SMITH VALLEY CONSERVATION DISTRICT

RESOURCE NEEDS ASSESSMENT

August 2019

Complied by
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Funded by
Nevada Association of Conservation District

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Nevada Association of Conservation Districts

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Smith Valley Conservation District
Executive Summary

Purpose

The Smith Valley Conservation District has developed this resource needs assessment with the goal that conservation efforts in the District address the most important local resource needs. This report identifies natural and social resources present and details specific areas of concerns. Local, state and regional entities can use this assessment develop resource management plans or to target conservation assistance needs.

The District recognizes that all who could have provided information may not have had the opportunity. This document is dynamic and will be updated as additional information is available or changes.

Natural Resource Priorities for the District

The Smith Valley Conservation District have identified five natural resource priorities. These priorities receive special emphasis because of their immediate significance in the District.

1. Plants – Noxious and Invasive Weeds. Noxious and invasive weeds pose a continued threat to natural resources in the District.

2. Plants – Wildfire Hazard. Wildfire hazard are a concern on the rangelands and on the wildland/rural interface and on fallow lands.

3. Water – Irrigation Water Efficiency. Improving existing irrigation delivery systems to be more water efficient.

4. Water – Sediment in surface water. Reducing sediment will improve water quality and reduce maintenance in the irrigation delivery systems.

5. Soil Erosion – Stream bank. Soil erosion on river streambanks is contributing to sediment in the river.

General Resource Observations

Natural and social resources are categorized as soil, water, air, plants, animals, and humans (SWAPA+H). This assessment describes the general condition of these resources and highlights additional concerns in each category. As opportunities become available to address these issues, and as circumstances change, their emphasis can change.

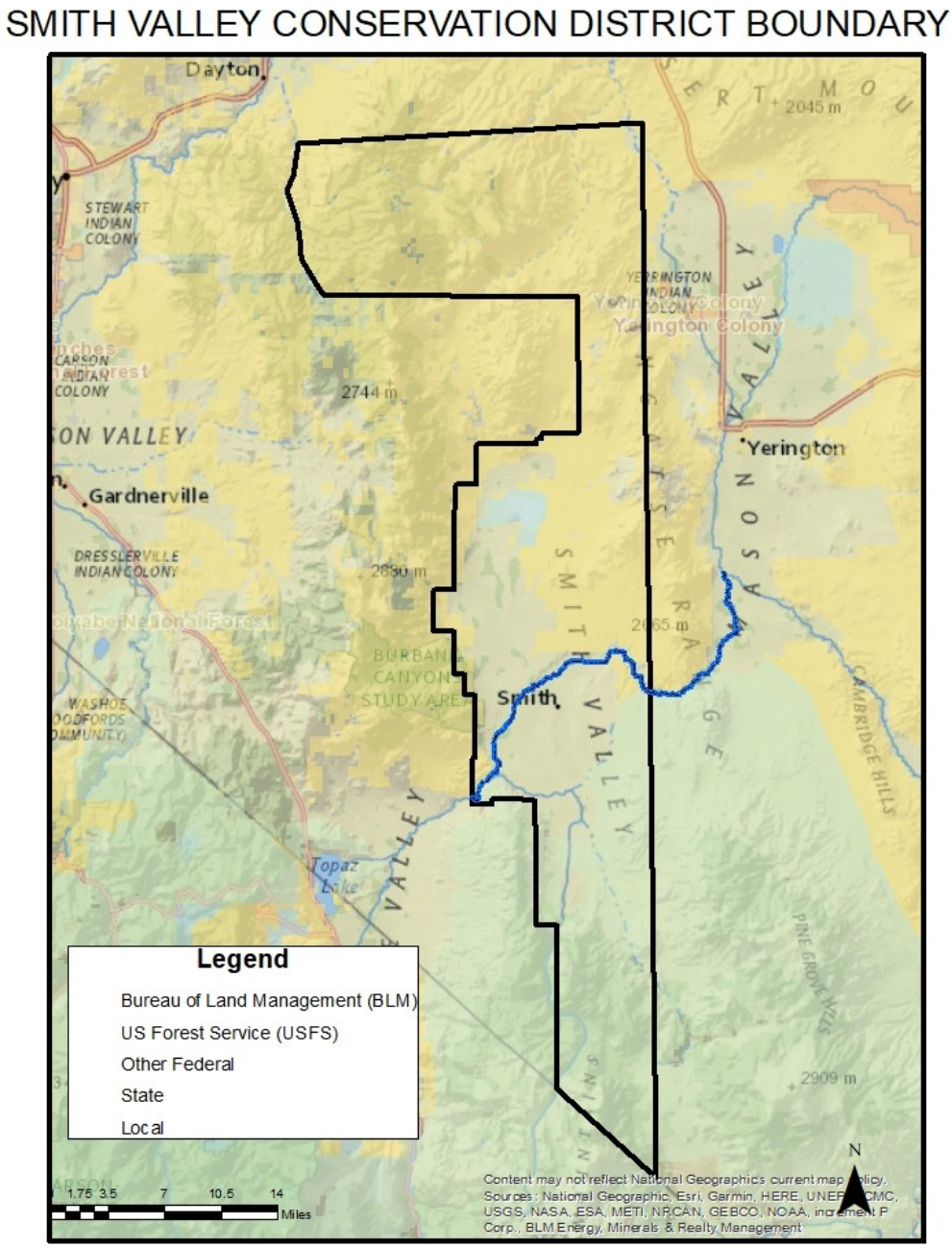
Soil – erosion along streambanks, erosion by wind
Water – irrigation, ground water use, water quality in West Walker River
Air – none at this time
Plants – noxious and invasive plants, encroachment by trees, wildfire hazards
Animals – habitat for sensitive species, habitat for non sensitive species, forage and water for livestock
Humans – social-economic considerations

1.0 Introduction

The Smith Valley Conservation District is located in the southwestern portion of Lyon County Nevada. The District is approximately 255,600 acres.

Elevation ranges from a low of 4,546 feet at Artesia Lake in the bottom of Smith Valley to 10,402 feet at East Sister Peak in the Sweetwater Mountains in the southwest portion of the District and 8753 feet at the Lyon Peak in the Pine Nut Mountains in the northwest portion of the District. Elevations in Smith Valley on irrigated farmland range from 4,725 to 4,850 feet. Conservation assistance is provided by the Smith Valley Conservation District.

Map 1.0 Conservation District Boundary



1.1 Common Resource Area (CRA)

A CRA is defined as a geographical area where resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) map delineation or polygon. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a Common Resource Area .

Carson Basin and Mountains 26.1

This unit includes the mountains, high fans and intermontane valleys on the east side of the major land resource area. The area is influenced by the nearby Sierra Nevada. Soil temperatures range from mesic to cryic; soil moisture regimes are aridic bordering xeric to xeric. Typical vegetation includes mountain big sagebrush, low sagebrush, Indian ricegrass, antelope bitterbrush and areas of singleleaf pinyon-Utah juniper woodland. Curlleaf mountain mahogany and aspen occur at high elevation.

Carson Basin and Mountains – Eastern Valleys and Uplands 26.2

This unit includes the basins, fan piedmonts and low hills and mountains on the east side of the major land resource area. The area is influenced by the nearby Sierra Nevada range. Soil temperatures range from mesic to frigid; soil moisture regimes are aridic bordering xeric or xeric. Typical vegetation includes Wyoming big sagebrush, basin big sagebrush, low sagebrush, Lahontan sagebrush, Indian ricegrass, antelope bitterbrush and small areas of singleleaf pinyon-Utah juniper woodland.

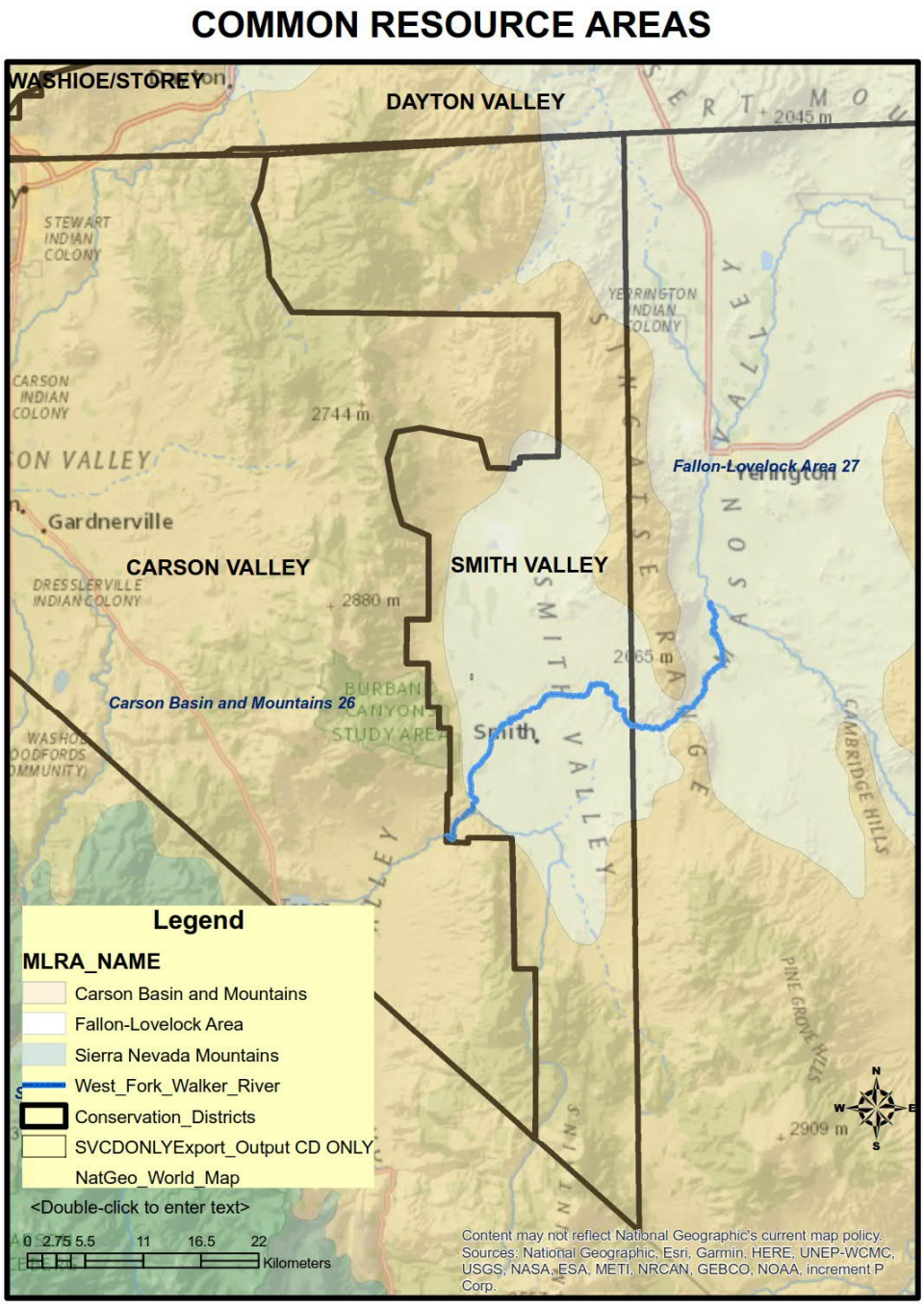
Fallon Lovelock Area – Lahontan Basins and Low Uplands 27.1

This unit is characterized by irrigated cropland, pastureland, and rapidly growing cities, suburbs, and industries. Many canals, reservoirs, and diversions are present. Aridic soils predominate and require irrigation to grow commercial crops. Surface water quality has been significantly affected by channel alteration, dams, irrigation return flow, and urban, industrial, and agricultural pollution. Crops include wheat, barley, alfalfa, sugar beets, potatoes, and beans. Crop diversity is greater, temperatures are warmer, and the mean frost free season is longer than in other CRA units. Population density is much greater than in nearby, rangeland-dominated units. This unit includes broad basins, fan piedmonts and low hills influenced by Lake Lahontan. Soil temperature regimes are mostly mesic; soil moisture regime is aridic. Typical vegetation consists largely of shadscale, Bailey greasewood, black greasewood and Indian ricegrass. At high elevations, Wyoming big sagebrush and Lahontan sagebrush are common.

Fallon Lovelock – Lahontan Mountains and High Fans 27.2

This unit consists of the mountains, high fans and intermontane valleys that bordered ancient Lake Lahontan. Soil temperature regimes are mostly mesic and frigid; soil moisture regime is aridic or aridic bordering xeric. Common vegetation includes shadscale and Bailey greasewood on lower slopes; Wyoming big sagebrush, Lahontan sagebrush, low sagebrush, black sagebrush, Utah juniper and singleleaf pinyon.

Map 1.1 Common Resource Area



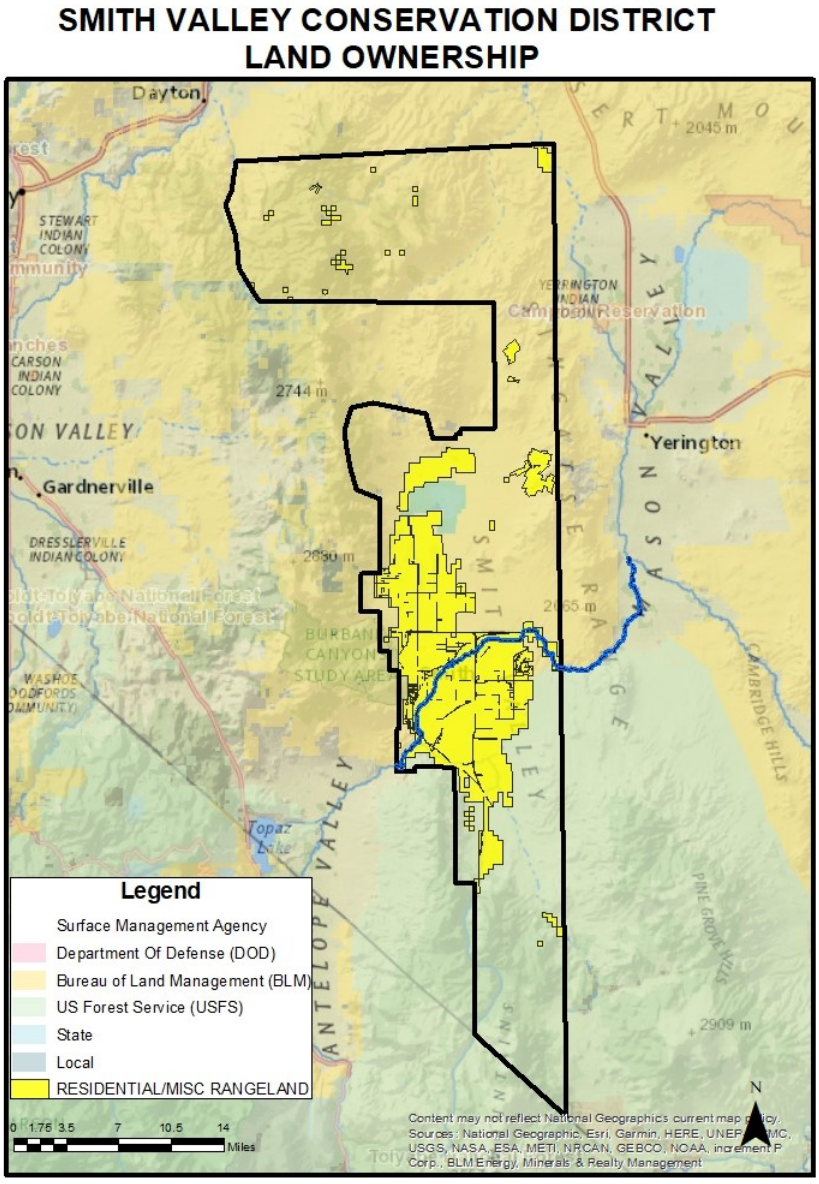
1.2 General Ownership

Land ownership in the Smith Valley Conservation District boundary is approximately 57 percent public land administered by the Bureau of Land Management, 21 percent National Forest and 22 percent in private ownership. Private ownership also includes Lyon County ownership.

Table 1.2 Land Cover and Land Use

LAND OWNERSHIP						
Private		BLM		USFS		TOTAL
20900 ac	22%	146683 ac	57%	53390 ac	21%	2,55600 ac

Map 1.2 General Land Ownership



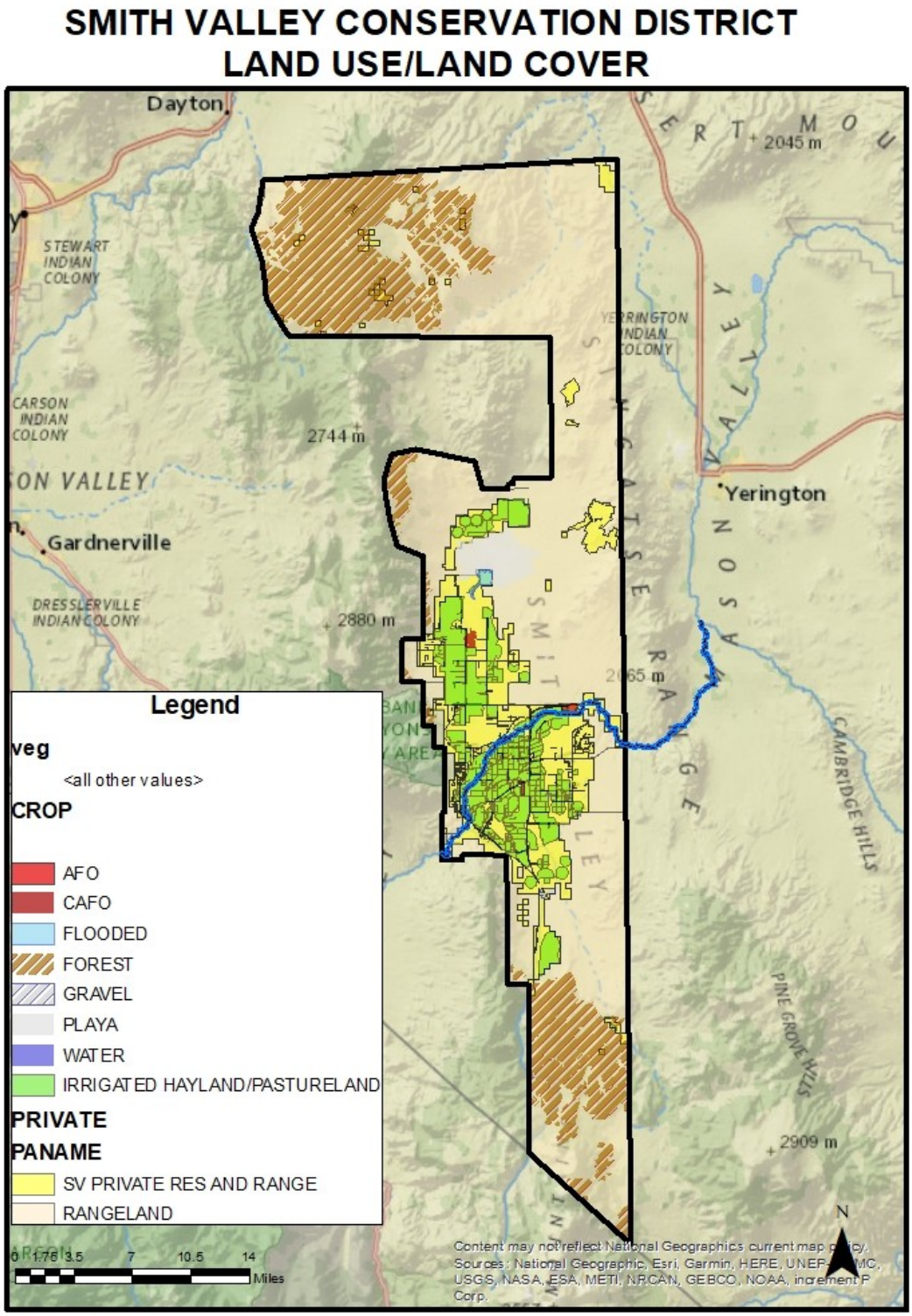
1.3 Land Use and Land Cover

Land Use cover in the District is 55 percent rangeland, 21 percent is pinyon-juniper forest based on soil potential, 8 percent is irrigated cropland (pasture, hayland, grain, silage), 12 percent is private residential/farm headquarters/rangeland. The remaining includes playas, river/riparian, ponds, flooded waterfowl habitat, livestock feedlots and dairies (AFO/CAFO) and mining.

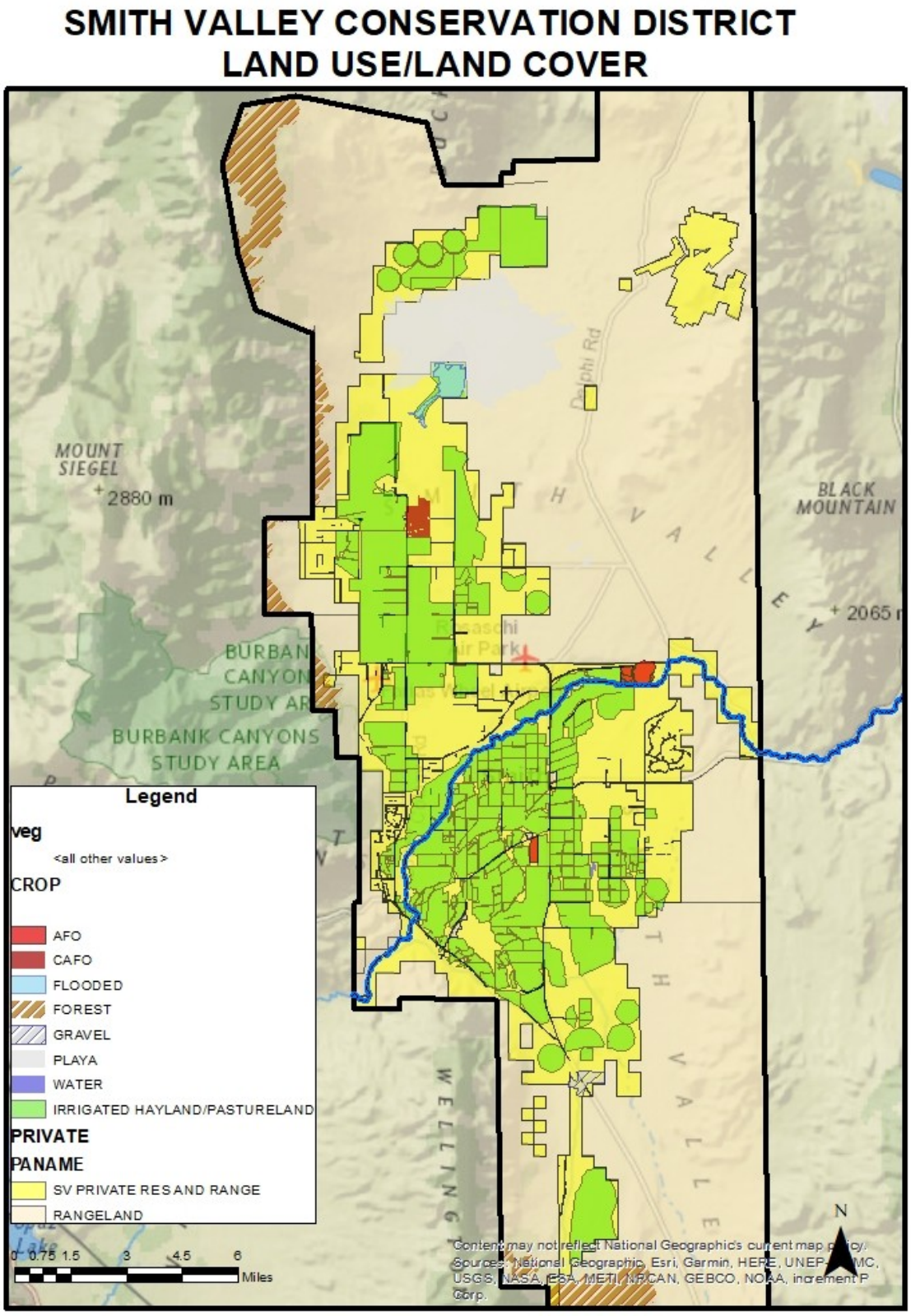
Table 1.3 Land Use and Land Cover

LAND COVER/ LAND USE	OWNERSHIP					
	Private ac		BLM ac	USFS ac	Total ac	%
Hayland/Cropland	16100				16100	
Pasture	4800				4800	
Total	**20900**	**38%**			**20900**	**8.18%**
Rangeland			106750	34584	**141334**	**55.3%**
Forest (Pinyon/Juniper)			35533	18806	**54339**	**21.3%**
Residential/ Farm Headquarter / Misc Rangeland	31051	56%			**31051**	**12.1%**
Riparian/River/Ponds	1000	2%	100		**1100**	**0.4%**
Playa/Badland	53	0%	4300		**4353**	**1.7%**
Flooded Waterfowl Habitat	300	0%			**300**	**0.1%**
AFO/CAFO	553	1%			**553**	**0.2%**
Mining Claims	1670	3%			**1670**	**0.7%**
Total	**55527**	**100%**	**146683**	**53390**	**255600**	**100.0%**
Total Percentage	**22%**		**57%**	**21%**	**100%**	

Map 1.30 Land Use and Cover Smith Valley District



Map 1.31 Land Use and Land Cover Smith Valley



2.0 RESOURCE CONCERN – SOILS

Resource Setting

Soils found in the Conservation District are a mix of granitic and igneous parent materials. The valley bottoms are a mix of material that have been transported by water over time. The eastern portion of District is a mix of material that has also been transported by wind. Soils along the West Walker River have been formed over time by the meandering of the river and deposition of water and soils on the floodplain. These soils are typically deep and have higher organic content and vary from sands, silts and some clay loams. On the upper terraces of the river, soils are typically have a high sand content. Along the west side of Smith Valley, soils have formed from granitic alluvium from the Pine Nut Mountains. On the south side of the valley, soils typically are alluvium from igneous parent material.

Irrigated Land Capability Class

Soils are mapped based on land capability limitations to cultivation. Table 2.0 and Figure 2.0 shows the acres and percentage of farmland in the District. Most soils have moderate limitations to crops. Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops and the way they respond to management.

In the capability system, soils are generally grouped at three levels-capability class, subclass, and unit. Capability classes are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. Most of the soils that are used for crop production in Smith Valley have a rating of 2-moderate limitation with the main limitation being wetness. Other limitations include dryness and shallow soils. Soils in the Capability classes 3 and 4 include shallow soils and wind erosion problems. Most of the cultivated soils in the District have a moderate limitation.

Table 2.0 Percentage of Cultivated Soils in Land Capability Classes

		Acres	%
Land Capability Class (For Crop and Pasture Lands)	**1**– slight limitations	none	**0%**
	2 – moderate limitations	10501	**50%**
	3 – severe limitations	3472	**17%**
	4 – very severe limitations	2635	**13%**
	5 – no erosion hazard, but other limitations	953	**5%**
	6 – severe limitations, unsuited for cultivation, limited to pasture, range, forest	586	**3%**
	7 – very severe limitations, unsuited for cultivation, limited to grazing, forest, wildlife	none	**0%**
	8– misc areas have limitations, limited to recreation, wildlife, and water supply	none	**0%**
	No Rating/Water/Wet/Saline-Ala kine	**2752**	**22%**
	Total Hay, Crop & Pasture Lands	**20900**	**100%**

Figure 2.0 Land Use Limitations

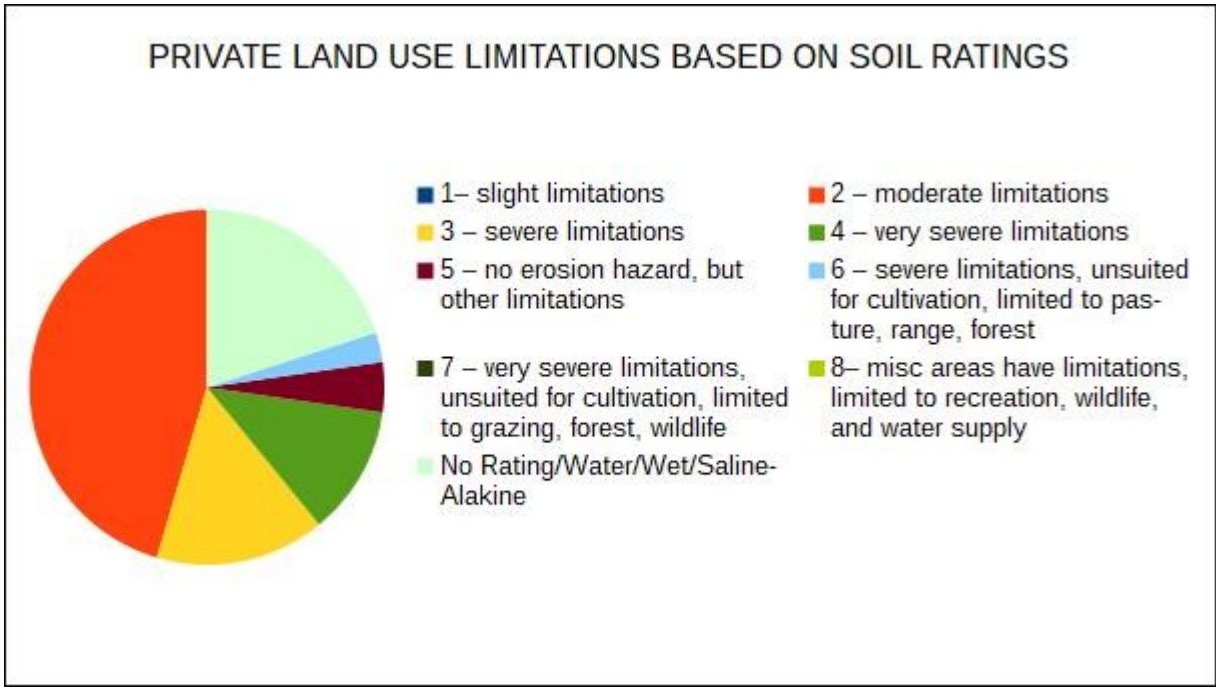


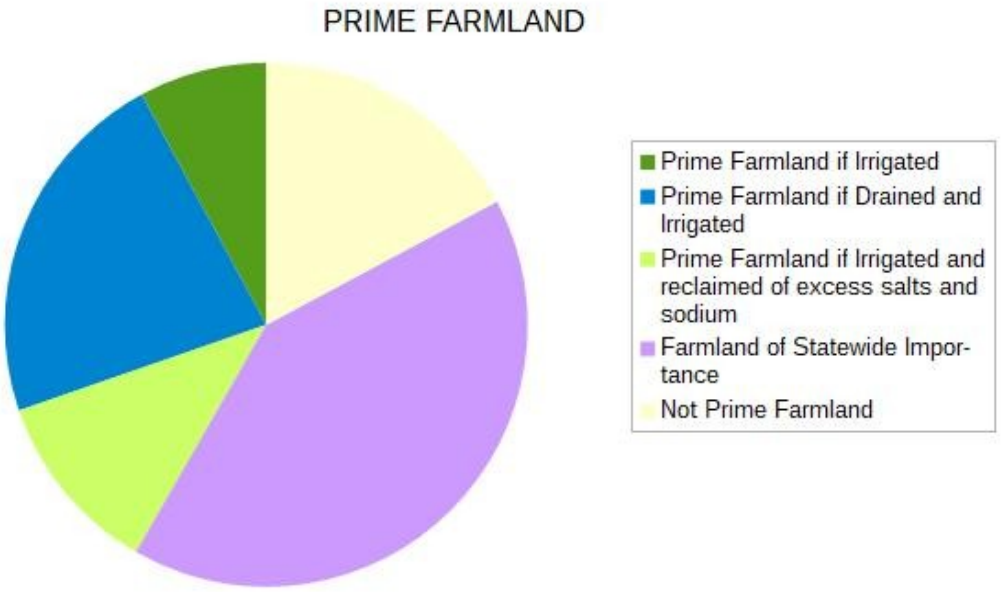
Table 2.01 lists the acres and percentage of irrigated lands that are categorized as Prime Farmland, Farmland of Statewide Importance and Not Prime Farmland based on the soil survey. Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland. Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

In Smith Valley there is approximately 3594 acres, or 17% of the farmland that does not have soils that are mapped as Prime, or soils of Statewide Importance. Figure 2.01 shows the percentages of each category.

Table 2.01 Farmland by Category based on Soil Survey

Farmland Classification	Prime Farmland if Irrigated	1651 ac	7.9%
	Prime Farmland if Drained and Irrigated	4682 ac	22.4%
	Prime Farmland if Irrigated and reclaimed of excess salts and sodium	2383 ac	11.4%
	Farmland of Statewide Importance	8590 ac	41.1%
	Not Prime Farmland	3594 ac	17.2%
	Total Hay and Pasture Lands	**20900 ac**	**100%**

Figure 2.01 Farmland Classification Smith Valley



2.1 Soil Erosion – Sheet, Rill and Wind Erosion

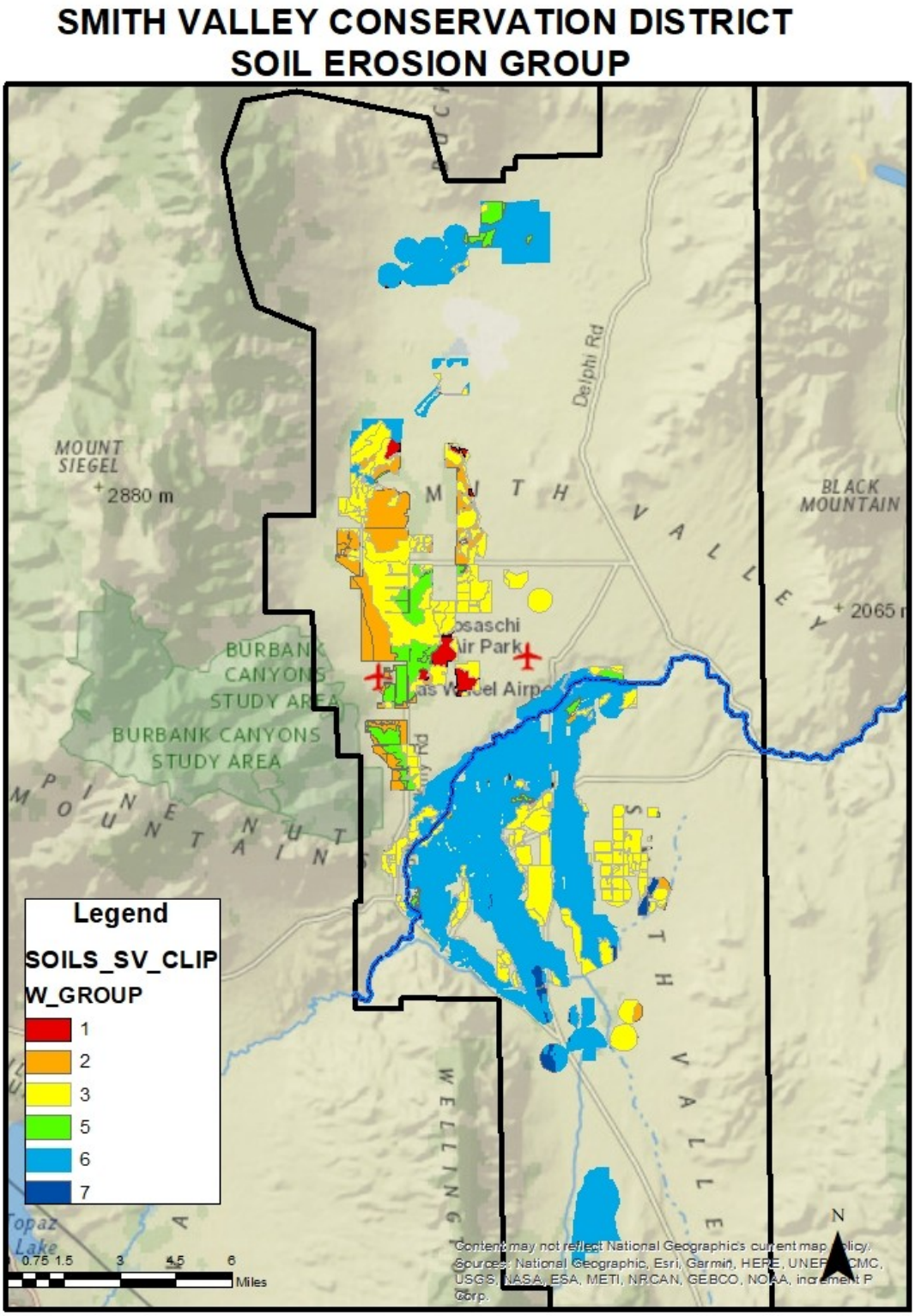
Wind or water erosion is the physical wearing of the earth's surface. Erosion is not always readily visible, even when soil loss exceeds unsustainable levels. Symptoms of soil erosion by water may be identified by small rills and channels on the soil surface, soil deposited at the based of slopes, sediment in streams, lakes and reservoirs. Water erosion is most obvious on steep slopes. Symptoms of wind erosion may be identified by dust clouds, soil accumulation along fence lines and a drifted appearance of the soil surface.

High winds are common in the District. Winds tend to be highest in the spring months and when storm fronts move into the area. Soil erosion by water is less common than wind erosion due to low rainfall amounts that occur. Most erosion by water occurs during summer months with high intensity rainfall events.

A wind erodibility group consists of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion. Typically the most erodible soils are with sandy soil surface textures.

Map 2.10 shows the potential of soil erosion of irrigated soils based on the wind erodibility group. The map shows that most of the soils south of the West Walker River are in Group 6, and soils north of the river are more erodible and are in Group 2 and 3. There are a few areas of Group 1 which occur on sandy soils along Day Lane.

Map 2.10 Wind Erodability Group



Resource Concerns Specific to the Conservation District

Sheet and Rill

Sheet and rill erosion is the detachment and transportation of soil particles caused by rainfall or irrigation runoff. The main concern of sheet and rill erosion is on rangelands that have burned and lack a vegetative cover.

Wind

Cultivation that occurs in sandy soil without adequate vegetation cover is susceptible to erosion by wind. This has occurred in several locations in the District including the Artist View area. Soil has blown into roads and adjacent properties. Other areas of concern are farm land that is no longer irrigated and the vegetation is now weeds. These fields are susceptible to erosion from wind without a good ground cover.

Practices to Solve Resource Concern and Physical Effects

Table 2.1 lists the practices that can be used to solve the resource concern and their environmental effect. Effects range from substantial improvement to non effect to substantial worsening. Practices listed are the common practices used in the area by NRCS.

Table 2.1 Conservation Physical Effects by Practice

Practice	Soil Erosion – Sheet and Rill Erosion	Soil Erosion – Wind Erosion
Access Control	3	1
Amending Soil Properties with Gypsum Products	1	1
Conservation Cover	4	4
Conservation Crop Rotation	4	4
Cover Crop	4	4
Critical Area Planting	5	5
Field Border	4	4
Forage and Biomass Planting	1	1
Heavy Use Area Protection	2	2
Herbaceous Weed Control	4	4
Integrated Pest Management	2	2
Prescribed Burning	2	2
Prescribed Grazing	4	4
Range Planting	4	4
Residue and Tillage Management, No Till	4	5
Riparian Herbaceous Cover	2	2
Sprinkler System	0	2
Surface Roughening	0	3
Tree/Shrub Establishment	5	5
Windbreak/Shelterbelt Establishment	1	5

5 Substantial Improvement, 4 Moderate To Substantial Improvement, 3 Moderate Improvement, 2 Slight To Moderate Improvement, 1 Slight Improvement, 0 No Effect, -1 Slight Worsening, -2 Slight To Moderate Worsening, -3 Moderate Worsening, -4 Moderate To Substantial Worsening, -5 Substantial Worsening

Note: Below is the draft of proposed planning to resolve resource issues. The Smith Valley Conservation District will finalize Goal and Objectives and Actions and Tasks at a later date.

(Draft)

Proposed Goals and Objectives

Reduce soil movement by wind on cultivated lands.
Reduce soil movement by wind and water on rangelands.

Proposed Actions and Tasks

Work with land owners to maintain vegetation cover on cultivated lands year-round to prevent soil loss from wind. Avoid cultivation of soil during high wind months. Provide vegetation on field borders and fence-lines as a barrier to soil movement. Practices include Conservation Cover, Cover Crop, No Till and Windbreak Establishment.

Work with federal and state land agencies to re-vegetate wildfire burns. Practices include Brush Management, Range Planting and Prescribed Grazing.

2.2 Soil Erosion – Concentrated Flow

Concentrated flow erosion is soil erosion created by the concentrated flow of water. Deposition of eroded material can obstruct roadways and fill drainage channels.

Resource Concerns Specific to the Conservation District

There is natural occurring soil movement from high intensity rainfall events in the summer. These storms produce soil and water movement that can cause gully formation and flooding in areas. The main concern is where there is a loss of vegetation from wildfires. The Bison wildfire in the Pine Nut Mountains had an event of soil movement by water that caused flooding and washing that overflowed a county road.

Other areas of concern are the recent wildlifes on the west side of Upper Colony road. The concern is with the loss of vegetation on the steep slopes of the burn and high intensity rainfall event may cause sediment and water to flood the adjacent road and the Colony irrigation ditch. There is a concern of concentrated flow coming off the upland rangeland into the West Walker River in locations and adding to the sediment to the river. Possible locations include Hoye canyon.

Practices to Solve Resource Concern and Physical Effects

Table 2.2 lists the practices that can be used to solve the resource concern and the effect

Table 2.2 Conservation Physical Effects by Practice

Practice	Concentrated Flow (Gully)
Critical Area Planting	4
Grade Stabilization Structure	2
Heavy Use Area Protection	2
Herbaceous Weed Control	2
Integrated Pest Management	2
Irrigation Pipeline	2
Lined Waterway or Outlet	2
Prescribed Grazing	1
Range Planting	2
Sediment Basin	2
Tree/Shrub Establishment	2
Water and Sediment Control Basin	2

5 Substantial Improvement, 4 Moderate To Substantial Improvement, 3 Moderate Improvement, 2 Slight To Moderate Improvement, 1 Slight Improvement, 0 No Effect, -1 Slight Worsening, -2 Slight To Moderate Worsening, -3 Moderate Worsening, -4 Moderate To Substantial Worsening, -5 Substantial Worsening

(Draft)

Proposed Goals and Objectives

Reduce soil movement by water on rangelands.

Proposed Actions and Tasks

Work with federal and state land agencies to re-vegetate burned areas as soon as possible. Practices include Brush Management, Range Planting, Critical Area Planting.

Install water and sediment basins in critical areas. Practices include Water and Sediment Control Basin and Grade Stabilization Structures.

2.3 Soil Erosion – Shoreline, Bank and Channel Erosion

Stream stability is an active process, and while streambank erosion is a natural part of this process, it is often accelerated by altering the stream system. Streambank erosion is the part of channel erosion in which material is eroded from the streambank and deposited at the base of the slope or in the channel. Streambank erosion is usually associated with erosion of the streambed.

Resource Setting

Descriptions of the West Walker River from the Walker River Basin Assessment 2009 prepared by Otis Bay Ecological Consultants for US Fish and Wildlife Service are included below:

Hoye Canyon Section

The West Walker River that flows through Hoye Canyon to Smith Valley is generally a steep, laterally confined canyon with riffle-pool morphology and laterally limited floodplain width. Hillslope deposits frequently reach the valley floor delivering coarse material to the stream. In the wider portions of the canyon, a narrow, heavily vegetated depositional surface has developed about 8 ft above the current elevation of the channel. An irrigation ditch parallels the river through the canyon and a large diversion dam at the downstream end of the canyon provides additional irrigation to Smith Valley. Channel slope is .8% and sinuosity is 1.17 and average width is 47 ft.

Smith Valley Section

The West Walker River that flows through Smith Valley is a low-gradient, and relative low sinuosity. Oxbows and meander scars suggest evidence of a historically sinuous channel, particularly at the upstream end of the river. Agricultural development has obscured much of the historic floodplain. The average channel slope is .25%, sinuosity is 1.17 and average width is 56 feet.

Changes to the river from 1938 to 2006 based on aerial photography include the river channel being straightened for the first four miles and the last 3.5 miles. The acreage of irrigated fields near the river increased dramatically between 1938 and 2003. The channel loses nearly two miles of length and 45 acres of active channel area. It appears that the sections of the river that were straightened have not incised and maybe accumulating sediment due to the river's low energy and high sediment load. This section of the river still appears to have a considerable flood-prone area bordering the channelized portion of the river. Fremont cottonwood trees appear to be decreasing over time and there is less area for re-establishment. The other change was Desert Creek no longer reaches the West Walker River.

Hudson-Aurora Bridge to Wilson Canyon

The lower section of the river from the bridge on Hudson Way to Wilson Canyon is generally low-gradient, with a meander pattern that is laterally restricted as the river incised alluvial fan deposits. The width of the alluvial valley becomes increasingly confined downstream. Channel sinuosity increases relative to the upstream section. The river meanders across a narrow floodplain exhibiting some riparian vegetation which can be dense near the stream. Agricultural activity is minor in this portion of the valley. The channel in this segment appears to be broad and shallow with deposition of

sand and small gravel on the point bars. Channel slope is 1.2% and Sinuosity is 1.13. Average width of the channel is 35 feet. Changes to the river from 1938 to 2006 include a slight increase in sinuosity and active bars in 1938 appear to have been stabilized by vegetation. Adjacent road density has increased. This section appears to to have a fairly natural channel-floodplain connection

Land Ownership and Land Cover

Table 2.30 Shows that most of the land along the West Walker river is private owned. Table 2.31 indicates that the vegetation along the river is mostly natural occurring riparian vegetation.

Table 2.30 Land Ownership

	River/Creek	MILES	%
Stream Ownership	***West Walker River***		
	Private	13	81%
	BLM	3	19%
	Total	**16**	**100%**
	Desert Creek (County line to Canal)		
	Private	7.2	90%
	USFS	.8	10%
	Total	**8**	**100%**
	Red Canyon Creek (County line to Pond)		
	BLM	1.2	100%

Table 2.31 Vegetation type along a 100 foot buffer.

	Adjacent Land Use	ACRES	%
West Walker River Land Cover/Use[1] based on a 100 ft. stretch on both sides of all streams	Pasture/Hay Lands	118	30%
	Residential/RV Park/Bridges	44	11%
	Riparian Vegetation	204	52%
	Barren	10	3%
	Other – AFO	15	4%
	Total	**391**	**100%**

Resource Concerns Specific to the Conservation District

Concern is sediment in the West Walker river and the effects on the irrigation systems and downstream flooding in Mason Valley. There are portions of the river that have eroding streambanks that are adding sediment to the system that could more than what would be “natural occurring”. Other concerns are where the banks are eroding and the river is cutting into cultivated fields. The bank erosion maybe accelerated due to 150 years of irrigation structures and stream channel modifications. Another concern is elevated water temperatures in the river.

[1] Based on mapping 100 ft .

Practices to Solve Resource Concern and Physical Effects
Table 2.3 lists the practices that can be used to solve the resource concern and the potential effect of installing the practice.

Table 2.3 Conservation Physical Effects by Practice

Practice	Streambank and Channel Erosion
Access Control	5
Channel Bed Stabilization	2
Clearing & Snagging	2
Critical Area Planting	4
Dam	1
Diversion	1
Grade Stabilization Structure	2
Herbaceous Weed Control	4
Irrigation Reservoir	1
Irrigation System, Tailwater Recovery	1
Pond	1
Prescribed Grazing	3
Range Planting	2
Riparian Forest Buffer	4
Riparian Herbaceous Cover	4
Rock Barrier	1
Stream Crossing	2
Stream Habitat Improvement and Management	5
Streambank and Shoreline Protection (bank protection, revetments)	4
Trails and Walkways	2
Tree/Shrub Establishment	2

5 Substantial Improvement, 4 Moderate To Substantial Improvement, 3 Moderate Improvement, 2 Slight To Moderate Improvement, 1 Slight Improvement, 0 No Effect, -1 Slight Worsening, -2 Slight To Moderate Worsening, -3 Moderate Worsening, -4 Moderate To Substantial Worsening, -5 Substantial Worsening

(Draft)
Proposed Goal/Objectives
Increase knowledge of the functionality of the West Walker River.

Proposed Actions and Tasks
Conduct a fluvial geomorphology study to determine the condition the West Walker River. Inventory the West Walker River on bank stability. The study will help determine where problems are and what the possible solutions to reduce sedimentation and improve bank stability.

2.4 Soil Quality Degradation – Soil Subsistence
Loss of volume and depth of organic soils due to oxidation. Not a resource concern in the District.

2.5 Soil Quality Degradation– Compaction
Management induced soil compaction resulting in decreased rooting depth that reduces plant growth. Not a resource concern in the District.

2.6 Soil Quality Degradation – Organic Matter
Soil organic matter is not adequate to provide a suitable medium for plant growth. Not a resource concern in the District.

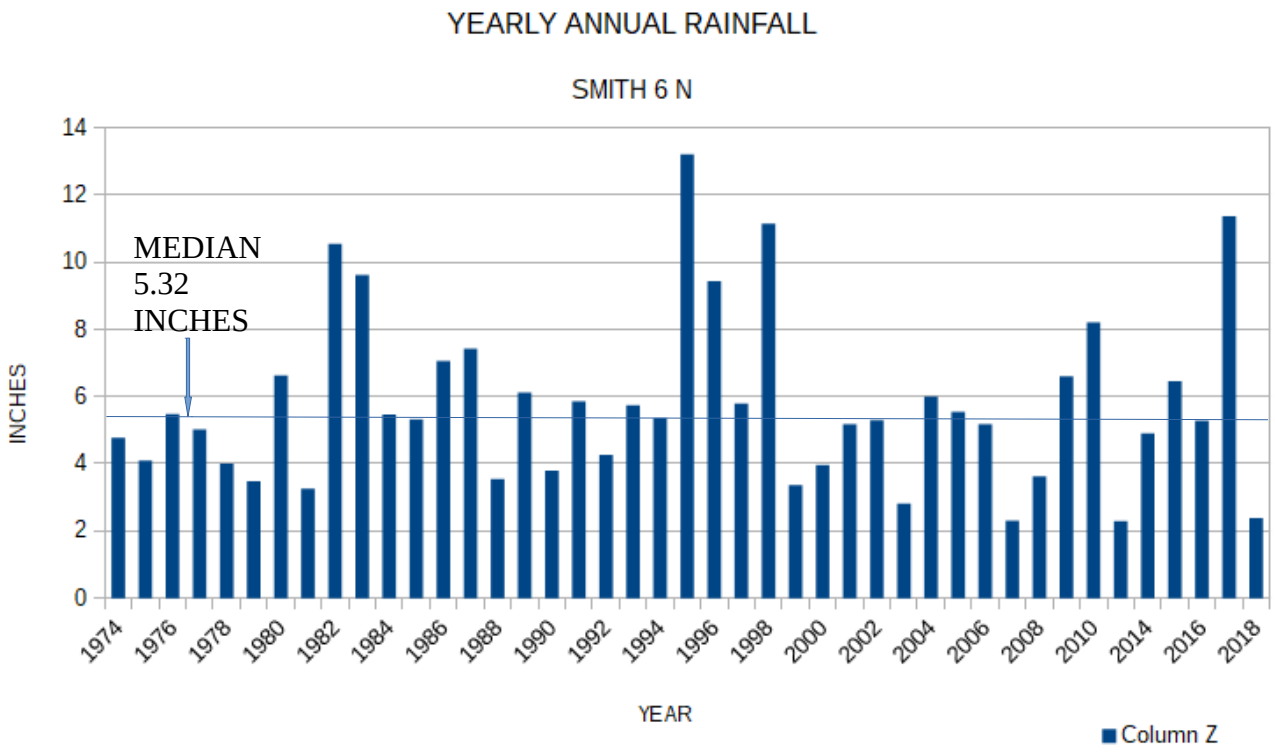
2.7 Soil Quality Degradation – Salts and Chemicals
Concentration of salts leading to salinity and/or sodicity reducing productivity or limiting desired use. Not a resource concern in the District.

3.0 RESOURCE CONCERN – WATER

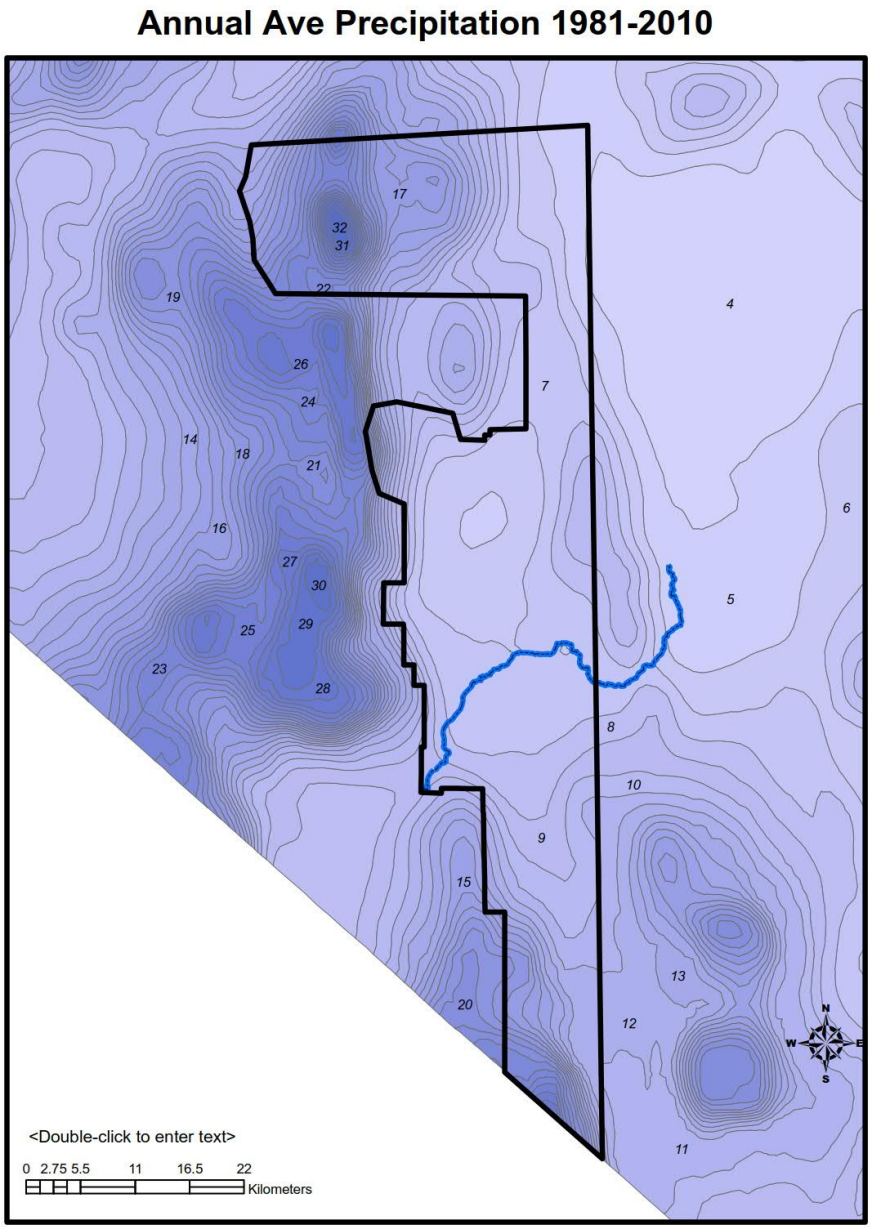
Resource Setting – Precipitation

The average annual precipitation for Smith, NV is 6.22 inches at the Smith 6N station found at 5000 feet elevation in Smith Valley. Period of record is 1973 to 2016. Precipitation ranges from a high of 13 inches to a low of 2 inches over the recorded period. The median (amount that occurs the most often) amount of rainfall is 5.32 inches.

Figure 3.0 Smith Rainfall



Map 3.0 Annual Average Rainfall by Elevation



Snow and Climate Measuring Stations

There are four automated or manually measured high elevation snow and climatic measuring stations in the West Walker watershed and one in the Desert Creek watershed. These stations are automated and part of the USDA NRCS SNOTEL (SNOw TELemetry) network. These SNOTEL stations report hourly climatic data including snow water equivalent, precipitation and air temperature while some stations also report snow depth, soil moisture and soil temperature. All six stations are part of the USDA NRCS Snow Survey Data Network operated and maintained by the NRCS.

Streamflow Summary

The West Walker watershed straddles the California-Nevada border. The California headwaters have a maximum elevation of about 11,000 feet and drop to about 5,000 feet before emptying into Topaz Reservoir on the California and Nevada state line. The main tributaries are the West Walker River, Little West Walker and Mill Creek. The Desert Creek watershed is in the Sweetwater Mountains that straddle the California-Nevada line. The headwaters is at 11,000 feet and drops to about 9,200 feet at Lobdell Lake reservoir. The main tributary is Desert Creek. This creek is diverted into irrigation in Smith Valley and typically does not connect to the West Walker River except in high runoff events.

The topography of the area is dominated by high elevation mountains and valleys with rivers. Streams and rivers provide recreational activities such as fishing and boating. Other beneficial uses include fisheries, irrigation, and municipal water supply.

There are four long term streamflow stations in the watershed from the upper reaches of the West Walker river to Smith Valley that are operated by the United States Geological Survey. Below in Table 3.00 list the stations on the West Walker River.

Table 3.00 West Walker River Gage Summary

Station Name	USGS Station #	Drainage Basin Acres (mi2)	Elevation of Gate Datum (ft)
W WALKER R A LEVITT MD NR COLEVILLE CA	10295200	73.4	7111
W WALKER R BLW L WALKER R NR COLEVILLE, CA	10296000	181	6591
W WALKER R AT HOYE BRIDGE NR WELLINGTON	10297500	497	4980
W WALKER R NR HUDSON, NV	10300000	964	4650

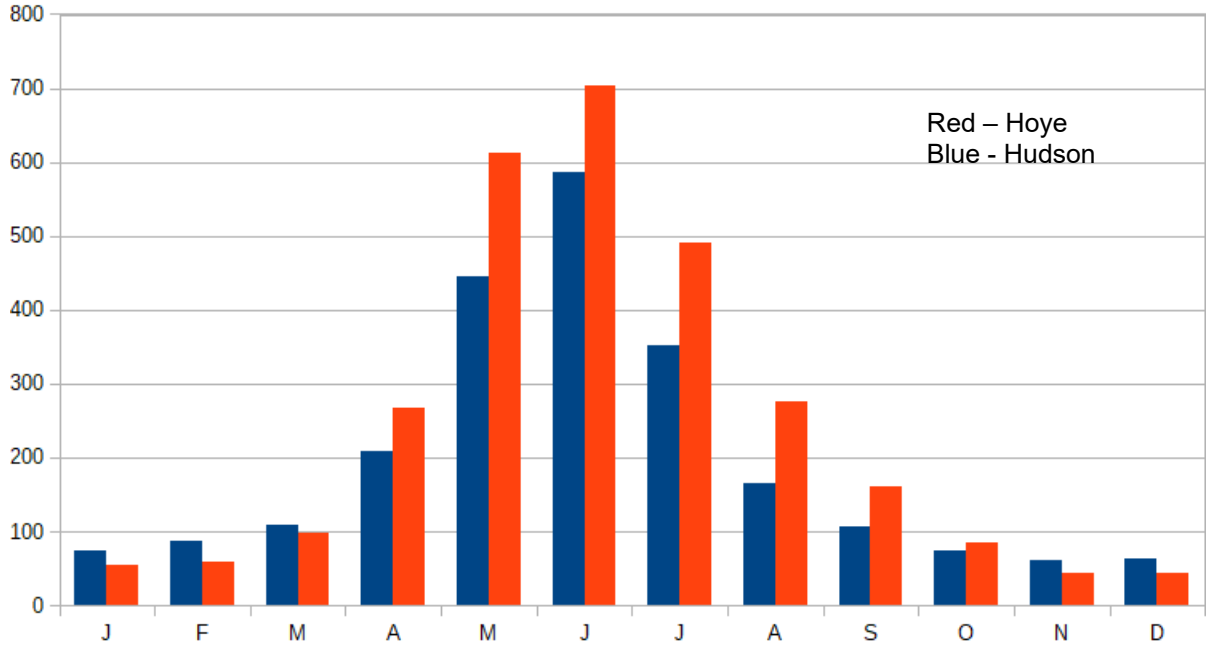
Table 3.01 shows the average annual streamflow at the Hoye Canyon Gage above Smith Valley and the gauge below Smith Valley. The table shows annual flow and the irrigation season flow.

Table 3.01 Stream Flow by Gage

Stream Flow Data	West Walker River at Hoye Canyon Gage	Average Annual	2894 cfs
		March-Oct Average	**2694 cfs**
	West Walker River at Hudson Gage	Average Annual	2329 cfs
		March-Oct Average	**2045 cfs**

Figure 3.00 shows the monthly average streamflow of the two gauges.

Figure 3.00: Average Monthly Streamflow at Stations Hoye Bridge and Hudson, cubic feet/sec.



3.1 Water Quantity – Flooding Excess

Rivers function naturally by periodic high flows that rise above the channel banks and flow out into the floodplains. When water access the floodplains, it slows down and drops sediment and recharges the aquifer. Water flow that is above the natural high flow is considered flooding excess. This excess restricts land use and management goals. Water can flood or pond and restrict plant growth and land use. Flooding can cause damage to irrigation structures, crops, farming operations and homes and towns.

Resource Concerns Specific to the Conservation District

There are two concerns, excess flooding and ponding and lack of flooding on the floodplain.
The first concern is the increase in sediment in the channel that raises channel bed and increases the chance of the river accessing the floodplain in non-flood events, i.e. high spring run-off flows. Areas of concern include locations where the river is constricted, such as bridges and where the flow is slowed down, such as weirs and other irrigation structures.

The second concern is where portions of the rivers does not have access to the normal floodplain to dissipate high flows and recharge the groundwater. The concerns is levees have been installed or the river has been strengthened to prevent the river from accessing the floodplain in high water events. This channelization may increase the occurrence and intensity of downstream flooding events. In addition, portions of the West Walker River do not have access to the floodplain due to straightening and lowering of the channel bed.

Another concern is if a flood event occurs in Desert Creek the lower portion of the channel will not be able to carry the flow and will cause some flooding damage downstream around Smith.

Practices to Solve Resource Concern and Physical Effects
Table 3.1 lists the practices that can be used to solve the resource concern and the potential effect of installing the practice.

Table 3.1 Conservation Physical Effects by Practice

Practice	Excess Water – Runoff, Flooding, or Ponding
Channel Bed Stabilization	2
Clearing & Snagging	2
Constructed Wetland	2
Dam	2
Dam, Diversion	2
Dike	2
Diversion	2
Irrigation Canal or Lateral	2
Irrigation Reservoir	2
Lined Waterway or Outlet	2
Mole Drain	2
Obstruction Removal	0
Open Channel	5
Pond	2
Pumping Plant	2
Riparian Herbaceous Cover	-3
Sediment Basin	2
Shallow Water Development and Management	2
Structure for Water Control	2
Subsurface Drain	4
Underground Outlet	4
Vertical Drain	4
Water and Sediment Control Basin	2
Wetland Creation	2
Wetland Enhancement	2
Wetland Restoration	2

5 Substantial Improvement, 4 Moderate To Substantial Improvement, 3 Moderate Improvement, 2 Slight To Moderate Improvement, 1 Slight Improvement, 0 No Effect, -1 Slight Worsening, -2 Slight To Moderate Worsening, -3 Moderate Worsening, -4 Moderate To Substantial Worsening, -5 Substantial Worsening

(Draft)

Proposed Goal/Objectives

Increase knowledge of the functionality of the West Walker River and Desert Creek and determine areas of excess flooding problems.

Proposed Actions and Tasks

Conduct a fluvial geomorphology study to determine the condition the West Walker River.
Work to reduce the flooding hazard of Desert Creek.

3.20 Water Quantity – Insufficient Moisture Management
Natural precipitation is not optimally managed to support desired land use goals or ecological process. Not a resource concern in the District.

3.30 Water Quantity Surface– Insufficient Use of Irrigation Water
Insufficient use of irrigation can cause impacts on and off-site water quantity and quality. Insufficient and inefficient use of irrigation water is not stored, delivered, scheduled or applied efficiently. Aquifer or surface water withdrawals can threaten sustained availability of ground or surface water. Available irrigation water supplies can be reduced due to aquifer depletion. Agriculture is the main use of water from the West Walker River and Desert Creek. About 70,000 acre-ft of water is used in Smith Valley.

Streamflow and Water Rights Summary
Decree rights are rights to divert natural river flow. Storage rights are rights allocated by Walker River Irrigation District (WRID) to use water previously stored in upstream reservoirs (Topaz). Flood water rights are rights to make use of natural river flow when there is excess or surplus water in the river.

Table 3.300 Surface Water Diversions

	Diversions	Acre-Feet/Yr	%
Irrigated Adjudicated Water Rights[2])	Surface Water Average Decree Diversion	30,765	43%
	Average storage diversion	27,499	38%
	Average Flood Water Diversion	13,208	19%
	Total Irrigated Adjudicated Water Rights	**71,472**	**100%**

Water diversion rates are listed in Table 3.301.

Table 3.301 Surface water rights diversion rates and acres per decree C-125.[3]

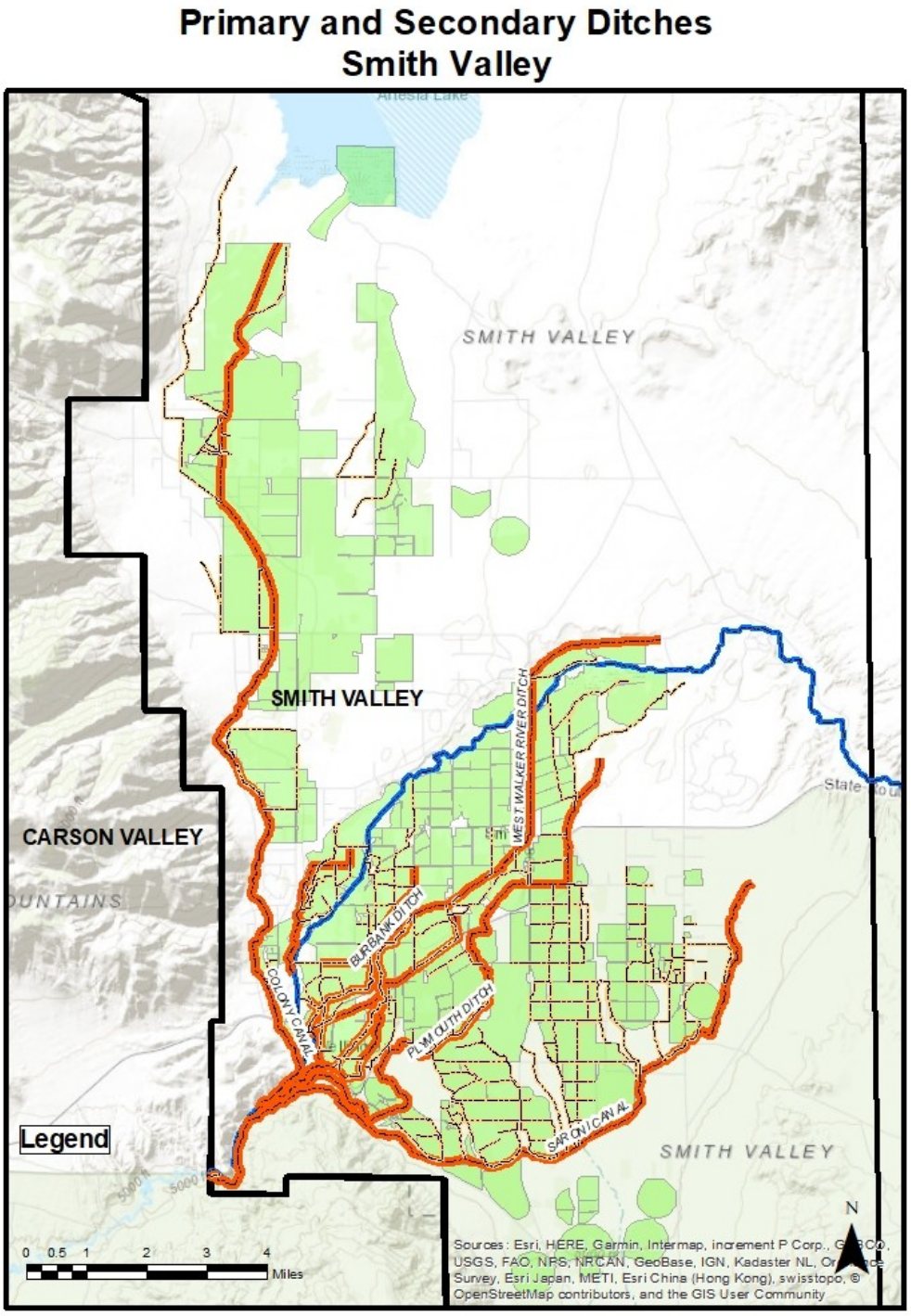
	Water Source	Rate (CFS)	Acres Per Decree
SMITH VALLEY	North side West Walker R	40	3545
	South side West Walker R	86	6261
	Desert Creek	28	1754
	Total	**154**	**11560**

There are approximately 57 miles of primary/main ditches and well over 100 miles of secondary ditches within Smith Valley that transports water from the West Walker River. See Map 3.3. The longest primary ditch is the Colony ditch at 13 miles long, and the second is the Plymouth at 10 miles long. Most of the primary ditches are dirtlined with portions of the Saroni concrete lined from the diversion. There is a small percentage of the secondary ditches that have been converted to underground pipelines. There is a higher percent of on-farm ditches that have been converted to underground pipeline.

[2] 2009. Walker River Basin Acquisition Program, Draft Environmental Impact Statement. USDI Bureau of Reclamation. Table 3-8.

[3] Sharpe, Saxon E. Cablk, Mary. Thomas, James M. 2007, 2008 Riv. The Walker Basin, Nevada and California: Physical Environment, Hydrology, and Biology. Desert Research Institute. Pub. No. 41231. Table 2. Pg 12.

Map 3.30 Primary and Secondary Ditches in Smith Valley



Resource Concerns Specific to the Conservation District
Improving irrigation systems to be more water efficient. This includes replacing the dirtlined ditches and canals with ditch lining and pipe. Installing water measuring devices with new irrigation systems would improve water use efficiency.

Increasing irrigation water storage. With drought years and possible decrease in snowpack over time there is a need to increase water storage. Upstream water storage in Topaz provides irrigation water during the cropping season in normal to wet years. In drought years water is limited. Additional upstream storage in Hoye Canyon has been proposed since the formation of Walker River Irrigation District. Other water storage proposed is a regulatory reservoirs that would reduce the fluctuations of river flow during the irrigation season.

Practices to Solve Resource Concern and Physical Effects
Table 3.303 lists the practices that can be used to solve the resource concern and the effect.

Table 3.303 Conservation Physical Effects by Practice

Practice	Insufficient Water – Inefficient Use of Irrigation Water Surface
Dam, Diversion	2
Diversion	2
Herbaceous Weed Control	2
Irrigation Canal or Lateral	5
Irrigation Ditch Lining	5
Irrigation Field Ditch	5
Irrigation Land Leveling	4
Irrigation Pipeline	2
Irrigation Reservoir	2
Irrigation System, Microirrigation	2
Irrigation System, Tailwater Recovery	2
Irrigation Water Management	2
Pond	2
Pond Sealing or Lining, Compacted Soil Treatment	2
Pond Sealing or Lining, Concrete	2
Pond Sealing or Lining, Flexible Membrane	2
Pumping Plant	2
Sprinkler System	5
Structure for Water Control	2
Windbreak/Shelterbelt Establishment	5

5 Substantial Improvement, 4 Moderate To Substantial Improvement, 3 Moderate Improvement, 2 Slight To Moderate Improvement, 1 Slight Improvement, 0 No Effect, -1 Slight Worsening, -2 Slight To Moderate Worsening, -3 Moderate Worsening, -4 Moderate To Substantial Worsening, -5 Substantial Worsening

(Draft)
Proposed Goal/Objectives
Improve irrigation efficiencies in Smith Valley.

Proposed Actions and Tasks
Replace dirtlined ditches and canals with linings or pipe to reduce seepage. Install regulatory reservoirs. Install irrigation systems that will improve irrigation efficiency (i.e. flood to pivot sprinkler).

Install tailwater recovery systems. Practices include Pipelines, Pivots, Sprinklers, Pumps, Structures, Irrigation Reservoirs.

3.31 Water Quantity – Ground Water

The perennial yield in Smith Valley is estimated at 17,000 acre-feet/year from precipitation. Most of the recharge, 16,000 acre-feet per year, is from the Pine Nut Mountains and Sweetwater mountains. The main source of recharge to alluvial aquifers in Smith Valley is from percolation of irrigation water derived primarily from diversions of the Walker River. The amount of West Walker River water that recharges alluvial aquifers in Smith Valley depends on flows in the river and the amount of water level decline in the alluvial aquifers. Rush and Schroer in a 1976 publication estimated that 47,000 acre-feet per year of diverted West Walker River water (out of 71,472 acre feet of irrigation water) recharges the alluvial aquifers.

Local precipitation on the valley floor, at altitudes less than 6,000 feet, is assumed to contribute no recharge to the alluvial aquifers. Little, if any, ponded water on the Artesia Lake playa recharges the alluvial aquifers. Groundwater outflow from Smith Valley is small, but no estimate of this small amount of potential groundwater outflow has been made.

There was a drop of approximate 8 feet per year of water in wells the years 2012, 2013 and 2014 due to drought and lack of surface irrigation water and high pumping levels.

Table 3.31. Smith Valley Groundwater Average Year

		Acre-Feet/Year	Net
GROUND WATER	Annual Recharge from Precipitation	17,000	17,000
	Surface Water Diversions recharge to aquifer	47,000	64,000
	Primary Ground Irrigation Water Rights	-21,000	43,000
	Supplemental Ground Irrigation Water Rights	*-34,000*	9,000

There are approximately 174 irrigation wells in the Smith Valley basin as of 2018 as soon in Map 3.31.. Figure 3.31 shows water levels from 2008 to 2017 from various uses of ground water and water levels of the West Walker river during those years. Figure from the Nevada Division of Water Resources, Smith Valley Ground Water Pumpage Inventory 2017. Figure 3.32 shows domestic well activity since 1946. In the last several years some existing wells have been deepened due to the drop in ground water.

Map 3.31 Map of Irrigation Wells in Smith Valley.

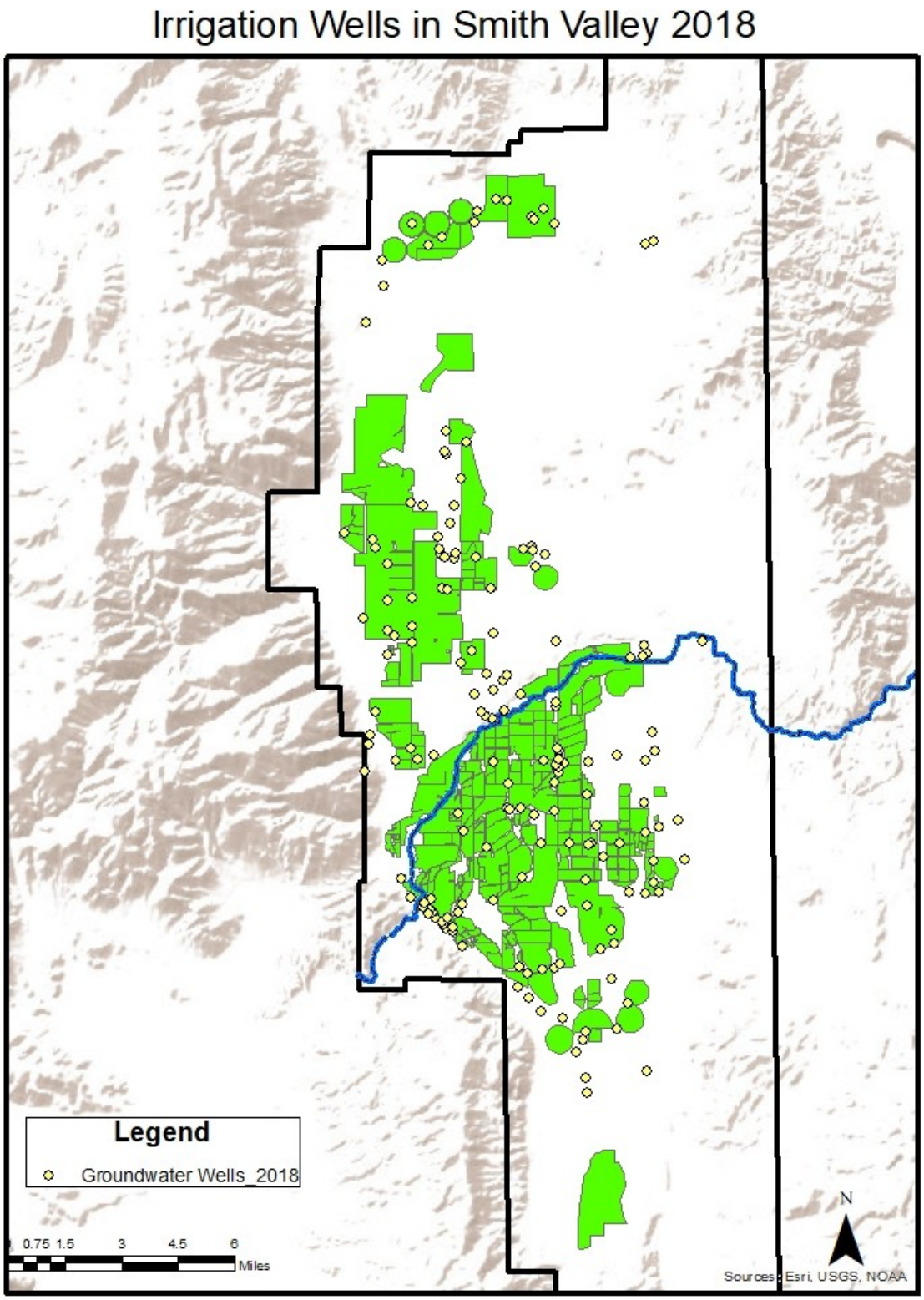


Figure 3.31 Smith Valley pumpage by manner of use compared to West Walker River streamflow.

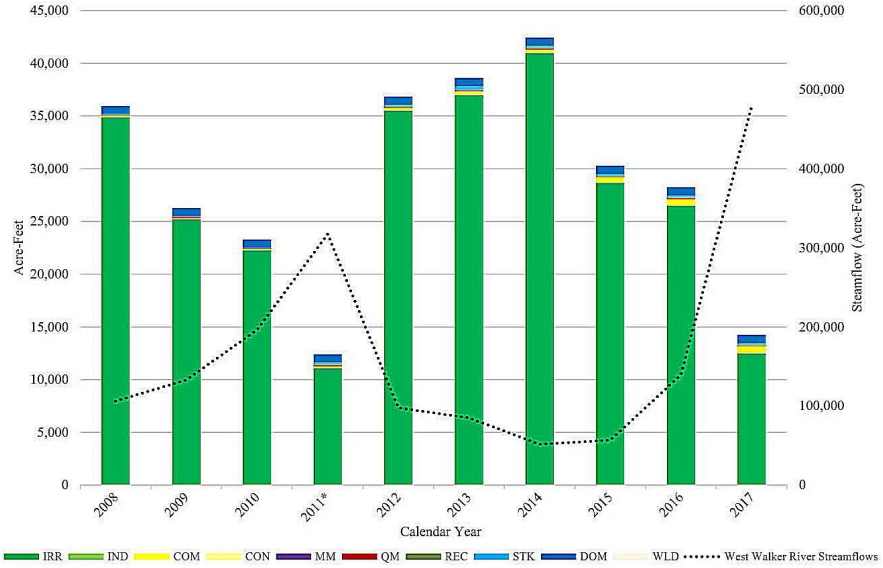
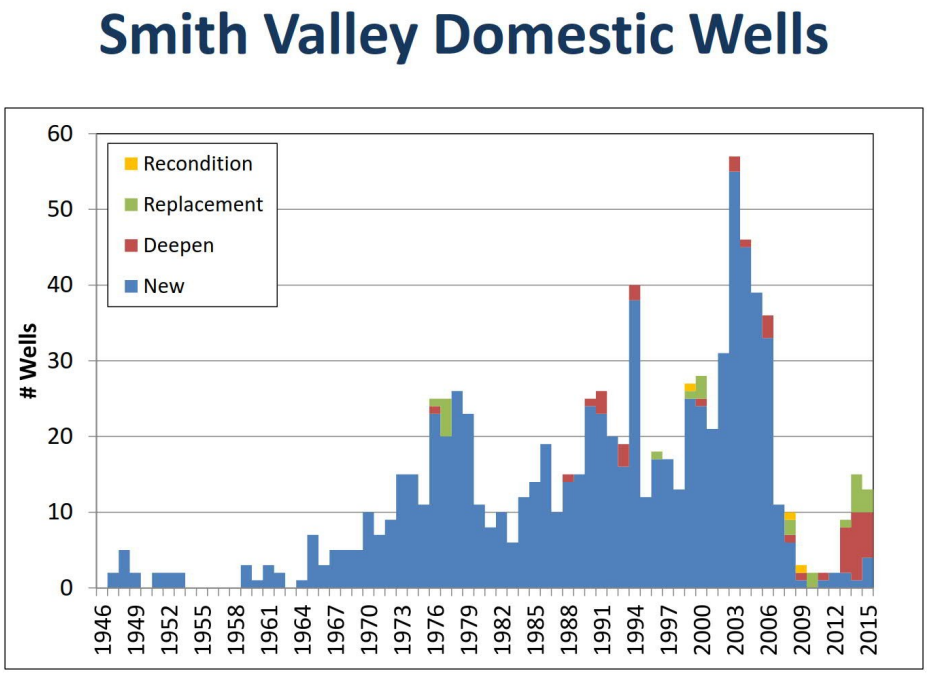


Figure 3. Smith Valley historical pumpage by manner of use as compared with West Walker River streamflows at Hoye Bridge.
*Prior to 2011, pumpage use monitoring was mostly limited to larger users/wells.

Figure 3.32 Smith Valley Domestic Wells Activity



Resource Concerns Specific to the Conservation District
Aquifer withdrawals that are greater than recharge are a concern. Concern is shared by agriculture and domestic water users. Agriculture wells are now monitored by the Nevada Division of Water Resources for water table drop and pumping amount. One concern with aquifer recharge is the reduction of seepage of water from ditches and canals and irrigated fields with improved irrigation systems (i.e. dirtlined ditches to pipe and flood irrigation to pivot sprinklers). Another concern is irrigated land being taken out of production. Another minor concern is that some domestic water users are exceeding their allowable water amount.

Practices to Solve Resource Concern and Physical Effects
Table 3.32 lists the practices that can be used to solve the resource concern and the effect.

Table 3.32 Conservation Physical Effects by Practice

Practice	Insufficient Water – Inefficient Use of Irrigation Water Ground Water
Irrigation System, Microirrigation	2
Irrigation System, Tailwater Recovery	2
Irrigation Water Management	2
Pumping Plant	2
Sprinkler System	5
Structure for Water Control	2

5 Substantial Improvement, 4 Moderate To Substantial Improvement, 3 Moderate Improvement, 2 Slight To Moderate Improvement, 1 Slight Improvement, 0 No Effect, -1 Slight Worsening, -2 Slight To Moderate Worsening, -3 Moderate Worsening, -4 Moderate To Substantial Worsening, -5 Substantial Worsening

(Draft)
Proposed Goals/Objectives
Long term sustainable aquifer with-drawls for agriculture and domestic use.

Proposed Actions and Tasks
Install irrigation systems that will improve irrigation efficiency of irrigation ground water (side-roll sprinklers to low pressure pivot sprinkler).
Improve irrigation efficiencies in Smith Valley.
Increase ground water recharge during wet years.

4.0 RESOURCE CONCERN – WATER QUALITY

4.1 Water Quality Degradation – Nutrients

Nutrients are transported to receiving water through surface runoff and/or leaching into shallow ground waters in quantities that degrade water quality and limit use for intended purposes. Not a resource concern in the District.

4.2 Water Quality Degradation – Pathogens

Chemicals are carried by soil amendments that are applied to the land and are transported to waters in quantities that degrade water quality. Not a resource concern in the District.

4.3 Water Quality Degradation – Pesticides

Pest control chemicals are transported to waters in quantities that degrade water quality and limit use for intended purposes. Not a resource concern in the District.

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4.4 Water Quality Degradation – Salts

Irrigation or rainfall runoff transports salts to receiving waters in quantities that degrade water quality. Not a resource concern in the District.

4.5 Water Quality Degradation – Petroleum and Heavy Metals

Pollutants are transported to water sources in quantities that degrade water quality. Not a resource concern in the District.

4.6 Water Quality Degradation – Sediments

Off-site transport of sediment from sheet, rill, gully and wind erosion into surface water that threatens to degrade surface water quality. Not a resource concern in the District.

4.7 Water Quality Degradation – Elevated Temperatures

This resource concern is where surface water temperatures exceed State and Federal standards and/or limit use for intended purposes.

Table 4.7 lists the portions of streams in the Conservation District that are listed as impaired by the Nevada Division of Environmental Protection. Listing is due to causes that vary from water temperature to heavy metals. Some of the heavy metal concentrations could be the results of past mining operations in the watersheds. The West Walker River is a 303d listed stream. Water temperatures are the main cause for not meeting water quality criteria.

Table 4.7 303d Streams

	Water Quality Impaired Streams			
	Water Body	**Category**	**Not Supporting**	**Cause**
Nevada 2014 Integrated Report Water Quality	West Walker River (State line to Wellington)	5 (303d)	Aquatic Life	Water Temperature
	West Walker River (Wellington to confluence East Walker)	5 (303d)	Aquatic Life	Water Temperature
	Desert Creek (State line, Douglas, Lyon to Canal)	1	None	None
	Red Canyon Creek (Top of watershed Douglas to Lyon to Pond)	2	None	None

Resource Concerns Specific to the Conservation District
Water temperature is a concern for the West Walker River. Water temperatures effects fish and other aquatic life. Warm water also has the potential to increase the presence of dissolved toxic substances that may restrict the suitability of water for human use.

Practices to Solve Resource Concern and Physical Effects
Table 4.71 lists the practices that can be used to solve the resource concern and the effect.

Table 4.71 Conservation Physical Effects by Practice

Practice	Water Quality Degradation – Elevated Water Temperature
Aquatic Organism Passage	2
Channel Bed Stabilization	1
Clearing & Snagging	-1
Dam	0
Dam, Diversion	-2
Prescribed Grazing	1
Riparian Forest Buffer	5
Riparian Herbaceous Cover	2
Stream Habitat Improvement and Management	2
Streambank and Shoreline Protection	1
Structure for Water Control	1
Tree/Shrub Establishment	1
Water and Sediment Control Basin	-2
Watering Facility	1
Wetland Wildlife Habitat Management	0

5 Substantial Improvement, 4 Moderate To Substantial Improvement, 3 Moderate Improvement, 2 Slight To Moderate Improvement, 1 Slight Improvement, 0 No Effect, -1 Slight Worsening, -2 Slight To Moderate Worsening, -3 Moderate Worsening, -4 Moderate To Substantial Worsening, -5 Substantial Worsening

(Draft)
Proposed Goals and Objectives
Improve the water temperatures for the West Walker River.

Proposed Actions and Tasks
Increase riparian vegetation. Reduce sediment into the river. Practices include Riparian Herbaceous Cover, Tree/Shrub Establishment, Streambank and Shoreline Protection.

5.0 Resource Concern – Air Quality Impacts

5.1 Air Quality Impacts – Greenhouse Gas

Emissions that increase atmospheric concentrations of greenhouse gases. Not a resource concern in the District.

5.2 Air Quality Impacts – Odors

Emissions of odorous compounds causes nuisance conditions. Not a resource concern in the District.

5.3 Air Quality Impacts – Ozone Precursors

Emissions of ozone precursors that cause negative impacts to plants and animals. Not a resource concern in the District.

5.4 Air Quality Impacts – Particulate Matter

Direct emissions of particulate matter, such as dust and smoke, chemicals, animal operations. Not a resource concern in the District.

6.0 Resource Concern – Plants

6.1 Degraded Plant Condition – Productivity and Health

Plant productivity does not meet yield potential due to improper fertility, management or plants not adapted to site. Resource concern for crop production. Not a resource concern in the District.

6.2 Degraded Plant Condition – Structure and Composition

Plant communities do not achieve ecological functions and management objectives.

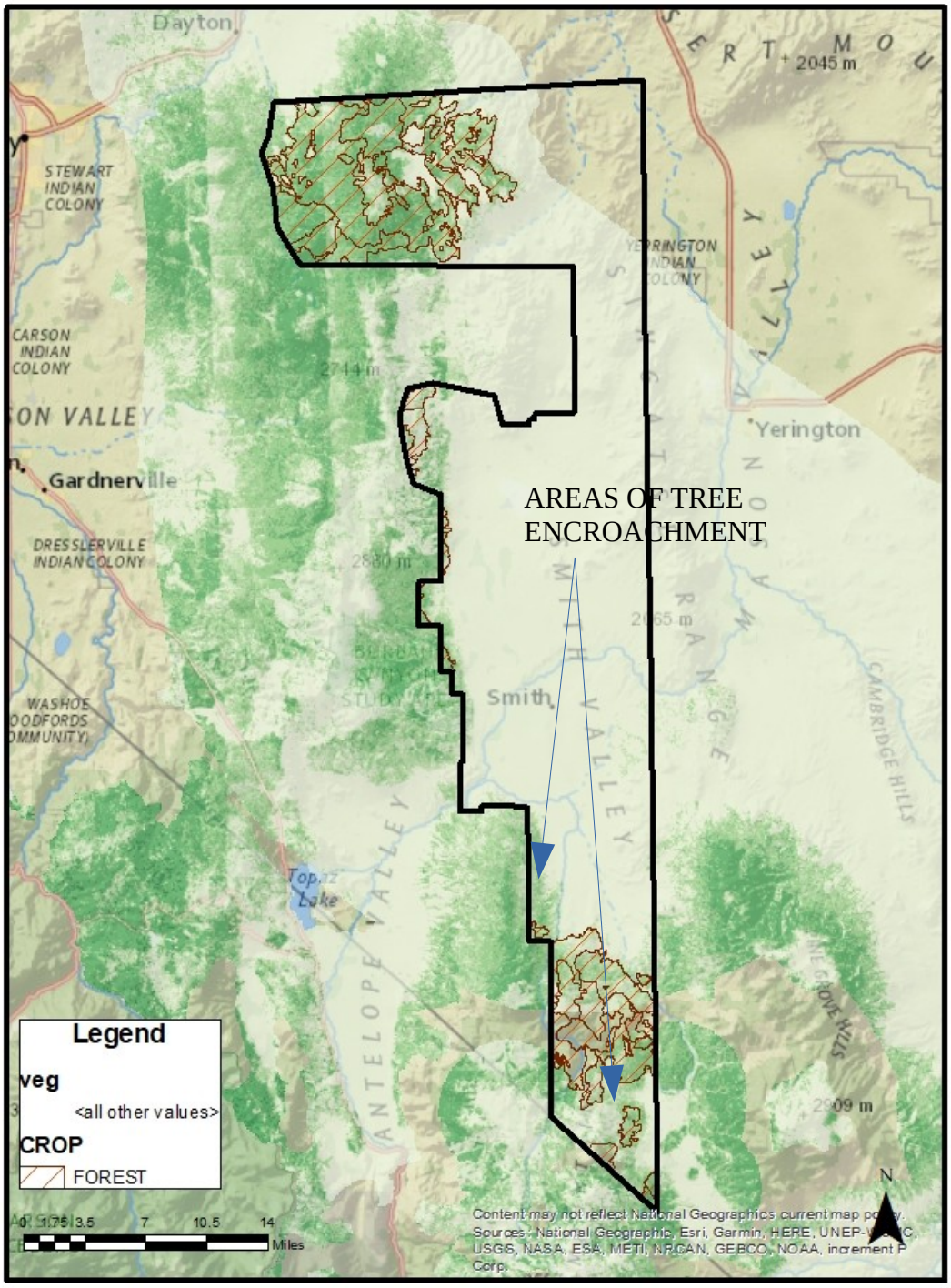
Resource Setting

Pinyon Juniper Trees

Naturally occurring pinyon and juniper tree forests are found along the slopes and to the top of the lower elevation mountains in the District. This includes the Sweetwater, Pine Grove and Pine Nut Mountains. Portions of these mountains also have areas of sagebrush rangeland that are encroached with trees. Encroachment by trees is due to several factors, the main being lack of wildfire. In areas of important sage-grouse habitat, trees are being cut to maintain or improve the sagebrush habitat. Most of the habitat work being done is in the Sweetwater and Pine Nut Mountains. Map 6.20 shows forest soils (brown hatching) and locations of existing tree cover (green color). Areas where there is tree cover, but is not mapped as forest soils are areas of possible tree encroachment.

Map 6.2 Forest Soils and Existing Pinyon and Juniper Tree Cover

TREE COVER VERSUS FOREST ECOLOGICAL SITES



Resource Concerns Specific to the Conservation District

Encroachment of pinyon and juniper trees into rangeland habitat is a concern. Currently the BLM, US Forest Service, Nevada Department of Wildlife and private land owners have been removing trees to improve rangeland and to benefit sage grouse habitat. There is more rangeland that would benefit from tree removal. There is also a need for maintenance on those acres where trees were removed in the past. New tree saplings need to be removed from the treated acres every several years.

Practices to Solve Resource Concern and Physical Effects

Table 6.2 lists the practices that can be used to solve the resource concern and the effect.

Table 6.2 Conservation Physical Effects by Practice

Practice	Degraded Plant Condition – Inadequate Structure and Composition
Access Control	4
Brush Management (Tree cutting)	4
Grazing Land Mechanical Treatment	2
Herbaceous Weed Control	4
Prescribed Burning	4
Prescribed Grazing	4
Range Planting	5
Tree/Shrub Establishment	5

5 Substantial Improvement, 4 Moderate To Substantial Improvement, 3 Moderate Improvement, 2 Slight To Moderate Improvement, 1 Slight Improvement, 0 No Effect, -1 Slight Worsening, -2 Slight To Moderate Worsening, -3 Moderate Worsening, -4 Moderate To Substantial Worsening, -5 Substantial Worsening

(Draft)

Proposed Goal and Objectives

Improve the structure and composition of rangelands that are encroached by pinyon and juniper trees.

Proposed Actions and Tasks

Remove trees under the Brush Management practice or Prescribed Burning.

6.3 Degraded Plant Condition – Pests

Resource Setting
There are numerous plant pests within the District boundary. Most of the plant pest and noxious weeds are found associated with the rivers and moist soil conditions.

Noxious and Invasive Weeds
As in many areas throughout the state, noxious and invasive weeds pose a significant threat to natural resources. The impact of noxious weeds is occurring across ownership and jurisdictional boundaries. The District has been working over the years to control and treat weeds, but continued monitoring and treatment is needed. Management favoring desired vegetation will reduce the weed's influence and spread to new areas, as well as maintain or improve the desired use often site. While eradication is unlikely, these weeds must be controlled or their impact will continue to expand.

Resource Concerns Specific to the Conservation District
Many of the weeds species found in the District are associated with the river, ditches and irrigated land. Weeds include Perennial pepperweed, salt-cedar and several thistle species. Weeds found on the drier sites and fallowed farmland include Russian knapweed and kochia. On the rangeland sites cheatgrass (*Bromus tectorum*) is common through the District. There is a cooperative weed management area but is not active at this time. There is concern that weeds are not being treated as they should be on private lands in Smith Valley. Some of the concerns include residential property and farms and ranches where irrigation water rights are being removed and the land is going fallow.

Weeds the District are currently treating or are of concern are listed below:

Perennial Pepperweed/Tall Whitetop *(Lepidium latifolium)*
Hoary Cress *(Cardaria drabe)*
Musk Thistle *(Carduus mutans)*
Canada Thistle *(Cirsium arvense)*
Scotch Thistle *(Onopordum acanthium)*
Yellow Star Thistle *(Centaurea solstitialis)*
Russian Knapweed *(Centaurea repens)*
Poison and Water Hemlock *(Conium maculatum,*
Medusahead grass *(Taeniatherum caput-medusae)*
Salt Cedar/Tamarix *(Tamarix spp.)*
Russian Olive *(Elaeagnus angustifolia)*

Practices to Solve Resource Concern and Physical Effects
Table 6.3 lists the practices that can be used to solve the resource concern and the effect.

Table 6.3 Conservation Physical Effects by Practice

Practice	Degraded Plant Condition - Excessive Plant Pest Pressure
Access Control	5
Brush Management	4
Conservation Cover	4
Conservation Crop Rotation	2
Cover Crop	4
Critical Area Planting	4
Firebreak	-1
Fuel Break	-1

Grazing Land Mechanical Treatment	-1
Herbaceous Weed Control	4
Integrated Pest Management	0
Irrigation Land Leveling	1
Irrigation Water Management	1
Prescribed Burning	4
Prescribed Grazing	1
Range Planting	4
Riparian Herbaceous Cover	4
Streambank and Shoreline Protection	4
Tree/Shrub Establishment	5

5 Substantial Improvement, 4 Moderate To Substantial Improvement, 3 Moderate Improvement, 2 Slight To Moderate Improvement, 1 Slight Improvement, 0 No Effect, -1 Slight Worsening, -2 Slight To Moderate Worsening, -3 Moderate Worsening, -4 Moderate To Substantial Worsening, -5 Substantial Worsening

(Draft)

Proposed Goals and Objective

Reduce the occurrence of noxious weeds in the District.

Proposed Strategies

Increase funding opportunities for noxious weeds and invasive species
Increase participation in the Cooperative Weed Management Area
Increase early detection and rapid response mechanisms to identify and respond to small infestations
Increase coordination between agencies and private citizens to improve county inventory of noxious weeds

Proposed Actions and Tasks

Develop funding proposals for Coordinated Weed Management District
Work with the State of Nevada to report weeds mapping efforts.
Coordinate efforts with private land owners to mitigate Russian olive.
Look for funding proposal to remove Russian olive and replace with Silver buffaloberry.
Continue to treat weeds with existing funding. Work to increase weed treatment capacity.
Support Targeted Grazing to treat weeds and reduce fuel loads.

6.4 Degraded Plant Condition – Wildfire Hazard

Wildfire hazard is accumulated plant residue that can pose risks to human safety, structures, plants, animals, and air resources if it burns.

Resource Setting

Within the conservation District boundary there are several main vegetation types. This includes at the lower elevation the salt-desert plant community. At the mid elevations and higher precipitation is the Wyoming sagebrush and low sagebrush communities. At a high elevation is the mountain sagebrush community. The pinyon and juniper woodland community is found along the mid-slopes of the mountains. These community types have different natural burn intervals. The intervals are listed below: Salt-desert shrub: 100-300+ years, Wyoming sagebrush: 30-120 years, Low sagebrush: 75-150 years, Mountain sagebrush: 15-100 years, Pinyon-Juniper Forest: 100-1000 years

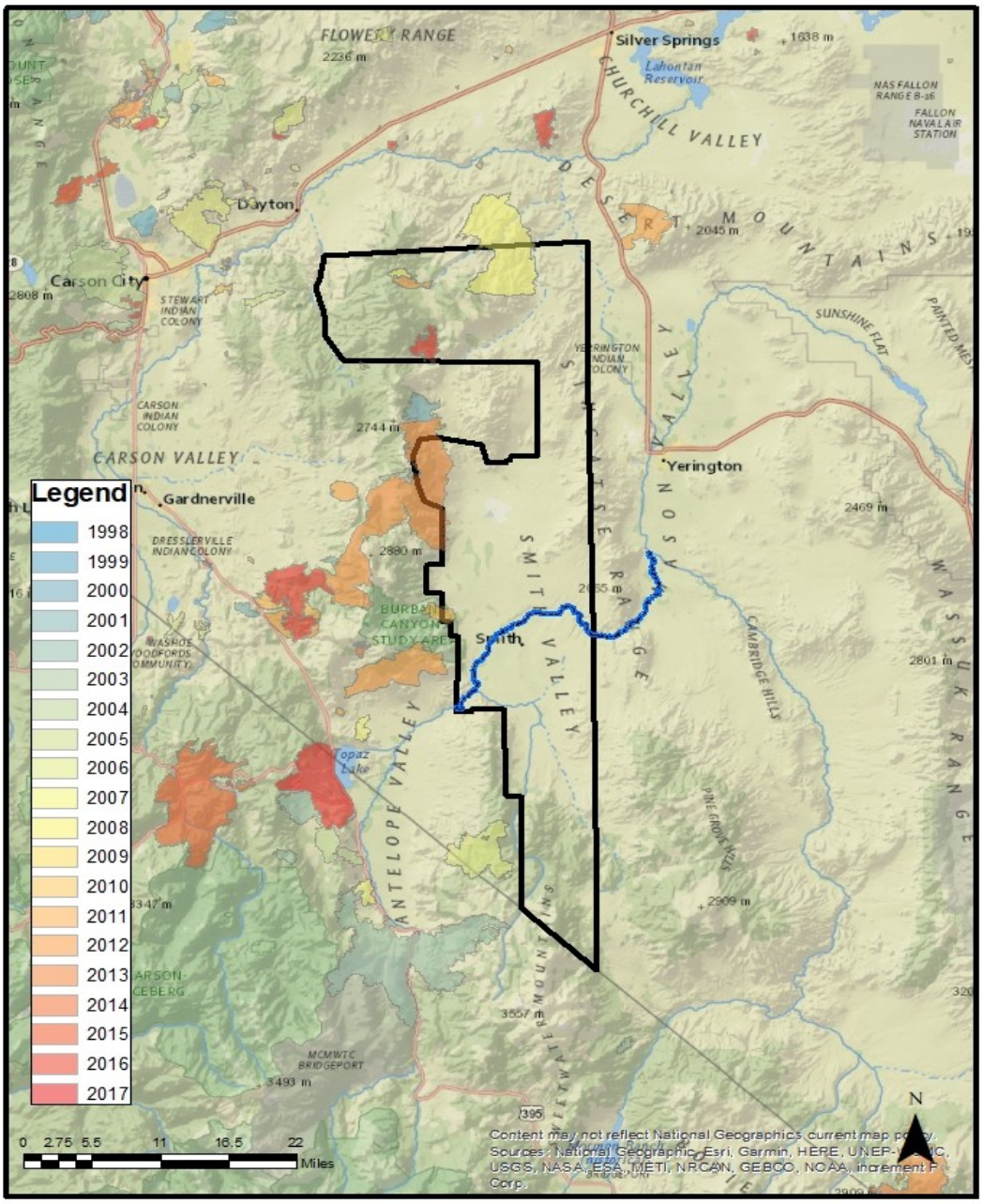
The current fire intervals have changed due numerous factors. But the most significant change has been the occurrence of cheatgrass in the understory of these plant communities. Cheatgrass has decreased the fire interval by increasing the fuel load after good precipitation years. Maps 6.40 and 6.41 shows the 20 year fire history in and adjacent to the District boundary. Fires include both natural and man caused. The map shows that there have been very few fires in the District. The largest fire, in the Pine Nut Mountains' was natural caused and burned in a mix of mountain sagebrush and pinyon woodlands.

To reduce the hazard of wild fires adjacent to residential property fuels treatments project have been conducted on both private and federal lands over the last several years. In the recent burn areas, specifically the Burbank Canyon wild fire (2011), with the loss of brush, cheatgrass and tumble mustard typically increase in density. Density of the annual weeds depends on winter and spring rainfall. In wet years production can be very high. When these plants dry the fuel loads can be high.

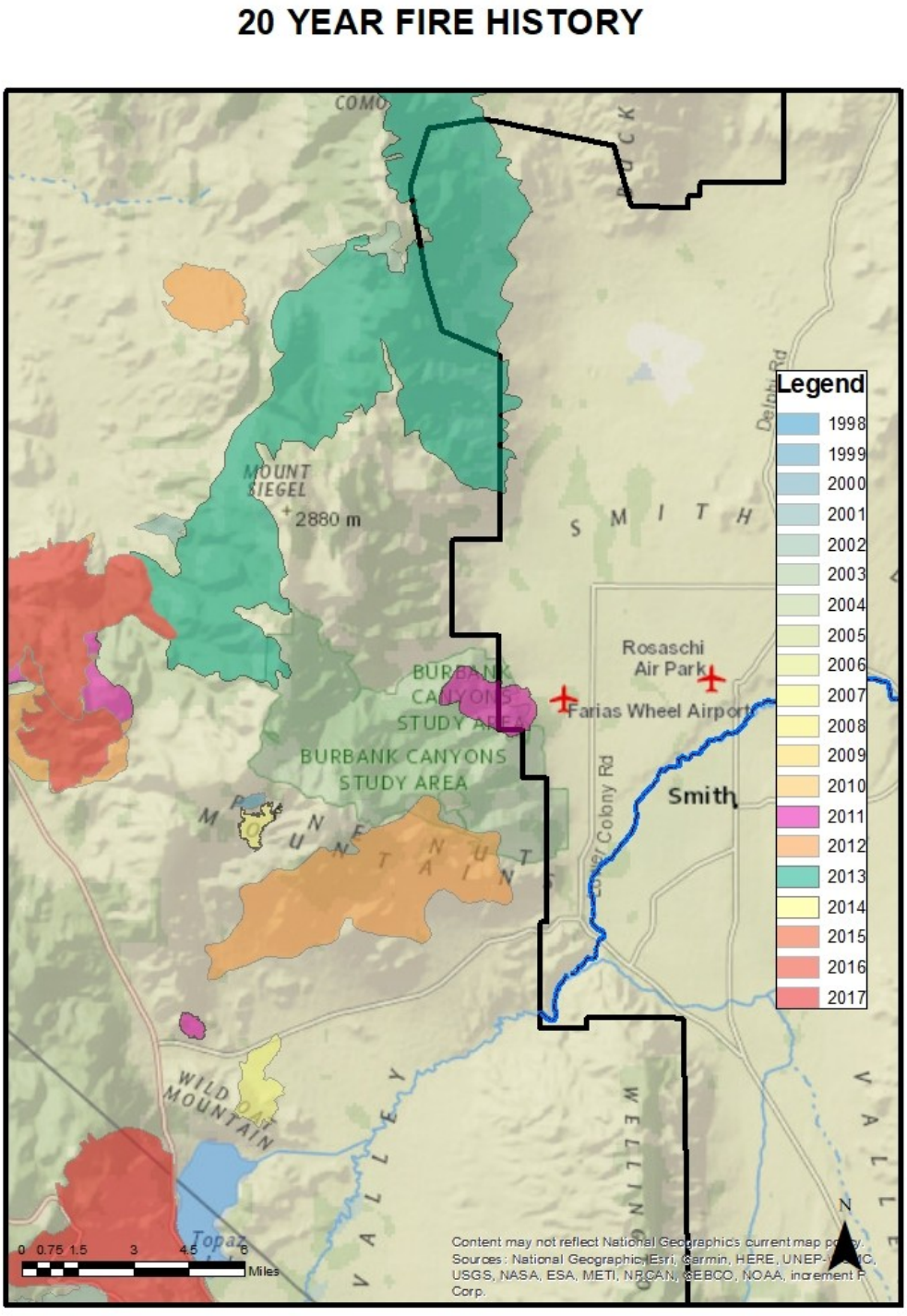
In 2009 a Landscape-Scale Wildland Fire Risk/Hazard Assessment for Lyon County was prepared for the Nevada Fire Board. Map 6.42 is the summary findings of the report. This map indicates that rangeland and pinyon-juniper areas have the highest risk of large wildland fires in the counties.

Map 6.4 20 Year Fire History

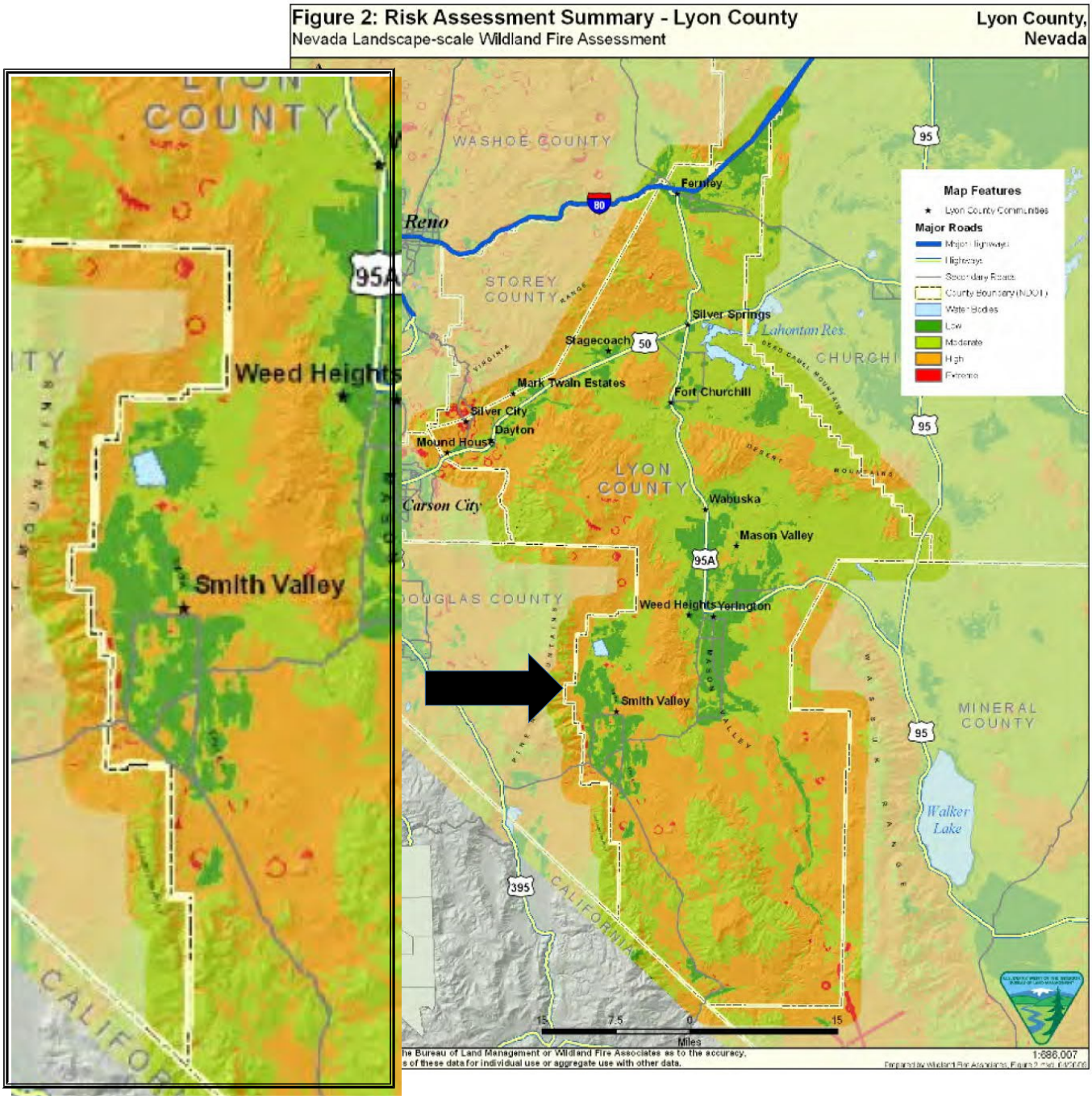
20 YEAR FIRE HISTORY



Map 6.41 20 Year Fire History West Side Smith Valley



Map 6.42 Lyon County Fire Risk Assessment Summary



Resource Concerns Specific to the Conservation District
Wildfires are a concern to residents adjacent to the wildlland interface. Additional concerns are the fallow/abandoned farmland that now have a cover of weeds that are fine fuels. Other concerns are private land that have a high amount of brush and fine fuels.

Practices to Solve Resource Concern and Physical Effects
Table 6.4 lists the practices that can be used to solve the resource concern and the effect.

Table 6.4 Conservation Physical Effects by Practice

Practice	Degraded Plant Condition - Wildfire Hazard, Excessive Biomass Accumulation
Brush Management	4
Critical Area Planting	0
Firebreak	5
Fuel Break	5
Herbaceous Weed Control	1
Prescribed Burning	5
Prescribed Grazing	2
Range Planting	0
Tree/Shrub Establishment	0
Tree/Shrub Pruning	3
Woody Residue Treatment	3

5 Substantial Improvement, 4 Moderate To Substantial Improvement, 3 Moderate Improvement, 2 Slight To Moderate Improvement, 1 Slight Improvement, 0 No Effect, -1 Slight Worsening, -2 Slight To Moderate Worsening, -3 Moderate Worsening, -4 Moderate To Substantial Worsening, -5 Substantial Worsening

(Draft)
Proposed Goals and Objective
Reduce wildfire hazards that pose risks to human safety, structures, plants, animals and air resources.

Proposed Actions and Tasks
Treat or remove vegetation that poses a hazard for residential areas.
Create and implement a wildfire plan.
Reduce fuels on non irrigated farmland by mowing.
Install fuel breaks.

Resource Concern – Animals

7.0 Inadequate Habitat for Fish and Wildlife – Habitat Degradation
Habitat is inadequate in quantity, quality or connectivity of food, cover, space, shelter and or water to meet the requirements of identified fish, wildlife or invertebrate species.

Resource Setting

Bi-State Sage Grouse (See Map 7.00)
The Bi-State sage grouse can be found in several location within the District boundary. These areas include Mill Canyon on the northern end of the District in the Pine Nut Mountains. On the southern end birds are found around the Desert Creek ranch in Smith Valley and on Sweetwater flat. These areas are where there are leks (breeding areas).

Resource Concerns Specific to the Conservation District
The main area of importance in the District is Desert Creek ranch and adjacent federal and private lands. There are several leks adjacent to the ranch on US Forest Service land. Birds also nest in this area and then go to the irrigated pastures for early and late brooding habitat. The Bi-State Action Plan recommends a conservation easement being put in place on the Desert Creek ranch. There is an on-going effort to improve habitat for sage-grouse through the Bi-State Local Area Work Group Action Plan. Most of the work is removal of pinyon and juniper trees on encroached rangelands on the north and south portions of the District.

Lahontan Cutthroat Trout (LCT)
LCT is a federally listed species. It occurred historically in the West and East Walker Rivers and down to Walker Lake. The West, East and Walker rivers are not currently considered suitable habitat. There are several populations in the headwaters of the East and West Walker rivers.

Mule Deer (See Map 7.01)
The Walker / Mono Interstate Deer Herd is found in parts of the District. Nevada Department of Wildlife (NDOW) reports that there appears to be a declining population trend based on past fawn to adult ratios. Habitat water is limited in certain parts of this unit group. Future water developments may aid in the establishment of a viable resident deer herd. Pinyon and juniper encroachment is a continuing problem for the Bodie interstate herd. Future management plans have identified potential project areas for the benefit of sage-grouse. These same areas will aid in restoring the brush communities which in turn will benefit the mule deer herd.

Resource Concerns Specific to the Conservation District
Mule deer habitat within Smith Valley consists of alfalfa fields surrounded by pinyon and sagebrush communities. The highest concentrations of deer exist in and around the West Walker River corridor which provides thick stands of willows creating shelter and escape cover. Mule deer can be a problem with hay growers where they are grazing in high numbers on the fields. Most of the fences in the District are not constructed to allow safe passage of mule deer. There are problems with deer being hit by vehicles in certain areas.

Pronghorn Antelope (See Map 7.02)
For Lyon and Douglas counties, populations are stable with low fawn ratios in recent years. Population estimated at slightly less than 200 animals. Habitat includes feral horses within the Pine Nut Herd Management Area that are increasing and may have a negative effect on the antelope population.

Resource Concerns Specific to the Conservation District
Future water development projects are needed in the Singatse, Buckskin, and Pine Nut Mountain Ranges which would enable the herd to occupy new and varying terrain.

Black Bear (See Map 7.03)
Black bear can be found along the west side of Nevada in the mountains and foothills. It is estimated that there are 300-400 black bears in the Nevada/California boundary.

Resource Concerns Specific to the Conservation District
There are issues with bears coming into neighborhoods and getting into trash and buildings.

Other – Wild Horses and Burros (See Map 7.04)
Within the District boundary there is the Pine Nut Mountains Herd Management Area (HMA) This herd was estimated to be 188% of the AML prior to the 2018-19 gathers.

Resource Concerns Specific to the Conservation District
Wild horses can also be found outside the designated herd area throughout the Pine Nut Mountains. Over population of wild horses can affect wildlife habitat and livestock grazing permits.

Other – Wildlife
There is a diversity of wildlife habitat and species within the District boundary. From along the West Walker River to the tops of the mountains. There are two species that are listed as Threatened in Lyon County, the Yellow-billed Cuckoo and Lahontan cutthroat trout

Table 7.0 Listed Species in Lyon County

Common Name	***Scientific Name***	**Status**
Yellow-billed Cuckoo	*Coccyzus americanus*	Listed Threatened
Lahontan cutthroat trout	*Oncorhynchus clarkii henshawi*	Listed Threatened

Table 7.01 lists At-Risk Species in Lyon County from Nevada Natural Heritage list. The attached Plant and Animal Watch List outlines taxa that could be declining in Nevada or across much of their range and/or are less common than currently thought and, as a result, could become at risk in the future.

Table 7.01 Species At-Risk in Lyon County

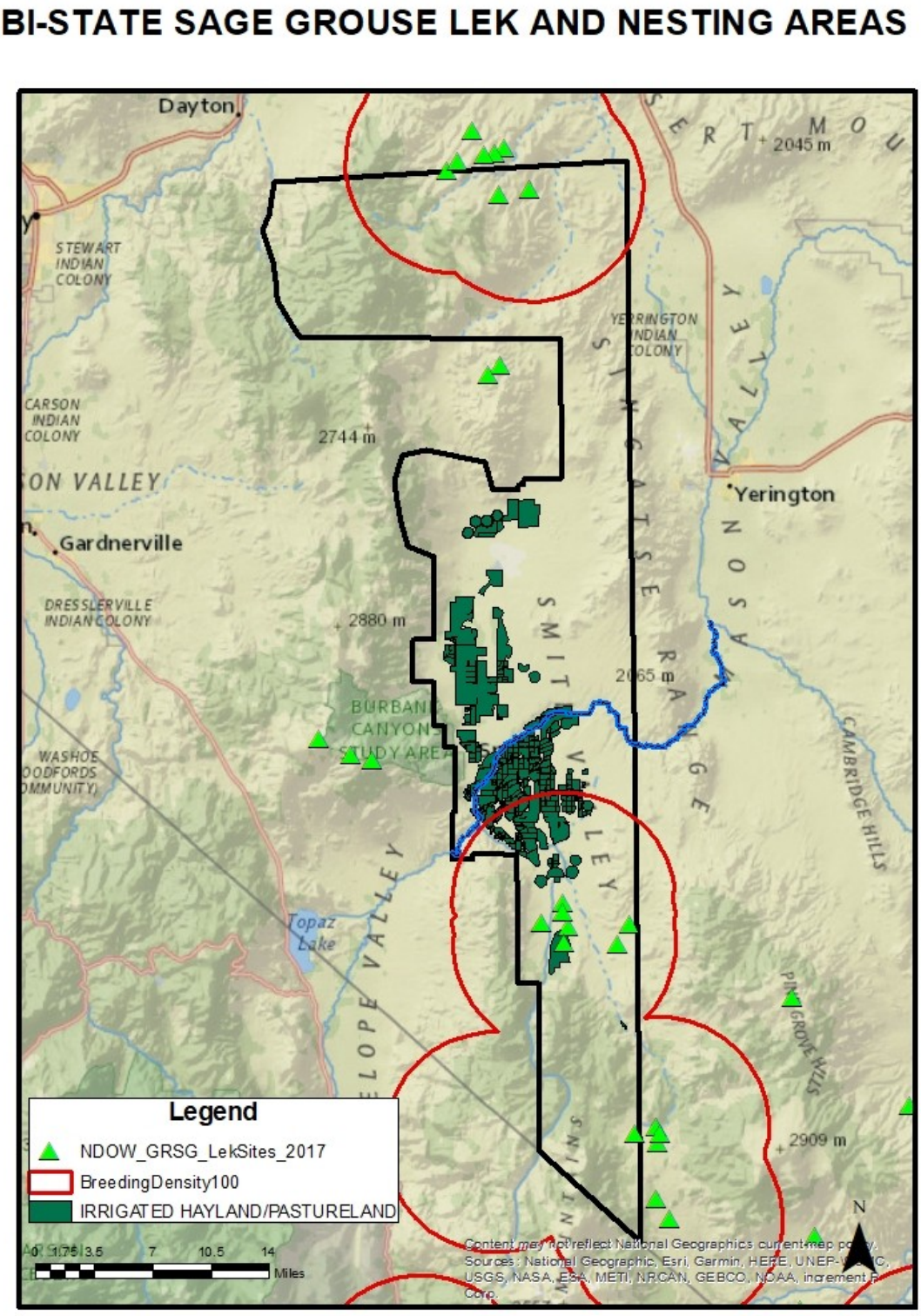
Common Name	**Scientific**	**Common Name**	**Scientific**
Mono checkerspot	*Euphydryas editha monoensis*	pygmy rabbit	*Brachylagus idahoensis*
Nevada viceroy	*Limenitis archippus lahontani*	Townsend's big-eared bat	*Corynorhinus townsendii*
Great Basin small blue	*Philotiella speciosa septentrionalis*	desert kangaroo rat	*Dipodomys deserti*
Nevada alkali skipperling	*Pseudocopaeodes eunus flavus*	big brown bat	*Eptesicus fuscus*
Apache silverspot butterfly	*Speyeria nokomis apacheana*	spotted bat	*Euderma maculatum*
turban pebblesnail	*Fluminicola turbiniformis*	silver-haired bat	*Lasionycteris noctivagans*
northern leopard frog	*Lithobates pipiens*	hoary bat	*Lasiurus cinereus*
Northern Goshawk	*Accipiter gentilis*	sagebrush vole	*Lemmiscus curtatus*
Tricolored Blackbird	*Agelaius tricolor*	pale kangaroo mouse	*Microdipodops pallidus*
American Pipit	*Anthus rubescens*	California myotis	*Myotis californicus*
Golden Eagle	*Aquila chrysaetos*	western small-footed myotis	*Myotis ciliolabrum*
Short-eared Owl	*Asio flammeus*	long-eared myotis	*Myotis evotis*
Long-eared Owl	*Asio otus*	little brown myotis	*Myotis lucifugus*

Common Name	Scientific
Western Burrowing Owl	*Athene cunicularia hypugaea*
Ferruginous Hawk	*Buteo regalis*
Swainson's Hawk	*Buteo swainsoni*
Bi-State Sage-Grouse	*Centrocercus urophasianus*
Western Snowy Plover	*Charadrius nivosus nivosus*
Black Tern	*Chlidonias niger*
Olive-sided Flycatcher	*Contopus cooperi*
Peregrine Falcon	*Falco peregrinus*
Pinyon Jay	*Gymnorhinus cyanocephalus*
Bald Eagle	*Haliaeetus leucocephalus*
Loggerhead Shrike	*Lanius ludovicianus*
Lewis's Woodpecker	*Melanerpes lewis*
Long-billed Curlew	*Numenius americanus*
American White Pelican	*Pelecanus erythrorhynchos*
White-faced Ibis	*Plegadis chihi*
Flammulated Owl	*Psiloscops flammeolus*
Bank Swallow	*Riparia riparia*
Pine Siskin	*Spinus pinus*
Brewer's Sparrow	*Spizella breweri*
California Spotted Owl	*Strix occidentalis occidentalis*
pallid bat	*Antrozous pallidus*
fringed myotis	*Myotis thysanodes*
long-legged myotis	*Myotis volans*
Yuma myotis	*Myotis yumanensis*
American pika	*Ochotona princeps*
American water shrew	*Sorex palustris*
Inyo shrew	*Sorex tenellus*
Mexican free-tailed bat	*Tadarida brasiliensis*
Douglas's squirrel	*Tamiasciurus douglasii*
kit fox	*Vulpes macrotis*
western pond turtle	*Actinemys marmorata*
northern rubber boa	*Charina bottae*
Great Basin collared lizard	*Crotaphytus bicinctores*
Sierra alligator lizard	*Elgaria coerulea palmeri*
long-nosed leopard lizard	*Gambelia wislizenii*
desert horned lizard	*Phrynosoma platyrhinos*
Sierra gartersnake	*Thamnophis couchii*
common gartersnake	*Thamnophis sirtalis*

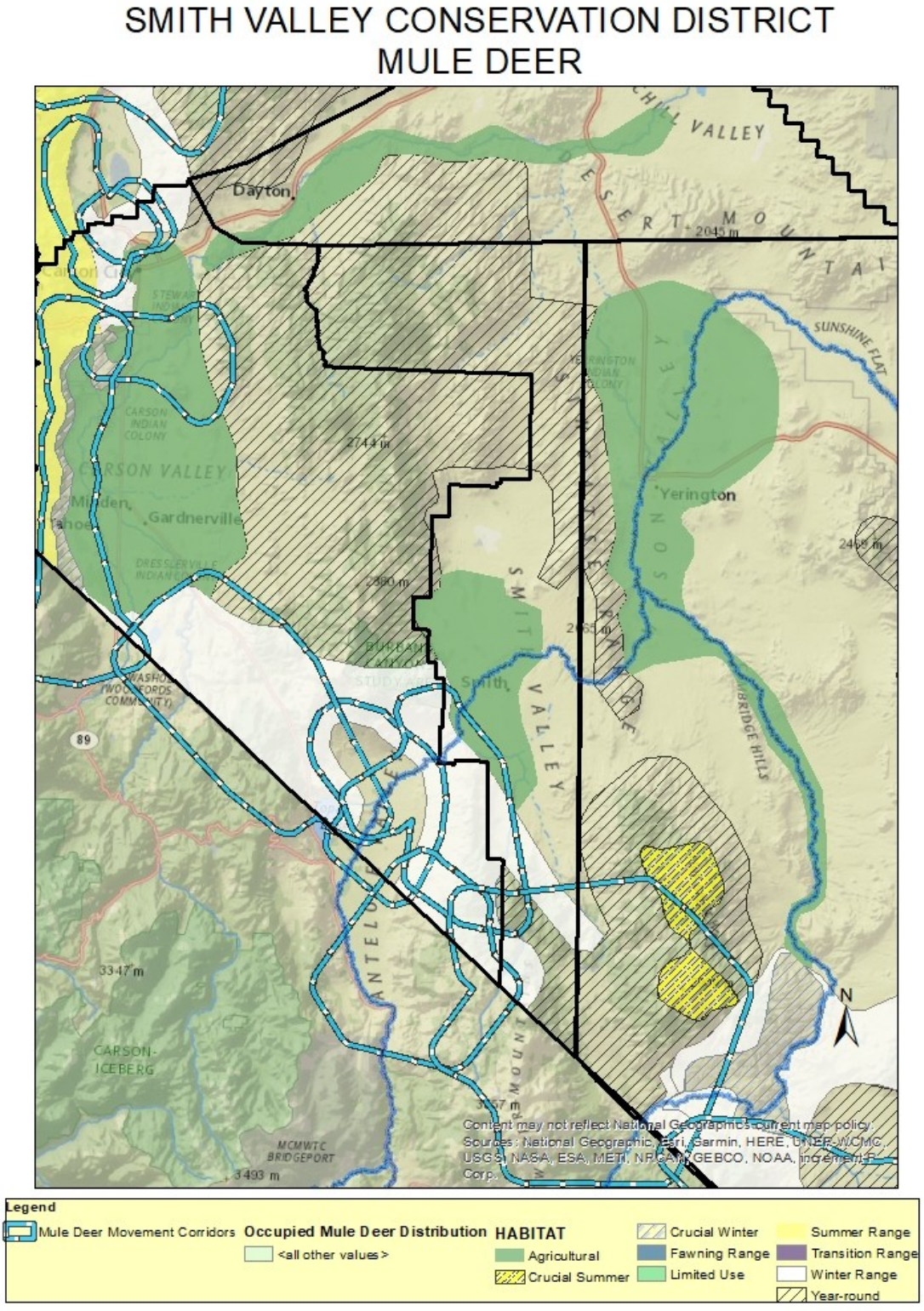
Resource Concerns Specific to the Conservation District

Within the District there are opportunities to increase and improve habitat for a variety of species. One area for improvement would be the increase in cover along hay and pastureland field boundaries. Planting trees, shrubs and forbs could increase habitat for pollinators (insects), birds and mammals. Increasing cover along the banks of the West Walker would improve habitat for birds and mammals. There are many possibilities to improve habitat within the District for numerous species.

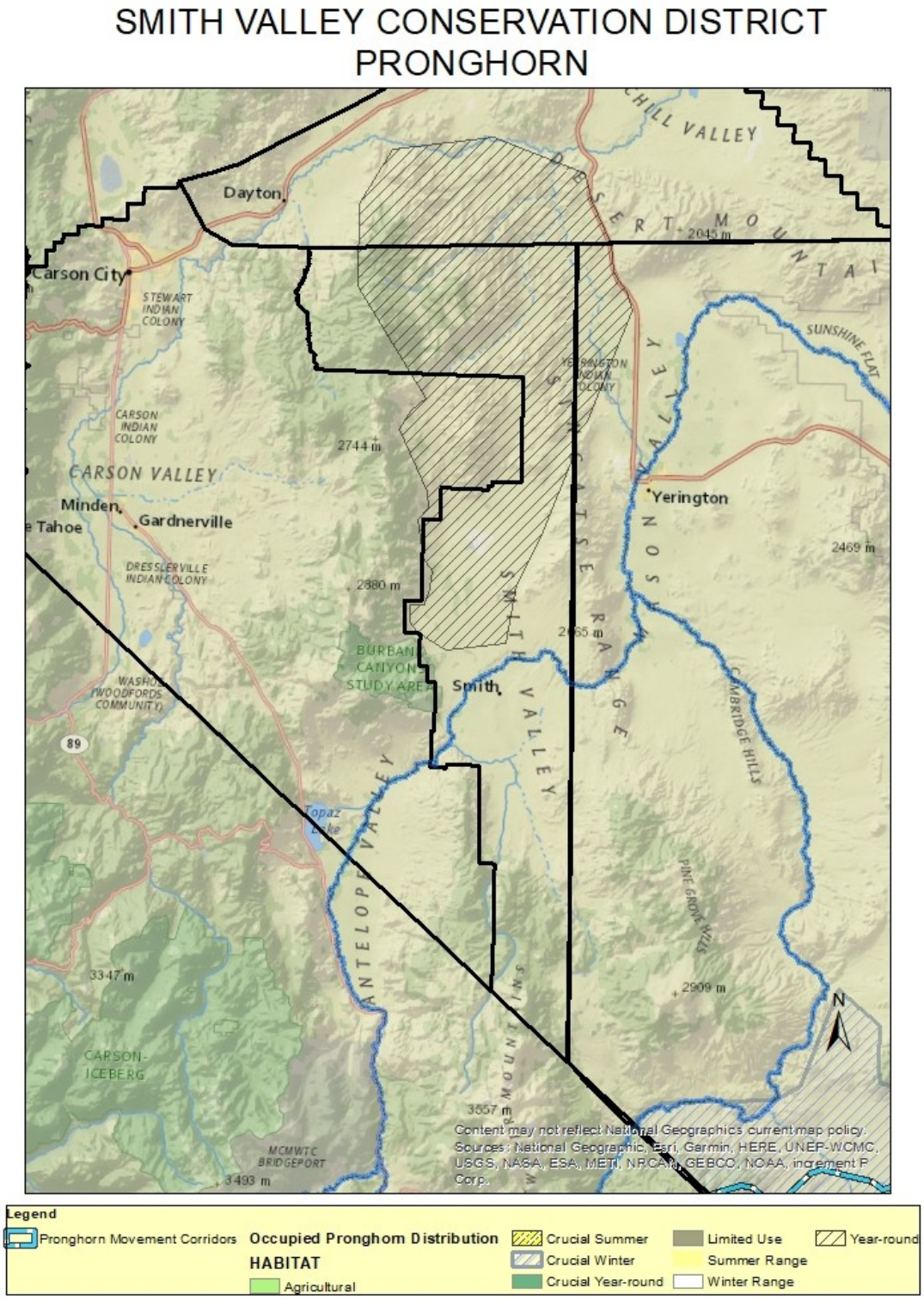
Map 7.0 Sage Grouse Lek and Possible Nesting Habitat



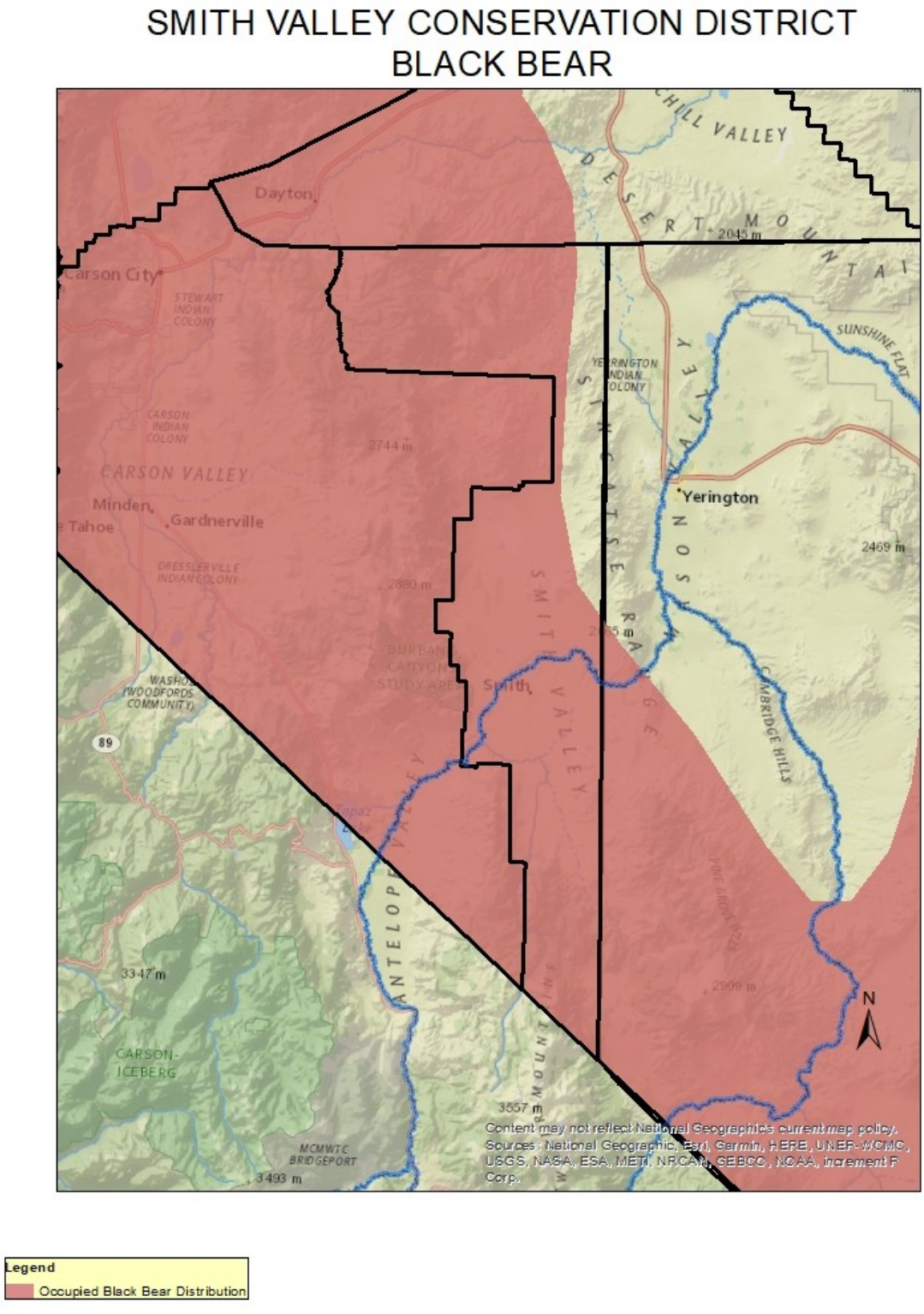
Map 7.01 Mule Deer Habitat



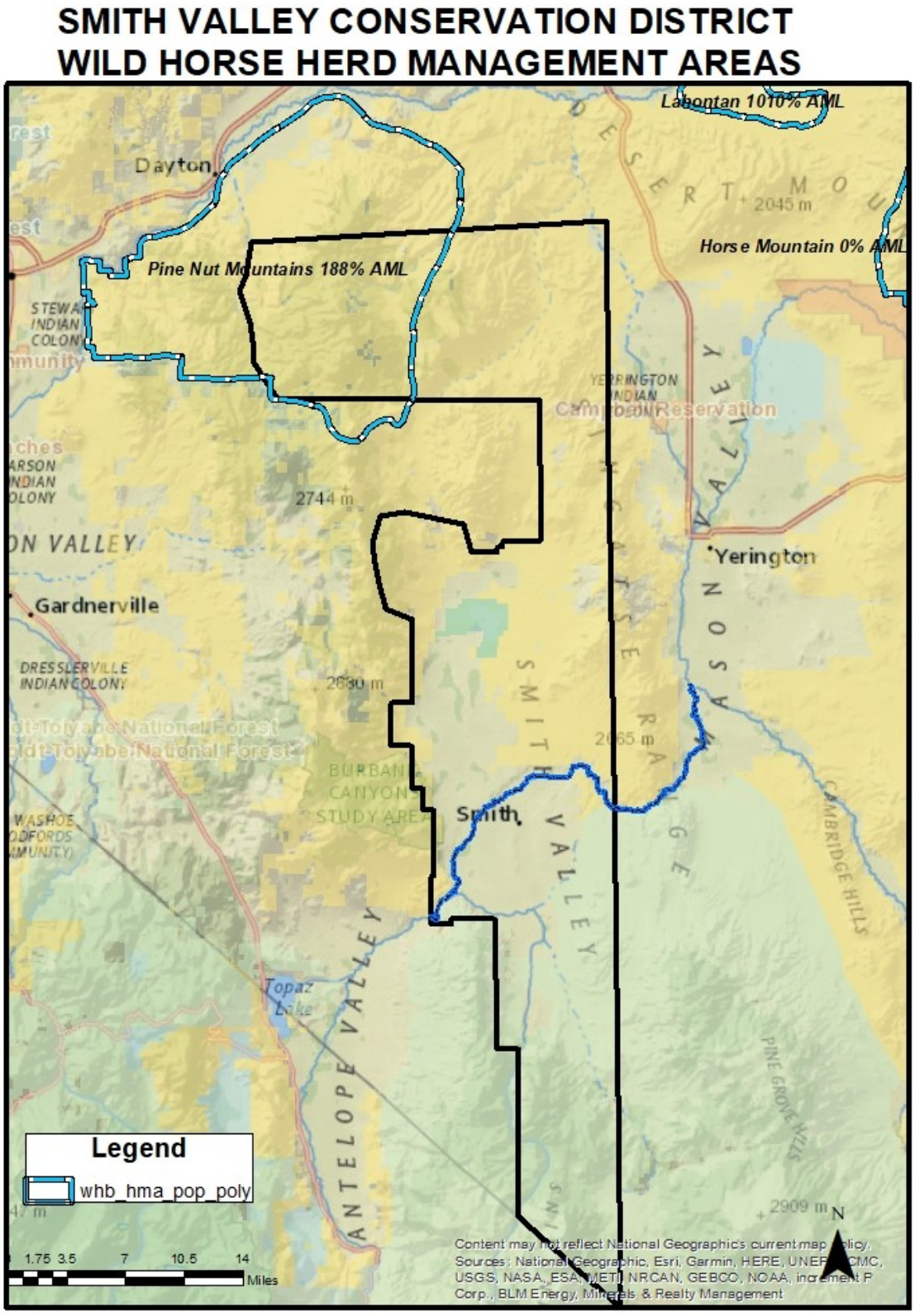
Map 7.02 Pronghorn Antelope Habitat



Map 7.03 Black Bear



Map 7.04 Designated Herd Management Area



Practices to Solve Resource Concern and Physical Effects
Table 7.02 lists the practices that can be used to solve the resource concern and the effect. Practices listed are the common practices used in the area by NRCS.

Table 7.02 Conservation Physical Effects by Practice

			Inadequate	
Practice	**Food**	**Cover /Shelter**	**Water**	**Habitat Continuity (Space)**
Access Control	3	3	1	1
Aquatic Organism Passage	0	2	1	5
Brush Management	2	2	0	1
Cover Crop	2	2	0	2
Critical Area Planting	2	2	0	2
Firebreak	0	0	0	-1
Forage and Biomass Planting	1	1	0	0
Forage Harvest Management	1	1	0	0
Fuel Break	1	-1	0	0
Grade Stabilization Structure	2	2	1	0
Herbaceous Weed Control	2	2	0	1
Integrated Pest Management	2	0	2	0
Pond	2	2	4	2
Prescribed Burning	2	2	0	4
Prescribed Grazing	2	2	0	4
Range Planting	2	2	0	4
Riparian Herbaceous Cover	4	4	2	4
Spring Development	0	0	4	2
Stream Habitat Improvement and Management	2	3	3	4
Streambank and Shoreline Protection	2	2	0	2
Tree/Shrub Establishment	1	3	0	3
Upland Wildlife Habitat Management	5	5	0	5
Water Harvesting Catchment	0	0	4	2
Water Well	0	0	2	0
Watering Facility	0	0	5	3

5 Substantial Improvement, 4 Moderate To Substantial Improvement, 3 Moderate Improvement, 2 Slight To Moderate Improvement, 1 Slight Improvement, 0 No Effect, -1 Slight Worsening, -2 Slight To Moderate Worsening, -3 Moderate Worsening, -4 Moderate To Substantial Worsening, -5 Substantial Worsening

(Draft)
Proposed Goals and Objectives
Maintain or improve habitat for wildlife species in the District.

Proposed Actions and Tasks
Bi-State Sage-grouse - See Bi-State Sage-Grouse Action Plan.
Lahontan Cutthroat Trout – See LCT Recovery Plan
Mule Deer – Work with NDOW on hunting seasons and type of hunt to help reduce problems with mule deer and crops in Smith Valley. Work with private land owners to install wildlife friendly fencing.
Pronghorn Antelope – Work with NDOW and volunteer groups to install water projects for antelope.

Black Bear – Work with NDOW on bear awareness programs for residents in Smith Valley.
Wild Horses – Support BLM on keep wild horses at AML and within the herd management areas.
Other – Encourage practices that increase habitat for wildlife on cultivated lands. This could include trees and shrub planting on field borders, river banks and abandoned farmland.

7.1 Livestock Production Limitation – Feed and Forage

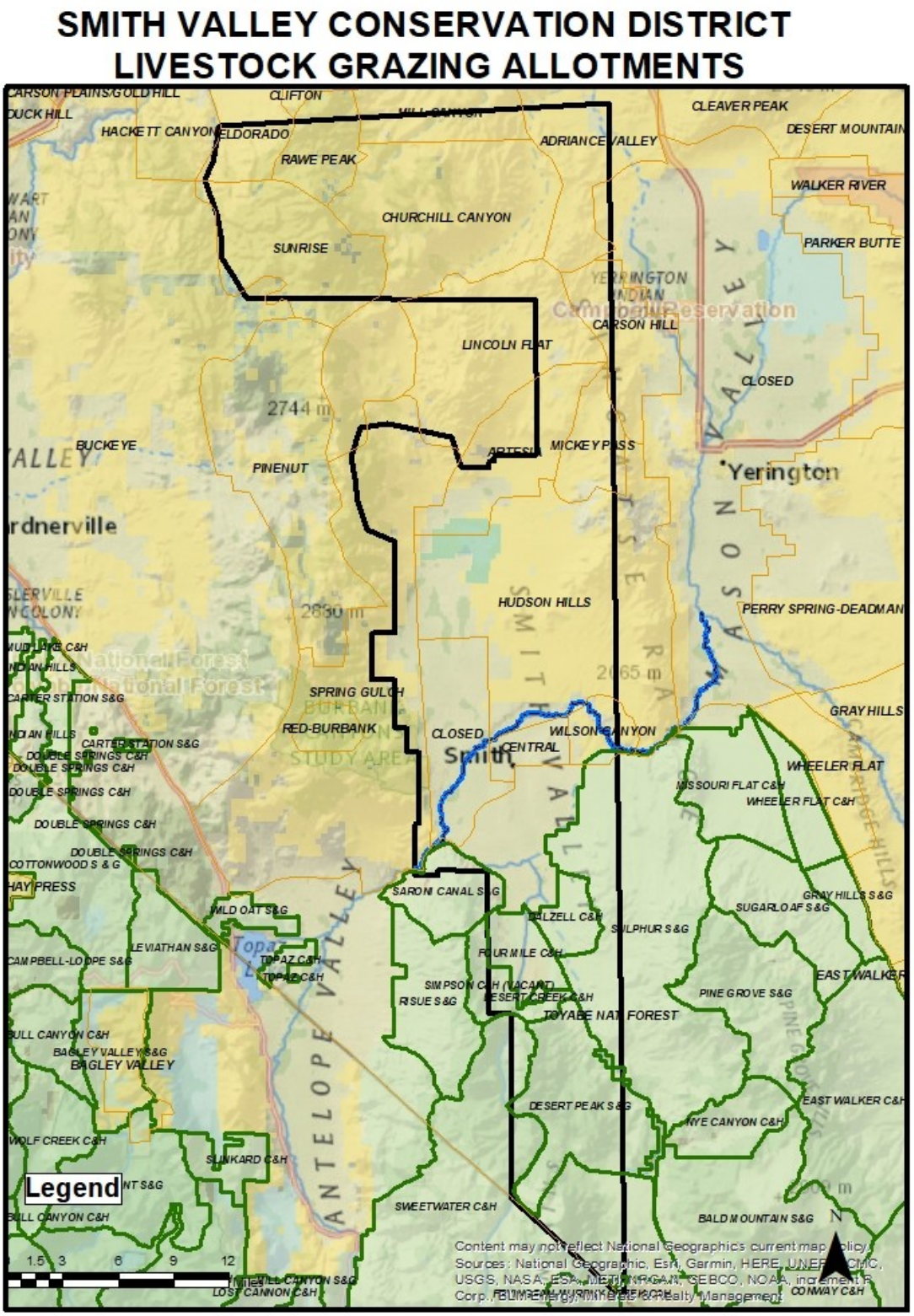
This resource concern is feed and forage quality or quantity is inadequate for nutritional needs and production goals of the kinds and classes of livestock.

Resource Setting

The main livestock production in the District is cattle and sheep. Based on the 2012 Agricultural Census there were 46,000 head of cattle and 27,000 head of sheep in Lyon County. Private land grazing includes irrigated pasture in the summer and hayland stubble in the winter. Many of the hay fields are leased in the winter for sheep grazing.

Several of the ranches in the area utilize federal grazing permits during part of the year and graze private land the other portion. Federal grazing permits include year-round grazing, winter grazing and summer grazing. There are portions of 12 permits on BLM land and 8 permits on National Forest lands within the conservation District boundary. The majority of the permits are cattle grazing in the winter. Map 7.1 shows location of federal grazing permits. Tan lines are BLM allotments and green lines are US Forest Service allotments.

Map 7.1 Grazing Allotments



Resource Concerns Specific to the Conservation District
Forage production for grazing is dependent on moisture, either from rainfall on rangelands or irrigation water on pastures. When forage production is low on rangelands, there is a concern with conflict between livestock grazing and wild horse use. Other concerns include lack of forage plants and increase in brush and trees.

On pastureland there is a concern with improving irrigation efficiency for production. Other concerns include weeds in pastures. On some private rangeland there is a concern with overuse of forages and increase soil erosion from wind.

Practices to Solve Resource Concern and Physical Effects
Table 7.1 lists the practices that can be used to solve the resource concern and the effect.

Table 7.1 Conservation Physical Effects by Practice

Practices	Inadequate Feed and Forage
Brush Management	4
Fence	3
Forage and Biomass Planting	5
Grazing Land Mechanical Treatment	1
Herbaceous Weed Control	4
Irrigation Water Management	4
Nutrient Management	4
Prescribed Burning	5
Prescribed Grazing	5
Range Planting	5
Spring Development	2
Water Well	2
Watering Facility	2

Substantial Improvement, 4 Moderate To Substantial Improvement, 3 Moderate Improvement, 2 Slight To Moderate Improvement, 1 Slight Improvement, 0 No Effect, -1 Slight Worsening, -2 Slight To Moderate Worsening, -3 Moderate Worsening, -4 Moderate To Substantial Worsening, -5 Substantial Worsening

(Draft)
Proposed Goals and Objectives
Proper grazing management on pastures and rangelands.

Proposed Actions and Tasks
Reduce trees on encroached rangelands with the Brush Management Practice.
Plant adapted forage species and implement prescribed grazing on private rangelands.

7.2 Livestock Production Limitation – Shelter
Livestock lack adequate shelter from climatic conditions to maintain health or production goals. Not a concern in the District.

7.3 Livestock Production Limitation – Water
This resource concern includes quantity, quality and/or distribution of drinking water that is insufficient to maintain health or production goals for the kinds and classes of livestock.

Resource Setting
Grazing permits on federal lands include developed water sources. Water sources include livestock wells, spring developments, livestock pipelines and water haul sites. Livestock also access water

found in streams, rivers and ponds. On private land water sources include wells, livestock pipelines, river water and ditch water.

Resource Concerns Specific to the Conservation District
Many livestock water developments found on federal land are in need of repair. Many developments are old and are not functioning adequately. Some water developments need to be retrofitted for wildlife use.

Practices to Solve Resource Concern and Physical Effects
Table 7.3 lists the practices that can be used to solve the resource concern and the effect. Practices listed are the common practices used in the area by NRCS.

Table 7.3 Conservation Physical Effects by Practice

Practices	Inadequate Water
Irrigation Reservoir	4
Livestock Pipeline	5
Pond	5
Spring Development	5
Stream Crossing	2
Structure for Water Control	1
Water Harvesting Catchment	5
Water Well	5
Watering Facility	5

5 Substantial Improvement, 4 Moderate To Substantial Improvement, 3 Moderate Improvement, 2 Slight To Moderate Improvement, 1 Slight Improvement, 0 No Effect, -1 Slight Worsening, -2 Slight To Moderate Worsening, -3 Moderate Worsening, -4 Moderate To Substantial Worsening, -5 Substantial Worsening

(Draft)
Proposed Goals and Objectives
Improve availability of water for livestock.

Proposed Actions and Tasks
Install practices such as Livestock Pipeline, Spring development, Water Well, and Watering Facility.

8.0 Resource Concern – Energy

8.1 Inefficient Energy Use – Equipment and Facilities

This resource concern is the inefficient use of energy increases costs and dependence on non-renewable energy sources. Not a District resource concern.

8.2 Inefficient Energy Use – Field Operations

This resource concern is the inefficient use of energy increases costs and dependence on non-renewable energy sources. Not a District resource concern at this time.

9.0 Humans – Social and Economic Considerations

Social and Economic Setting

Within the Smith Valley Conservation District the community of residents consists of farmers, ranchers, agriculture labors, retirees, residents that commute to jobs, and a few commercial and professional workers. Many of the farms and ranches are owned and managed by older family members.

There is a private recreational facility along the West Walker River and a camping and off-road area on public land (BLM). Dispersed camping, fishing, hunting, horse riding and off-road vehicle use is popular in the area.

Several farms in the District have sold either their water-rights or their land and water-rights for the purpose of water transfer to Walker Lake.

Other issues include removal of pinyon trees on federal lands that had value to the Tribes in the area.

Social and Economic Concerns Specific to the Conservation District

Non agriculture residents lack knowledge/experience with agriculture practices in the District. This may at times lead to conflict over cultural practices and land use.

There is a lack of young farmers and ranchers. There are financial barriers to young people getting into farming and ranching.

Off-road vehicles can be a problem when they do not stay on trails.

There is a concern about irrigation water leaving Smith Valley to go to Walker Lake and portions of Smith Valley no longer producing crops.

There is a concern by Tribal members with removal of pinyon trees in traditional pine nut gathering areas.

There maybe vacant grazing allotment on BLM and U.S. Forest Service lands that could be made available to grazing.

(Draft)

Proposed Actions and Tasks

Provide information/education on agricultural practices for non-agriculture residents.

References

Bi-State Sage-Grouse Conservation Action Plan. 2012. see https://bistatesagegrouse.com/general/page/2012-bi-state-action-plan

Collopy, M.W., Thomas, J.M. 2010. Restoration of a Desert Lake in an Agriculturally Dominated Watershed: The Walker Lake Basin. DRI. UNR, Reno, NV.

Creech, E., Singletary, L., Davison, J., Blecker, L., Schultz, B. 2010. Nevada's 2008 Weed Management Extension Program Needs Assessment: A Survey of Agricultural Producers and Public Land Managers. UNCE. Pub. SP-10-03.

Everett, D. E., and F. E. Rush. 1967. Water Resources Reconnaissance Series: A Brief Appraisal of the Water Resources of the Walker Lake Area, Mineral, Lyon and Churchill Counties, Nevada. Nevada Division of Water Resources Reconnaissance Report 40, 44 p.

Kettelmann, Rick. 2012. East Walker River Watershed Assessment. Eastern Sierra Land Trust. Bishop, CA 93515.

Glancy, P. A. 1971. Water-Resources Appraisal of Antelope Valley and East Walker Area, Nevada and California., U.S. Geological Survey, Reconnaissance Report 53.

Harris, T.R. 2007. An Economic Description of the Agricultural Sectors in Lyon County. University Center for economic Development. Department of Resource Economics. University of Nevada, Reno.

Huxel, J. C. J., and E. E. Harris. 1969. Water Resources and Development in Mason Valley, Lyon and Mineral 1948-65. Nevada Division of Water Resources, Bulletin 38.

Myers, T. 2001. Walker River Hydrology Documents - Hydrology and Water Balance: Smith Valley, NV - Impacts of Water Rights Transfers; Hydrogeology of the Basin Fill Aquifer in Mason Valley, NV - Effects of Water Rights Transfers; An Assessment of Diversion and Water Rights, Smith and Mason Valleys, Nevada. Prepared for the Bureau of Land Management, Carson City, NV.

Schaefer, D. H. 1980. Water Resources of the Walker River Indian Reservation, West-Central Nevada. U.S. Geological Survey Open-File Report 80-427.

Sharpe, S.E., Cablk, M.E., Thomas, J.M. 2007. The Walker Basin, Nevada and California: Physical Environment, Hydrology, and Biology. Desert Research Institute. Pub. 41231.

State of Nevada. Department of Agriculture. 2017. Nevada Food and Agriculture, Lyon County Facts and Figures. Carson City, NV.

State of Nevada. Department of Agriculture. 2017. Nevada Food and Agriculture, Mineral County Facts and Figures. Carson City, NV.

State of Nevada. Division of Environmental Protection, Bureau of Water Quality Planing. 2014. Nevada 2012 Water Quality Integrated Report with EPA Over-listing. 2014. Carson City, NV 89701.

State of Nevada. Department of Wildlife (NDOW). 2019. Database query. Nevada Department of Wildlife. 1100 Valley Rd., Reno, NV

State of Nevada. Division of Water Resources. 2017. Statewide Groundwater Pumpage Inventory. Carson City, Nevada.

State of Nevada. Division of Water Resources. August 2015. Walker River Workshops. Department of Conservation and Natural Resources. Division of Water Resources. Carson City, NV

USDA. NRCS. Custom Soil Resource Reports. Lyon and Mineral Counties. Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at the following link: http://websoilsurvey.sc.egov.usda.gov/.

USDA, NRCS. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. USDA Agriculture Handbook 296 (2006). http://soils.usda.gov/MLRAExplorer.

USDA, NRCS. 2019. The PLANTS Database (http://plants.usda.gov). National Plant Data Center, Baton Rouge, La.
USDI, BLM. June 2009. Landscape-Scale Wildland Fire Risk/Hazard/Value Assessment for Lyon County, Nevada. BLM, Nevada State Office, Reno, NV.
USDI, BLM. August 2009. Landscape-Scale Wildland Fire Risk/Hazard/Value Assessment for Mineral County, Nevada. BLM, Nevada State Office, Reno, NV.
USDI. Fish and Wildlife Service. August 2003. Short-Term Action Plan for Lahontan Cutthroat Trout (Oncorhynchus clarki henshawi) for the Walker River Basin. Reno, Nevada.
USDI, Bureau of Reclamation. 2009. Walker River Basin Acquisition Program Draft Environmental Impact Statement.
USDI. Fish and Wildlife Service. 2009. Walker River Basin Assessment. Lahontan National Fish Hatcheries Complex, Reno, NV.
Walker River Irrigation District Water Rights Workshop. June 2018.

Web Sites and Map Data Sources

State of Nevada. Division of Wildlife http://www.ndow.org/Nevada_Wildlife/Maps_and_Data/
State of Nevada. Heritage http://heritage.nv.gov/species_info
State of Nevada. Division of Water Resources http://water.nv.gov/mapping.aspx
USDI. BLM https://www.blm.gov/services/geospatial/GISData
USDI. Fish and Wildlife Service. IpaC (Information for Planning and Consultation). https://ecos.fws.gov/ipac/
USGS https://waterdata.usgs.gov/nv/nwis/rt
Western Regional Climate Center. https://wrcc.dri.edu/