge is located eleven miles northwest of Burns on the Silvies River. The gauge number is 10393500 and has collected stream flow data from 1923 to 1996. The average discharge is 177 cfs (cubic feet per second) or 128,000 acre-feet. The extremes for the period of record are a maximum discharge of 4,960 cfs on April 6, 1952 and a minimum discharge of no flow on July 19 through September 22, 1934 (Graph #3). (OWRD Gauge

Records, gauge #10393500) The annual outflow on the Silvies river may vary from under 45,000 acre-feet to over 270,000 acre-feet. The outflow of good water years is approximately six times that of poor water years.(State Water Resources Board, 1967)

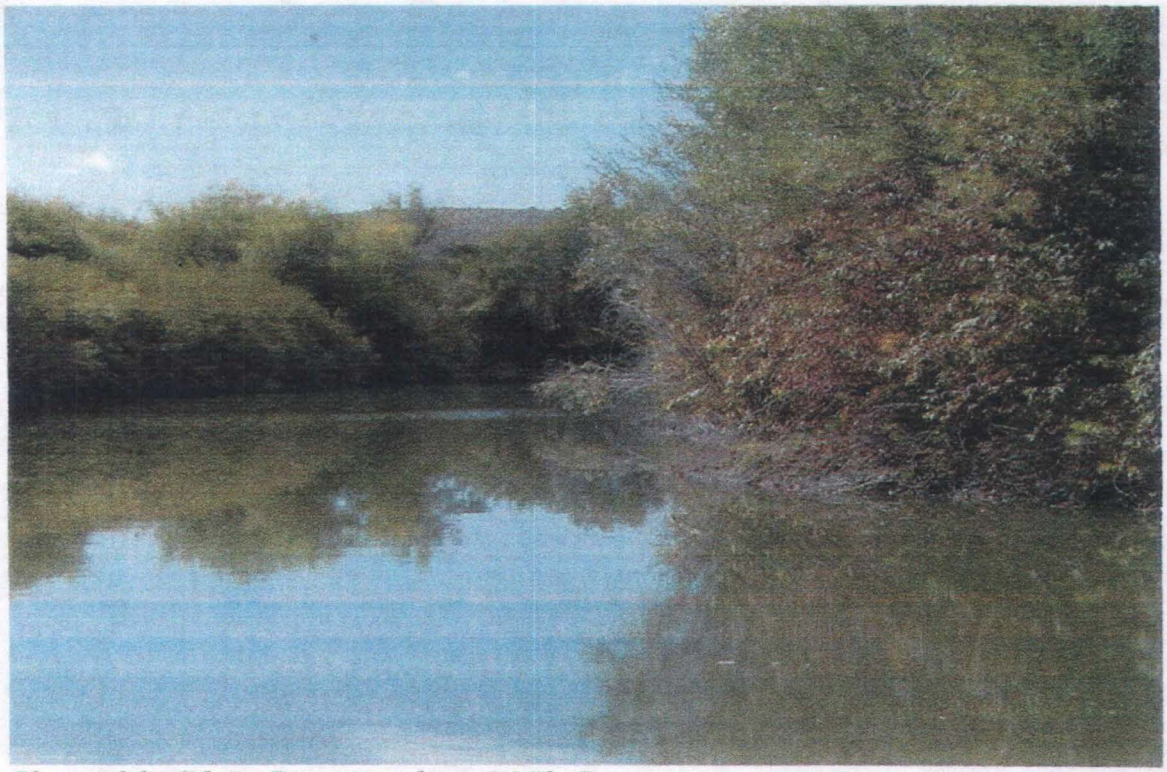
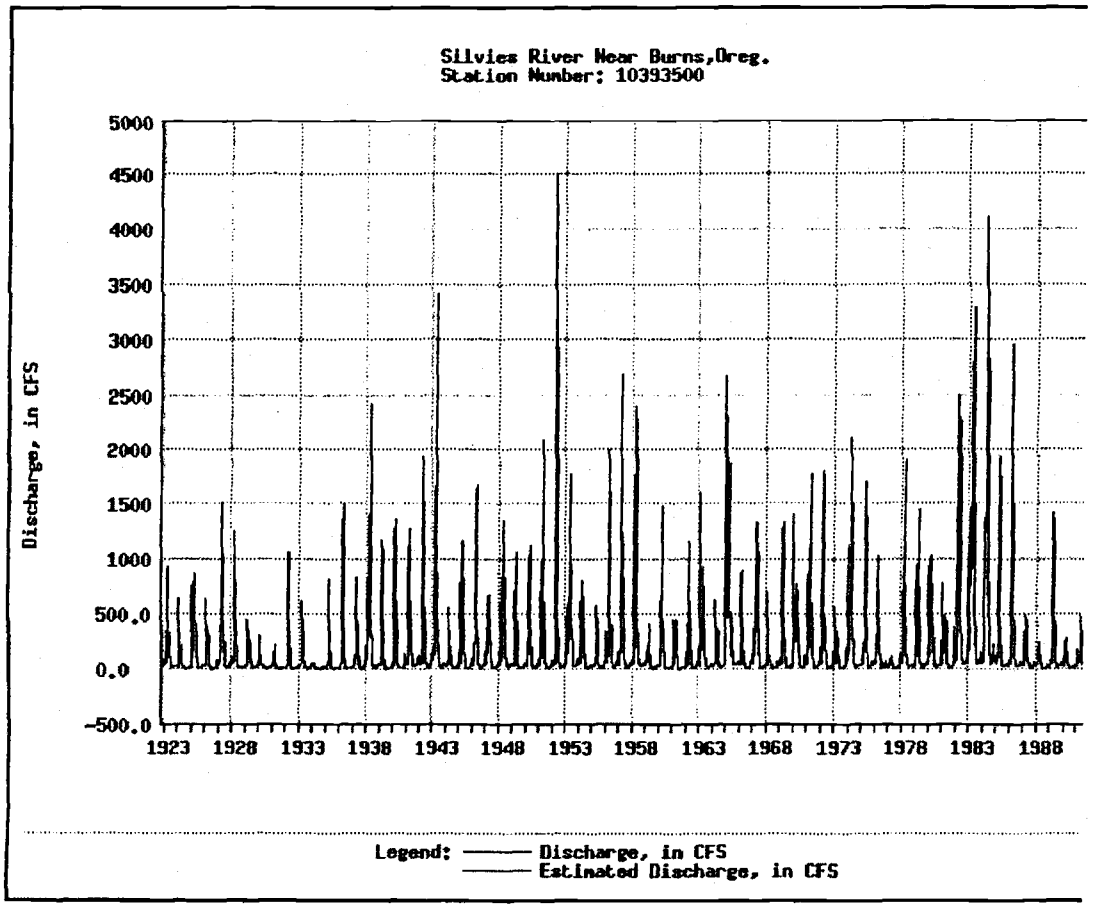


Photo of the Silvies River just above 5 Mile Dam

Graph #3

Historical Streamflow Daily Values Graph for Silvies River Near Burns,Oreg. (10393500)



Flows on the Silvies River fluctuate greatly from month to month throughout the year (Graph #4). Peak flows usually occur on the Silvies River in April. The April mean discharge for the Silvies is 767 cfs. The lowest flows usually occur during the month of September. The September mean discharge is 13.5 cfs (Table #1).

Graph #4

STREAMFLOW DATA

Oregon Water Resources Department

Station #: 10393500
Description: SILVIES RIVER NEAR BURNS,OREG.
Requested Period: 01/1996 - 12/1996

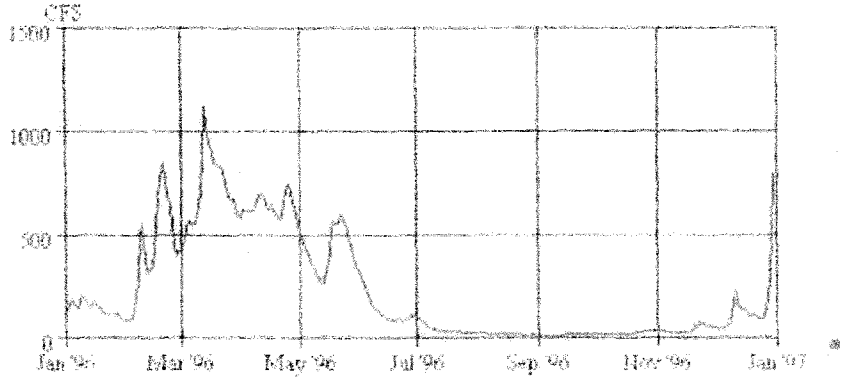


Table #1 Statistics of Monthly Mean Data For Water Years 1903-1991, Discharge in CFS (Data from USGS Gauge #10393500)

STATISTIC	MONTH											
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	20.6	34.0	51.5	80.5	159	380	767	464	140	33.3	14.0	13.5
MAX	74.5	142	482	715	799	1653	2716	1898	612	182	69.2	72.5
MIN	3.88	5.17	10.0	10.0	18.0	30.0	11.7	5.62	2.24	0.45	0.00	0.59

CHAPTER THREE

HUMAN USES

Timber harvesting and livestock grazing were once the economic basis for residents of the Silvies Sub-basin. Because of governmental restrictions and pressure from environmental groups, logging within this area has been greatly reduced. Livestock grazing, agriculture and recreation are the major human uses within the sub-basin today. Government agencies, Louisiana Pacific and Harney Coach Works, a recreational vehicle manufacturer, as well as local businesses and restaurants employ many residents of the cities of Burns and Hines. Mining also occurs in the area, primarily for cinder, sand and gravel production.

Agriculture in the sub-basin largely consists of feed crops for livestock. Commercial crop production is restricted by a short growing season and is predominantly limited to hearty varieties of alfalfa, pasture mix, wild hay and spring grains. Very little non-irrigated cropland exists in the area due to low annual precipitation and the short growing season. The largest agricultural product in the Silvies Sub-basin is wild hay which is flood irrigated by the Silvies River and surrounding tributaries. Flood irrigated wild hay is produced in Bear Valley, Silvies Valley and in Harney Valley.

Photo of Bear Valley

There are problems associated with flood irrigation along the Silvies River due to extreme fluctuations in flow. In the spring during high flow, which usually occurs in April, the Silvies River naturally overflows its banks and floods large portions of Harney Valley. In mid to late summer, July or August, there is not enough flow in the river to irrigate. Because of this seasonal distribution of flow, floodwaters must be diverted onto fields for early irrigation even though it may not be the optimal growth period because of low temperatures. Annual flooding also limits the production and quality of hay crops.

Water is the most limiting factor on agricultural development in this area followed by soil shallowness, drainage and alkalinity. Irrigation from the Silvies River is set by both adjudication and administrative rule. (Yokim and Smith, 1996) There are no appreciable quantities of unapropriated surface water. Any increase in agricultural land is dependant upon the availability of stored water or the development of ground water. Ground water availability is limited in some areas. Some high volume wells in Harney Valley have problems with pumping sand containing magnetite, which is abrasive and rapidly wears pumps. (Yockim and Smith, 1996)

The Northern Paiute people traditionally gathered plants for various uses and still continue this practice within the Silvies Sub-basin today. Plants found in the sub-basin that are used by the Harney Valley Paiute are listed in Appendix B. (USFS, 1997)

Recreation has become increasingly popular in this area in recent years. The solitude and openness in and of itself attracts many people. During the winter months the deep snow of the mid to upper elevations draws snowmobilers and cross-country skiers.

Hunting is an extremely popular recreational activity within the Silvies Sub-basin. Antelope season opens in late summer followed by deer season in the fall. Through the late fall and winter, many people hunt elk, cougar and bear. During waterfowl and upland game bird seasons, bird hunters actively seek a wide variety of bird species.

Bird watching in this area attracts people from long distances. Many species of migratory birds flock to hay meadows along the Silvies River (Appendix A). Thousands of birds can be observed here during the spring of the year.

Fishing and camping are popular during the summer months. Off-highway vehicle use often accompanies these activities.

Municipal water is another human use that occurs in the Silvies Sub-basin. The Cities of Burns and Hines, and the town of Seneca all have wells to meet their municipal water needs. The City of Hines has four wells that have a combined pumping rate capacity of 3,725 gallons per minute or 5,364,000 gallons per day. Hines also has two storage tanks. One tank has a 250,000 gallon storage capacity and the other has a 600,000 gallon storage capacity.(Hoffman, 2000) The City of Burns obtains its water from five wells that have the combined pumping capacity of 5,100 gallons per minute or 7,344,000 gallons per day (Corbit, 2000).

Both the City of Burns and the City of Hines treat their waste water using sewage lagoons. Burns and Hines each currently use 2 lagoons to treat waste water. The two communities are in the process of developing a combined Waste Water Treatment Plan.(Hoffman, 2000)

WILDLIFE

The Silvies Sub-basin provides habitat for a wide variety of animals (Appendix A). Elk, deer and antelope are the important big game species found in this area. Black bear and cougar are game animals that occur in the sub-basin as well.

During the summer months, elk forage in the higher elevation forested ecosystems. Deer utilize forested areas in the summer, but are also found in large numbers in juniper and sagebrush habitats. Antelope summer primarily in sagebrush habitat but are also found in meadows and grasslands.

Elk winter below 5500 ft in elevation on the fringe of the forest below the fir zone and in juniper and sagebrush habitats. Mule deer generally winter below the elevation of wintering elk and concentrate more in the open sagebrush and bitterbrush habitats. Agricultural crops are damaged during the winter season by both deer and elk. Antelope that summer in Silvies and Bear Valley are known to travel to Warm Springs Reservoir, east of the Silvies Sub-basin, to spend the winter months. Other herds of antelope in the sub-basin winter in the lowest elevation possible in order to escape any snow-pack.

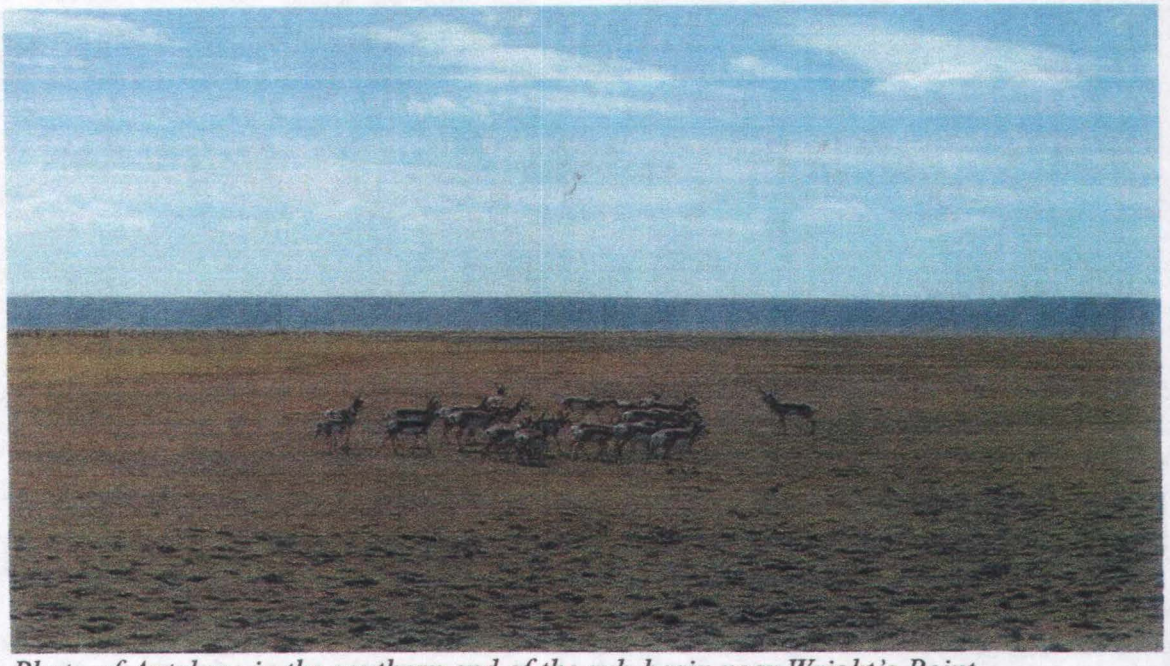


Photo of Antelope in the southern end of the sub-basin near Wright's Point

Bear are not found in high numbers in the Silvies Sub-basin. Bear prefer areas with berry producing shrubbery under a forested canopy and green grass that remains throughout the year. The Silvies sub-basin is marginal bear habitat because of the drier climate.

Cougar populations in this area are rising dramatically. Hunting cougar and bear using dogs has recently become illegal in the State of Oregon. This is the most effective means of cougar harvest, and the illegality of it is the primary cause for the increase in cougar numbers.

High populations of bobcats are found with in the Silvies Sub-basin. An increase in numbers has occurred because trapping efforts have diminished due to a declining fur trade. Bobcat occupy rim-rock areas and the lower portion of the forest. They depend on various rodents and cottontail rabbits.

Coyotes are very common throughout the sub-basin. Their populations are not as large in some areas as they have been in the past. However, based upon public input, Bear and Silvies Valleys have been substantially affected by increasing coyote numbers.

There are many resident bird species found in the sub-basin. Sand hill cranes nest in both Silvies and Bear Valleys. At the south end of Silvies Valley a

bald eagle nest has been observed. Blue grouse are found in the upper elevation of the forest. Rough grouse reside along riparian areas that have a high willow and shrub component. Sage grouse occupy sagebrush fringe habitat. Sage grouse strutting grounds can be found in the Silvies Valley, Emigrant Creek and areas north of the City of Burns. (Lemos, 2000)

Wild turkeys have recently been introduced by the ODFW into the sub-basin. In the early 1990's, turkeys were planted in Emigrant Creek. During January and February of the year 2000, turkeys were placed in Little Emigrant Creek and on Burnt Mountain, located between Myrtle Creek and the Silvies River.

The hay meadows in the sub-basin provide habitat for migratory birds in the spring of the year. Flood irrigation by local ranchers provides a food base that attracts these migratory birds by the thousands. The sloughs and flooded areas contain large numbers of waterfowl at certain times of the year.

Several threatened, endangered or sensitive mammals, birds and reptiles can be found within the sub-basin (Table #2).

Table # 2 Threatened, Endangered and Sensitive Animal and Bird Species that are known to occur within the Silvies Sub-basin.

COMMON NAME	SCIENTIFIC NAME	STATUS
bald eagle	*Haliaeetus leucocephalus*	Threatened
Columbia spotted frog	*Rana luteiventris*	Federal Candidate
ferruginous hawk	*Buteo regalis*	Sensitive
greater sandhill crane	*Grus Canadensis tabida*	Sensitive
long-billed curlew	*Numenius americanus*	Sensitive
peregrine falcon	*Falco peregrinus anatum*	Endangered
Preble's shrew	*Sorex preblei*	Sensitive
western sage grouse	*Centrocercus urophasianus phaios*	Sensitive
wolverine	*Gulo gulo luseus*	Sensitive

FISH

There are many native and non-native fish species found in the Silvies Sub-basin (Appendix C). The native fish are derived from Columbia River fauna that came from early connections with the upper Snake River and more recently from the lower Columbia River.(Klingemean, Bond, Cole, et. al., 1971) Introduced fish were brought into the streams, lakes and man made reservoirs primarily by the Oregon Department of Fish and Wildlife (ODFW) to establish populations of game fish. Small mouth bass that were stocked in 1967 can still be found in Stancliff Creek. Brook Trout were stocked in the 1940's and populations remain in Bear Creek and Scotty Creek Drainages and in the Upper Myrtle Creek Drainage. Stocking fish in streams and rivers within the sub-basin is no longer practiced by the ODFW. However, Yellow Jacket Lake, the newly constructed Poison Creek Reservoir, Willow Reservoir, State Reservoir and Greenspot Reservoir are still stocked with rainbow trout. With the exception of hatchery rainbow trout, brook trout and small mouth bass, introduced fish species are found mainly in low slow-flowing areas. The lower 40 miles of the Silvies River, including the East and West forks, contain many non-native warm water game fishes as well as large populations of native and introduced non-game fish. Carp, an introduced species, is especially abundant in the lower portion of the Silvies River. These fish create water quality problems by increasing stream turbidity, which has a negative affect on macro-invertebrate populations and trout habitat.

Native redband trout occur in all of the major tributaries of the Silvies River. Hatchery rainbow trout can be found in the Silvies River below the mouth of Myrtle Creek, in parts of Emigrant Creek, Yellow Jacket Creek and Bear Creek. There are approximately 310 stream miles that are considered trout habitat within the Silvies Sub-basin.(Hosford and Pribyl, 1991) Trout abundance, both redband and rainbow, diminish from the mouth of Silvies Canyon downstream along the Silvies River. Below Five Mile Dam, for the remaining miles of the Silvies River, trout habitat is generally poor. This poor quality habitat is a combination of both natural channel characteristics, manmade irrigation dams and diversions, and non-native fish species activity.

The ODFW, USFS, BLM and other participants are conducting a comprehensive fish and stream survey for the majority of the Silvies Sub-basin that is scheduled for completion by 2001. This survey will reveal the

current habitat conditions and current fish distribution for the streams in this area. The "Distribution, Life History and Abundance of Redband Trout in the Great Basin", written by S.P. Cramer and Associates, Inc. in November 1999 discusses the results of a stream survey conducted on many stream miles of private land on the Silvies River.

Scouring peak flows, alternating with extremely low flows in the fall (Table #1) create an instability detrimental to maintaining significant fish populations. In an effort to ensure a minimum flow in streams to maintain fish populations, the ODFW has obtained instream water rights on a few streams within the Silvies Sub-basin (Table #3).

Table #3 Instream Water Rights in the Silvies Sub-basin.
(Data from Oregon Department of Water Resources)

Stream	Priority Date	Permit Number	Water Right (cfs)
Silvies River	03/28/91	IS 71472	15.0
Emigrant Creek	04/16/90	IS 70293	12.0
Sawtooth Creek	11/19/91	IS 72023	4.0
Trout Creek	03/28/91	IS 71474	4.0
Bear Creek	03/28/91	IS 71468	12.0
Bear Creek	03/28/91	IS 71467	12.0

The redband trout and the Malheur mottled sculpin are two fish that have been designated as sensitive species within the Silvies Sub-basin (Table #4). Both species have similar habitat requirements. They both prefer cool, clear, fast flowing water with clean cobbles and gravels.

Table #4 Threatened, Endangered and Sensitive Fish Species that are known to occur within the Silvies Sub-basin.

COMMON NAME	SCIENTIFIC NAME	STATUS
Malheur mottled sculpin	*Cottus bairdi bairdi*	Sensitive
redband trout	*Onchorhynchus mykiss spp.*	Sensitive

VEGETATION

Vegetation types within the Silvies Sub-basin vary greatly due to the high variation in elevation, annual precipitation, length of growing season, soil texture and depth, and aspect. Fire suppression, herbivore grazing and timber harvest are some historic management practices that have altered vegetative communities over the years. Natural occurrences such as insect and disease outbreaks, and wild land fires have also resulted in a change in vegetative structure and type.

A large percentage of the northern Silvies Sub-basin, beginning just above the city of Burns, is forested. The forested land is comprised of pure ponderosa pine stands, pure juniper stands and mixed conifer stands that include ponderosa pine, lodge pole pine, grand fir, white fir, Douglas fir and western larch. Fire suppression and insect infestation have negatively effected many forest populations in this area.

Quaking aspen stands are widely distributed in the sub-basin. Aspen clones are maintained by disturbance regimes such as fire. The lack of disturbance, and the invasion of juniper have negatively affected aspen stands in the area.(USFS, 1997)

Below the forested uplands, sagebrush/grass communities are dominant. Mountain mahogany, bitterbrush and rabbit brush are common in these areas. Greasewood and rabbit brush along with salt grass and basin wild rye become dominant in areas within Harney Valley where the soil becomes more alkaline.

Juniper has become widespread throughout the sub-basin and particularly in the transitional zone between conifer forest and sagebrush vegetative types. Juniper is very susceptible to fire. Historically, when fire occurrence was much more frequent, juniper was found mainly on wind swept ridges. Fire

suppression has influenced the increase in juniper population and distribution in the sub-basin.

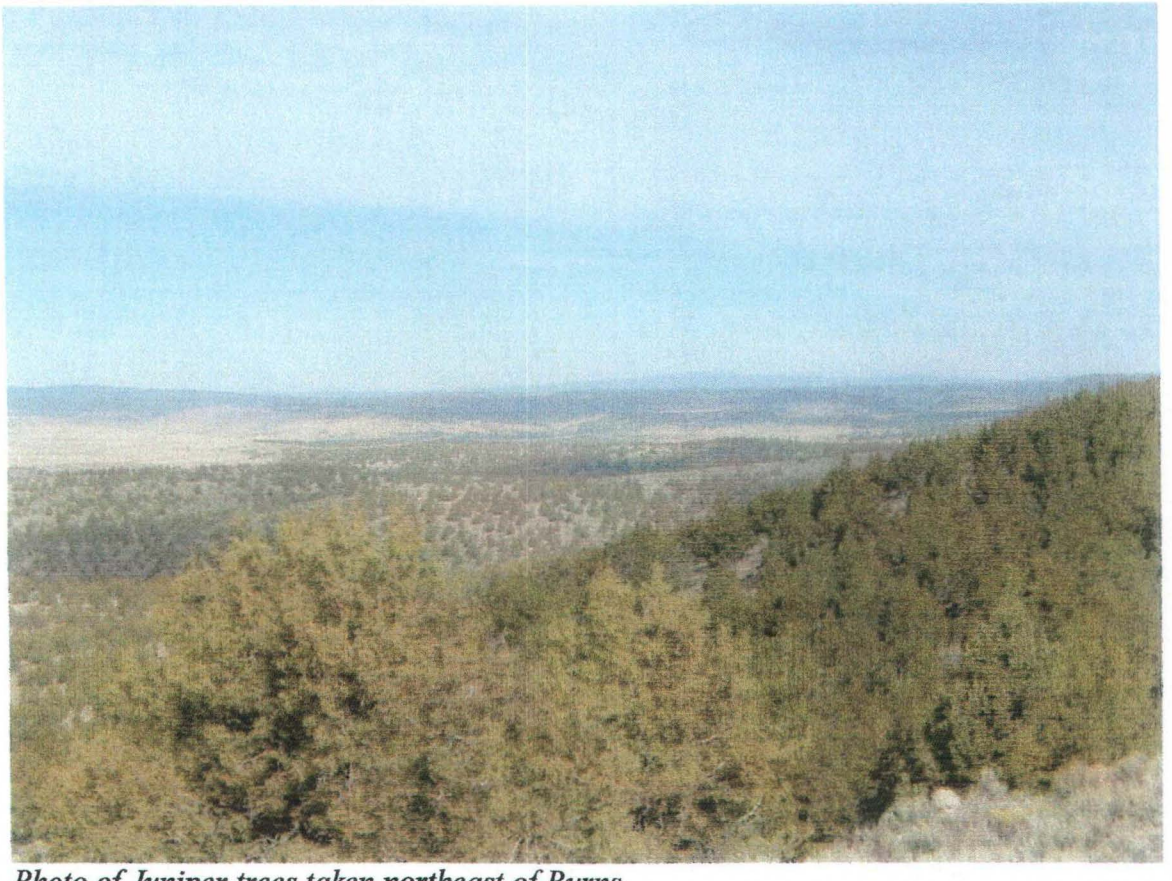


Photo of Juniper trees taken northeast of Burns

There are 4 sensitive plant species known to occur within the sub-basin (Table #5).

Table # 5 Threatened, Endangered and Sensitive Plant Species that are known to occur within the Silvies Sub-basin.

COMMON NAME	SCIENTIFIC NAME	STATUS
Deschute milkvetch	*Astragalus tegetariodes*	Sensitive
Peck's long-bearded mariposa-lilly	*Calochortus longebarbatus var. peckii*	Sensitive
Raven's lomatium	*Lomatium ravenii*	Sensitive
Parry's sedge	*Carex parryana*	Sensitive

There are many noxious weeds found in the Silvies Sub-basin (Appendix D). Weed infestations tend to be mostly scattered and are not severe in Silvies

Valley and Bear Valley. In these areas Canada thistle, diffuse and spotted napweed and hounds tongue are common. Beginning approximately 10 miles north of Burns, along the flood plain of the Silvies River, Russian napweed is a major problem and perennial pepperweed is becoming invasive. White top populations have drastically increased in the vicinity of Burns. In the foothills surrounding Burns, dalmation toadflax is in the invasion stage and is becoming more prevalent. In the southern part of Harney Valley, perennial pepperweed is especially problematic along riparian areas and meadows. (Sippel, 2000)

Riparian vegetation in the sub-basin varies and is determined largely by stream gradient. Where stream gradient is steep and riparian soils are generally shallow and rocky, stream banks are covered with shallow rooted species and are armored with rocks and large woody debris. In streams with a lower gradient where soil is deeper, strongly rooted vegetation exists such as sedges and willows. (USFS, 1997) The dominant overstory species found in the riparian areas in the Silvies Sub-basin are: dogwood, alder, ponderosa pine, cottonwood, chokecherry, willow, Douglas fir and aspen. The riparian area understory is most often some combination of Kentucky bluegrass, tufted hairgrass, Timothy, meadow foxtail, clover, sedges, rushes and many different forbs. Grazing, road density and location, timber harvest, and fire suppression are all human activities that affect the riparian areas within the Silvies Sub-basin.

Photo of Bear Creek

PROPER FUNCTIONING CONDITION

Proper Functioning Condition (PFC) is a methodology used by the US Forest Service (USFS), Bureau of Land Management (BLM), Natural Resource Conservation Service (NRCS) and private individuals to assess the functionality of stream systems. PFC of a stream is determined relative to the streams capability and potential given no political, social or economic constraints. PFC is identified as the minimum standard for streams. This method is beneficial because a wide variety of groups can compare like information, but it is controversial due to the lack of "hard numbers". There are 5 categories involved in this methodology, they are: PFC, functional-at risk with an upward trend, functional-at risk with a downward trend, functional-at risk, trend not apparent, and non-functional (see glossary).

PFC for all stream miles managed by the BLM within the Silvies Sub-basin has been assessed. The USFS has determined PFC on many miles, but they have a large number of streams that have not yet been assessed. PFC has not been completed along any streams on private land within the sub-basin. Proper Functioning Condition has been determined for 72.47 stream miles in the sub-basin. 50.95 miles were at PFC, 13.73 miles were functional-at risk with an upward trend, 0 miles were functional-at risk with a downward trend, 6.65 miles were functional-at risk, trend not apparent and 1.14 miles were non-functional. (Appendix E)

WATER QUALITY LIMITED STREAMS – 303(d) LIST (DEQ 1998)

Section 303(d) of the Clean Water Act requires the State Department of Environmental Quality (DEQ) to identify those waters that are "water-quality" limited based on the requirements of the most sensitive designated beneficial use. Cold-water fish are generally the beneficial use that parameters are based upon in this area.

The majority of 303(d) listed streams in Eastern Oregon are placed on the list because they exceed the 7-day average of daily maximums for temperature during the summer months. Very few streams in this area meet the State Water Quality Standards during the summer months of July thru September. It is debatable as to whether or not these temperature standards are realistic or achievable in most stream systems. The Oregon State University Range Department is conducting studies to determine the effect

of stream width/depth/gradient ratio and vegetative shading on stream temperature mechanics.

There are 6 streams in the Silvies Sub-basin that have been placed on the 303(d) list. (Table #6 and Map #4) Many other streams are likely to be added in the future if the temperature standard remains the same.

Table #6 303(d) Listed Streams in the Silvies Sub-basin

STREAM NAME	BOUNDARIES	PARAMETER EXCEEDED
Crowsfoot Creek	Mouth to Headwaters	Temperature
Hay Creek	Mouth to Headwaters	Temperature
Myrtle Creek	Mouth to Headwaters	Temperature
Scotty Creek	Mouth to North/South Confluence	Temperature
Scotty Creek, South Fork	Mouth to Headwaters	Temperature
Skull Creek	Mouth to Dry Gulch	Temperature

MAP # - SILVIES SUBBASIN - 303D LISTED STREAMS - UPDATED 1998

303D Listed Streams.
Miles in Subbasin: 55.6

- Subbasin Boundary
- County Line
- Major Roads
- Perennial Streams
- Intermittent Streams

0 1 2 3 4 5 6 MILES

Scale: 1 inch = 5.2 miles

Note: No warranty is made by Harney County or the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

HARNEY COUNTY GIS
In cooperation with
The Bureau of Land Management
Burns District Office; Burns, Oregon

Date: 03-OCT-2001, Pam Keller, subbasin11x17.aml/silvies303d.ps

CHAPTER FOUR

ISSUES AND RECOMMENDATIONS

Issue: Lowering of the water table due to an increase in the number of wells.
Recommendation: Educate the public as to the importance of establishing a database for the location of wells and baselines of seasonal/periodic fluctuations of ground water in those wells. This will help prevent government-mandated moratoriums on well construction due to a lack of baseline data.

Issue: Carp control.
Recommendation: Continue the development and use of selective carp management.

Issue: Weed control.
Recommendation: **a)** Educate the public as to the importance of their input to the existing databases of noxious weed areas. **b)** Recommend the continuance of government assistance for both riparian and upland weed control. **c)** Encourage interagency and private cooperation to increase efficiency in weed control programs.

Issue: Stream bank restoration.
Recommendation: **a)** Educate landowners on the typical problem conditions to be aware of on their stream systems. **b)** Continue to encourage assistance programs for landowners to institute repairs and riparian enhancement on their property.

Issue: Public awareness of natural resource conditions within the Silvies Sub-basin.
Recommendation: **a)** Ensure that the general public is aware of the development of the sub-basin assessments and improvement project summaries completed by the HCWC. Advertising their completion in the general media and making copies readily available to the public can accomplish this.

Issue: Ecological balance of native plant communities.
Recommendation: Continue to manage for ecological balance through the density control of conifers, reduction of invasive juniper populations, prescribed burning and other management practices.

Issue: Roads in the Silvies Sub-basin.
Recommendation: Create an inventory of the roads in the sub-basin and assess their affect on watershed condition.

Issue: Fish Passage and Fish Screens
Recommendation: Educate private landowners on the sources of funding available for the implementation of fish passage improvements and fish screening.

Issue: Structural integrity of existing dams along the Silvies River.
Recommendation: Educate the public on funding availability to improve the structural integrity of problem dams along the river.

APPENDIX A

Terrestrial species that occur or have the potential to occur in the Silvies Sub-basin.

MAMMALS

COMMON NAME	SCIENTIFIC NAME
badger	*Taxidea taxus*
beaver	*Castor canadensis*
Belding's ground squirrel	*Spermophilus beldingi*
big brown bat	*Eptesicus fuscus*
big freetail bat	*Tadarida brasiliensis*
black bear	*Ursas americanus*
black-tailed jackrabbit	*Eutamias minimus*
bobcat	*Felis rufus*
bushy-tailed woodrat	*Neotoma cinerea*
California myotis	*Myotis californicus*
canyon mouse	*Permomyscus crinitus*
chickaree	*Tamiasciurus douglasi*
cougar	*Felis concolor*
coyote	*Canis latrans*
dark kangaroo mouse	*Microdipodops megacephalus*
deer mouse	*Permomyscus maniculatus*
desert woodrat	*Neotoma lepida*
fringed myotis	*Myotis thysanodes*
golden mantled ground squirrel	*Spermophilus lateralis*
Great Basin kangaroo rat	*Dipodomys microps*
Great Basin pocket mouse	*Perognathus parvosi*
hairy-winged myotis	
hoary bat	*Lasiurus cinerus*
house mouse	*Mus musculus*
least chipmunk	*Tamias minimus*
little brown myotis	*Myotis lucifugus*
long-eared myotis	*Myotis evotis*
longtail vole	*Microtus longicaudus*
long-tailed weasel	*Mustela frenata*
lump-nosed bat	
Merriam's shrew	*Sorex merriami*

COMMON NAME	SCIENTIFIC NAME
mink	*Mustela vision*
montane meadow mouse	*Micotus montanus*
mule deer	*Odocoileus hemionus*
muskrat	*Ondatra zibethicus*
northern grasshopper mouse	*Onychomys leucogaster*
northern pocket gopher	*Thomomys talpoides*
Nuttall's cottontail	*Sylvilagus nattalii*
Ord's kangaroo rat	*Dipodomys ordii*
Pale western big-eared bat	*Corynorhinus townsedii pallescens*
pallid bat	*Antrozous pallidus*
porcupine	*Erethizon dorsatum*
Preble's shrew	*Sorex preblei*
pronghorn antelope	*Antilocapra americana*
pygmy rabbit	*Sylvilagus idahoensis*
racoon	*Procyon lotor*
red fox	*Vulpes vulpes*
Rocky Mountain elk	*Cervus canadensis*
sagebrush vole	*Lagurus curtatus*
silver-haired bat	*Lasionycteris noctivagans*
small-footed myotis	
striped skunk	*Mephitis mephitus*
Townsend's ground squirrel	*Spermophilus townsendii*
Townsend's pocket gopher	*Thomomys townsendii*
Vagrant shrew	*Sorex vagrans*
water shrew	*Sorex palustris*
western harvest mouse	*Reithodontonys megalotis*
western jumping mouse	*Zapus princeps*
western pipistrelle	*Pipistrellus Hesperus*
western spotted skunk	*Spilogale gracilis*
white-tailed antelope squirrel	*Ammospermophilus leucurus*
white-tailed jackrabbit	*Lepus townsendii*
wild horse	
wolverine	*Gulo gulo luseus*
yellow pine chipmunk	*Tamias townsendii*
yellow-bellied marmot	*Marmota flaviventris*
Yuma myotis	*Myotis yumanensis*

BIRDS

COMMON NAME	SCIENTIFIC NAME
American avocet	*Recurvirostra Americana*
American bittern	*Botaurus lentiginosus*
American coot	*Fulica Americana*
American crow	*Crovus brachyrhynchos*
American dipper	*Cinclus mexicanus*
American goldfinch	*Carduelis tristis*
American kestral	*Falco sparverius*
American pipit	*Anthus rubescens*
American robin	*Turdus migratorius*
American white pelican	*Pelecanus erthrorhynchos*
American wigeon	*Anas Americana*
ash-throated flycatcher	*Myiarchus cinerascens*
bald eagle	*Haliaeetus leucocephalus*
bank swallow	*Riparia riparia*
barn owl	*Tyto alba*
barn swallow	*Hirundo rustica*
Barrow's goldeneye	*Bucephala islandica*
belted kingfisher	*Ceryle alcyon*
Bewick's wren	*Thryomanes bewickii*
black tern	*Chlidonias niger*
black-and-white warbler	*Dendroica striata*
black-backed woodpecker	*Picoides areticus*
black-billed magpie	*Pica pica*
black-capped chickadee	*Parus atricapillus*
black-chinned hummingbird	*Archilochus alexandri*
black-crowned night heron	*Nycticorax nycitcorax*
black-headed grosbeak	*Pheucticus melanocephalus*
black-necked stilt	*Llimantopus mexicanus*
black-throated gray warbler	*Dendroica nigrescens*
blue grouse	*Dendragapus obscurus*
blue-winged teal	*Anas discors*
bobolink	*Dolichonyx oryzivorus*
bohemian waxwing	*Bombycilla garrulous*
Bonaparte's gull	*Larus Philadelphia*
Brewer's blackbird	*Euphagus cyanocephalus*
Brewer's sparrow	*Spizella breweri*

COMMON NAME	SCIENTIFIC NAME
broad-tail hummingbird	*Selasphorus platycercus*
brown-headed cowbird	*Molothrus ater*
bufflehead	*Bucephala albeola*
burrowing owl	*Athene cunicularia*
California gull	*Larus californicus*
California quail	*Callipepla californica*
calliope hummingbird	*Stellula calliope*
Canada goose	*Branta canadensis*
canvasback	*Aythya valisneria*
canyon wren	*Catherpes mexicanus*
cared grebe	*Podilymbus nigricollis*
Caspian tern	*Sterna caspia*
ceder waxwing	*Bombycilla cedrorum*
chipping sparrow	*Spizella passerina*
chukar	*Alectoris chukar*
cinnamon teal	*Anas cyanoptera*
Clark's grebe	*Aechmorphorus clarkii*
Clark's nutcracker	*Nucifraga columbiana*
cliff swallow	*Petrochelidon pyrrhonota*
common goldeneye	*Bucephala clangula*
common merganser	*Mergus merganser*
common nighthawk	*Chordeiles acutipennis*
common poor-will	*Phalaenoptilus nuttallii*
common raven	*Corvus corax*
common snipe	*Gallinago gallinago*
common yellowthroat	*Geothlypis trichas*
Cooper's hawk	*Accipiter copperii*
Cordilleran flycatcher	
dark-eyed junco	*Junco hyemalis*
double-crested cormorant	*Phalacrocorax auritus*
downy woodpecker	*Picoides pubescens*
dunlin	*Calidris alpina*
dusky flycatcher	*Empidonax oberholseri*
eastern kingbird	*Tyrannus tyrannus*
Eurasion wigeon	*Anas penlope*
European starling	*Sturnus vulgaris*
ferruginous hawk	*Buteo regalis*

COMMON NAME	SCIENTIFIC NAME
flammulated owl	*Otus flammeollus*
Forester's tern	*Sterna forsteri*
fox sparrow	*Passerella iliaca*
Franklin's gull	*Larus pipixcan*
gadwall	*Anas strepera*
golden eagle	*Aquila chrysaetos*
golden-crowned kinglet	*Regulus calendula*
golden-crowned sparrow	*Zonotrichia atricapilla*
grasshopper sparrow	*Ammodramus savannarum*
gray flycatcher	*Empidonax wrightii*
gray jay	*Perisoreus Canadensis*
great blue heron	*Ardea herodias*
great egret	*Ardea alba*
great gray owl	*Strix nebulosa*
great horned owl	*Bubo virginianus*
greater white-fronted goose	*Anser albifrons*
greater yellowlegs	*Tringa melanoleuca*
green-tailed towhee	*Pipilo chlorurus*
green-winged teal	*Anas crecca*
hairy woodpecker	*Picoides villosus*
Hammond's flycatcher	*Empidonax hammondii*
Harris sparrow	*Zonotrichia querula*
hermit thrush	*Catharus guttatus*
hooded warbler	*Wilsonia citrina*
horned lark	*Eremophila alpestris*
house sparrow	*Paser domesticus*
house wren	*Troglodytes aedon*
killdeer	*Charadrius vociferous*
Lapland longspur	*Calcarius lapponicus*
lark sparrow	*Chondester grammacus*
least flycatcher	*Empidonax alnorum*
least sandpiper	*Calidris minutilla*
lesser scaup	*Aythya affinis*
lesser yellowlegs	*Tringa flavipes*
Lincoln's sparrow	*Melospiza lincolnii*
loggerhead shrike	*Lanius ludovicianus*
long-billed curlew	*Neumius americanus*
long-billed dowitcher	*Limnodromus scolopaceus*

COMMON NAME	SCIENTIFIC NAME
long-eared owl	*Asio otus*
MacGillivray's warbler	*Oporornis tolmiei*
mallard	*Anas platyrhynchos*
marbled godwit	*Limosa fedoa*
marsh wren	*Cistothorus palutris*
merlin	*Faleo columbarius*
mountain bluebird	*Sialia currucoides*
mountain chickadee	*Parus gambeli*
mourning dove	*Zenaida macroura*
n. rough-winged swallow	*Stelgidopterys serripennis*
n. saw-whet owl	*Aegolius acadicus*
Nashville warbler	*Vermivora ruficapilla*
northern flicker	*Colaptes auratus*
northern goshawk	*Accipiter gentiles*
northern harrier	*Circus cyaneus*
northern mockingbird	*Mimus polyglottos*
northern pintail	*Anas acuta*
northern shoveler	*Anas clypeata*
northern shrike	*Lanius excubitor*
northern waterthrush	*Seiurus noveboracensis*
olive-sided flycatcher	*Contopus borealis*
orange-crowned warbler	*Vermivora celata*
osprey	*Pandion haliaetus*
peregrine falcon	*Falco peregrinus anatum*
pied-billed grebe	*Podilymbus podiceps*
pine grosbeak	*Pinicola enucleator*
prairie falcon	*Falco mexicanus*
pygmy nuthatch	*Sitta pygmaea*
red-breasted nuthatch	*Sitta Canadensis*
redhead	*Aythya Americana*
red-naped sapsucker	*Sphyrapicus nuchalis*
red-tailed hawk	*Buteo jamaicensis*
red-wingd blackbird	*Agelaius phoeniceus*
ring-billed gull	*Larus delawarensis*
ring-necked duck	*Aythya collaris*
ring-necked pheasant	*Phasianus colchicus*
rock wren	*Salpincies obsoletus*
Ross' goose	*Chen rossii*

COMMON NAME	SCIENTIFIC NAME
rough-legged hawk	*Buteo lagopus*
ruby-crowned kinglet	*Regulus calendula*
ruddy duck	*Oxyura jamaicensis*
ruffed grouse	*Bonasa umbellus*
rufous hummingbird	*Selasphorus rufus*
rufous-sided towhee	*Pipilo erythrophthalmus*
sage sparrow	*Amphispiza belli*
sage thrasher	*Oreoscoptes montanus*
sandhill crane	*Grus canadensis*
savannah sparrow	*Passerculus sandwichensis*
Say's phoebe	*Sayornis saya*
scrub jay	*Aphelocoma coerulescens*
sharp-skinned hawk	*Accipiter striatus*
short-eared owl	*Asio flammeus*
snow bunting	*Plectrophenax nivalis*
snow goose	*Chen caerulescens*
snowy egret	*Egretta thula*
snowy plover	*Charadrius alexandrinus*
solitary vireo	*Vireo solitarius*
song sparrow	*Melopiza melodia*
sora	*Porzana Carolina*
spotted sandpiper	*Actitis macularia*
Steller's jay	*Cyanocitta stelleri*
Swainson's hawk	*Buteo sawinsoni*
three-toed woodpecker	*Picoides tridactylus*
Townsend's solitaire	*Myadestes townsendi*
Townsend's warbler	*Dendroica townsendi*
tree swallow	*Tachycineta bicolor*
Turkey vulture	*Cathartes aura*
tundra swan	*Cygnus colubianus*
Vaux's swift	*Chaetura vauxi*
veery	*Catharus fuscescens*
vesper sparrow	*Pooecetes gramineus*
violet-green swallow	*Tachycineta thalassina*
Virginia rail	*Rallus limicola*
warbling vireo	*Vireo gilvus*
western bluebird	*Sialia mexicana*
western grebe	*Aechmophorus occidentalis*

COMMON NAME	SCIENTIFIC NAME
western kingbird	*Tyrannus verticalis*
western meadowlark	*Surnella neglecta*
Western sage grouse	*Centrocercus urophasianus phaios*
western sandpiper	*Calidris pusilla*
western screech owl	*Otus kennicottii*
western tanager	*Piranga ludoviciana*
western wood pewee	*Contopus sordidulus*
white face ibis	*Plegadis chihl*
white-breasted nuthatch	*Sitta carolinensis*
white-crowned sparrow	*Zonotrichia leucophrys*
white-headed woodpecker	*Picoides albolarvatus*
white-throated sparrow	*Zonotrichia albicollis*
white-throated swift	*Aeronautes saxatalis*
wild turkey	*Meleagris gallopavo*
willet	*Catoptrophorus semipalmatus*
Williamson's sapsucker	*Sphyrapicus thyroideus*
willow flycatcher	*Empidonax traillii*
Wilson's phalarope	*Phalaropus tricolor*
Wilson's warbler	*Wilsonia pusilla*
winter wren	*Troglodytes troglodytes*
wood duck	*Aix sponsa*
yellow warbler	*Dendroica petechia*
yellow-headed blackbird	*Xanthocephalus xanthocephalus*
yellow-rumped warbler	*Dendroica coronata*
greater sandhill crane	*Grus Canadensis tabida*
long-billed curlew	*Numenius americanus*

REPTILES AND AMPHIBIANS

COMMON NAME	SCIENTIFIC NAME
boreal toad	*Bufo boreas*
Columbia spotted frog	*Rana luteiventris*
common kingsnake	*Lampropeltis getula*
desert horned lizard	*Phrynosoma platyrhinos*
desert night snake	*Hypsiglena torquata*
desert striped whipsnake	*Masticophis taeniatus*
E. long-toes salamander	*Ambystoma macrodactylum*

COMMON NAME	SCIENTIFIC NAME
Great Basin fence lizard	*Sceloporus occidentalis*
Great Basin gopher snake	*Pituophis catenifer*
Great Basin spadefoot toad	*Spea intermontana*
Great Basin whiptail	*Cnemidophorus tigris*
n. side-blotch lizard	*Utastans buriana*
northern sagebrush lizard	*Sceloporus graciosis*
Pacific treefrog	*Hyla regilla*
rubber boa	*Charina bottae*
sagebrush lizard	*Sceloporus graciosus*
short-horned lizard	*Phyrynosoma douglassii*
spotted frog	*Rana pretiosa*
valley garter snake	
w. yellow-bellied racer	
wandering garter snake	
western fence lizard	*Sceloporus occidentalis*
western rattlesnake	*Crotalus virdis*
western skink	*Eumeces skiltonianus*

APPENDIX B Plants used by the Burns Paiute Indian Tribe (USFS, 1997)

Scientific Name	Northern Paiute Name	English Common Name
Achillea millefolium	waa da qusi	yarrow
Allium acuminatum	kyyga	tapertip onion
Allium madicum	sii	swamp onion
Artemesia frigida	na te zoowa	wormwood/praire sagewort
Artemesia tridentata	sah wabi	big sagebrush
Calochortus macrocarus	koogi	sagebrush mariposa lily
Camassia quamash	paazigo	camas
Fritillaria pudica	winida	yellow bell
Juniperus occidentalis	waa pi	juniper
Lewisia rediviva	kanicy	bitterroot
Lomatium canbyi	canacuka	Canby's biscuit-root
Lomatium cous	cuka	cous biscuit-root
Lomatium gormanii	kwidapoo	German's biscuit-root
Lomatium macrocarpum	haapi	large-fruit biscuit-root
Lomatium nudicaule	unknown	bare stem biscuit-root
Mentha arvensis	pakwana	fieldmint
Penstemon spp.	namogot	beardtongue
Perideridia bolanderi	yapa, yampa, payapa	Gairdner's yampah
Perideridia oregana	pamahayapa	Oregon yampah
Pinus ponderosa	ti bi	ponderosa pine
Prunus virginiana	toosia bui	chokecherry
Ribes aureum	poko pisa	golden currant
Trifolium macrocephalum	poziidapy	big-head clover

APPENDIX C

FISH SPECIES OF THE SILVIES SUB-BASIN

NATIVE FISH

COMMON NAME	SCIENTIFIC NAME
bridgelip sucker	*Catostomus columbianus*
chiselmouth	*Acrocheilus alutaceus*
largescale sucker	*Catostomus macrocheilus*
longnose dace	*Rhinichthys cataractae*
Malheur mottled sculpin	*Cottus bairdi bairdi*
mottled sculpin	*Cottus bairdi*
northern squawfish	*Ptychocheilus oregonensis*
redband trout	*Oncorhyncus mykiss newberii*
redside shiner	*Richardsonius balteatus*
speckled dace	*Rhinichthys asculus*

NON-NATIVE FISH

COMMON NAME	SCIENTIFIC NAME
bluegill	*Lepomis macrochirus*
brook trout	*Salvelinus fontinalis*
brown bullhead	*Ictalurus nebulosus*
common carp	*Cyprinus carpio*
largemouth bass	*Micropterous salmoides*
pumpkinseed	*Lepomis gibbosus*
rainbow trout	*Oncorhyncus mykiss*
smallmouth bass	*Micropterous dolomieui*
white crappie	*Pomoxis annularis*
yellow perch	*Perca flavescens*

APPENDIX D
HARNEY COUNTY NOXIOUS WEEDS

A Rated Weeds (infestations are subject to eradication where found)

Common Name	Scientific Name
tansy ragwort	*Senecio jacobaea*
diffuse knapweed	*Centaurea diffusa*
spotted knapweed	*Centaurea maculosa*
squarrose knapweed	*Centaurea virgata*
yellow star thistle	*Centaurea solstitialis*
purple loosestrife	*Lythrum salicaria*
leafy spurge	*Euphorbia esula*
rush skeletonweed	*Chondrilla juncea*
scotch broom	*Cytisus scoparius*
salt cedar	*Tamarix ramosissima*
musk thistle	*Cardus nutans*
yellow toadflax	*Linaria vulgaris*

B Rated Weeds (infestations are handled at county discretion)

Common Name	Scientific Name
perennial pepperweed	*Lepidium latifolium*
scotch thistle	*Onopordum acanthium*
puncture vine	*Tribulus terrestris*
dalmatian toadflax	*Linaria dalmatica*
russian knapweed	*Centaurea repens*
medusahead rye	*Taeniatherum caput-medusa*
mediterranean sage	*Salvia aethiopis*

C Rated Weeds (infestations are handled at landowners discretion)

Common Name	Scientific Name
klamath weed	*Hypericum perforatum*
morning glory	*Convolvulus arvensis*
canada thistle	*Cirsium arvense*
white top	*Cardaria draba*
halogeton	*Halogeton spp.*

Stream	Approx. Legal Location	Ownership	PFC (miles)	Functional At Risk Upward Trend (miles)	Functional At Risk Downward Trend (miles)	Functional At Risk Trend Not Apparent (miles)	Non Functional (miles)
Crane Creek #1	T19S R30E sec. 3	Forest Service				0.5	
Crane Creek #2	T19S R30E sec. 3&10	Forest Service	1				
Crane Creek Totals			**1**				
Emmigrant Creek	T20S R29E sec.21&31	B.L.M	1.7				
Hay Cr. & West Fork Hay Cr.	T20S R29E sec.1,11,12	B.L.M		2.85			
Heifer Creek #1	T18S R30E sec. 21,22,29	Forest Service	1.75				
Heifer Creek #2	T18S R30E sec. 29	Forest Service				0.75	
Heifer Creek Totals			**1.75**			**0.75**	
Landing Creek	T21S R29E/30E sec. 1,4,5,6	B.L.M	3.6				
Little Sagehen Creek #1	T19S R30E sec. 31	Forest Service	0.5				
Little Sagehen Creek #2	T19S R30E sec. 25,30,31	Forest Service				1.75	
Little Sagehen Creek #3	T19S R30E sec. 24&25	Forest Service		0.5			
Little Sagehen Creek #4	T19S R30E sec. 14,23,24,25	Forest Service	1.75				
Little Sagehen Creek Totals			**11.05**	**3.35**		**1.75**	
Mountain Creek	T18S/19S R32E sec. 32,33,4	B.L.M	2.48				
Myrtle Creek #1	T19S R30E sec. 27,28,33	Forest Service	1.75				
Myrtle Creek #2	T19SR30Esec.2,10,15,16,22,27	Forest Service	5.5				
Myrtle Creek #3	T19S R30E sec. 1&2	Forest Service		0.25			
Myrtle Creek #4	T18S R30E sec. 36	Forest Service	0.75				
Myrtle Creek #5	T18S R30E sec. 25&26	Forest Service		1.25			
Myrtle Creek #6	T18S R30E sec. 27	Forest Service	0.25				
Myrtle Creek #7	T18SR30Esec.16,21,22,27	Forest Service		2.5			
Myrtle Creek #8	T18SR30Esec.17,18,20,21	Forest Service	2				
Myrtle Creek Totals			**10.25**	**4**			
Newell Creek	T18S R32E sec. 32,33,28,27	B.L.M	2.67				
Sagehen Creek #1	T19S R31E sec. 29	Forest Service	0.19				
Sagehen Creek #2	T19S R31E sec.19,29,30	Forest Service				1.25	
Sagehen Creek #3	T19S R31E sec. 18&19	Forest Service	0.75				
Sagehen Creek #4	T19S R31E sec. 18	Forest Service				0.5	
Sagehen Creek #5	T19S R30S/31S sec.7,13,18	Forest Service	1.25				
Sagehen Creek Totals			**2.19**			**1.75**	

Stream	Approx. Legal Location	Ownership	PFC (miles)	Functional At Risk Upward Trend (miles)	Functional At Risk Downward Trend (miles)	Functional At Risk Trend Not Apparent (miles)	Non Functional (miles)
Silvies River #1	T20S R30E sec. 32,6,7	B.L.M				1.9	
Silvies River #2	T20S R29E sec. 13&24	B.L.M					1.14
Silvies River #3	T21S R29E sec. 13,25,24,14	B.L.M		3.24			
Silvies River #4	T20S R30E sec. 3&4	Forest Service		0.75			
Silvies River #5	T20S R30E sec. 1,12,11,10,4	Forest Service					
Silvies River #5	T20S R31E sec. 6	Forest Service					
Silvies River #5	T19S R31E sec. 31,29,28,21	Forest Service					
Silvies River #5	T19S R31E sec. 22,15	Forest Service	12.5				
Silvies River Totals			**12.5**	**3.99**		**1.9**	**1.14**
East Creek	T20S R32E sec. 7&8	B.L.M	1				
Skull Creek #1	T21S R29E sec. 5&6	B.L.M	0.6				
Skull Creek #2	T20S/21S R29E sec.4,5,6	B.L.M	1.14				
Skull Creek #3	T21S R29E sec. 5&6	B.L.M		0.38			
Skull Creek #4	T20S R29E sec. 34&35	B.L.M	0.57				
Skull Creek Totals			**2.31**	**0.38**			
Stancliff Creek #1	T19S R31E sec. 29&32	Forest Service	0.75				
Stancliff Creek #2	T19S/20S R31E sec.33&4	Forest Service		1.25			
Stancliff Creek #3	T20S R31E sec. 4,8,9	Forest Service	0.75				
Stancliff Creek #4	T20S R31E sec. 8	Forest Service		0.25			
Stancliff Creek #5	T20S R31E sec. 8	Forest Service	0.25				
Stancliff Creek Totals			**1.75**	**1.5**			
Tributary of Myrtle Cr. #1	T18SR30Esec.19,20,27	Forest Service	2				
Tributary of Myrtle Cr. #2	T18S R30E sec. 19&27	Forest Service		1			
Tributary of Myrtle Cr. #3	T18S R29E sec. 24	Forest Service		0.5			
Tributary of Myrtle Cr. Totals			**2**	**1.5**			
West Fork of Myrtle Creek	T19S R30E sec. 4,5,6,9,10	Forest Service	4.25				
Silvies Sub-basin Totals			**50.95**	**13.73**	**0**	**6.65**	**1.14**
Total Stream Miles Assessed	**72.47**						

LIST OF RECORDED WELLS WITHIN THE SILVIES RIVER SUBBASIN			
TWN'SHP	RANGE	GEOGRAPHIC AREA	NUMBER OF WATER WELLS REPORTED
15S	30	LOGDELL	9
15S	31	WINDFALL SPRING	8
16S	30	JACK CREEK-SCOTTY CREEK	5
16S	31	BEAR VALLEY	11
16S	32	BEAR CREEK	1
16S	33	UPPER BEAR CREEK	0
17 S	29	UPPER SCOTTY CREEK	3
17 S	30	CAMP CREEK	0
17 S	31	SENECA-LOWER CAMP CREEK	4
17S	32	UPPER ANTELOPE CREEK	0
18S	30	CROOKED CREEK	0
18S	31	JUMP CREEK	2
18S	32	HOUSE CREEK	1
19S	26	CROWSFOOT CREEK	3
19S	27	UPPER EMIGRANT CREEK	0
19S	28	UPPER SAWTOOTH CREEK	0
19S	29	SUGARLOAF MTN.	2
19S	30	MYRTLE CREEK	0
19S	31	SAGE HEN-TROUT CREEK	2
19S	32	MOUNTAIN CREEK	1
20S	27	BEAR CANYON	5

LIST OF RECORDED WELLS WITHIN THE SILVIES RIVER			
TWN'SHP	RANGE	GEOGRAPHIC AREA	NUMBER OF WATER WELLS REPORTED
20S	30	MYRTLE CREEK-UPPER DRY CREEK	1
20S	31	CROW FLAT	2
21S	28	SPRING CREEK	0
21S	29	SKULL CREEK	0
21S	30	GORDON CREEK	2
21S	31	POISON CREEK	1
22S	28	WEST WILLOW CREEK	0
22S	29	UPPER CRICKET CREEK	1
22S	30	MIDDLE-LOWER SILVIES	30
22S	31	DEVINE CANYON WEST-NORTH BURNS	63
23S	29	LITTLE SAGE HEN CREEK	1
23S	30	CITY OF HINES	52
23S	31	CITY OF BURNS	208
24S	29	SOUTH SAGE HEN	31
24S	30	WEST HINES	60
24S	31	BURNS EAST	42
24S	32	BURNS SOUTH	72
25S	30	SOUTH WRIGHTS POINT	16
25S	31	HYW 205 WEST	95
25S	32	ISLAND RANCH	14
TOTAL			748

NOTE; LIST DOES NOT INCLUDE ANY WELLS NOT FILED WITH THE OREGON DEPARTMENT OF WATER RESOURCES NOR FILED AFTER MAY 1999. SOURCE FOR DATA IS THE OREGON DEPARTMENT OF WATER RESOURCES. NO MONITOR OR GEOLOGIC WELLS LISTED. NO DIFFERENTIATION BETWEEN DOMESTIC AND IRRIGATION WELLS MADE

APPENDIX G

ISSUES DISCUSSED AT PUBLIC MEETINGS

Two public meetings were held to discuss this assessment. One meeting was located in Burns on August 28, 2000, the other was held in Seneca on August 31, 2000. The following are issues that were discussed at these meetings.

1. Urban sprawl issues in Burns and Hines.

2. Lowering of the water table due to an increase in wells.

3. Carp control.

4. Weed control.

5. Desire to maintain wild flow along the Silvies as opposed to storing water.

6. Stream bank restoration.

7. Need for an education program on stream bank stability and stream potential.

8. More realistic reporting of elk numbers and control of the elk population.

9. Need to raise public awareness as to the good condition of natural resources within the sub-basin.

GLOSSARY

Proper Functioning Condition (PFC) – Riparian-wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve flood-water retention and ground-water recharge; develop root masses that stabilize stream banks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding and other uses; and support greater biodiversity. The functioning condition of riparian-wetland areas is a result of interaction among geology, soil, water and vegetation. (USDI Bureau of Land Management, 1995)

Functional at Risk – Riparian-wetland areas that are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation. (USDI Bureau of Land Management, 1995) An upward trend signifies that conditions are improving and moving towards PFC. A downward trend implies that conditions are worsening.

Nonfunctional – Riparian-wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and thus are not reducing erosion, improving water quality, etc., as listed above. The absence of certain physical attributes such as a floodplain where one should be are indicators of nonfunctioning conditions. (USDI Bureau of Land Management, 1995)

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