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DRAFT Water Plan Framework Humboldt County, Nevada



Prepared by:



Resource Concepts, Inc.
340 N. Minnesota Street
Carson City, NV 89703
775 / 883-1600

Prepared for:

Humboldt County Board
of Commissioners
50 West 5th Street
Winnemucca, NV 89445

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Table of Contents

	<u>Page</u>
1.0 Introduction	1-2
1.1 Purpose.....	2
1.2 Preliminary Goals and Objectives.....	3
1.3 Statutory Authority and Existing Plans.....	3
1.4 Organization.....	4
1.5 Water Plan Process.....	4
2.0 Water Resource Background and Assessment.....	5
2.1 Setting.....	5
2.1.1 Topography and Geology.....	5
2.1.2 Climate and Precipitation.....	5
2.1.3 Vegetation.....	8
2.1.4 Land Management.....	9
2.1.5 Infrastructure and Public Services.....	11
2.2 Water Resources.....	11
2.2.1 Surface Water.....	11
2.2.2 Groundwater.....	21
2.2.3 Reuse/Recycling/ Conservation.....	32
3.0 Water Uses and Forecasts.....	35
3.1 Economy.....	34
3.2 Population Trends.....	34
3.3 Agriculture.....	36
3.3.1 Custom and Culture of Humboldt County Agriculture.....	39
3.4 Mining and Milling.....	41
3.5 Municipal and Domestic.....	42
3.6 Industry.....	44
3.7 Recreation/Tourism.....	45
3.8 Wildlife.....	45
4.0 Water Resource Planning and Management.....	47
4.1 Stakeholders and Agencies.....	47
4.2 Existing Management Plans.....	47
4.3 Issues and Opportunities.....	47
4.3.1 Water Supply and Allocation.....	48
4.3.2 Economic Development.....	48
4.3.4 Hazard Reduction.....	48
4.3.5 Water Quality.....	48
4.3.6 Education and Communication.....	49
4.3.7 Financial Resources.....	49
4.4 Legal Issues Concerning Interbasin Transfer of Water.....	50
4.4.1 Transfers Within Humboldt County.....	50
4.4.2 Transfers Outside of Humboldt County.....	50
5.0 County Water Planning Alternatives Approach, Policies, and Implementation.....	58
5.1 Alternative Planning Approaches, and Preferred Approach.....	58
5.2 Water Plan Implementation.....	62
5.3 Water Planning Considerations and Opportunities.....	63

5.4 Water Plan Completion 64

6.0 References..... 66

List of Tables (Pages are not correct for tables, figures, etc. - TL

Table 2-1. Average Annual Precipitation and Temperature Across Humboldt County 9

Table 2-2. Land Management in Humboldt County 12

Table 2-3. Humboldt County Hydrographic Regions..... 14

Table 2-4. Surface Water Bodies with Water Quality Not Supporting Beneficial Use Standards 17

Table 2-5. Summary of Surface Water Rights (AFA) in Humboldt County Basins 18

Table 2-6. Summary of Groundwater Rights (AFA) in Humboldt County, Supplementally Adjusted
..... 29

Table 2-7. Groundwater Manner of Use for Hydrographic Basins in Humboldt County 31

Table 3-1. Population in Humboldt County and Communities..... 35

Table 3-2. Comparison of Population Projections in Humboldt County. 37

Table 3-3. Summary of Agriculture in Humboldt County in 2012 37

Table 3-4. Water demand associated with expansion in irrigated crop area in Humboldt County,
based on the total amount identified as being suitable for disposal by the BLM..... 39

Table 3-5. Public Water Supply Systems and Population Served..... 45

Table 3-6. Population and Domestic and Municipal Water Use Projections 46

Table 4-1. Summary of Potential Water Stakeholders in Humboldt County 54

Table 4-2. Existing Land and Resource Management Plans in Humboldt County..... 55

Table 4-3. Issues and Opportunities to Consider in Water Planning..... 57

List of Acronyms/Abbreviations

BLM	USDI Bureau of Land Management
BOR	USDI Bureau of Reclamation
BSDW	Bureau of Safe Drinking Water (State/DEP)
BWPC	Bureau of Water Pollution Control (State/DEP)
CSWP	Community Source Water Protection
DCNR	Nevada Department of Conservation and Natural Resources (State)
DEP	Nevada Division of Environmental Protection (State), used interchangeably with “State Engineer” or “State Engineer’s Office”
DHHS	Nevada Department of Health and Human Services (State)
DWR	Nevada Division of Water Resources (State)
EPA	U.S. Environmental Protection Agency (Federal)
GIS	Geographic Information System
GPM	gallons per minute
GPS	Global Positioning System
HCBC	Humboldt County Board of Commissioners
NAC	Nevada Administrative Code

Master Plan	Humboldt County Regional Master Plan as approved in 2012
NDOW	Nevada Department of Wildlife
NRS	Nevada Revised Statutes
NRCS	Natural Resource Conservation Service, USDA
PWS	Public Water System
RCI	Resource Concepts, Inc.
USDI	United States Department of the Interior
USGS	United States Geological Survey
Water Plan	Water Plan for Humboldt County
WNDD	Western Nevada Development District

7

List of Figures

Figure 1. Major Topographic and Geologic Features in Humboldt County 7
Figure 2. Hydrogeology Map..... 8
Figure 3. Land Status Map..... 11
Figure 4. Surface Water Map 13
Figure 5. 100-Year Flood Zone Map 21
Figure 6. Groundwater Basin Status Map 28

Appendices

Appendix A USDA 2012 Census of Agriculture County Profile for Humboldt County, Nevada
Appendix B University of Nevada Cooperative Extension Special Publication 17-00 *An Overview of Agricultural Production and Agricultural Water Use in Humboldt County, Nevada, and the Risk from Withdrawing Irrigation Water*

Acknowledgements

Organization	Phone Number
Humboldt County and Humboldt County Board of Commissioners	
Dave Mendiola, County Manager	(775) 623-6300
Betty Lawrence, Regional Planning Department	(775) 623-6393
Mike Bell, Chairman	
Ron Cerri, Vice-Chairman	
Jim French, Commissioner	
Marlene Brissenden, Commissioner	
Ken Tipton, Commissioner	
Technical Support	
Jeremy Drew, Project Manager, Resource Concepts, Inc.	(775) 883-1600
Humboldt County Water Plan Advisory Group	
Brad Schultz, Extension Educator, University of Nevada Cooperative Extension	
Dan Hetrick	
Tony Lesperance	
Ben Garrett	
Shane Hall	
Mike Macdonald	
Walter Curtis	
Barbara Ferguson	
Tommy Swanger	

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1.0 Introduction

1.1 HISTORY AND CULTURE OVERVIEW (See Section 3.3.1 for the entire story)

The first people to utilize the water in this region were the Numa, members of Northern Paiute Tribes who depended on annual harvests of plants and animals, including abundant trout and other animals. Numa were commonly identified by the most common food source in their areas, such as trout (agai) and rabbit (kamu).

The first people of European ancestry that stepped foot in what was to become Humboldt County was a band of mountain men under the command of Peter Skeene Ogden. (Ogden's Snake Country Journals, Hudson Bay Record Society) Ogden and his men were employees of Hudson Bay, in search of new rivers and new sources of beaver. Ogden first entered what was to become Humboldt County in the vicinity of Denio on October 30, 1828, and spent a little over a month in the area. The party again passed through Humboldt during April of 1829. Throughout his diary there is little, if any, indication of the Humboldt country being hospitable to man, other than the indigenous Northern Paiutes.

Discovery of Gold in California, 1848, set in motion vast changes to the ecology, economy, culture and customs of the Humboldt country. It was only 8 years after discovery of gold in California that the Utah Territorial Legislature created Humboldt County in 1856, making it the oldest County in what would eventually become Nevada. Likewise, it didn't take the Nevada Territorial Legislature long to recognize the County, once the Mormons withdrew to Salt Lake. Humboldt became one of Nevada's original nine counties in 1861.

Mining was the driving force during those early years. Agriculture was only in its infancy, producing only adequate foodstuffs for the scattered mining populations. But that was all about to change. With the discovery of the natural resources of Paradise Valley it didn't take long for agriculture to flourish on a grand scale. The Humboldt Register reported on November 16, 1866 the following; "Humboldt County alone is capable of producing all the hay, grain and vegetables needed by the present population of the State."

Throughout the early developmental period of the County, agriculture (1860-1930) production was driven by the agriculturists ability to control and harvest mountain spring runoff from the Counties various mountain ranges. Diversion dams were built, and miles and miles of ditches were constructed, mostly employing mules, Fresno scrapers and back labor. Production increased every year, and the County became and remained the most productive of all Nevada Counties. However, the great drought of the 1930's, following in the footsteps of the Great Depression, forced many operations into bankruptcy. Production didn't decline from these events, farms and ranchers just got bigger as the more successful operations simply took over the less successful, and management probably got better. It had to in order to survive.

Who were the people that saw the potential agriculture future so early on? They were of German and Italian background for the most part, people who knew how to make the land produce, as long as a bit of water could be found and applied at the right time. They were followed by Basque, and Hispanics, folks more orientated to animal agriculture, as well as Americans from all corners of the land. They came, they worked hard, very hard, and they were successful. They didn't build empires, instead they build productive farms and ranches, and collectively, those farms and ranches created its own empire, called

Humboldt agriculture, the most productive agricultural county in Nevada, and one of the most productive within the intermountain region.

The transfer of water rights from basins where current pumping exceeds perennial yield only worsens the complex relationship between groundwater over draft, local economics and tax revenue. The basin remains over-drafted, yet the local direct economic activity (sale of a product) provided by that water will be eliminated. That decline in economic activity will have adverse downstream effects on other businesses. Ultimately tax revenues would decline, adversely affecting the ability to provide local government services, some of which are likely mandated by the State. The Humboldt County Board of Commissioners (Add specific Resolution here-This has not been done yet) sees no logic economic or environmental logic or benefit to transferring water from over-drafted basins out of the county of origin. Any benefit to the receiving entity is likely to be short term as continued over pumping at the same or similar level will eventually fully deplete the aquifer and there is no data to suggest another water source will be available to replace it.

This Water Plan is an attempt to protect and enhance opportunities for the people of Humboldt County through sound water management, in conjunction with the State Water Engineer and the Division of Water Quality and Water Resources. The Humboldt County Board of Commissioners seek to both sustain the current economic vitality of the County and provide future generations the opportunity to continue the cultural foundation that made Humboldt County what it is today.

1.2 Purpose

Humboldt County is one of the most prosperous regions of rural Nevada as demonstrated by the consistently lower than average unemployment rate and higher than average median income (WNDD, 2014). The region supports agriculture, mining, tourism, and recreation. However, Nevada is the driest state in the nation, where water is widely recognized as a precious and limited resource. The availability and use of water is critical to sustain the existing quality of life, customs, culture, economy, and natural environment of the County.

The Humboldt County Board of Commissioners (HCBC) recognize the value of a County Water Plan (**Water Plan**) This Water Plan for ~~Humboldt~~ **the** County (note County refers to Humboldt County henceforth, and the Humboldt County Board of Commissioners unless otherwise noted) is intended to:

- Characterize quantity and quality of the current and future sources of water in ~~Humboldt~~ **the** County;
- Describe current water use, water quality and water quantity in ~~Humboldt~~ **the** County;
- Describe future water use and demands, including agriculture, municipal, general industrial, mining, recreation, and the environment;
- Describe critical water resource issues throughout **the** County;
- Determine and describe the desired role and level of involvement by **the** County in future water issues; and,
- Develop water resources policies that will be recognized by regional, State and federal authorities in order to increase **the** County's influence in future water processes and decisions.
- **Above all, protect the current water resources for both the environmental and economic future of the County and its citizens.**

The HCBC adopted the following purpose statement for the Water Plan:

- Ensure availability of water to maintain the County’s customs, culture, and environment for this and future generations;
- Provide opportunity for well planned community growth and economic development that is in balance with available water resources; and,
- Maximize the County’s influence on decisions that directly impact water resources within Humboldt County.

1.3 Preliminary Goals and Objectives

The goals, objectives, policies and management strategies contained in this Water Plan were developed and refined by the communities and stakeholders in the County through the planning process, see Section 1.5. However, the following preliminary goals and objectives are offered as a starting point based on concerns expressed by local officials, existing plans and policies, and broader common water resource issues in Humboldt the County and the State of Nevada.

Goal #1: Develop a Water Plan that encourages and maintains the County’s existing customs, culture, economy and way of life.

- Policies and management strategies should encourage the continued use of water for beneficial use within the County.
- Policies and management strategies should protect the County from adverse transfer of water for use outside of the County.
- Policies and management strategies should not interfere with property and water rights currently used in the County.

Goal #2: Maintain existing uses of water supplies for continued economic prosperity, municipal and recreational use, and ensure future growth and development is in balance with existing water supplies.

- Provide acceptable levels of service to communities in the County.
- Implement measures to protect water resources for beneficial uses within the County.
- Ensure land use planning incorporates water resources.

Goal #3: Protect surface and groundwater quality in the County with a focus on drinking water supplies.

- Manage potential sources of groundwater and surface water contamination.
- Manage wastewater for sustainability of water resources.
- Incorporate protecting water quality in land use planning.

1.4 Statutory Authority and Existing Plans

Nevada Revised Statutes (NRS 278.150) directs the planning commission to prepare and adopt a comprehensive, long-term general plan for the physical development of the city, county or region that, in the Commission’s HCBC judgment, bears relation to the planning thereof. The County Regional Master Plan as approved in 2012 (Master Plan) is designed “to promote the general health, safety, welfare, convenience and prosperity of the region and its residents”.

The Master Plan goals, policies and implementation provide guidance for making decisions concerning the future of land use and economic development for **the County**, communities **within the County**, as well as the City of Winnemucca. The policies and actions are intended to ensure that the County's livability is enhanced, rather than reduced, as the region grows.

The economic goals identified in the Master Plan include:

- *...to achieve a diversified and stable economy; and,*
- *...to maintain and enhance natural resource-based industries, including mining, agriculture, ranching, recreation and tourism...".*

Development of a ~~water resources plan~~ **Water Plan** is needed to achieve the Master Plan goals, and as a key component of a natural resources element, which is identified in the Master Plan Implementation section:

"7. Identify additional master plan elements, and establish a schedule for development and adoption

- *Natural Resources Element*
- *Historic Preservation Element*
- *Housing Element*
- *Public Lands Element (Policy Plan for Public Lands December 7, 1998)"*

This Water Plan is specific to ~~the Humboldt~~ **the Humboldt** County, and does not apply directly to the City of Winnemucca or supersede the existing Master Plan. However, the Water Plan or portions thereof may be incorporated directly, or by reference, into the Master Plan as appropriate. Any changes would require a Master Plan Amendment and shall follow all appropriate processes.

1.5 Organization

The Water Plan Framework for Humboldt County includes the following sections:

- Section 2.0 provides a summary description of the quantity and quality of water resources in Humboldt County;
- Section 3.0 discusses current uses and future projections for water resources demand in Humboldt County;
- Section 4.0 summarizes water resources planning and policy measures in the region, **including legal implications;**
- Section 5.0 contains the County adopted management strategies ~~and~~, policies **and implementation of the Water Plan** for future water management in Humboldt County, as well as the future development of the Water Plan.

1.6 Water Plan Process

In 2016, the HCBC retained Resource Concepts, Inc. (RCI) to provide technical support in development of a Water Plan. The initial Phase of work consisted of development of a Water Plan Framework for Humboldt County and was completed in August 2016. The Framework was presented to the HCBC, and contained basic background information on County water resources, as well as listing considerations for further plan development. This work represented Phase 1 of a 3-phase planning process.

The HCBC requested that RCI provide further technical support in seeking community input on key Water Plan components, including but not limited to, a preferred management strategy and preliminary water policies that may ultimately be incorporated into a plan. Between December 2016 and April 2017, RCI developed and implemented a Community Outreach strategy and solicited public input. This work represented Phase 2, and included:

- Establishment of a Water Plan Advisory Group made up of local community members recommended by the HCBC (see page iii for members);
- Development of a Water Plan Purpose Statement;
- Scheduling and Advertising a series of Public Workshops;
- Development of Preliminary Water Policies to solicit community input; and,
- Development of a Citizen's Survey to solicit community input on key aspects of a possible Water Plan including: Goals / Objectives, Management Strategies, and possible Water Plan Policies.

The HCBC and RCI hosted a series of three public workshops in Paradise **Valley**, Winnemucca and Orovada. The workshops were publicly noticed, advertised in local media, and supported by a project website. A total of 66 interested public attended the workshops, and a total of 47 Citizen Surveys were received by RCI. The results of the workshops and Citizen's Surveys were presented to the HCBC on April 17, 2017 along with RCI's recommendations for moving forward with a Draft Water Plan if so desired. This presentation and report represented the conclusion of Phase 2 of the planning process.

Based on the results of Phase 2, the HCBC requested that RCI incorporate the community and HCBC inputs into the Draft Water Plan Framework to develop a Draft Water Plan for **the Humboldt** County. Phase 3 of the Planning process will include development of a Draft Water Plan for consideration by the HCBC, and possible adoption of a Final Water Plan.

2.0 Water Resource Background and Assessment

2.1 Setting

2.1.1 Topography and Geology

Humboldt County encompasses 9,626 square miles (6.2 million acres) in north central Nevada (Figure 1). The County is bordered by Oregon to the north, Washoe County to the west, Pershing County to the south, and Lander and Elko Counties to the east. The county seat and largest city is Winnemucca, which is in the southeast portion of the County along the Humboldt River.

Elevations in Humboldt County range from lows of about 4,000 feet where Quinn River terminates on the Black Rock Desert, to 4,200 feet where the Humboldt River leaves the County, to a high point of 9,732 feet at Granite Peak in the Santa Rosa Range.

The majority of Humboldt County has features typical of the Great Basin (Figure 2). Mountains and valleys are oriented north south with both features being typically 15-20 miles wide. Deep structural basins underlie the valleys with basin-fill deposits from the adjacent mountains (Lampke, 1965). The geologic units that form the mountain ranges are shale, sandstone, chert, limestone, granitic and volcanic rock of Tertiary and Cretaceous age.

The northwest corner of the County includes features typical of both the Great Basin and the Columbia River Plateau to the north. The topography is dominated by plateaus (tables) that are underlain by Tertiary age lava flows (Willden, 1964). Drainage in most of the area is northward and eastward along Virgin, Sagebrush, Craine and Thousand Creeks to Continental Lake.

The northeast corner of the County drains into the Snake River Basin and includes the Little Owyhee River Area. The topography of the area is dominated by a volcanic plateau (Willden, 1964, plate 1).

The Humboldt River flows through southeast and south central Humboldt County. The Little Humboldt River drains northeast parts of the County, although its flow rarely reaches the Humboldt River. Quinn River and its main tributary, the Kings River, flow through and terminate in the Black Rock Desert.

2.1.2 Climate and Precipitation

The climate in Humboldt County is typical of the arid west with hot dry summers and cold winters. From northern parts of the County at Denio and McDermitt, to southern parts at Winnemucca, Golconda, and Valmy, the elevation of the communities does not change more than several hundred feet, and temperature, precipitation, and habitat are similar throughout these areas. The annual snowmelt in the mountains plays an important local role in seasonal surface water flow and groundwater recharge. Table 2-1 summarizes the annual average precipitation and temperatures across the County.

Figure 1. Major Topographic and Geologic Features in Humboldt County

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Figure 2. Hydrogeology Map

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Table 2-1. Average Annual Precipitation and Temperature Across Humboldt County

Location (Period of Record, Years)	Average Annual Total Precipitation (inches)	Average Annual Total Snowfall (inches)	Average Annual Maximum & Minimum Temperature (F)
Virgin Valley ^{1/} (1959 – 2013)	6.75	15.5	62.5 29.1
Leonard Creek Ranch ^{1/} (1954 – 2016)	8.76	15.7	65.2 37.5
Denio ^{1/} (1951 – 2016)	8.97	19.2	65.0 34.2
Disaster Peak, 6,260' Trout Creek Mountains ^{2/} (1981 – 2010)	21.4	N/A	N/A
Kings River Valley ^{1/} (1956 – 2016)	8.42	19.1	64.8 32.6
Orovada ^{1/} (1911 - 2016)	10.49	22.6	64.7 33.3
McDermitt ^{1/} (1892 – 2016)	8.88	19.1	62.7 30.7
Buckskin Lower, 6,930' Santa Rosa Mountains ^{2/} (1981 – 2010)	24.3	N/A	N/A
Granite Peak, 8,503' Santa Rosa Mountains ^{2/} (1981–2010)	32.1	N/A	N/A
Lamance Creek, 6,395' Santa Rosa Mountains ^{2/} (1981 – 2010)	28.5	N/A	N/A
Paradise Valley ^{1/} (1894 – 2010)	9.75	30.5	64.3 31.0
Winnemucca Municipal Airport ^{1/} (1877 – 2016)	8.26	17.1	64.8 33.0
Golconda ^{1/} (1893 – 2008)	6.50	14.0	65.1 34.2

Sources: ^{1/} Western Regional Climate Center, NV DWR Mapping and Data
^{2/} NRCS SNOTEL Site Data

2.1.3 Vegetation

There are six vegetative zones in Humboldt County that occur throughout the different elevations. The vegetative zones and their predominant plant species are:

- Salt Desert Shrub: **greasewood** saltbush, shadscale;

- Sagebrush: Sagebrush species;
- Pygmy conifer: Utah juniper;
- Montane: aspen and mountain mahogany; and,
- Subalpine: limberpine.

Because the climate of Humboldt County is very dry, the potential for wildland fires is an ongoing management issue. Wildfires can adversely affect desirable plant species, and encourage non-native noxious weeds and invasive species such as cheatgrass, **Medusa head and others**.

2.1.4 Land Management

Humboldt County is the fourth largest county in Nevada. Per the Master Plan, roughly 80 percent of the County is under **federal public** ownership, and less than one percent of the private land (32,000 acres) is considered urban. Land ownership patterns are illustrated in Figure 3 and statistics listed in Table 2-2.

Figure 3. Land Status Map

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Table 2-2. Land Management in Humboldt County

Public Lands	Acres	Percent
Bureau of Land Management	4,319,413	70%
United States Forest Service	274,332	4%
United States Fish and Wildlife Service	390,866	6%
Bureau of Indian Affairs	2,200	<1%
Total Public Land	4,986,811	80.4%
Private Lands	Acres	Percent
Agriculture	738,041	12%
Urban	32,000	<1%
Other (primarily range)	453,708	7%
Total Private/State	1,223,749	19.5%
Total Lands	6,210,560 Acres	

Source: Master Plan

2.1.5 Infrastructure and Public Services

The absence of essential urban services such as water and sewer to designated industrial lands, along with incompatible uses nearby, makes much of the industrial land currently unsuitable for private development (Master Plan). The Master Plan concludes that there is sufficient existing infrastructure within the City of Winnemucca (water, sewer, utilities, roads) to support projected growth through 2022. However, in unincorporated areas, there is not adequate infrastructure to support expansion of residential, commercial or industrial uses.

Mining operations provide their own temporary infrastructure including water and wastewater. Housing to serve mine employees is not necessarily addressed for all new mines.

2.2 Water Resources

2.2.1 Surface Water

Hydrographic Regions

Humboldt County encompasses portions of five different hydrographic regions (Rush, 1968). The two largest are the Black Rock Desert Region and the Humboldt River Basin, which comprise 85 percent of the County (Table 2-3). Select surface water resources are illustrated in Figure 4 and described by hydrographic regions in the following sections.

Figure 4. Surface Water Map

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Table 2-3. Humboldt County Hydrographic Regions

Region Number	Hydrographic Region	Percent of County in Each Region
2	Black Rock Desert Region	56 %
4	Humboldt River Basin	29 %
1	Northwestern Region	11 %
3	Snake River Basin	3 %
10	Central Region	1 %

Source: Calculated from Nevada Division of Water Resources (DWR), 2016. Hydrographic Regions and Basins

Black Rock Desert Region

The Black Rock Desert Region covers the north-central, south-central and southwest portions of Humboldt County. Stream flow and spring flow in the region are used primarily for agriculture and livestock watering, but also support wildlife habitat and recreation activities (hunting, fishing, camping, etc.).

The towns of McDermitt and Orovada are located in the Quinn River Valley along the west side of the Santa Rosa Range. Numerous small streams on the west slope of the Santa Rosa Range and east slope of the Montana Range support ranching and farming operations in the Upper Quinn River Valley and recharge(s) the groundwater aquifer. The Quinn River flows southward in the valley and is fed primarily by the East Fork of the Quinn River, originating in the Santa Rosa Range and McDermitt Creek, originating from the northern portion of the Montana Mountains near the Nevada-Oregon border. The river turns westward at a gap between the Double H Mountains and Slumbering Hills and flows across the south end of Kings River Valley where it is joined by the Kings River. However, flows in the Kings River, which **actually** originate in the Trout Creek Mountains, but primarily drains the area south of the Oregon border and between the crests of the Bilk Creek and Montana Mountains, seldom reach this point. Flow continues westward to another gap between the Bilk Creek Mountains and Jackson Mountains where the river turns southward into the sink of the eastern arm of the Black Rock Desert. The Quinn River terminates in the Black Rock Desert, which is characterized by a wide flat valley floor and extensive playa. In most years flows from the Quinn River never reach the Black Rock Desert.

Average annual flow of the Quinn River, recorded at a station near McDermitt from 1950 to 1985, was about 26,000 acre-feet per year. At another site, several miles south of the gap between the Double H Mountains and Slumbering Hills, average annual flow (recorded intermittently for 8 years between 1964 and 1981) was about 1,300 acre-feet per year, although there were two years of no flow during that period. Irrigation diversions, infiltration to underlying aquifers and evapotranspiration are the principal reasons for reduced surface flows in the Quinn River (Huxel 1966). The Kings River watershed is the largest tributary to the Quinn River and drains from the Oregon border south through central Humboldt County.

Similar to other watersheds in the County, springs and perennial streams originate in the mountain ranges, and typically infiltrate when reaching the valleys, or are diverted for agricultural uses. These include tributaries from the Bilk Creek Range (Bilk Creek) and the east slope of the Pine Forest Range (Alta,

Big, Bishop and Leonard Creeks) to the north, as well as the Black Rock Range (Bartlette and Battle Creeks) and Jackson Mountains (Bottle Creek) further south. Bilk Creek Reservoir supports agricultural operations and a popular local sport fishery.

Soldier Meadows Hot Springs supports agriculture, wildlife, recreation and guest accommodations in the southwest corner of the County, where Mud Meadows drains to the Black Rock Desert along the east side of the Calico Mountains.

Humboldt River Basin

The Humboldt River flows east to west through the southeast part of Humboldt County. Both the railroad and the I-80 follow the River. The largest population centers in the County, the City of Winnemucca and the nearby development of Grass Valley, as well as the smaller developments of Golconda and Valmy, are located along this River and transportation corridor.

In the Winnemucca area, flow in the Humboldt River flow typically is greatest in April through June (Cohen 1963). Variation in annual flows depends almost entirely on the volume of the winter snowpack in the mountainous headwaters area in Elko County. The USGS stream gaging station at Comus in eastern Humboldt County has been in operation since 1894. Average annual flow of the river at this site is about 241,000 acre-feet per year. The Imlay gaging station is in Pershing County about 32 miles southwest of Winnemucca and has been in operation since 1945. Average annual flow of the river at this site is about 197,000 acre-feet per year. The flow loss of more than 40,000 acre-feet per year can be attributed mostly to irrigation diversions and seepage loss.

The main tributary to the Humboldt River in Humboldt County is the Little Humboldt River and its ~~tributary Martin Creek~~ **tributaries; Martin, Cottonwood, Indian and several smaller streams (Abel, Hanson, Lamance, , Morey, Mullinix, Provo, Singus, Solid Silver and Stonehouse Creeks), all coming off the Santa Rosa Mountain range.** Stream gaging for both **the Little Humboldt and Martin Creek have** been conducted since 1921. The stations are in the northeastern part of Paradise Valley and their combined average annual flow is 40,000 acre-feet per year. However, flow of the Little Humboldt River rarely reaches the Humboldt River due to altered hydrology following construction of Chimney Dam Reservoir (located near the confluence of the north and south forks of the Little Humboldt River), irrigation diversions and infiltration. Even in years of high flows, the Little Humboldt River often does not reach the Humboldt River. **The ability of the Little Humboldt to reach the Humboldt River is also complicated by drifting sand dunes (originating from the Black Rock Desert) that stretch from the south end of Paradise Valley westward to Desert Valley. These dunes often block the Little Humboldt channel, resulting in the creation of a vast, but shallow lake known locally as Gumbo Lake.**

Several other smaller watersheds that drain the mountain ranges are characterized by perennial streams in narrow canyons, which become intermittent when they reach the alluvial slopes at the toe of the mountain ranges. These include Rock Creek and Pole Creek originating on the east side of the Sonoma Range; Kluncy and Water Canyon Creeks near Winnemucca; and, Thomas Canyon, Sonoma Creek and Clear Creek draining west to Grass Valley from the Sonoma Range; Abel, Cottonwood (Big and Little), Hanson, Indian, Lamance, Martin, Morey, Mullinix, Provo, Singus, Solid Silver and Stonehouse Creeks from the Santa Rosa Range all draining into Paradise Valley; the South Fork of the Little Humboldt, Kelly and Jakes Creeks from the Snowstorm Range; and, Summer Camp and Granite Creeks from the Osgood Range.

Springs occurring in the various ranges provide water for agriculture, livestock, wildlife, and are water sources for two of the County's municipal water systems (Golconda and the City of Winnemucca).

Northwest Region

The Northwest Region is a relatively undeveloped and remote area of Humboldt the County, yet is highly popular for outdoor recreation (hunting, fishing, camping, wildlife viewing, etc.) by both residents and tourists. It includes the Sheldon National Wildlife Refuge (Dufurrena Ponds), portions of the Black Rock Desert/High Rock Canyon National Conservation Area, and the Summit Lake Indian Reservation. Big Spring Creek, Virgin Valley Creek, and Long Creek also drain north and east to Thousand Creek, which flows through Thousand Creek Gorge and drains eastward terminating at Continental Lake (seasonal) southwest of Denio. The west side of the Pine Forest Range, including Alder Creek, drains toward Craine Creek. There are several small but important reservoirs in the Pine Forest Range that are used to support agriculture and popular sport fisheries such as Onion Reservoir, Knott Creek Reservoir, as well as the popular fisheries of Blue Lakes. There is no known stream flow data for the region.

Snake River Basin

The northeast corner of the County is part of the Owyhee Desert. The Little Owyhee River and several other small streams drain eastward across the desert toward the Owyhee and Snake Rivers. There is no readily available stream flow data for this part of Humboldt County.

Central Region

The Central Region includes Buffalo Valley which is a hydrologically closed basin surrounded by mountains, except on its east side where a low alluvial divide separates it from the Lower Reese River Valley. All drainage in the valley is toward a playa in its center. ~~The only known intermittent stream in the valley is Willow Creek in Lander County.~~ **The amount of land within Buffalo Valley that lies in the County is inconsequential in regard to water.**

Surface Water Quality

Surface water quality in Humboldt the County is related to both geography and human activities in the watersheds. In general, perennial and intermittent streams originating in undeveloped high elevation mountain ranges satisfy the State's water quality standards for beneficial uses. Typically, surface water turbidity and suspended sediment may increase during spring runoff and intense precipitation events. Total dissolved solids and temperature may increase during late summer and fall periods when snowmelt/runoff decreases and groundwater provides stream base flow. Seasonally, surface runoff may temporarily accumulate in playas on the valley floors, though this water quality is saline and not typically useful for irrigation, drinking water, or livestock.

Surface water quality is monitored for many of the water bodies in Humboldt the County and may be classified as supporting, or not supporting beneficial use standards, as defined by the Nevada Department of Environmental Protection (NDEP). Most of the water bodies monitored in Humboldt County maintain water quality levels that may support the following beneficial use standards (NDEP, 2015).

- Aquatic Life
- Enhancement of Water Quality
- Fish Consumption
- Industrial Supply
- Irrigation
- Municipal or Domestic Supply
- Propagation of Wildlife

- Recreation Involving Contact with Water
- Recreation Not Involving Contact with Water
- Watering of Livestock
- Wildland Fire Fighting

Table 2-4 summarizes the water body segments with water quality not meeting standards for all beneficial uses as reported in the Nevada Integrated Report 2010, 2012, and 2014 assessment periods. It should be noted that these beneficial uses are not active on all water sources, are not necessarily the same as “beneficial use” as defined by the State Engineer in terms of water rights, and that the data is specific to water quality standards defined for each type of beneficial use. As an example, Bilk Creek Reservoir still supports abundant “aquatic life”, including edible fish, even though it doesn’t meet several water quality standards.

Table 2-4. Surface Water Bodies with Water Quality Not Supporting Beneficial Use Standards

Surface Water	Beneficial Uses Not Supported	Cause*
Black Rock Desert Region		
Bilk Creek Reservoir NV02-BL-09-B_00	Aquatic Life, Recreation (Contact w/ Water), Propagation of Wildlife	DO, pH, TPhos
Quinn River, East Fork NV02-BL-11-A_01	Aquatic Life, Recreation (Contact w/ Water)	TPhos
Soldier Meadow Hot Springs Crk NV02-BL-26_00	Irrigation, Propagation of wildlife, Aquatic Life, Watering of Livestock	Boron, Fluoride, pH
Humboldt River Region		
Humboldt River, Battle Mtn. to Comus NV04-HR-04_00	Aquatic Life Fish Consumption	Iron, TSS, TDS, TPhos, Mercury
Humboldt River, Comus to Imlay NV04-HR-05_00	Aquatic Life, Municipal Supply, Fish Consumption	Iron, TDS, Mercury
Little Humboldt River NV04-LH-47-C_00	Aquatic Life, Recreation (Contact w/ Water)	TPhos
Little Humboldt River, North Fork NV04-LH-45-A_00	Aquatic Life	Temp., Zinc, Cd, Cu, Fe, water
North Fork Little Humboldt River NV04-LH-46-B_00	Aquatic Life Fish Consumption	Mercury Temp.
South Fork Little Humboldt River NV04-LH-49-B_00	Aquatic Life, Recreation (Contact w/ Water)	TPhos, Iron
Cabin Creek NV04-LH-61_00	Aquatic Life	Temp., Zinc, water
Goosey Lake Creek NV04-LH-191_00	Aquatic Life	Temp., water
Chimney Reservoir NV04-LH-95-B_00	Aquatic Life, Irrigation, Recreation (Contact w/ Water), Fish Consumption	TPhos, Iron, Fluoride, Mercury
Northwest Region		

Cove Creek NV01-NW-08_00	Aquatic Life Recreation (Contact w/ Water)	TPhos
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Source: eMap 7/8/2016, 2014 Integrated Report, <http://webgis.ndep.nv.gov/>

*Abbreviations:

- TSS - Total Suspended Solids
- TDS - Total Dissolved Solids
- Temp. – Temperature
- TPhos – Total Phosphorus
- DO – Dissolved Oxygen

Surface Water Rights

A summary of surface water rights is provided in Table 2-5. These values represent “paper water”, or the amount of water allocated by some sort of water right through the State Engineer’s Office; however, that doesn’t necessarily equate to the actual amount of surface water utilized in a given year, or “wet water”. The total quantity of surface water resources in Humboldt County varies considerably from year to year based on climate and precipitation, as does the actual use of such surface water based on land use.

Table 2-5. Summary of Surface Water Rights (AFA) (AF) in Humboldt County Basins

Basin	Basin Name	Certificated	Permitted	Vested	Total Allocated
Northwest Region					
001	Pueblo Valley	346.54	0.00	572.76	919.30
002	Continental Lake Valley	5,273.55	992.00	0.00	6,265.55
003	Gridley Lake Valley	508.29	15,555.53	3,955.78	20,019.60
004	Virgin Valley	3,311.45	0.00	689.10	4,000.56
005	Sage Hen Valley	0.00	0.00	0.00	0.00
006	Guano Valley	0.00	0.00	0.00	0.00
007	Swan Lake Valley	9.42	7.37	0.00	16.79
Black Rock Desert					
024	Hualapai Flat	0.00	0.00	0.00	0.00
025	High Rock Lake Valley	34.22	5.26	26.88	66.36
026	Mud Meadow	5,223.60	362.00	350.21	5,935.82
027	Summit Lake Valley	1,972.88	760.00	26.88	2,759.77
028	Black Rock Desert	42.18	0.46	9.67	52.31
029	Pine Forest Valley	11,402.61	6,193.29	7,574.48	25,170.38
030	Kings River Valley	0.00	0.00	0.00	
030A	Rio King Subarea	92.61	240.00	0.00	332.61
030B	Sod House Subarea	758.03	600.00	0.00	1,358.03
031	Desert Valley	3,862.28	1,383.04	0.00	5,245.32

Basin	Basin Name	Certificated	Permitted	Vested	Total Allocated
032	Silver State Valley	23.81	1.00	0.00	24.81
033	Quinn River Valley	0.00	0.00	0.00	0.00
033A	Orovada Subarea	16,691.27	4,296.04	4,640.36	25,627.68
033B	McDermitt Subarea	1,788.01	3,081.20	5.00	4,874.21
Snake River Basin					
034	Little Owyhee River Area	553.18	449.26	1,464.63	2,467.06
Humboldt River Basin					
064	Clovers Area	1,168.50	1,691.89	0.00	2,860.39
065	Pumpnickel Valley	5212.767	0.00	45.27	5,258.03
066	Kelly Creek Area	1,538.90	1,033.00	0.00	2,571.90
067	Little Humboldt Valley	26,389.67	0.00	2,003.64	28,393.31
068	Hardscrabble Area	0.09	0.00	0.00	0.09
069	Paradise Valley	3,923.73	19.20	60.00	4,002.93
070	Winnemucca Segment	1,060.30	0.00	3,773.66	4,833.95
071	Grass Valley	3,824.88	290.00	50.42	4,165.30
Central Region					
131	Buffalo Valley	0.00	0.00	0.00	0
Total		95,012.77	36,960.54	25,248.76	157,222.06

Source: NDWR on-line database

Flooding

The Humboldt River has historically been the greatest concern for flooding in the County, though flash floods in dry drainages and mountain streams can occur throughout the region. Floods are typically natural events caused by various weather conditions:

- Winter flooding due to rain on snow events;
- Spring flooding due to exceptional high snowpack runoff; or,
- Localized flooding caused by intense rain events.

Flood zones for the 1% return interval (100-year event) have been mapped along the Humboldt River corridor (Figure 5) by the Federal Emergency Management Agency (FEMA) and represent areas where flood damage is recognized as a hazard in the Regional Tri-County Hazard Mitigation Plan 2015 (HMP 2015). To address concerns in the vicinity of Winnemucca, the City adopted Chapter 15.16, Floodplain Management Plan, in the Code of Ordinances. Historical flooding has caused damage in Winnemucca and Paradise Valley, as well as along the Humboldt River and Little Humboldt River corridors to roads, bridges, railroads, livestock, crops, and irrigation infrastructure.

The recently completed Tri-County Hazard Mitigation Plan also describes potential flood hazards due to structural failures of canals and dams. Within Humboldt the County, the State Engineer, Division of Dam Safety, has classified the Soldier Meadows Dam and Fort McDermitt Dam as “high hazard” dams (Regional Tri-County HMP 2015).

Droughts

Historically, consecutive years of lower than average to well below average precipitation in Humboldt and surrounding Counties creates dramatic reductions in surface water flows and availability. During the recent drought period, 2012 through 2015, areas in Humboldt the County were recognized as being in extreme drought conditions (Nevada Drought Response Committee, 2014). Drought conditions create reduced stream flows throughout the region, limiting irrigation, grazing, and recreation activities dependent upon surface water. Lower runoff and surface flow also reduces groundwater recharge, and over the long-term can affect groundwater levels. The impact to groundwater can be further exacerbated through pumping associated with supplemental groundwater rights that are intended for use in times of limited surface water availability.

Figure 5. 100-Year Flood Zone Map

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2.2.2 Groundwater

Infiltration from rain and snowfall, and flow losses from surface waters, including the Humboldt River, are the only sources of groundwater recharge in the hydrographic basins in Humboldt the County. Rain and snowmelt infiltrate fractured bedrock in mountainous areas. Infiltration of rain and snowmelt into bedrock, and of stream flow at the heads of alluvial fans are the main recharge sources. Recharge moves down gradient from mountainous areas into basin-fill aquifers that underlie each hydrographic area.

Almost all developed aquifers in Humboldt the County occur in flood plain deposits, alluvial fans and basin lowlands, and are collectively referred to as basin-fill aquifers. The majority of wells for irrigation and water supply are finished at a depth of less than 500-feet in basin-fill aquifers (DWR well logs). Basin-fill deposits can be subdivided as:

- Sorted to well sorted flood plain deposits of Quaternary age;
- Unsorted to poorly sorted, fine- to coarse-grained deposits of alluvial fans and basin lowlands of Quaternary age; and,
- Unsorted to poorly sorted deposits of Tertiary age.

Although basin-fill aquifers are the most common aquifers in Humboldt the County, bedrock aquifers have yielded surprising amounts of water at the Sleeper Mine in Desert Valley and the Lone Tree Mine in Pumpernickel Valley, both of which had to be dewatered. Very little is known regarding other bedrock aquifers.

Bedrock hydrogeologic units generally are thought to be relatively impermeable and do not function as aquifers. However, there are highly permeable volcanic rocks at depth in the Winnemucca area. These rocks are discussed in the Humboldt River section below. In addition, the Lone Tree and Twin Creeks Mines in the southeast part of the County and at the Sleeper Mine in Desert Valley required pumping of large volumes of groundwater in clastic and carbonate rocks of Paleozoic age for dewatering purposes. Bedrock can be subdivided as:

- Basic volcanic rocks of Tertiary age;
- Silicic volcanic rocks of Tertiary age;
- Granitic and metamorphic rocks of Tertiary to Triassic age; and,
- Clastic and carbonate rocks of early Tertiary to Cambrian age.

Hydrographic Regions

Groundwater resources in Humboldt the County are described in the following paragraphs by hydrographic region (see Figure 2). It should be noted that the State Engineer administers groundwater based on smaller “Administrative Groundwater Basins” often referred to as “hydrographic basins” or “basins” and sometimes smaller units called “subareas”.

Black Rock Desert Region

Hydrographic areas in the eastern part of the Black Rock Desert Region are interconnected by the Quinn River. The main groundwater recharge area for Quinn River Valley is the western slopes of the Santa Rosa Range. ~~The south end of the Trout Creek Mountains,~~ The east slope of the Montana Mountains and Double H Mountains generate ~~much little~~ recharge because due in part to the ranges tilt to the north into Oregon and because the generally low elevations receive less precipitation. ~~tudes~~. The exception is the large east facing ridge in the Trout Creek Mountains that provides substantial snowmelt **in heavy snow**

years for forboth McDermitt Creek and the upper Quinn River. Under pre-development conditions groundwater in Quinn River Valley moved toward valley lowlands and then southward in north parts of the valley and northward in south parts. However, pumping for irrigation throughout the valley may have changed directions of flow. The amount of westward groundwater flowing through the gap between the southern end of the Double H Mountains and northern end of the Slumbering Hills is not known, but whatever flow there was may have been captured by past and current pumping.

Kings River and Desert Valleys are separated by the westward flowing Quinn River. The main groundwater recharge areas for Kings River Valley is the east slope of the Bilk Creek Mountains, the south slope of the Trout Creek Mountains and the west slope of the Montana and Double H Mountains. The main groundwater recharge areas for Desert Valley are the east slope of the Jackson Mountains and the west slope of the Slumbering Hills. Groundwater flow in each of the valleys is likely toward Quinn River, although pumping for irrigation in both valleys and dewatering (or current pit-lake evaporation) of the Sleeper Mine in Desert Valley may alter flow direction and volume.

The boundary between Pine Forest Valley Basin and the northeastern boundary of the Desert Valley is at the gap between the Bilk Creek Range and the Jackson Mountains. ~~As the~~ **The** Quinn River flows west through this gap and then turns southward to the Black Rock Desert. The southwestern boundary of the Pine Forest Valley Basin is nondescript, merging into the northeast arm of the Black Rock Desert Basin. The eastern slope of the Pine Forest Range and the western slope of the Bilk Creek Mountains are groundwater recharge areas for Pine Forest Valley. Southern subsurface flow from the Pine Forest Valley Basin serves as recharge for the Black Rock Desert Basin. Groundwater flow in the two hydrographic areas is toward the axis of each valley and then southward in the direction of Quinn River. Additional recharge of the Black Rock Desert Basin includes flows from the south slopes of the Pine Forest Range, west slopes of the Jackson Mountains and east slopes of the Black Rock Range.

The main aquifers in each of the valleys discussed above are in basin-fill deposits. However, there is also potential for aquifers to exist in volcanic rock units, which are common in adjacent mountain ranges.

Recharge areas for the western part of the Black Rock Region including the Summit Lake Valley and Mud Meadows Basins are the west slope of the Black Rock Range and the east slope of the Calico Mountains. Groundwater flow is most likely southward in basin-fill deposits from Summit Lake Valley to Mud Meadows to the Black Rock Desert. There is also an extensive geothermal aquifer in this part of the Black Rock Desert Region, and the two aquifer systems are likely to be interconnected.

Humboldt River Basin

Groundwater in the Humboldt River Basin generally moves along the river floodplain more or less parallel to the river channel. Groundwater in the Winnemucca Segment Hydrological Basin (Winnemucca Segment) occurs in a shallow sand and gravel aquifer, called the medial gravel, and in a deeper basin-fill aquifer. In other hydrographic areas groundwater moves from basin margins toward lowlands and then along the basin axis toward the river flood plain. An aquifer composed of fractured volcanic rocks underlies parts of the Winnemucca Segment at depths of several hundred feet. Since the Humboldt River is a through flowing stream, infiltration from the river into the aquifers is an additional source of groundwater recharge. These flow losses recharge the shallow medial gravel aquifer beneath the river flood plain in the Winnemucca Segment, and the deeper basin-fill aquifer elsewhere.

Groundwater levels have declined in the Humboldt River Basin wherever there has been heavy groundwater pumping. Areas of decline due to agricultural and municipal pumping include Grass Valley

and the Winnemucca Segment Basin. While declines haven't been as notable in the Paradise Valley Basin, historic southerly flows ~~have probably~~ **may have** been altered due to agricultural pumping. **The construction of Chimney Dam, in the early 1970's, which can hold up to 33,000 af of water has also significantly diminished surface flow in the lower section of the Little Humboldt River. .**

Groundwater also has been pumped for mine dewatering purposes at the Lone Tree Mine at the north end of Pumpnickel Valley and at the Twin Creeks Mine in the Kelly Creek Area. Pumping for dewatering has resulted in water-level declines in aquifers at both mines; however, dewatering at the Lone Tree Mine has ceased and groundwater levels are recovering. The development of a pit lake, however, will result in annual evaporative losses, not previously present. Continued pumping at the Twin Creeks Mine has resulted in declines of unknown extent, **but could be significant. The eventual development of a pit lake (upon mine abandonment) will result in an additional increases in evaporative losses**

Northwest Region

The seven hydrographic basins of the Northwest Region are all interconnected by stream flow and possibly also by groundwater flow in basin-fill aquifers and volcanic rock aquifers, though limited studies are available. Basin-fill aquifers are most extensive in eastern parts of the region in Continental Lake and Gridley Lake Valleys. The main groundwater recharge area for this part of the region is probably the western slopes of the Pine Forest Range, with groundwater moving west from the recharge area toward Craine Creek and then north to the discharge area at Continental Lake.

Farther west the region is underlain by various units of volcanic rocks and associated sedimentary rocks. Much of this area is at altitudes of less than 6,000 feet suggesting low amounts of groundwater recharge. Groundwater in each hydrographic area is assumed to move in the general direction of stream flow as indicated by springs and flowing wells along Virgin and Thousand Creeks. Lava flows have the potential to be highly permeable at the tops and bottoms of flows or where fractured and vesicular.

Snake River Basin

Groundwater in the Snake River Basin portion of Humboldt County (Little Owyhee River Area) is inferred to move from the recharge area on the northeastern slopes of the ~~Santa Rosa Range~~ **Calico Mountains** toward the South Fork of the Owyhee River to the northeast in Elko County and southern Idaho. The entire area in northeastern Humboldt County is underlain by lava flows of andesitic to basaltic composition (Willden, 1946, plate 1). These rocks are the probable aquifer in the area and may be highly permeable at the tops and bottoms of individual flows and where they are fractured and vesicular.

Central Region

Groundwater in Buffalo Valley moves from recharge areas in the mountains on the northeast, northwest and west sides of the valley through a basin-fill aquifer toward a playa in the south-central part of the valley. This playa is the groundwater discharge area in the valley. **Only a small portion of Buffalo Valley exists in the County, and as such is of no significance in regard to a Water Plan.**

Groundwater Water Quality

Groundwater quality in the hydrographic regions of ~~Humboldt~~ the County is typically related to the level of dissolved minerals (often reported as total dissolved solids or TDS), which varies with geography, geology, and annual precipitation. In some developed areas, groundwater quality can also be affected by man's activities, such as wastewater disposal or leaks/spills of fuel or chemicals.

The mountain ranges in Humboldt County experience cooler temperatures than the valleys and slightly greater precipitation as the elevation increases. Winter snow accumulations and annual snowmelt cause seasonal surface water runoff from mountain ranges, and groundwater recharge from infiltration along the foothills of the mountain ranges. This fresh water infiltration often results in higher water quality in the recharge areas: alluvial fans and along the fringes of the valley fill aquifers.

The water quality in the basin fill aquifers often becomes more saline toward the center of the valleys. Groundwater tends to dissolve minerals as it travels from the recharge areas to the discharge areas. Groundwater discharge through evapotranspiration occurs at the lower elevations of the valleys, which leaves higher concentrations of mineral salts in soils and groundwater. ~~Typically, the~~ **It is presumed that TDS in groundwater doubles between the alluvial deposits near the mountains and the valley floor, then possibly doubles again between the valley floor and the playa, although there is insufficient data to clearly support this thought, especially as a global concept across all hydrologic basis and sub-basins.**

Mountain spring water quality is good and springs are an important water source for wildlife, livestock, and municipal/domestic drinking water supplies. The exception is thermal springs that have concentrations of dissolved minerals that make the water unsuitable for some uses (drinking water, irrigation, etc.), though they remain suitable for recreation uses.

Typical limitations of groundwater quality in Humboldt County are:

- The concentrations of TDS, sodium, or boron limit suitability for irrigation;
- Naturally occurring arsenic, iron, manganese and TDS limit suitability for drinking water supplies;
- Nitrate concentrations from on-site wastewater disposal systems (septic systems, fertilizers) limit suitability for drinking water supplies; and,
- Isolated areas of petroleum hydrocarbons from leaking underground fuel storage tanks have locally degraded drinking water quality in developed areas.

In the Black Rock Desert Region, groundwater quality is typically suitable for irrigation in the larger valleys to the north (Quinn River, Kings River, and Pine Forest Valley), becoming marginal or unsuitable toward the south and west portion of Humboldt the County (Silver State Valley, Desert Valley and Black Rock Desert) due to high TDS and sodium. Areas with water quality suitable for irrigation are limited largely to locations above the barren playas and greasewood flats. Some locations in the north part of the Quinn River Valley, north of the East Fork of the Quinn River and McDermitt Creek, are also marginal for irrigation due to salinity. In the south and east valleys of the region water suitable for irrigation is limited but can be found near recharge areas along the upper margins of the valleys where infiltration on alluvial slopes provides fresh water that can be intercepted before groundwater migrating toward valley floors and mingling with more saline water. In the vicinity of certain thermal springs (Pine Forest Valley, Hualapi Valley, Mud Meadows), groundwater can be unsuitable for irrigation and drinking water.

Groundwater quality within the Humboldt River Basin is typically suited for all uses. Wells located in basin fill aquifers are used for both irrigation and drinking water supplies. In Grass Valley, groundwater salinity increases toward northeast and in Paradise Valley groundwater salinity increases as it moves south, particularly on the east side of the valley. In general, groundwater in valleys of the Humboldt River Region have some outflow to the Humboldt River that reduces the accumulation of dissolved salts. High salinity makes groundwater unsuitable for drinking water in some areas, due to evapotranspiration and salt concentration in the shallow aquifers of the valley floors.

While most wells in ~~Humboldt~~ the County are finished in the basin fill aquifers, volcanic rock aquifers supply water to a few of the municipal water systems, including the deeper wells used by City of Winnemucca water system, and the clastic/carbonate rock formations pumped by mine dewatering. The City of Winnemucca well water quality meets drinking water standards and water dewatering discharge from the Lone Tree Mine in the 1990's typically met drinking water standards, though was slightly higher than the current arsenic standard for drinking water. The town of Golconda and City of Winnemucca also have spring sources with water quality meeting drinking water standards.

Groundwater nitrate concentrations have exceeded the drinking water standard of 10 mg/L in residential and monitoring wells in Grass Valley, as well as a few other wells on the outskirts of Winnemucca. Several studies regarding groundwater quality in the Grass Valley area suggest that elevated nitrate levels may be related to residential and commercial on-site disposal systems (septic systems) and past irrigation with treated wastewater **from a potato processing plant** (Winnemucca Farms). This processing plant closed in 2015.

Published groundwater quality data is not extensive for portions of the Northwest, Snake River Basin, and Central Regions that fall within ~~Humboldt~~ the County. In the Northwest Region, the quality of groundwater is generally suitable for irrigation and domestic use. Pueblo Valley is similar to other Valleys in the northern Humboldt County with higher TDS and marginal water quality near the central valley floor. Groundwater in the vicinity of thermal springs (Bog Hot Spring) may not be suitable for irrigation due to salinity or drinking water due to salinity and fluoride.

Groundwater Basin Yields and Water Rights

Groundwater rights in Nevada can be described by status and by manner of use. The most common water rights descriptions are Certificated and Permitted. Each status indicates a current right to develop a certain amount of water from a particular source for a certain purpose at a defined location (DWR 2009). Other status indicators include Application, Relinquished, Abrogated, Canceled, Withdrawn, and Vested, among others. These status indicators cover a range of situations, including water rights that are no longer valid, current valid water rights, and water rights still in the application stage that are not yet valid. For the purpose of this Water Plan, currently permitted and certificated water rights within basins in ~~Humboldt~~ the County are considered. **However it is important to note that a great number of livestock water rights are considered vested rights. These water sources have been continuously used for as long as 150 years, thus are considered vested by the State Engineer. Vested rights refer to water being beneficially used prior to the creation of Nevada water law in 1903. Ranchers have been encouraged to properly file on such livestock water sources to avoid possible conflicts in future years.**

A water right manner of use, defined by Nevada Division of Water Resources (DWR), classifies the way in which the water is put to beneficial use. The most common uses in Humboldt County are irrigation, stock water, mining and milling, industrial, and municipal. Other common manners of use include commercial, environmental, power generation, quasi-municipal, recreation, and wildlife. Wildlife have first right to all Nevada water. Any beneficial use of water must not prohibit any wildlife use of the same water. It is important to note that while it is the goal to permit and certificate only the amount of water that can be or has been put to beneficial use, the permitted or certificated duty of a water right may not reflect the actual water used in any given year due to normal fluctuations in use, or periods where certain water rights were not used for some reason or another. For instance, in dry years available surface water flows may limit use from surface water sources, resulting in more groundwater pumping from supplemental groundwater rights that can only be utilized in times of reduced surface water availability.

While the DWR tracks crop and water pumpage inventories in some hydrographic basins, none of the 29 hydrographic basins in Humboldt the County were tracked until 2016. The Humboldt River area was recently ordered for metering in 2016. For this reason, there is no widespread measurement of actual water use basin-wide or countywide, and the use in any given basin can only be estimated as some amount less than the combined permitted and certificated duty.

The perennial yield of a basin can be described as the maximum amount of natural discharge that can be salvaged each year over the long-term by pumping without bringing about some undesired result (DWR 2009). The perennial yield has been established for all hydrographic basins in Nevada, based on various geologic investigations **and computerized models**; these values are shown in Table 2-6.

Analysis of water rights data and characteristics can reinforce ideas, provide new perspectives, and present new questions, such as:

- the importance of agriculture and mining within certain basins;
- the concentration of some uses within some basins and not others;
- the distribution of water use throughout the county;
- the overall water allocated (permitted, certificated, and vested) versus the perennial yield in each basin;
- the relationship between groundwater and surface water rights in some basins; and,
- whether opportunities or threats exist relative to the goals and priorities of Humboldt the County, as related to water rights and potential water use.

Permitted and certificated water rights in excess of the perennial yield of a basin can result in over-pumping in that basin, as well as associated potential consequences such as water level decline, water quality degradation, higher well drilling and pumping costs, land subsidence, and decreases in land value and related tax revenue.

Domestic wells are not required to have water rights associated with them. There are about 2,300 domestic wells in the County, 90 percent of which are in the Winnemucca, Paradise Valley, and Grass Valley areas.

The water rights included in Tables 2-6 and 2-7 was current as of June 2016, and intended to provide a broad overview of the quantity of water rights of various statuses and manners of use within the hydrographic basins in Humboldt the County. Several hydrographic basins are shared with other counties in Nevada and Oregon and the values provided are only for Humboldt the County. only. For more in-depth considerations of water rights in Humboldt the County, it is important to examine and understand the water rights within individual basins, and by individual permit/certificate. Figure 6 illustrates the status of groundwater basins in Humboldt the County as determined by DWR.

Figure 6. Groundwater Basin Status Map

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Table 2-6. Summary of Groundwater Rights (AF) in Humboldt County, Supplementally Adjusted

Basin	Basin Name	Total Rights ^{1/}	Total Demand ^{2/}	Perennial Yield ^{3/}	Designated Basin, Engineers Order #
Northwest Region					
001	Pueblo Valley	5,876.68	5,876.68	2,000	No
002	Continental Lake Valley	10,666.64	10,666.64	11,000	No
003	Gridley Lake Valley	5,916.05	5,916.05	3,000	No
004	Virgin Valley	15.50	15.50	6,000	No
005	Sage Hen Valley	0.00	0.00	250	No
006	Guano Valley	0.00	0.00	2,000	No
007	Swan Lake Valley	0.00	66.62	N/A	No
Black Rock Desert					
024	Hualapai Flat	0.00	25,546.47	6,700	No
025	High Rock Lake Valley	18.66	1,320.85	5,000	No
026	Mud Meadow	5,759.16	5,759.16	13,000	No
027	Summit Lake Valley	12.00	12.00	1,000	No
028	Black Rock Desert	32,696.59	32,696.59	30,000	No
029	Pine Forest Valley	37,873.53	37,873.53	11,000	Yes 711, 831
030	Kings River Valley	0.00	0.00	0	
030A	Rio King Subarea	61,186.82	61,186.82	Combined Yield of 17000	Yes 740, 743
030B	Sod House Subarea	478.34	478.34		Yes 740, 743
031	Desert Valley	38,586.25	38,586.25	9,000	Yes 535, 1269
032	Silver State Valley	19,849.78	19,849.78	5,900	Yes 285
033	Quinn River Valley	0.00			
033A	Orovada Subarea	102,903.51	102,903.51	Combined Yield of 60000	Yes 285, 1227, 1227-1
033B	McDermitt Subarea	6,713.21	6,713.22		Yes 285
Snake River Basin					
034	Little Owyhee River Area	28.04	28.04	1,400	No
Humboldt River Basin					
064	Clovers Area	19,601.34	37,684.15	Combined Yield of 72000	Yes 700
065	Pumpnickel Valley	6,237.47	6,237.47		No
066	Kelly Creek Area	21,601.77	21,601.77		Yes 536
067	Little Humboldt Valley	9,268.95	9,291.01	Combined Yield of 34000	No
068	Hardscrabble Area	0.00	0.00		No
069	Paradise Valley	115,508.09	115,508.09		Yes 408
070	Winnemucca Segment	36,443.46	36,443.45	17,000	Yes 464, 534, 1246
071	Grass Valley	14,609.70	38,324.80	13,000	Yes 464, 1247
Central Region					
131	Buffalo Valley	15,504.80	23,093.25	8,000	No
Total		567,356.34	643,680.04	328,250	

^{1/} Total water rights with points of diversion within the portion of the basin in Humboldt County.

^{2/} Total water rights within the basin, including those with points of diversion in portions of the basin outside Humboldt County.

^{3/} Source Report 3 by NDR

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Table 2-7. Groundwater Manner of Use for Hydrographic Basins in Humboldt County (listed as acre feet)

Basin #	Basin Name	Com	Dom	Env	Ind	Irr	M&M	Mun	POW	QM	REC	Stk	Wld	Other	Total
Northwest Region															
001	Pueblo Valley	10.63	64.42	0.00	0.00	5,784.13	0.00	0.00	0.00	4.06	0.00	13.44	0.00	0.00	5,876.68
002	Continental Lake Valley	0.00	0.00	0.00	0.00	10,433.20	203.20	0.00	0.00	0.00	0.00	30.24	0.00	0.00	10,666.64
003	Gridley Lake Valley	0.00	0.00	0.00	0.00	5,864.52	0.00	0.00	0.00	0.00	0.00	51.53	0.00	0.00	5,916.05
004	Virgin Valley	0.00	0.00	0.00	0.00	0.00	8.50	0.00	0.00	7.00	0.00	0.00	0.00	0.00	15.50
005	Sage Hen Valley	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
006	Guano Valley	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
007	Swan Lake Valley	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Black Rock Desert															
024	Hualapai Flat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
025	High Rock Lake Valley	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.66	0.00	0.00	18.66
026	Mud Meadow	0.00	0.00	0.00	0.00	5,759.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5,759.16
027	Summit Lake Valley	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.00	0.00	0.00	12.00
028	Black Rock Desert	0.00	0.00	0.00	0.00	12,002.43	20,616.33	0.00	0.00	6.14	0.00	71.68	0.00	0.00	32,696.58
029	Pine Forest Valley	4.48	1.63	0.00	0.00	37,712.46	0.00	0.00	0.00	6.32	0.00	148.64	0.00	0.00	37,873.53
030	Kings River Valley	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
030A	Rio King Subarea	112.35	0.00	0.00	0.00	60,833.73	0.00	0.00	0.00	1.00	0.00	145.61	0.00	94.12	61,186.81
030B	Sod House Subarea	0.00	0.00	0.00	0.00	354.00	0.00	0.00	0.00	0.00	0.00	124.34	0.00	0.00	478.34
031	Desert Valley	1.81	0.00	0.00	3,011.59	27,652.15	6,907.46	0.00	0.00	1.75	772.20	168.92	0.00	70.36	38,586.24
032	Silver State Valley	0.00	0.00	0.00	0.00	19,779.00	0.00	0.00	0.00	2.24	0.00	68.54	0.00	0.00	19,849.78
033	Quinn River Valley	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
033A	Orovada Subarea	80.40	0.00	0.00	0.00	102,267.72	15.50	306.89	0.00	0.00	0.00	232.98	0.03	0.00	102,903.52

Basin #	Basin Name	Com	Dom	Env	Ind	Irr	M&M	Mun	POW	QM	REC	Stk	Wld	Other	Total
033B	McDermitt Subarea	0.00	181.00	0.00	0.00	6,198.33	0.00	171.19	0.00	46.70	0.00	115.99	0.00	0.00	6,713.21
Snake River Basin															
034	Little Owyhee River Area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.86	0.18	0.00	28.04
Humboldt River Basin															
064	Clovers Area	0.00	0.00	0.00	16,472.00	320.00	2,643.00	0.00	0.00	23.88	0.00	142.47	0.00	0.00	19,601.34
065	Pumpnickel Valley	0.00	0.00	0.00	0.00	4,436.08	1,688.15	0.00	0.00	0.00	0.00	113.24	0.00	0.00	6,237.47
066	Kelly Creek Area	0.00	0.00	217.19	18.41	5,582.72	15,739.66	0.00	0.00	0.00	0.00	43.79	0.00	0.00	21,601.77
067	Little Humboldt Valley	0.00	0.00	0.00	0.00	9,177.60	0.00	0.00	0.00	0.00	0.00	91.35	0.00	0.00	9,268.95
068	Hardscrabble Area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
069	Paradise Valley	238.61	9.60	0.00	10.00	114,483.99	202.67	0.00	0.00	15.55	2.50	531.98	0.00	13.20	115,508.10
070	Winnemucca Segment	293.04	338.32	24.20	2,261.98	26,764.55	102.02	3,869.34	0.00	2,285.71	136.25	74.23	238.55	55.26	36,443.45
071	Grass Valley	30.66	1.66	0.00	1,122.48	7,885.08	0.00	5,539.53	0.00	9.10	0.00	21.20	0.00	0.00	14,609.70
Central Region															
131	Buffalo Valley	0.00	0.00	0.00	0.00	2,560.00	12,905.00	0.00	0.00	0.00	0.00	39.80	0.00	0.00	15,504.80
Total		771.98	596.63	241.39	22,896.46	465,850.85	61,031.49	9,886.95	-	2,409.45	910.95	2,288.49	238.76	232.94	567,356.32
Percent of total		0.14%	0.11%	0.04%	4.04%	82.11%	10.76%	1.74%	0.00%	0.42%	0.16%	0.40%	0.04%	0.04%	100.00%

Com – Commercial
 Dom – Domestic (not use from domestic wells)
 Env – Environmental
 Ind – Industrial
 Irr – Irrigation
 M&M – Mining and Milling

Mun – Municipal
 Pow – Power generation
 QM – Quasi-Municipal
 REC – Recreation
 Stk – Stock Watering
 Wld – Wildlife

Designated Basins

In the interest of public welfare, the State Engineer is authorized by statute (NRS 534.120) to designate a groundwater basin where groundwater is being depleted, and declare Preferred Uses within such designated basin. The State Engineer has additional authority in the administration of the water resources within a designated groundwater basin. Figure 6 illustrates the designated basins in Humboldt County.

The State Engineer required the installation of metering devices on all non-domestic wells in designated basins within the Humboldt River hydrographic region, to monitor water use by February 1, 2016. In addition, monthly records must be kept of the amount of water pumped and submitted to the State Engineer quarterly. At this time, metering is not required in the other hydrologic regions in Humboldt County.

Commercial, industrial, and quasi-municipal manners of use have been defined as preferred uses in a number of basins, usually with a limited duty ranging from 1,800 to 4,000 gallons per day. The State Engineer has the ability to take out of order and take action on those applications filed for preferred uses. Filings for non-preferred uses can be denied without going to publication.

2.2.3 Reuse/Recycling/ Conservation

Wastewater Reuse

Reuse of treated wastewater is a water resource that has benefitted many communities in Nevada. Publicly owned treatment works collect and treat wastewater from domestic, commercial, and industrial sources that is primarily used for landscape and crop irrigation.

In ~~Humboldt~~ **the** County the communities of Winnemucca, Orovida, McDermitt, and Paradise Valley have small publicly owned treatment systems, but do not reuse the treated wastewater.

Wastewater is also treated at some smaller commercial and industrial facilities in the County and most discharge is disposed of lined ponds for evaporation or rapid infiltration basins (RIBs). While not presently an extensive resource in the County, waste reuse for beneficial uses such as irrigation or wetlands, is a future option.

Underground Injection and Aquifer Recharge

Underground Injection is an expanding technology that can be used to enhance the water resource options. In Nevada, direct underground injection has been used for disposal of industrial wastewater, geothermal discharges, mine dewatering recovery, and direct aquifer recharge. Aquifer recharge through injection wells is being considered in certain locations to seasonally recharge groundwater with surface waters, and high-quality wastewater. The type of discharge and the aquifer characteristics are critical in injection and recharge facility design.

In ~~Humboldt~~ **the** County, underground injection has been permitted for the geothermal facility near Winnemucca (**Blue Mountain**). Mine dewatering has occurred at the Lone Tree Mine. While temporary in nature, mine dewatering and reinjection can involve large volumes of water and present water resource management considerations and opportunities. The effects of mine dewatering are now being considered by the State Engineer in regional water supply evaluations for the Humboldt River Basin.

Small-scale infiltration from residential, commercial, and industrial buildings and infrastructure has also become a popular means of local recharge of aquifers. This approach, known as 'low impact development' and/or 'green infrastructure' is recognized by NDEP as a viable means of storm water management.

Water Conservation

Conservation measures that increase the efficiency of water use are an important tool in water planning. The public water systems in Nevada are required to develop Water Conservation Plans. Water Conservation Plans require an analysis of the effectiveness of proposed water conservation measures, as well as an analysis of the effectiveness of utilizing a conservation-based water rate structure. The Water Conservation Plans also outline proposed water conservation enforcement measures. Building and development codes also require use of water efficient fixtures in new construction and reconstruction.

In addition to municipal water use, water conservation is an important tool in efficient agriculture irrigation practices. Agricultural operations using real-time climate data to calculate evapotranspiration rates and flow measurement may maximize irrigation efficiency. **Additionally, tremendous advances in pumped water application through various irrigation structures (pivots, nozzle type and location, application pressure, etc,) has been made in all County irrigation areas** In Nevada water conservation is considered as a key measure in drought resiliency and is gaining support for resolving water supply issues in certain basins where critical water shortages are predicted.

3.0 Water Uses and Forecasts

3.1 Economy

The economy in Humboldt the County has historically been based on mining, agriculture, agricultural services, and tourism: all of which continue to the present day. A goal identified within the Statement of Economic Development, Goals and Policies, in the Master Plan is to maintain and enhance natural resource-based industries including mining, agriculture, ranching, recreation and tourism, and to seek value-added manufacturing of those resources. It is expected that the County’s economy will continue to rely largely on mining, agriculture, and tourism into the future, while identifying opportunities to diversify by building on strengths such as the large amount of outdoor recreation opportunities and access to the I-80 corridor.

Mining plays a key role in the County, and is an important contributor of capital investment, human resources and skills, technology, and equipment. Agriculture is an important and land-intensive economic sector in Humboldt the County. Agriculture is also important to the County’s customs and culture, and includes ranching and the production of alfalfa hay, alfalfa seed, mint, peas, spring and winter wheat, barley and other crops. There are also areas of land that are specifically set aside for the preservation of natural resources, remnant landscapes, and natural settings for active and passive recreation opportunities.

3.2 Population Trends

The population in Humboldt County in 2015 was 18,248, with 43 percent (7,963 persons) living in Winnemucca (US Census, 2015). Since 2000, the countywide population has grown. Populations in the County, **as well as all communities**, from 2000 to 2015 is summarized in Table 3-1.

Table 3-1. Population in Humboldt County and Communities

Year	2000	2010	2015	Change from 2000 to 2015
Humboldt County	15,903	16,614	18,248	13%
Denio	57	47	N/A	
Golconda	197	214	214	8%
McDermitt	177	172	N/A	
Orovada	140	155	155	10%
Paradise Valley	133	109	109	-22%
Valmy	11	37	N/A	
Winnemucca	7,107	7,462	7,963	11%

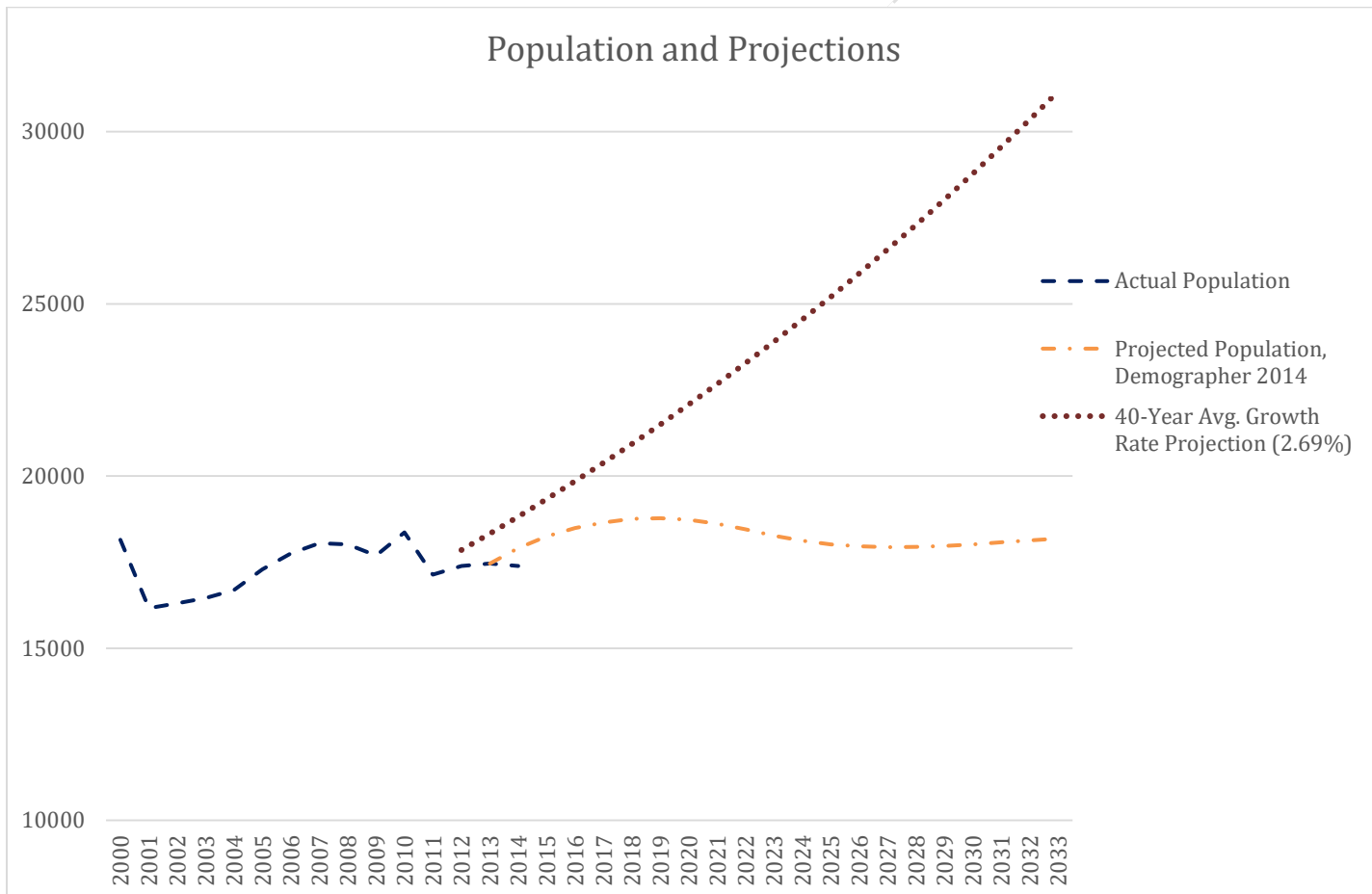
Source: US Census

Long-term actual population statistics from 1969 to 2009 are presented in the Analysis of Socio-Economic Data and Trends for Humboldt County (University of Nevada, Reno, Center for Economic Development, 2012), which determines the average annual population growth for Humboldt the County at 2.69%, based on 40 years of population data. If this longer-term population growth is used to project the population in the County, an additional and different population projection is available to inform planning and decision-making. **The 40- year period to used in the above analysis noted study involved the phenomenal growth**

of the hard rock mining industry, an industry which has more or less stabilized at this point in time. It is extremely doubtful that the estimated annual growth rate of 2.69%, will continue based on the present status of the gold mining industry.

Projecting population in communities can be challenging, especially in communities where the economy and population are so closely tied to boom-and-bust sectors, such as mining. The Nevada State Water Plan, published in 1999, included population projections through 2020, while The “Nevada County Population Projections 2014 to 2033” from the Nevada State Demographer’s Office presented projections through 2033, and took into consideration the effects of the pending Tesla Gigafactory into population estimates. The population projection based on the historic annual growth rate of 2.69% has been projected through 2033 as well. The following graph illustrates the population statistics, as well as two different projections. It must be noted that both the HCBC and the Winnemucca City Council have consistently gone on record of expanding the local economy. Further, they have consistently supported the beneficial use of water to support such efforts. Any transfer of water outside of the County only diminishes or eliminates the success of such necessary efforts

Population and Population Projections 2000 to 2033.



A snapshot comparison of the projected population under the three different projection methods is shown in Table 3-2.

Table 3-2. Comparison of Population Projections in Humboldt County.

<u>Year</u>	<u>Nevada State Water Plan (1999)</u>	<u>Nevada State Demographer (2014)</u>	<u>Historic Average Annual Growth (2.69%)</u>
<u>2016</u>	<u>24,468</u>	<u>18,492</u>	<u>19,851</u>
<u>2021</u>	<u>25,114*</u>	<u>18,618</u>	<u>22,669</u>
<u>2026</u>	<u>-</u>	<u>17,959</u>	<u>25,886</u>
<u>2031</u>	<u>-</u>	<u>18,074</u>	<u>29,561</u>

* Projected population for 2020.

The population projection from the Nevada State Demographer in 2014 continues the overall trend of the actual population from 2000 to 2014. ~~while the older the population projection from the Nevada State Water Plan depicts a much higher growth rate than the actual or the newer projection. The historic annual growth rate of 2.69% also produces a population projection that diverges from the actual population in the near term, and from the projection from the State Demographer in the long term.~~ **Based on current conditions in the County (tourism, mining industrial growth and agriculture) it would suggest that future planning concerning growth should closely follow the Nevada State Demographer’s projections.**

Future water use can be estimated in a number of ways, but most often includes an analysis of historic and existing use, as well as projected future population and major industrial, commercial, and agricultural sectors with respect to development goals. The largest current water uses in Humboldt County are irrigation, mining, industrial, and municipal. It is important to note that the projected possible water use described in the following paragraphs does not take into account water availability in any given hydrographic basin. Existing water use is estimated as the water rights allocated for each use category.

3.3 Agriculture

Irrigation water use comprises 82 percent of groundwater used in ~~Humboldt~~ **the** County, and given the goals presented in a number of planning documents, is expected to remain as the largest water use in the County. The Master Plan, Statement of Land Use Goals and Policies, presents an agricultural policy of “retaining and maintaining areas for agricultural use that are suitable for long-term production”.

In 2012, the Census of Agriculture identified 359 farms and ranches that owned 808,872 acres in total, as shown in Table 3-3. The full USDA 2012 Census of Agriculture County Profile for ~~Humboldt the County, Nevada~~ **the** County, Nevada is included in Appendix A.

Table 3-3 Summary of Agriculture in Humboldt County in 2012

Attribute	Amount
Farms/ranches	359
Land in farms	808,872 ac
Average farm size	2,253 ac

Attribute	Amount
Median farm size	200 ac
Average Market value of land and buildings per farm	\$ 2,233,570
Average Market value of land and buildings per acre	\$991
Market value of all machinery and equipment in county	\$ 97,502,000
Market value of all machinery and equipment per farm	\$271,594
Total cropland	165,292 ac
Harvested cropland	127,509 ac
Irrigated land	137,470 ac
Market value of all agricultural products sold	\$135,337,000
Crops	\$102,440,000
Livestock	\$32,897,000
Cattle and calves	\$32,454,000
Market value of agricultural products sold per farm	\$376,982

Source: Data from Summary of Humboldt County Agriculture, Brad Schultz

Particular items of note (Summary of Humboldt County Agriculture, Brad Schultz):

- The value of agricultural sales in Humboldt County is the largest in Nevada, 135.3 million dollars, and accounts for 17.7% of all crop and livestock sales in the state;
- Tens of thousands of acres of native grass hay meadows (important to livestock production) along the Humboldt River and other streams were not irrigated in 2012 due to drought conditions (with drought conditions extending from 2012 to 2015);
- Alfalfa hay is grown on more acres than any other crop. The 2014 crop survey reported alfalfa hay production on 67,000 acres and a harvest of 337,000 tons; just over five tons per acre; and,
- Livestock production is primarily beef cattle and their calves, with one large sheep operation in the County. Almost all ranches are in the cow-calf business, where the primary product sold is calves.
- **The combined value of ranches and farms, equipment, and commodities produced in the County, based on the data in Table 3-3, approaches exceeds one billion dollars (\$1,034,690,000)**

The present annual market value of all agriculture products sold in the County exceeds \$135,000,000. Economist tell us that for every dollar of agriculture product sold, at least an additional indirect dollar is produced in the local economy. Thus, agriculture in the County is today producing annually, including both direct and indirect impacts, in excess of \$270,000,000.

The primary agricultural water uses in Humboldt County are crop irrigation and drinking water for cattle and calves (the numbers of all other livestock are trivial in comparison). In 2012, the National Agricultural Census reported 137,470 irrigated acres in Humboldt County. Hay crops constitute the bulk of the irrigated acres, with alfalfa hay occurring on over 75% of all acres producing hay. Alfalfa hay typically uses much more water than grass hay.

The 2013 Farm and Ranch Irrigation Survey reported that the average total water applied across all farm sizes, and all types of crops, was 2.8 acre-feet per irrigated acre. Multiplying 137,470 irrigated acres in 2012, by 2.8 acre-feet per acre, suggests an annual consumptive crop use of 384,916 acre-feet. The DWR estimated the groundwater pumped for irrigation in Humboldt County in 2013 to be 321,867 AFA, which is based on the groundwater irrigation water rights in the County. The total irrigation water rights in Humboldt County as of June 2016 was 465,851 AFA. (Summary of Humboldt County Agriculture, Brad Schultz).

~~Since it is not expected that the average rate of water applied per acre of irrigated cropland will change substantially, any changes in water use for irrigation would be due to an increase or decrease in irrigated acreage.~~ The Winnemucca District BLM Resource Management Plan (BLM, 2015) identifies 1,298,544 acres suitable for disposal through sale or exchange. Many of the lands identified are immediately adjacent to existing irrigated areas and could be developed for agriculture if purchased by private landowners, **and assuming additional water would be available.** Table 3-4 presents scenarios of potential water use increase associated with development and irrigation of varying portions of the land identified as suitable for disposal in the RMP. The irrigation water use on a small portion of the total lands identified as suitable for disposal by the BLM quickly dwarfs the existing water use for irrigation in Humboldt County.

Table 3-4. Water demand associated with expansion in irrigated crop area in Humboldt County, based on the total amount identified as being suitable for disposal by the BLM.

Percentage of Total Land Available for Disposal	Area (AC)	Water Use at 2.8 AF/ ACRE	Percentage Increase in Irrigation Use from 2012 Census
1%	12,985	36,358	9.4%
5%	64,927	181,796	47.2%
10%	129,854	363,591	94.4%
20%	259,709	727,185	189%
50%	649,272	1,817,962	472%
100%	1,298,544	3,635,923	945%

Another key consideration is the potential for a decrease in irrigation use in ~~Humboldt~~ **Humboldt** the County in the event of an inter-county transfer of water. Several high-profile discussions have occurred in recent years with owners of agricultural lands and associated irrigation water rights, considering the transfer of said water out of Humboldt County to supply water for increased residential and industrial demands in ~~Washoe and Storey~~ **Washoe, Storey and Lyon** counties. Such a project ~~could~~ **would** result in an **unimaginable** economic loss to Humboldt County due to retraction of one of its biggest industries, as well as the potential ecological effects associated with the retirement of agricultural lands. Appendix B contains University of Nevada Cooperative Extension Special Publication (submitted for review) 17-00 *An Overview of Agricultural Production and Agricultural Water Use in Humboldt County, Nevada, and the Risk from Withdrawing Irrigation Water.*

Almost all water consumed by livestock is from cattle and calves. The January 1 annual census for the number of on-farm/ranch cattle and calves in 2012 was 58,490 head. This value includes bulls, cows without calves, calves either sold and not shipped or held over as yearlings. Water consumption by a mature animal across an entire year averages about 15 gallons per day, which corresponds to an annual consumption in 2012 of about 320 million gallons, or about 983 acre-feet annually. In recent years, cattle numbers have been as high as 65,000 on January 1st, and this number of cattle would consume about 1,092 acre-feet of water. All other livestock combines to consume from under one gallon per day per head (poultry) to about 12 gallons per day per head (domestic horses). Collectively these animals consume less than 25 acre-feet annually. The combined direct consumption of water by all livestock in Humboldt County typically ranges from about 1,000 acre-feet when cattle numbers are low, to 1,117 acre-feet when cattle numbers are high (Summary of Humboldt County Agriculture, Brad Schultz).

Not included in the above figures are wild and feral animals, such as horses and burros managed by the BLM, US Forest Service and US Fish and Wildlife Service. See Section 3.8 for further discussion.

3.3.1 Custom and Culture of Humboldt County Agriculture

The first people to utilize the water in this region were the Numa, members of Northern Paiute Tribes who depended on annual harvests of plants and animals, including abundant trout and other animals. Numa were commonly identified by the most common food source in their areas, such as trout (agai) and rabbit (kamu).

The first people of European ancestry that stepped foot in what was to become Humboldt County was a band of mountain men under the command of Peter Skeene Ogden. (Ogden's Snake Country Journals, Hudson Bay Record Society) Ogden and his men were employees of Hudson Bay, in search of new rivers and new sources of beaver. Ogden first entered what was to become Humboldt County in the vicinity of Denio on October 30, 1828, and spent a little over a month in the area. The party again passed through Humboldt during April of 1829. Throughout his diary there is little, if any, indication of the Humboldt country being hospitable to man, other than the indigenous Northern Paiutes.

Discovery of Gold in California, 1848, set in motion vast changes to the ecology, economy, culture and customs of the Humboldt country. In a few short years thousands of emigrants, oxen, horses, wagons, and every other conceivable means of western movement paraded west down the Humboldt. They had either one of two missions, get to Sacramento and get rich with gold, or go northwest to the Willamette and homestead. They did not stop to see the country, which in a few short years would become Humboldt County.

It was only 8 years after discovery of gold in California that the Utah Territorial Legislature created Humboldt County in 1856, making it the oldest County in what would eventually become Nevada. Likewise, it didn't take the Nevada Territorial Legislature long to recognize the County, once the Mormons withdrew to Salt Lake. Humboldt became one of Nevada's original nine counties in 1861.

Mining was the driving force during those early years. Agriculture was only in its infancy, producing only adequate foodstuffs for the scattered mining populations. But that was all about to change. Thompson and West's 1881 History of Nevada describes the following events; "About the first of June, 1863, R.D Carr, W.B. Huff, J.A. Whitmore and W.C. Gregg started from Star City with the

intention of prospecting the mountains on the north side of the Humboldt ranging to the east. They crossed near where Mill City now stands, and followed the western slope of the mountains until they struck Rebel Creek, which they followed to its source near the summit. On attaining the summit a wide and beautiful valley burst on their view. Having seen only canyons and rugged hills they were much surprised, and W.B. Huff involuntarily exclaimed, "What a paradise", and thus gave name to the valley". By all accounts Carr, Huff, Whitmore and Gregg rapidly switched from mining to agriculture, and within two years were producing grain and hay delivered to Winnemucca for the passing migrants.

With the discovery of the natural resources of Paradise Valley it didn't take long for agriculture to flourish on a grand scale. The Humboldt Register reported on November 16, 1866 the following; *"Humboldt County alone is capable of producing all the hay, grain and vegetables needed by the present population of the State."*

Throughout the early developmental period of the County, agriculture (1860-1930) production was driven by the agriculturists ability to control and harvest mountain spring runoff from the Counties various mountain ranges. Diversion dams were built and miles and miles of ditches were constructed, mostly employing mules, Fresno scrapers and back labor. Production increased every year, and the County became and remained the most productive of all Nevada Counties. However, the great drought of the 1930's. following in the footsteps of the Great Depression, forced many operations into bankruptcy. Production didn't decline from these events, farms and ranchers just got bigger as the more successful operations simply took over the less successful, and management probably got better. It had to, to survive.

Agriculture producers long suspected, and even knew for that matter, that another source of irrigation water was available, literally under their feet – underground aquifers. Shortly after the end of World War II, veterans returned to Nevada and agriculture. Soon various acts, including Desert Land Entries became available, coupled with a flood of cable tool well drillers, mostly from Texas. This combination led to many additional desert valleys becoming equally productive. These included Orovada/McDermitt, Kings River, Denio Valley, Golconda, Desert Valley, Black Rock, Silver State Valley, to name but a few. Then came better well drilling techniques, reverse rotary gravel packed was soon the name of the game. New wells could produce abundant amounts of water and avoid the costly gamble of well collapse associated with the old cable tool way. Advances also occurred with the irrigation techniques, first with solid set sprinklers, then wheel lines and finally center pivots that utilize drops and low head pressure that put water directly where the plant needed it, thus reducing evaporation.. Now computer technology has entered the business, allowing irrigation to be more direct to where the water is needed, as well as the time of day to maximize water efficiency and crop production.

Who were the people that saw the potential agriculture future so early on? They were of German and Italian background for the most part, people who knew how to make the land produce, as long as a bit of water could be found and applied at the right time. They were followed by Basque, and Hispanics, folks more orientated to animal agriculture, as well as Americans from all corners of the land. They came, they worked hard, very hard, and they were successful. They didn't build empires, instead they build productive farms and ranches, and collectively, those farms and ranches created its own empire, called Humboldt agriculture, the most productive agricultural county in Nevada, and one of the most productive within the intermountain region.

3.4 Mining and Milling

The **County** Master Plan states that: “historically, mining, with its boom-and-bust cycles, has dominated the economy of Humboldt County. A decline in all other employment sectors, as well as population, follows the decline in mining activity. Greater economic diversity is necessary to stabilize the economy and soften the impacts of this mercurial industry.” Additionally, “variables in the mining sector have a ripple effect on the employment in all other sectors of the economy.” In addition to a direct effect on employment within the communities near mines and the County as a whole, water use related to mining is affected with fluctuations in mining activity. In 2014, there were 12 mines operating in Humboldt County, which employed a total of 2,343 people or 13 percent of the total county population (Nevada Mining Association).

Mining is identified in numerous plans as a key part of the economy, culture, and history in ~~Humboldt the~~ Humboldt County, to be supported currently and into the future. Within the Comprehensive Economic Development Strategy developed in 2014 for the Western Nevada Development District (WNDD, which includes Humboldt County), a number of goals are identified related to supporting mining into the future. The County is no longer is a member of WNDD. It now is a member of the Northeastern Nevada Economic Development Authority (NNRDA), based in Elko, Nevada. A new Strategic Plan is being developed, and will include:

- *NNRDA Area may want to initiate activities that enhanced gold production in Humboldt and Pershing counties, and linkages to their economic sectors in the NNRDA Region; and,*
- *To help mining-intensive counties to cope with increased demands on infrastructure that come with new mines opening.*

Diversify the Counties economy to include more non-mining businesses, including those that support the growing economic base in the Reno area, where rapidly rising costs are roadblocks to smaller companies that want to do business in the Reno/Tahoe area.

This infrastructure includes the demands on the various water systems within the county.

As shown in Table 2-7, Mining and Milling accounts for the majority of permitted and certificated ground-water rights within a number of hydrographic basins in ~~Humboldt the~~ Humboldt County (Black Rock Desert, Kelly Creek Area, and Buffalo Valley) and is a significant portion of the permitted and certificated duty in others (Desert Valley, Clovers Area, and Pumpernickel Valley). While communities usually occur at or near available water resources, mines are often located distant from usable water sources, which can necessitate inter-basin transfers of water rights to provide sufficient water for dust control, processing, and potable water.

Some mines pump groundwater for dewatering operations, but much of that water quantity is often reinjected into the aquifer in a different location. The quantity of Mining and Milling water rights included in Table 2-7 may or may not include the full amount of water withdrawn from the aquifer, rather than just the consumptive use for individual mines. Individual permits must be reviewed to better differentiate the consumptive use from the total pumped at any given time. Depending on the processes employed, water use in mines can include water for: construction, dust control, equipment maintenance and cleaning, heap leach, ponds, processing, reclamation and revegetation, and potable water for mine employees, among others.

Future mining activity is difficult to predict. Current water rights (groundwater) for mining and milling in Humboldt County total 61,031 AFA (which may include water extracted for dewatering then re-injected). There were 12 active mines in Humboldt County in 2014, which results in an average use of about 5,000 AFA per mine. If up to five additional mines began operating, while retaining those existing in Humboldt County, an increase in water use of 25,000 AFA could result (given the assumptions noted). This would be equivalent to an increase of approximately 40% in water use over the existing permitted and certificated water rights. It is important to recognize that the water use at different mines will vary based on location, need for dewatering, size of the operation, and methods used for mining and processing the ore. An understanding of the current mining activity and associated water use can help to inform projections and assumptions for potential future use.

It should also be noted that pit lakes, existing and future, associated with mining operations influence groundwater dynamics and will result in **significant** evaporative losses. **Annual evaporation rates approach exceed four feet per year throughout the upper Great Basin.** In addition to the potential loss of groundwater associated with pit lakes, they can also change flow and pressure gradients potentially altering subsurface flow direction and quality. Pumps could be kept in place and water reinjected into the aquifer, keeping the pits dry, but that is not economically realistic. At least in theory, all other uses of groundwater could be curtailed.

3.5 Industry

Industry in Humboldt the County includes a coal-fired power plant at Valmy, as well as various industrial uses in the Winnemucca area (Winnemucca and Grass Valley). However, the Valmy plan is currently scheduled to be completely shut down by 2025, although renewable energy projects are currently underway in the County near the Valmy Power Plant and could replace some of the jobs lost to the plant closing. The County has in the past been home to one of the largest potato fields in the U.S. (lower Paradise Valley) and one of the largest potato dehydration facilities in the world (Master Plan). Potato production has largely been replaced with peas, and the potato processing plant has closed.

The current industrial water use, based on permitted and certificated water rights in Humboldt the County is 22,896 AFA, which is the third highest, behind Irrigation and Mining and Milling (Table 2-7). The largest industrial water user is the coal-fired power plant at Valmy, which is located in the Clovers Area (#64) hydrographic basin. Industrial water use in the Clovers Area is 16,472 AFA, or over 70% of the current permitted and certificated Industrial water rights in the County.

In addition to direct agricultural production as described in Section 3.4, the Comprehensive Economic Development Strategy (WNDD, 2014) identifies supporting infrastructure development for food processing plants (contingent upon water availability) as a regional economic sector goal, as well as the creation of an aqua farm (aquaponics) within the WNDD. One regional economic sector goal identified in the Comprehensive Economic Development Strategy is “increase the production, processing, local consumption, and export of food products such as produce, fish, and milk and dairy products, from farming and value-added activities within the region as a way of increasing income for agricultural producers and related businesses, and as a way of increasing food security for residents...” Opportunity may exist for agriculture-related industry given the existing infrastructure in Winnemucca that previously served the potato dehydration facility. There may be additional land available for disposal from the BLM adjacent to existing industrial properties near Winnemucca that could be used for expanding industry in the future.

In addition to agriculture-related industry, the Comprehensive Economic Development Strategy (WNDD, 2014) document identifies diversification of the regional energy portfolio to meet the regional needs while exporting energy to meet larger geographic demand as a goal within the WNDD, as well as to “expand production and use of alternate/clean energy use within the region and increase the export of such energy outside the immediate region and across state lines in the form of products and services that create jobs.”

The Winnemucca District BLM Resource Management Plan (BLM 2015) identifies 1,298,544 acres suitable for disposal through sale or exchange in Humboldt the County, which includes a 4,100-acre parcel adjacent to the existing Winnemucca Airport. This property could be an extension of the existing industrial use near the Winnemucca Airport, should the land be sold and supporting infrastructure developed. Industrial water use varies substantially from one user to the next, as some operations are water intensive while others are not. If an average water use of 3 AFA per acre of industrial development is assumed, an additional 12,300 AFA would be used for 4,100 acres of industrial development, for a total of nearly 35,200 AFA

Any of these projected future industrial opportunities would be dependent upon the availability of water of sufficient quality and quantity, as well as the infrastructure to deliver the water to the appropriate industrial areas. Additionally, waste requirements must be considered and developed.

3.6 Municipal and Domestic

The largest municipal (public) and domestic (private) water supply systems in Humboldt County are summarized in Table 3-5. All other public water supply systems in Humboldt County (parks, stores, gas stations) have one connection. Humboldt County also has a widespread rural population.

Table 3-5. Public Water Supply Systems and Population Served.

Public Water System (water basin)	# Connections ^{1/}	Local Population 2010	# Private Wells ^{2/}
Winnemucca (070 Winnemucca Segment)	2,700	7,462	800
Golconda (070 Winnemucca Segment)	100	214	
Gold Country Estates (070 Winnemucca Segment)	353	353	
Star City (070 Winnemucca Segment)	122	450	
McDermitt (033 Quinn River)	100	172	60
Orovada (033 Quinn River)	50	155	
Valmy (064 Clovers)	48	37	10
Denio (001 Pueblo)	Na	47	35
Paradise (069 Paradise)	Na	109	615
Rural areas	Na	7,945 ³	700

^{1/} Source: Bureau of Safe Drinking Water (BSDW)

^{2/} Source: Parcel map digital information

^{3/} This value is the 2010 Humboldt population less the populations in this column.

Municipal and domestic water use is related directly to population in any given area, and is often expressed as a per capita water use, which is a representative average water use for every person each day in the area of consideration. Municipal water rights encompass use only within public water system service areas.

Community Public Water Systems serve a population of approximately 10,800 people in Humboldt County, according to the Nevada Division of Environmental Protection. Nearly 40% of the population relies on private domestic wells. The per capita water use in Nevada in 2010, as determined by the USGS (2012) was 189 gpd (gallons per day) for those that are self-supplied and 130 gpd for those on a public water supply. In determining projected water use for municipal and domestic use, population is multiplied by the per capita water use. Table 3-6 presents the projected municipal and domestic water use in Humboldt County, based on different population projections presented in Section 3-2.

The Master Plan, Statement of Land Use Goals and Policies section: *Rural Residential policy: "Allow only large lot residential uses (minimum 1.25 acres) in areas that lack adequate infrastructure, i.e., public water, sewer, utilities, and roads.*

New development is limited in the designated basins by water rights. County Code Chapter 16 states that *pursuant to NRS 278.461(2), in the groundwater basins currently designated as depleted by the Nevada Division of Water Resources, which include, Paradise Valley (069), Winnemucca Segment (070) and Grass Valley (071), and in any groundwater basins that will be designated by the Nevada Division of Water Resources as depleted in the future, a parcel map creating new parcels of less than five (5) acres shall be required to relinquish two (2) acre-feet of water rights for each parcel. Prior to approval of the final parcel map, the applicant shall provide documentation that the water rights have been relinquished to the Nevada Division of Water Resources. The Applicant is responsible for the costs associated with acquiring the water rights and relinquishments.*

Table 3-6. Population and Domestic and Municipal Water Use Projections

Year	Nevada State Water Plan	Projected Water Use (AFA)	Nevada State Demographer	Projected Water Use (AF)	Projected Growth (2.69% growth rate)	Projected Water Use (AF)
2016	24,468	4,385	18,492	3,314	19,851	3,558
2021	25,114*	4,501	18,618	3,337	22,669	4,063
2026	-	-	17,959	3,219	25,886	4,639
2031	-	-	18,074	3,239	29,561	5,298

3.7 Recreation/Tourism

Recreation and tourism are identified as an economic development opportunity throughout the County. One regional economic sector goal identified in the Comprehensive Economic Development Strategy (WNDD, 2014) is to “create a world-class destination for state, national, and international visitors that highlights the cultural, recreational, and entertainment amenities of the region.” One strategy identified is to develop additional recreation amenities including wildlife related activities, and trails of multiple forms (hiking, mountain bike, equestrian).

The **County** Master Plan identifies the Humboldt River and riparian corridor as a prominent and valuable landscape feature providing visual resource, economic benefit, wildlife habitat, natural amenities, flood way and water quality benefits. Numerous other recreation areas exist within the County, including high quality hunting and fishing areas, wilderness areas, and small lakes and streams.

Recreation use is a component on the management plans for public lands in Humboldt County including the:

- Humboldt-Toiyabe National Forest;
- Winnemucca District of the BLM;
- Black Rock Desert High Rock Canyon Conservation Area; and,
- Sheldon National Wildlife Refuge.

Water resources are vital in the development of recreation and tourism opportunities within the County, in both the natural and developed environments. In addition to the quality and quantity of those water resources, accessibility in the natural environment and availability to the built environment are essential. If all recreation/tourism, including possibly world class recreation, opportunities become fully developed, annual water consumption could be expected to increase exponentially.

3.8 Wildlife

Wildlife, and associated recreation is a critical component of the customs and culture of Humboldt the County, and provides a key aspect for both recreation and tourism. Hunting, fishing and ~~trapping~~ **camping** are all popular activities amongst Humboldt County residents and visitors alike. Big game found in the County includes: California Bighorn Sheep, Mule Deer, Pronghorn Antelope, and Rocky Mountain Elk. Upland Game found in the County includes: Chucker and Hungarian Partridge, Greater Sage-grouse and Ruffed Grouse. Popular fishing destinations in the County include, but are not limited to: Catnip Reservoir and Dufurrena Ponds (Sheldon National Wildlife Refuge), Onion Valley Reservoir, Knott Creek Reservoir and Blue Lakes (Pine Forest Range), Bilk Creek Reservoir (Bilk Creek Mountains), East Fork Quinn River, North Fork Little Humboldt River, ~~and~~ Martin Creek (Santa Rosa Range), ~~and~~ Chimney Reservoir, **and numerous small mountain creeks originating on the Santa Rosa and other mountain ranges throughout the county..** Wildlife watching is also a popular activity, specifically within the Sheldon National Wildlife Refuge and designated wildlife viewing areas such as High Rock Canyon, Mahogany Creek (Black Rock Range), Pine Forest Mountains, McGill Canyon (Jackson Mountains), Santa Rosa Mountains, and Sonoma Creek.

All the above-listed wildlife resources and associated recreation rely upon available natural water sources and supplemental water sources such as big and small game guzzlers. State Water law guarantees

customary access to spring sources under NRS 533.367, while wildlife guzzlers do not require a water right to collect precipitation for wildlife use. In recent years water rights holders have worked collaboratively with the Nevada Department of Wildlife to develop agreements for maintenance of minimum pool levels in reservoirs such as Knott Creek Reservoir, as well as ensuring in-stream flows for projects like restoration of Lahontan cutthroat trout. Maintaining, improving and developing water available to wildlife in Humboldt County will continue to be important to the conservation of this valuable resource. Conversely, the loss of water and associated habitat available to wildlife could result in adverse environmental and economic consequences associated with any lost wildlife-based recreation and/or potential restrictions on future land use associated with a possible species listing under the Endangered Species Act.

It should be noted that Wild Horses and Burros are not managed as wildlife in the State under the authority of the Nevada Department of Wildlife. Rather, they are managed by the Bureau of Land Management and US Forest Service under the Wild Horse and Burrow Act. The US Fish and Wildlife Service has management authority of horses and burros within the Sheldon NWR, and respective tribes have management authority on tribal lands. Despite this, water rights have been granted by the State Engineer specifically for wild horse use under a “wildlife” beneficial use. This is a contentious issue, particularly given that wild horse and burrow populations often exceed the appropriate management levels set by the BLM, which has resulted in direct conflicts and negative impacts to private land, water rights, public land grazing operations and critical wildlife habitat.

4.0 Water Resource Planning, and Management and Legal Considerations

This Water Plan Framework is intended to provide the communities in Humboldt County a reference to develop local water resources planning and policy measures. Identifying existing plans, policies, and resources which compliment or conflict with local water resources goals, is a critical step in this process. The following summary of issues and opportunities is offered to consider in the development of water resource objectives and policies in Humboldt the County.

This Water Plan serves as a guide in the County's future involvement toward water resource planning, projects, policy and procedures. Such involvement and implementation of the Water Plan will involve continued involvement and interactions with various stakeholders and agencies, and their associated management plans, processes, rules and regulations. This section outlines some of those stakeholders and potential future interactions, as well as anticipated issues and opportunities.

4.1 Stakeholders and Agencies

Water is a precious and limited natural resource in Humboldt the County and throughout Nevada. This Plan was developed under two key guiding principles: In consequence, the water resource plan must:

1. To seek input and support from County citizens and stakeholders; and,
2. To be defensible under associated local, State and federal laws, policies, rules and regulations.
 - be supported by local and regional stakeholders,
 - be defensible before local, State, Tribal and Federal government entities.

Multiple entities have an interest in water resource management. Many will be involved in the implementation of this Plan and should be engaged in the plan development process. Table 4.1 lists potential stakeholders and agencies with a brief summary of their respective general interests.

4.2 Existing Management Plans

Plans and policies developed and adopted at the local level may provide communities in Humboldt the County a strong voice in decision making at the State and federal level. Policies adopted in the Humboldt County Water Plan should acknowledge, though not necessarily concur with, existing management plans for land use and water resources developed by other agencies and/or local communities. While this is a County Water Plan, local communities and other agencies or stakeholders may choose to incorporate policies into their local rules and regulations. Communities represented in the Water Plan may consider incorporating measures in response to or in coordination with these existing policies. Table 4.2 lists a selection of adopted plans with a brief description of related water resource objectives.

4.3 Issues and Opportunities

Numerous plans, policies and programs exist that are relevant to development and implementation of a successful Water Plan. ~~water resources management plan in Humboldt County.~~ For reference, as this planning process progresses, Table 4.3 outlines existing issues and opportunities, as well as future considerations for the following key topics. Communities and decision makers may choose which topics to emphasize in Humboldt County's approach to water planning.

4.3.1 Water Supply and Allocation

Water supply and allocation in Nevada is a complex process regulated primarily through the State Engineer and the DWR and governed by the NRS, the NAC and associated legal rulings. While the Water Plan cannot circumvent laws, regulations, policies, established processes, and legal precedent it can provide a structured framework for when and how the County involves itself in water allocation decisions. Throughout the planning process, the County's citizens and stakeholders have clearly stated they do not want the County to interfere with existing water rights and beneficial water uses within the County, unless it coordinates and cooperates with existing water right holders. However, there is an ardent desire for the County to engage in future water right processes and decisions that if implemented may result in water from Humboldt County being exported to large urban areas, with corresponding negative impacts to the County's customs, culture, economy and/or **environment**. ~~involving local private property owners and potentially public land managers.~~ One outcome of a County approved water plan is an increased probability that the State Engineer will recognize the interests of local communities when decisions are made about water rights, including their transfer out of the County. An on-going participation in water supply and allocation may be a policy emphasis. **An additional goal is to develop and support legal standing on all water issues that could possibly negatively impact the Counties economy.**

4.3.2 Economic Development

Water supply is an important factor in continuing economic development for Humboldt County. Throughout the planning process, County citizens and stakeholders have made it clear that they do not want the County to serve as a public water utility. However, there was a desire for the County to work collaboratively with specific communities, willing water right holders, and stakeholders to address water quality and quantity issues that would allow for economic development that is in balance with available water resources. Current plans for economic development and availability of water and wastewater infrastructure, particularly in the Grass Valley and Winnemucca areas are anticipated to be one focus of water planning.

4.3.4 Hazard Reduction

A water resources plan considers the hazards that can be reduced through effective water resources management. Flood, fire and drought can cause losses for agriculture, tourism, and private property, as well as directly affecting public drinking water supplies. There are several programs currently in place that the County has integrated into this Water Plan, and future water resources planning efforts.

4.3.5 Water Quality

Surface and groundwater quality are an increasingly important consideration in managing water resources. Water uses depend on the quality of water available, as influenced by both natural conditions and human-related pollution. Local planning such as the Source Water Protection Plan to identify the quality of water sources and prevent degradation, is an investment in future water supplies.

High density development without adequate infrastructure was also identified as a potential risk to groundwater and drinking water supplies. While this Water Plan addresses future planning efforts to avoid such problems, the County has indicated a desire to help address existing issues by working collaboratively with affected communities.

4.3.6 Education and Communication

Education is valuable for both developing and implementing an effective Water Plan, as well as maintaining support for the plan into the future. In developing the Water Plan, the County made a

concerted effort to solicit and incorporate citizen and stakeholder input and participation. Implementation of the Water Plan should also incorporate open communications and focused education through the appropriate processes. The plan could choose to emphasize:

- educating the public about the importance of water;
- utilizing technical services available through government and non-profit organizations, and
- focusing on communication between agencies about water use.

4.3.7 Financial Resources

Financial resources are a component in managing water resources, whether it is simply maintaining engagement in on-going water issues, or actively pursuing projects for communities in Humboldt County. The County is responsible for staffing and associated fiscal resources required to implement this Plan.

Table 4.3 identifies some of the funding considerations, as well as local, State and federal sources that could be used in defining the approach to managing water as a precious resource in Humboldt County.

Specific to inter-county water transfers, Nevada water law states that if an appropriation of groundwater results in the transfer and beneficial use of water in a county other than the county in which the point of diversion is located, the county of origin may impose a fee of \$10 per acre-foot of water (NRS 533.438). However, the water law also provides that if the county of origin has not imposed a fee on the transfer of water, the permit holder and the county may execute a plan to mitigate the adverse economic effects caused by transferring water out of the county (NRS 533.4385).

~~4.3.8 Legal Considerations~~

~~Development and adoption of a formal Water Plan will guide the County in its dealings with future federal, State and local processes that influence water resource, both quantity and quality. The Water Plan also improves the County's formal standing in many of these processes. In order to maximize the effectiveness of the Plan, implementation must be deliberate and continuous, requiring active County monitoring engagement in appropriate federal, State and local processes.~~

~~One of the major considerations of this Water Plan was positioning the County to maximize its influence on future water projects that would remove the beneficial use of water in Humboldt County, resulting in a negative impact to the County's customs, culture, economy and/or environment. While the State Engineer ultimately has the authority to make water right decisions, this Water Plan will maximize the County's influence on such a ruling, and subsequent legal or administrative proceedings. Precedent exists for strong local government influence as described by a document entitled "Lessons to be Learned from Serpa and Redrock" located in Appendix C.~~

4.4 Legal Issues Concerning Interbasin Transfer of Water

4.4.1 Transfers Within Humboldt County

Transfer of irrigation waters from one basin to another, within the confines of the County, will require approval of the Planning Commission, based on a submitted plan, prepared by the owner of the right, and the recipient, if other than the original owner. The portion of the plan dealing with the procedures necessary to transfer the water from one basin to another will require the applicant to obtain a Conditional Use Permit from the Planning Commission (*HCC: to be determined at a later date*). Failure

to obtain a Conditional Use Permit from the Planning Commission is appealable to the County Commission.

In addition to the above, the applicant's Plan must include information concerning how any abandoned irrigated land will be managed, including control of noxious weeds (*NRS 555.170*). This plan must include a ten-year management plan on revegetation, including possible irrigation requirements, as well as how said requirements will be accomplished. Revegetation must occur with plant species that will be adaptive to the site once all water is removed. All future harvesting techniques of the revegetated site including grazing, mechanical or other must be addressed. The Plan must be approved and have affixed the stamp of approval of a registered agriculturist with both agronomic and arid land expertise.

If the applicant fails to meet the above criteria, or does nothing, the County reserves the right to make the appropriate necessary arrangements to successfully complete revegetation, as well as noxious weed control, with all costs subsequently added to the applicant's tax base

If the applicant sells the property at the time of transfer, or any time during the subsequent ten-year period after approved transfer, a bond must be posted guaranteeing that the project will be successfully completed within the ten-year time frame. The Commission reserves the right to determine all aspects of the bond, including amount, method of payment, etc.

Water transfers within the same basin will not be affected by the above regulations.

4.4.2 Transfers Outside of Humboldt County

Water represents significant long-term economic opportunity for Humboldt County, far better than any other naturally occurring resource within the County. However, once water is transferred outside of the County, that potential economic resource is forever lost to the County, its citizens, and its future. Consequently, the Humboldt County Water Plan contains the strongest possible actions to reduce the potential loss of this invaluable resource to the County, its citizens, and its economic future.

Transfer of water from a basin within the County to some point outside of the County will require the same procedure(s) as outlined in 4.4.1. However, because of the large economic impact of such transfers, and potential significant environmental impacts at the withdrawal site and along pipeline corridors, the County Water Plan places additional requirements on water transfers that must be met by the entity proposing such transfer; before any transfer is finalized:

- (1) Interbasin transfer of water outside of Humboldt County will obviously require some form of transport, ranging from pipeline to canals to historic waterways. Any such method of transport will require a Conditional Use Permit (*HCC: to be determined at a later date*) from the County Planning Commission, prior to any actual construction of any such transport system. Such Conditional Use Permit will also require the approval of the County Board of Commissioners. (This will need RPC and CC action in the form of Ordinances and policy changes.
- (2) Prior to the actual transfer of water out of the County, the applicant will be required to financially support a scientifically sound independent inventory of all hydrologic and biological conditions in the basin of origin. Such study will include, but not

limited to, existing springs, creeks, seeps, wet meadows, vegetation type(s), current ground water levels and water quality within the impacted basin. The purpose of such investigation(s) will be to establish baseline data so effects any and all potential changes to the environment of the impacted basin can be determined and quantified. If the applicant's plan is approved by the County Board of Commissioners, prior to any actual construction, the applicant will be required to maintain the site study for a minimum of ten years. If the plan indicates that at any time undesirable environmental impacts are starting to occur, after the initiation of water transfer, the Board of Commissioners have the authority to adjust, or eliminate, outflow to correct whatever impacts have been documented.

- (3) The County Board of Commissioners will execute a plan to mitigate the adverse economic and environmental impacts caused by the transfer of water outside the County. It will be the responsibility of the HCBC to select a professionally qualified scientist(s) to conduct such study, and it will be the responsibility of the applicant to fund such study. Such plan will include, *but is not limited to*, provisions concerning the full annual compensation for all properly described economic and environmental impacts suffered by the citizens of the County, as well as the County itself. Compensation will include both primary damages, as well as secondary impacts. The study and compensation, will remain in place for a minimum of twenty years, or until such time that both parties agree to its termination.
- (4) If for any reason whatsoever, any of the above agreements are not fully met to the satisfaction of the County, prior to removal of the water, then removal will not occur. If for any reason whatsoever the above agreements are not fully met after transfer occurs, then the agreement becomes null and void, and the water in question reverts back to the County and will be under the control of the HCBC

Table 4-1. Summary of Potential Water Stakeholders in Humboldt County

Local Stakeholders and Cooperators	Potential Roles and Relevance
<ul style="list-style-type: none"> ▪ Property Owners ▪ Public Water Systems / GIDs ▪ Town Boards ▪ Humboldt Development Authority ▪ County Commission ▪ City Council ▪ Regional Planning Commission ▪ Mining and Industrial Representatives ▪ Grazing and Agriculture Representatives ▪ Conservation Districts ▪ UNR Cooperative Extension, Humboldt County Office 	<ul style="list-style-type: none"> ▪ Water rights can have value as a property right. ▪ Communities represent local interests and in some cases, provide drinking water and other important utilities. ▪ Different communities have different objectives and levels of interest in water resources. ▪ Local government involvement can help plan for the future rather than react once a there is a problem. ▪ Local commercial, agricultural, and industrial representatives help identify needs and issues for economic development. ▪ Humboldt County Extension agents are locally involved with education, watershed, agriculture, and other issues and serves as a key cooperator in critical water issues.
Regional Water Interests	Potential Roles and Relevance
<ul style="list-style-type: none"> ▪ Humboldt River Water Authority ▪ Northern Nevada Development Authority ▪ Central Nevada Water Authority ▪ Pershing County Water Authority 	<ul style="list-style-type: none"> ▪ Regional water authorities are organizations that typically represent interests of the water users by the Hydrologic Region Nevada. ▪ Economic development by local government and economic interests in the geographic region.
State Agencies	Potential Roles and Relevance
<ul style="list-style-type: none"> ▪ UNR Cooperative Extension (UNCE) ▪ Nevada Division of Water Resources (DWR) – State Engineer ▪ Nevada Division of Environmental Protection (NDEP): Bureaus of Safe Drinking Water (BSDW), Water Pollution Control (BWPC), and Water Quality Planning (BWQP) ▪ Nevada Department of Wildlife (NDOW) 	<ul style="list-style-type: none"> ▪ Cooperative extension is locally involved with education, watershed, agriculture, and other issues. ▪ DWR regulates water rights, dams, and wells. ▪ NDEP regulates and provides technical assistance related to groundwater and surface water quality. ▪ NDOW is the state agency responsible for the restoration, and management of fish and wildlife resources as well as the promotion of boating safety.

Federal Agencies	Potential Roles and Relevance
<ul style="list-style-type: none"> ▪ US Geological Survey (USGS) ▪ US Environmental Protection Agency (USEPA) ▪ USDA Forest Service (USFS), Humboldt-Toiyabe National Forest ▪ Bureau of Land Management (BLM), Winnemucca District and Black Rock Desert High Rock Canyon National Conservation Area ▪ US Fish and Wildlife Service (USFWS), Sheldon National Wildlife Refuge ▪ Bureau of Reclamation (BOR) ▪ Bureau of Indian Affairs (BIA) and the Fort McDermitt and Summit Lake Indian Reservations 	<ul style="list-style-type: none"> ▪ The USGS provides water resource data, including the on-going study for the Humboldt River, monitoring data, and groundwater contamination studies. ▪ The USEPA has federal oversight under the Clean water act, primarily related to maintaining surface water quality. ▪ The USFS, BLM, USFWS are agencies that manage water resources and water quality on public lands under their jurisdictions. ▪ The BOR manages, develops, and protects water and related resources in an environmentally and economically sound manner. ▪ The BIA provides services directly or through contracts, grants, or compacts to American Indians. The two Reservations in Humboldt County manage water resources within their respective areas.

Table 4-2. Existing Land and Resource Management Plans in Humboldt County

Plan	Water Resources Related Components
Humboldt County Regional Master Plan	<ul style="list-style-type: none"> ▪ Provisions to establish land uses, outline economic goals, and recognize water rights. ▪ Community Source Water Protection (CSWP) plan to manage sources of public drinking water.
Policy for Public Lands in Humboldt County	<ul style="list-style-type: none"> ▪ Brief statement regarding water rights.
USFS Humboldt National Forest Land and Resource Management Plan	<ul style="list-style-type: none"> ▪ Management direction specific to water resources includes: giving priority for improvement to watersheds where accelerated erosion exists or is increasing; compliance with state water quality standards; and, protecting or improving riparian dependent resources. ▪ <i>Amendment #5 Establishes new objectives, standards and guides for riparian areas with Inland Native Fish (INFISH)</i>
USFWS Sheldon National Wildlife Refuge Comprehensive Conservation Plan	<ul style="list-style-type: none"> ▪ Allow ROW compatible with appropriate uses and development. ▪ Identifies participation in planning and reviewing for water development that could affect refuge.
BLM Winnemucca District Resource Management Plan	<ul style="list-style-type: none"> ▪ Verification of water rights on any land to be acquired. ▪ Acquire water rights when grazing livestock are removed. ▪ Maintain water to support Threatened & Endangered species habitat. ▪ Acquisition of water rights for habitat management including wild horses and burros. ▪ Establishes wellhead protection zones and watershed protection for municipal water supplies.

Plan	Water Resources Related Components
BLM Black Rock Canyon – High Rock Canyon Conservation Area Resource Management Plan	<ul style="list-style-type: none">▪ Identify and restore water quality standards.▪ Maintain surface water quality for LCT and special species.▪ Obtain water rights for uses; maintain riparian and upland areas.

Table 4-3. Issues and Opportunities to Consider in Water Planning

Plans, Policies, Programs	Existing Issues / Opportunities	Potential Future Issues / Opportunities
Water Supply and Allocation		
Water Rights	<ul style="list-style-type: none"> ▪ State Water Plan overall needs and targets. ▪ Water rights permits as existing property rights. ▪ Proposed or future inter-basin and inter-county water transfers (see NRS 533.363 and .364). ▪ Future interstate water transfers. 	<ul style="list-style-type: none"> ▪ Maintain property rights and water management to benefit communities in County. ▪ Education regarding water use and supply. ▪ Monitor on-going study regarding Humboldt River (USGS and DRI). ▪ Opportunities for recharge and recovery projects for improving water supply. ▪ Consider opportunities to expand water reuse. ▪ Mine dewatering and pit lake policies. ▪ Maximize ability to maintain the beneficial use of water resource within the County and prevent water export in circumstances that negatively impact the County.
State Engineer Designations and Orders by Hydrologic Basin	<ul style="list-style-type: none"> ▪ Numerous over allocated basins. ▪ Orders restrict water available for different uses. ▪ Metering and reporting will generate data in Humboldt River Segments. ▪ Remote Basins in County have water available. 	<ul style="list-style-type: none"> ▪ Potential use restrictions for permits in designated basins by DWR. ▪ Data needed to evaluate yields and uses to support options in designated basins.
Water Monitoring Data	<ul style="list-style-type: none"> ▪ DWR ground water levels by hydrologic basin. ▪ USGS groundwater level and quality monitoring. ▪ Nevada BWQP and USGS surface water gaging stations. 	<ul style="list-style-type: none"> ▪ Evidence of declining water levels. ▪ Data to justify water demand or effects of water transfers. ▪ Background to support community water rights in the event of shortages.
County Ordinance	<ul style="list-style-type: none"> ▪ County ordinance for water rights for new parcels in “depleted” basins. 	<ul style="list-style-type: none"> ▪ Review policy and Nevada DWR requirements.
Economic Development		
Regional Master Plan for Humboldt County and the City of Winnemucca	<ul style="list-style-type: none"> ▪ Identifies land uses. ▪ Identifies economic goals and trends. 	<ul style="list-style-type: none"> ▪ Identifies need for a natural resources component. ▪ Water Resources Plan initiated. ▪ Maintain updates with the most recent socio-economic data.
North Nevada Development Authority	<ul style="list-style-type: none"> ▪ Identifies regional economic goals and trends. ▪ Identifies Humboldt County strengths and weaknesses for development. 	<ul style="list-style-type: none"> ▪ Incorporate into County Master Plan and policies.
Water Related Infrastructure: water supply, wastewater, storm water.	<ul style="list-style-type: none"> ▪ Six Community water systems (Winnemucca, Star City Properties, Gold Country Estates, Orovada, McDermitt, Paradise Valley) 	<ul style="list-style-type: none"> ▪ Update target areas for development that infrastructure can serve. ▪ Identify infrastructure expansion needed to serve development.

Plans, Policies, Programs	Existing Issues / Opportunities	Potential Future Issues / Opportunities
	<ul style="list-style-type: none"> ▪ Five wastewater collection and treatment systems (Winnemucca, Paradise, Orovada, McDermitt, Golconda) 	<ul style="list-style-type: none"> ▪ Consider needs to acquire public lands near communities or existing agriculture. ▪ Increasing regulation necessitating storm water utilities.
Hazard Reduction		
Regional Tri-County Hazard Mitigation Plan, 2015	<ul style="list-style-type: none"> ▪ Identifies flood prone areas, hazards for dams, fire risks. 	<ul style="list-style-type: none"> ▪ Implementation of action Items.
Public Water Systems	<ul style="list-style-type: none"> ▪ Water Conservations Plans for public water systems. ▪ Emergency Response Plans for public water systems 	<ul style="list-style-type: none"> ▪ Coordinate with drought resiliency planning. ▪ Coordinate with emergency response planning.
Drought Resiliency	<ul style="list-style-type: none"> ▪ State planning on-going. 	<ul style="list-style-type: none"> ▪ Expand local drought resiliency planning.
County-Wide Fire Assessment	<ul style="list-style-type: none"> ▪ Identifies wildfire risks County-wide. 	<ul style="list-style-type: none"> ▪ Implementation of action Items from Fire Assessments. ▪ Water removed from agricultural can create fire and noxious weed problems. ▪ Grazing management interrelated to wildland fire management – expand coordination.
Water Quality		
Groundwater	<ul style="list-style-type: none"> ▪ Community Source Water Protection Plan for quality of water source for public drinking water supplies. ▪ Past USGS reconnaissance studies. ▪ NDEP groundwater discharge regulations. 	<ul style="list-style-type: none"> ▪ Source water protection plan action items for implementation. ▪ Education and testing for private well owners.
Surface Water	<ul style="list-style-type: none"> ▪ NDEP 303d evaluations and TMDL requirements. ▪ Past USGS reconnaissance and other studies. ▪ USGS studies relating to mine dewatering and pit lakes. ▪ NDEP surface water discharge regulations (NPDES). 	<ul style="list-style-type: none"> ▪ Take advantage of non-point source planning grant opportunities.
Stormwater	<ul style="list-style-type: none"> ▪ NDOT storm water management program. ▪ NDEP permit requirements for construction, industrial, and mining activities. ▪ NDEP non-point source program. 	<ul style="list-style-type: none"> ▪ Future regulation by permit of small urban storm sewer systems (Winnemucca /Grass Valley area population over 10,000).
Water Quality Data	<ul style="list-style-type: none"> ▪ USGS groundwater quality monitoring. ▪ Humboldt County groundwater monitoring in Grass Valley area. ▪ NDEP water quality (nitrate) study in Grass Valley area. 	<ul style="list-style-type: none"> ▪ Ease restriction on new septic systems due to water quality in Grass Valley. ▪ Monitoring to reevaluate Nitrate Management/Restriction Area in Grass Valley.

Plans, Policies, Programs	Existing Issues / Opportunities	Potential Future Issues / Opportunities
	<ul style="list-style-type: none"> ▪ Nevada BWQP surface water quality monitoring. ▪ USGS surface water quality monitoring. 	
Financial Resources		
City/ County/ Utility	<ul style="list-style-type: none"> ▪ Local development fees ▪ Water and wastewater and utility fees (GIDs and privately-owned systems). ▪ Tax revenue 	<ul style="list-style-type: none"> ▪ Investigate GIDs, SADs, or other legal structure to address specific community financial needs. ▪ Consider assistance through Conservation Districts
State	<ul style="list-style-type: none"> ▪ Past assistance through NDEP Office of Water Financing for public water system and wastewater improvements. 	<ul style="list-style-type: none"> ▪ Apply for grants and loans for water, wastewater, and green infrastructure projects.
Federal	<ul style="list-style-type: none"> ▪ Past assistance through USDA Rural Development for water and wastewater project grants and loans. ▪ Past assistance with hazard reduction plans. 	<ul style="list-style-type: none"> ▪ CDBG Community Development Block Grants for assistance with City and County projects. ▪ USDA Rural Development funding for studies, planning, and capital improvements in rural communities. ▪ NRCS funding to address impacts to natural resources (agricultural assistance).
Education and Communication		
Public Education: Water Resources Watershed Water quality	<ul style="list-style-type: none"> ▪ Nevada Outdoor School non-point source water quality and source water protection ▪ Community Source Water Protection Plan Education components ▪ Cooperative Extension helps with agriculture, household wells and water quality 	<ul style="list-style-type: none"> ▪ Implementation of Source Water Protection Action items. ▪ Support NOS to provide a water supply/conservation message in education. ▪ Improve information to developers. ▪ Improve communication with public land managers.
Technical Assistance: Planning Grant/Loan Applications Engineering	<ul style="list-style-type: none"> ▪ Integrated source water protection program assists with plan implementation. ▪ Nevada Rural Water Association helps Public Water Systems ▪ NRCS – Engineering design for natural resources projects. 	<ul style="list-style-type: none"> ▪ Engage USDA Rural Development in water and wastewater infrastructure projects. ▪ RCAC provides assistance with household wells and septic systems. ▪ Utilize UNR Center for Economic Development for training about economic development and local financing opportunities.

5.0 County Water Planning Alternatives Approach, Policies, and Implementation

5.1 Alternative Planning Approaches, and Preferred Approach

The following four water planning approaches (Programs) were considered during the outreach and input phase of the Water Plan process:

Program 1. Limited County involvement (Continue current practice without modification). This involves continuing what the County and communities are currently doing, which is extremely limited involvement.

Program 2. The County would assist to develop water resources in support of local economic development projects. This would include assistance with project-specific water needs where the County would assist in finding water for the project.

Program 3. The County would more broadly assist in development of water resources in support of countywide domestic, municipal, and industrial needs. This would include countywide economic development and countywide water resources. The County would include water resources as an economic component in their Master Plan and consider water with land uses in the Master Plan. The County would take an active role in participating in regional water planning and water issues. The County would devote some staff time to stay in touch with the regional water issues, including water level declines; resource allocation and basin water yields.

The County could be the utility that provides the water and sewer to development.

Program 4. The County would actively consider County water resources from a regional perspective and provide County leadership and development of water resources:

- Consider purchasing and selling water to ensure that the needs for economic development are met;
- Produce and distribute water to assist and support the needs of local communities;
- Produce and distribute water to meet the needs of future economic development; and,
- Produce, purchase, wholesale and transport water from sources inside and outside of the County to meet customer water needs.

Based on input from the HCBC and feedback from Water Plan Workshops and the Citizen's Surveys, "**Program 3**" was the most widely supported Program. Support was strong for the concept of the County becoming more engaged and active in water planning and projects that influence water allocations and quality within the County. However, there was little support and even opposition to the County becoming a water "utility", or for the County implementing policies and actions that negatively impact existing water right holders and domestic well owners. The preferred water planning approach is as follows:

The County will devote staff time, and retain technical assistance when appropriate, to implement this Water Plan, particularly in terms of improving water quality and providing County input on new water allocations. The County's top priority will be to focus on any new water right applications or change applications that may result in out-of-County transfers of water or projects that would result in negative impacts the County's customs, culture, economy or environment. The

County will devote staff time to stay in touch with the regional water issues, including water level declines, resource allocation and basin water yields, as well as remaining engaged in regional water groups such as the Humboldt Basin Water Authority and the Central Nevada Water Authority(?).

The County will more broadly assist in development of water resources in support of countywide domestic, municipal, and industrial needs by encouraging and facilitating cooperation between existing water right holders, project developers and the appropriate stakeholders. The County will include water resources as appropriate in any update to its Master Plan and consistent with this Water Plan.

The County will not serve as a utility that provides water and sewer to development, or be involved with water rights applications and/or purchases to accommodate future growth. However, the County will assist with such efforts on a case-by-case basis when communities, general improvement districts, project proponents or other stakeholders request County support.

5.2 Water Plan Policies and Procedures

The following policies were developed during Phase 2, Public Outreach, of the Water Plan. Most were vetted through the public and HCBC and included on the Citizen's Survey, and some were amended to incorporate suggested changes. Several policies (WP-3c, 3d, 18 and 19) were added to the Draft Water Plan per requests by the HCBC and/or County Water Plan Advisory Group.

Definitions: The following Policies and Procedures were formulated based on the following definitions:

Policy: Must be grounded in some legal document (NRS/County Code/Federal Law) to be considered a Policy

Procedure: A tactic that suggests that this is a good thing to do, although not required by law. Procedures are grouped under policies that adhere to the most.

Water Policies and Procedures

General Policy 1: The County supports the doctrines of prior appropriation and beneficial use as established by Nevada State law, and recognizes that the right to buy, sell, and own water rights is a property right available to individuals, corporations, municipalities, and other organizations.

Procedure: The County supports private development of water resources on private, State and federal lands for beneficial use in Humboldt County in a manner that does not deplete or degrade water resources, lead to impacts on natural resources, or negatively impact the economy of the County. The County supports beneficial uses including, but not limited to, municipal water supply, economic development (industrial uses / mining and milling), irrigation, stockwater, recreation and wildlife uses. The County recognizes the State Engineer's authority to issue water rights in this regard, and will provide input as appropriate particularly when issuance of such a right may negatively impact the County's customs, culture, economy or environment.

Procedure: The County generally discourages out-of-basin water transfers unless beneficial to the County's customs, culture, economy and/or environment.

Procedure: The County strongly opposes out-of-County water transfers particularly in basins that are over-appropriated, and adamantly opposes any out-of-County water transfer that does not:

- a. Demonstrate minimal impact to existing water rights;
- b. Show a long-term benefit to the economic stability of the County; and,
- c. Ensure protection of the County's customs and culture, economy and environment including, but not limited to: agriculture, ranching, recreation, and wildlife.

The above criteria must be met and supported by the impartial and robust scientific and economic data.

General Policy 2: The County shall impose a \$10 per acre-foot fee (or greater amount permitted by current law) for any water exported out-of-county as allowed by NRS 533.438, unless the HCBC approves and executes a plan to mitigate the adverse economic effects caused by transferring water out of the County per NRS 533.4385, or approves an exemption if such a transfer is beneficial to the County's customs, culture, economy and environment.

General Policy 3: The County shall issue a special use permit for any water conveyance infrastructure or right-of-way used to transfer water across or out of Humboldt County. Issuance of a special use permit shall be contingent upon the developer meeting the conditions of WP-3b and WP-3c as determined by the HCBC. (Must enact an Ordinance for this to become a Policy.)

Procedure:: The County shall cooperate with the Division of Water Resources (DWR) to implement the Water Plan in regard to watershed planning, water management, and water data collection and distribution. This includes the County's participation in any monitoring, management, and mitigation planning for projects affecting ground and surface water resources in Humboldt County.

Procedure : The County shall inform federal agencies of its water resources policies and engage as a Cooperating Agency, and be an active participant in the development of federal land management plans and proposed amendments (Forest Management Plans, BLM Resource Management Plans, and US Fish and Wildlife Service Comprehensive Conservation Plans).

Procedure: The County shall encourage and engage in cooperative data collection of water resources in Humboldt County, and sharing of such data to better inform decision related to water management. Any monitoring conducted by the County should focus on general surface and groundwater resources and not on specific water rights unless part of an agreement between the water right holder, State Engineer and County.

Procedure: The County shall remain actively involved in the Humboldt River Basin Water Authority, and work with its members to address regional water resource issues of concern within the Basin.

Procedure: The County supports retaining authority of the State, rather than the US Environmental Protection Agency, to protect water quality under the Clean Water Act, and will encourage coordination among all responsible and affected interests when considering water quality actions.

Procedure: The County shall work with communities and existing water rights holders as necessary or requested to ensure adequate water rights are available for all communities to accommodate future growth, and to ensure that all community water systems meet drinking water standards. In cooperation with the appropriate community or water right holder, the County shall actively seek all possible funding mechanisms to ensure both provisions are met.

Procedure: The County may work with water right holders and project proponents to assist with water right acquisitions to be applied for municipal and industrial uses for future economic development, or to ensure that communities are meeting drinking water standards.

General Policy 4: The County shall continue to support County Code 16.16.030, or similarly adopted code in order to minimize impacts of future development within designated groundwater basin:

County Code, Chapter 16.16.030 states that pursuant to NRS 278.461(2), in the groundwater basins currently designated as depleted by the Nevada Division of Water Resources, which include, Paradise Valley (069), Winnemucca Segment (070) and Grass Valley (071), and in any groundwater basins that will be designated by the Nevada Division of Water Resources as depleted in the future, a parcel map creating new parcels of less than five (5) acres shall be required to relinquish two (2) acre feet of water rights for each parcel. Prior to approval of the final parcel map, the applicant shall provide documentation that the water rights have been relinquished to the Nevada Division of Water Resources. The Applicant is responsible for the costs associated with acquiring the water rights and relinquishments.

General Policy 5: The County shall establish density requirements for individual well and septic systems, and expand service areas where appropriate and/or necessary to avoid groundwater contamination and to meet drinking water standards. (Must enact an Ordinance to achieve this)

Procedure: The County shall implement and abide by the 2017 Community Source Water Protection Plan for Public Water Systems in Humboldt County to establish measures that prevent groundwater contamination.

Procedure: The County shall promote efficient use of water resources by encouraging water conservation measures for both future public and private developments.

Procedure: The County supports the development of conservation easements for willing landowners and water rights holders to purchase development rights resulting in lands staying in agricultural production with the beneficial use of water remaining within Humboldt County.

General Policy 6: The County supports the temporary reservation of water for reclamation of irrigated lands that are retired from production in the event of a water transfer. Reclamation would consist of establishment of desirable, adapted perennial vegetation that would stabilize the site from erosion (wind and water) and prevent establishment of non-desirable invasive or noxious species. (Must enact an Ordinance to achieve)

Procedure: The County shall work with the University of Nevada, Reno and/or UNR Cooperative Extension as well as local and regional economic development authorities to quantify the economic value of water being used in Humboldt County, as well as identifying future water needs for economic stability and development within the County.

Procedure: The County is generally opposed to the Federal Government, or any federal agency, holding water rights in Humboldt County. The County is adamantly opposed to the Federal Government holding water rights that do not fulfill that agency's original purpose and/or results in negative impacts to the County's customs, culture, economy or environment.

Procedure: The County is supportive of securing water rights and developing guzzlers for recreation and/or wildlife purposes when such rights and projects are developed in collaboration with existing water right holders and appropriate stakeholders. The County opposes new water rights or changes to existing water rights that would adversely impact important recreation activities and/or wildlife resources, particularly if such a change would result in the potential for listing of a species under the federal Endangered Species Act.

~~**Note: this policy statement was not included in the Phase 2, Citizen's survey but was requested by members of the HC Water Plan Advisory Group.**~~

5.3-5.2 Water Plan Implementation

This Draft Water Plan will be considered by the HCBC and may be approved and adopted by the HCBC as part of its regular public process. Any future amendments would also require consideration by and approval of the HCBC. If the Water Plan is approved, it will be up to County staff to determine the appropriate staffing assignments for implementation of the Water Plan. Implementation may require updates and approval of other associated plans and/or County rules and regulations per the appropriate process for each. The Water Plan should also be transmitted to appropriate stakeholders and agencies and be made available to the citizens of Humboldt County and any interested public.

5.2 5.3 Water Planning Considerations and Opportunities

Depending on the planning and active involvement approach, consider the following considerations and opportunities.

- Address proliferation of domestic wells. Does the County want to provide central water system? Consider buying water rights. Benefits include fire control.
- Consider creating a water district to:
 - Designate areas for concentrated development and provide with sewer and water.
 - Work with the State Engineer to change the 2 afa/lot requirement to 1 afa or less.
 - Apply for grants and loans.
 - Monitor and understand water resource quality and quantity.
 - Receive a domestic well credit for the water purveyor for every domestic well that hooks up to municipal water.
- Consider water as a valuable resource and commit staff time.
- Define the boundaries of the nitrate restricted area in Grass Valley.
- Consider a waste management system program with dedicated County staff.
- Consider smaller lots with infrastructure from the county.

- Consider policy that leaves 1 afa and funding with irrigated land to reclaim the land back to more native vegetation.
- Focus efforts in different basins and have policy alternatives for different basins.
- Consider plans for the remote areas with water. Consider if the County wants to keep water in the county or export it?
- Consider planning in over-allocated basins.
- Consider planning in basins with poor water quality or lack of enough water.
- Maintain water for fire control and weed suppression.
- Monitor to understand extent of basin issues.
- Develop policy for residential / industrial to target water.
- Participate in USGS / DRI projects.

~~5.3~~ 5.3 Water Plan Completion

Completion of this water plan will require thought and effort by the county and communities as described in this section:

- Develop a county and community planning team to finish the water plan.
- Provide a series of presentations and workshops for education and plan validation. Educate residents on water issues so they can tell you what they want.
- Consider county water planning alternatives and refine the planning and policy approach that the county and communities want to support.
- Discuss water planning alternatives with the communities and hold public hearings to receive comments.
- Revise this water plan to document the decisions including selected action items and priorities

5.4 The Future of The Water Plan

This Water Plan is a living document, its in its initial stages. Like any such document it is subject to certain changes, exactly as the County changes with time, exactly like agriculture has changed with time, exactly like this nation has changed with time. However, some things must never change if our future is to be secure. Above all else, water is absolutely essential to the economic and ecological future of this County, and this water must stay. Throughout the development of the Water Plan many ideas came forth from all quarters, but the underlining theme was always that water represents opportunity not only for the present, but far into the future and that water is absolutely essential. Many of the ideas that were presented are now an integral part of the Plan, many of the ideas remain ready to be incorporated as this living plan develops.

Some of the suggestions that are currently included in the Plan recognize the fact that the County supports the doctrine of prior appropriation and beneficial use, and the fact that a water right is a property right. The County supports private and wise development of water resources. The County recognizes the State Engineer's authority, but will provide significant input when issuance of such right may negatively impact the County's customs, cultures, economy or environment.

Plainly stated, the County will vigorously oppose any and all out proposed out of County water transfers.

As this Water Plan grows other factors are most worthy of consideration including; the County will cooperate fully with the DWR in better understanding this resource. The County will work closely with DWR to better manage the water resource including watershed management, water data collection, monitoring and management. Additionally the County must inform federal agencies of the Water Plan, and work closely with those agencies in the future development of all federal land management plans affecting this County and its citizens, including, with special emphasis, any such proposed plans that deal in any way with the County's water resources. The County must remain actively involved with the Humboldt River Basin Water Authority, and should consider joining the Central Nevada Water Authority.

At some point in time the Plan needs to clearly delineate the County's support of the authority of the State, rather than the United States Environmental Protection Agency in regards to water quality under the Clean Water Act

The future development of the Plan should include a better understanding of how the County can work positively with communities and existing water rights holders as necessary, or requested, to insure adequate water is available for all communities to accommodate future growth, and to ensure that all community water systems meet drinking water standards. Additionally the County must actively seek all possible funding mechanisms to ensure these provisions are met.

The County, through the continued development of the living Water Plan should work with all citizens to better understand the workings and importance of County Code 16.16.030, or any other similarly adopted code that impacts the development of residential water in designated ground water basins. Further, the County should establish density requirements for individual well and septic systems to avoid groundwater contamination, and to meet drinking water standards. Also the County shall implement the Community Source Water Protection Plan for Public Water Systems to establish measures that prevent groundwater contamination.

The County supports the study and possible development of conservation easements for willing landowners and water right holders to purchase development rights resulting in lands staying in agriculture production resulting in the economic and environmental beneficial use of water remaining within the County.

The County needs to continue and expand its work with the Nevada Cooperative Extension Service, the University of Nevada and any and all local and regional development authorities to more fully quantify the economic value of water being used within the County.

The County is adamantly opposed to the Federal Government, or any federal agency, holding any water rights that do not fulfill that agency's original purpose and/or results in negative impacts to the County's custom, culture, economy or environment. The County is generally opposed to the federal government, or any federal agency holding water rights in Humboldt County.

The County is supportive of securing water rights and developing such tools as guzzlers for recreation and/or wildlife purposes when such rights and projects are developed in collaboration with existing water right holders and appropriate stakeholders. The County opposes new water

rights or changes to existing water rights that would adversely impact important recreation activities and/or wildlife resources, particularly if such a change would result in the potential for listing of a species under the federal Endangered Species Act.

Finally, the County, and more importantly its citizens must remember that this Water Plan is a living document, and it has only begun its first days. The above discussion of ideas that have come from all walks of life within the County are the food for the continued growth of the Plan. In the final analyses its not up to the County Board of Commissioners to see that this happens, it up to the Citizens of one of this Nations greatest counties

-30-

6.0 References

- Bureau of Land Management, 2015. Winnemucca Resource Management Plan and Final Environmental Impact Statement.
- Cohen, Philip, 1966, Water in the Humboldt River Valley near Winnemucca, Nevada: U.S. Geological Survey Water-Supply Paper 1816, 69 p.
- City of Winnemucca, City of Winnemucca Water Conservation Plan, July 2006.
- Emett, D.C. Hutchinson, D.D., Jonson, N. A., and O’Hair, K.L., 1994, Water-resources data, Nevada, water-year 1993: U.S. Geological Survey Water-Data Report NV-93-1, 596 p.36.
- Harrill, J.R., and Moore D.O., 1970, Effects of Ground-Water Development on the Water Regimen of Paradise Valley, Humboldt County Nevada 1949-1968, and Hydrologic reconnaissance of the tributary Areas, Water Resources Bulletin No. 39.
- Huxel, C.J., Parkes, J.E., and Everett, D.E., 1966, Effects of Irrigation Development on the Water Supply in the Quinn river Valley Area, Nevada and Oregon, 1950-64, Water resources Bulletin No. 34, p. 39.
- Farr West Engineering. Regional Tri-County Hazard Mitigation Plan, 2015.
- Gilluly, James, 1967, Geologic map of the Winnemucca Quadrangle, Pershing and Humboldt Counties, Nevada: U.S. Geological Survey Geologic Quadrangle Map GQ-656, scale 1:62,500.
- Thompson, T.H., and A.A. West, 1881. History of Nevada, Oakland, CA.
- Humboldt County, Assessor Parcel Data and Land Use Data geospatial files, 2015.
- Humboldt County Regional Planning, Humboldt County Regional Master Plan. Revised 2012 Update.
- Lopes, T.J., Buto, S.G., Smith, J.L., and Welborn, T.L., 2006, Water-table levels and gradients, Nevada, 1947-2004: U.S. Geological Survey Scientific Investigations Report 2006-5100, 28 p.
- Lopes, T.J., 2006, Quality of Nevada’s Aquifers and Theirs Susceptibility to Contamination, 1990-2004: U.S. Geological Survey Scientific Investigations Report 2006-5127.
- Maurer, D.K., Lopes, T.J., Medina, R.L., and Smith, J.L., 2004, Hydrogeology and hydrologic landscape regions of Nevada: U.S. Geological Survey Scientific Investigations Report 2004-5131, 35 p.
- Nevada Department of Transportation, District III, 2014. Button Point Rest Area RP0808, Water Conservation Plan, 2014.
- Nevada Division Environmental Protection, State of Nevada. Map Resources: NDEP eMap. Retrieved September 2015 from <http://ndep.nv.gov/admin/gis/index.html>.

- Nevada Division of Environmental Protection Bureau of Water Quality Planning, 2015. Nevada 2015 Water Quality Integrated Report.
- Nevada Division of Water Resources, 2016. Water Level Data, retrieved on-line at <http://water.nv.gov/data/waterlevel/> on 4-22-2016.
- Nevada Division of Water Resources, 2016. Hydrographic Regions and Basins, Humboldt County's Hydrographic Regions, Basins and Sub-Basins. Retrieved June 2016 from <http://water.nv.gov/programs/planning/counties/?county=08>
- Nevada Mining Association, Data and Analysis. Retrieved June 15, 2016 from www.nevadamining.org/faq/analysis.php
- Nevada Rural Water Association. 2014. McDermitt General Improvements District, Water Conservation Plan, October 20, 2014.
- Nevada Rural Water Association. 2015. Orovada General Improvements District, Water Conservation Plan, March 16, 2014.
- Ogden's Snake Country Journals, 1827-1829. The Hudson's Bay Record Society. Volume XXVIII
- Plume, R.W., and Ponce, D.A., 1999, Hydrogeologic framework and ground-water levels, 1982 and 1996, middle Humboldt River basin, north-central Nevada: U.S. Geological Survey Water-Resources Investigation Report 98-4209, 2 sheets.
- Prudic, D.E., and Herman, M.E., 1996, Ground-water flow and simulated effects of development in Paradise Valley, a basin tributary to the Humboldt River in Humboldt County, Nevada: U.S. Geological Survey Professional Paper 1409-F, 92 p.
- Thomas, J.M., and Hoffman, R.J., 1987, Nevada Groundwater Quality, U.S. Geological Survey Open-File Report 87-0738.
- U.S. Census Bureau: State and County QuickFacts. Data derived from Population Estimates, American Community Survey, Census of Population and Housing, State and County Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic Census, Survey of Business Owners, Building Permits Last Revised: Wednesday, 02-Dec-2015 09:59:36 EST
- Waterresource Consulting Engineers (WCE), 2000, Well Head Protection Program for City of Winnemucca: Waterresource Consulting Engineers report, Reno, Nevada.
- Western Nevada Development District (WNDD). Comprehensive Economic Development Strategy 2014, February 2014.
- Western Regional Climate Center (WRCC), 2016. Website <http://www.wrcc.dri.edu/> accessed 2016.
- Humboldt Development Authority. Winnemucca Futures Project, Scenario Planning and A Shared Vision for 2030, 2015.

United States Census Bureau, City/County Boundaries, roads and other information, <http://www.census.gov/geo/maps-data/data/tiger.html>.

United States Geological Survey, 1:24,000 scale topographic maps variable dates, <http://nationalmap.gov/viewer.html>.

United States Geological Survey, Estimated Use of Water in the United States in 2010, Circular 1405, 2014

United States Federal Emergency Management System. Flood hazard mapping for Nevada, Map Service Center Flood Map Store, 32-NFHL_20110929.

Willden, Ronald, 1964, Geology and mineral resources of Humboldt County, Nevada: Nevada Bureau of Mines and Geology Bulletin 59, 154 p.