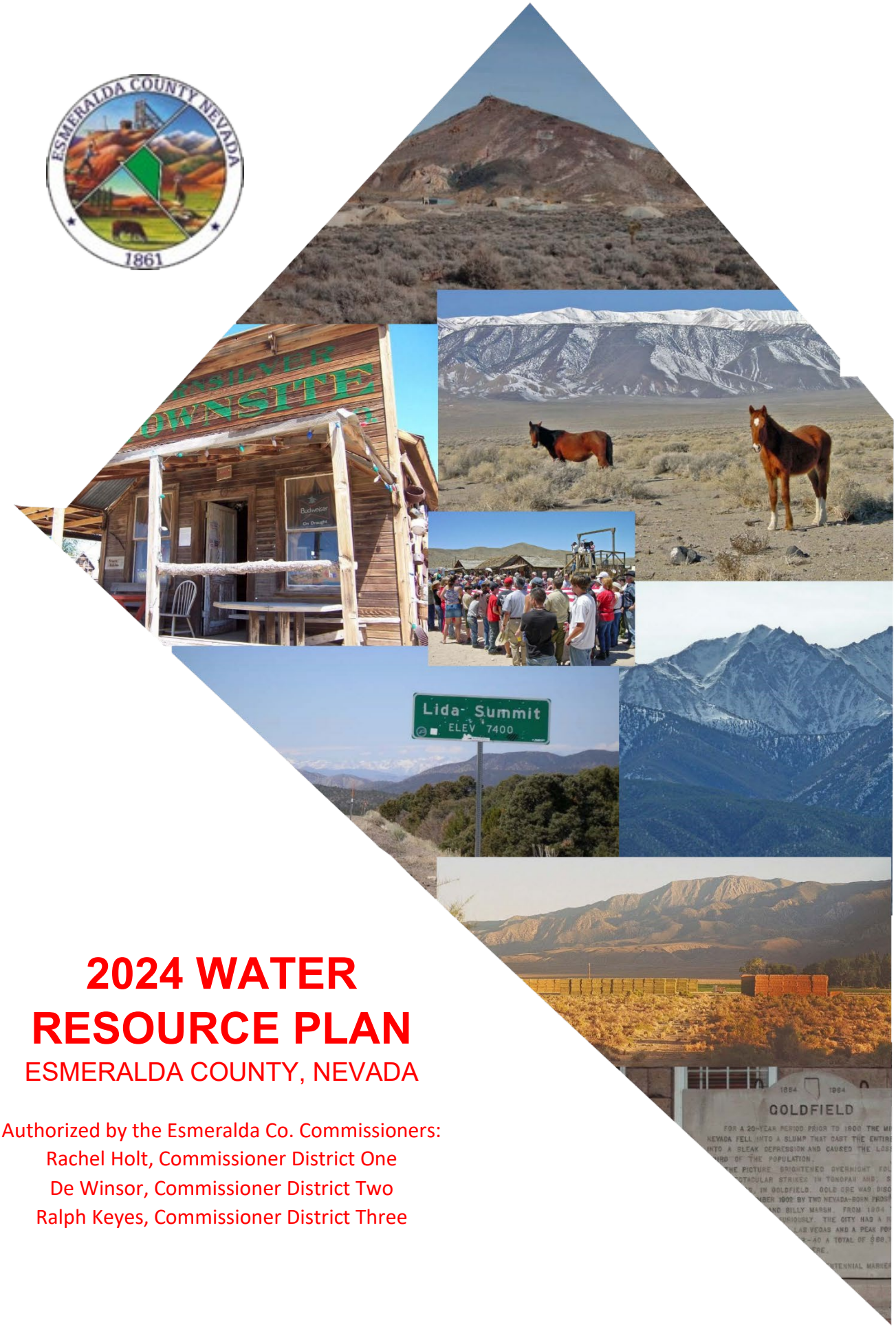

2024 WATER RESOURCE PLAN

ESMERALDA COUNTY, NEVADA

Authorized by the Esmeralda Co. Commissioners:
Rachel Holt, Commissioner District One
De Winsor, Commissioner District Two
Ralph Keyes, Commissioner District Three

2024 WATER RESOURCE PLAN

ESMERALDA COUNTY, NEVADA

Authorized by the Esmeralda County Commissioners

Rachel Holt, Commissioner District 1

De Winsor, Commissioner District 2

Ralph Keyes, Commissioner District 3

The Commissioners are currently the Planning Commission

Prepared by the Esmeralda County Land Use Advisory Committee (ECLUAC)

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Nevada State Land Use Planning Agency

Draft Initiated by the ECLUAC on January 27, 2022

Adopted this __th day of _____, 2024

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INTRODUCTION

Water is fundamental to Esmeralda County's present and future. It is the most precious natural resource the County possesses. To preserve the environment, resident lifestyles, and to meet the needs of area citizens, the County must provide an adequate source of water for economic well-being and quality of life.

The Esmeralda County Water Resources Plan (Plan) was developed to manage water resources by establishing guiding principles and policies. Policies restricted to public lands are presented in the Public Land Policy Plan and the County Master Plan refers to this Plan for Water Resource Policies that apply across the entire County. This Plan should be regularly updated at a minimum of ~~five~~ ten-year intervals, or when significant changes occur to the County's water resource demands. Senate Bill 150 (2019) requires every Nevada County to have a water resource plan.

There are eleven hydrographic basins that are either entirely or partially within the County. Eight of the hydrographic basins are also contained within other counties in Nevada and four of the hydrographic basins are partially in California. Fish Lake Valley and Big Smokey Valley hydrographic basins have been given a designated status (NRS 534.120) by the State Engineer. The designated basin status allows for additional management options including greater documentation of water withdrawals and water levels.

The Plan was initiated and established by the Esmeralda County Board of County Commissioners. The Board of Commissioners has recognized the need for long-term resource and development planning and has worked diligently to accomplish planning goals for several years. This Plan was developed in cooperation with the Nevada Division of Water Resources and other federal, state and local agencies. Preparation of the Plan occurred with public input through the County Commission and local participation.

This Plan quantifies water resources including precipitation, surface water, groundwater, beneficial use, climate change based on National Oceanic and Atmospheric Association (NOAA) modeling, drought, and environmental requirements. The beneficial use of surface and groundwater resources at allocated/allowable quantities of approximately 109,000 AFA (Table 1) exceeds the perennial yield and is not sustainable.

The annual groundwater withdrawal of approximately 44,000 AFA (Table 1) within the County has removed groundwater from storage in the three most populated basins as is evidenced by the continued decline of the water table for periods of time exceeding several years. ~~Water levels in Fish Lake Valley have declined up to 2.5 feet per year resulting in greater than 75 feet of cumulative drawdown.~~ Water level declines at current rates are resulting in:

- The deepening of wells and the need to drill new deeper replacement wells
- The installation of higher lift pumps and additional pump column
- Increased pumping costs from greater pumping lifts
- Irreversible land subsidence and collapse of aquifer storage
- Degrading of the groundwater water quality

- Fugitive dust contributing to health problems in the community

These impacts from water level declines will decrease the economic efficiency of agriculture, mining, industry, and residential water production resulting in unsustainable economic conditions for the beneficial use of water. In addition, environmental impacts from over withdrawals will degrade spring flows and vegetation that will impact the wildlife, native vegetation, and public health within the County

Water resource issues and demands vary greatly between the Districts within the County. This Plan provides guiding principles, and policies that will enable the County to utilize water resources in a sustainable manner. The policies were developed to accommodate the contrasting needs of the three Districts in the County. A brief discussion of the Districts and some of the issues are presented below.

District 1 includes the Goldfield area and must allocate water resources for mining, ranching, tourism, recreational activities and industry. Sustainable economic water resources must be managed to support the Goldfield Community and allow for growth within Goldfield. The aquifers in the area of Goldfield have experienced declining water levels in the past and are vulnerable to declines in subsurface inflows from Ralston Basin in Nye County.

Preventing unsustainable water uses within the basin and adjacent to District 1 in Nye County will be critical to the economic prosperity of Goldfield. Allowance of new uses of water will decrease the amount of water resources available to Goldfield Community. District 1 needs to incorporate future demands into the existing water supply system to allow for management of the groundwater resources and water system delivery.

District 2 includes the majority of the County excluding Goldfield and Fish Lake Valley and must allocate water resources for mining, ranching, recreational activities, residence-based retail services and geothermal power. Silver Peak constituents encourage growth, Tonopah constituents encourage industrial, large commercial and retail development and Lida constituents encourage historical preservation and residential development. The greatest issue within District 2 is the groundwater declines from the production of municipal water, industrial water, and mining of brackish water. Historic and permitted future pumping may take greater than one hundred years for the water level to return to levels prior to the initiation of pumping. Therefore, groundwater declines of the freshwater aquifer could continue for greater than one hundred years after the cessation of pumping for the existing evaporative mining operation. District 2 must balance the benefits of mining versus the long-term viability of other water uses within the basin. Growth and development of Silver Peak will require a reduction of water resources to mining or other industrial uses.

District 3 is limited to the Fish Lake Valley area and the water resource cannot sustain additional economic growth and development. Additional population growth would require a significant decrease of existing agricultural water use. The main groundwater issue for District 3 is that the current uses of water within the hydrographic basin, including California, exceed the recharge rates resulting in unsustainable, declining water levels. Therefore, permitted allocations which exceed available water resources and actual groundwater withdrawals must be reduced within Nevada and California until groundwater withdrawals are sustainable. Any additional use of water for residential or other purposes will need to be mitigated by forfeiture of water at a rate greater than demand to account for the over-appropriated water within the basin.

Hydrographic Basin Number and Name		DWR Perennial Yield Nevada & California AFA	ECWRP Perennial Yield Esmeralda County AFA	Water Use 2017 Esmeralda County AFA		Water Use 2017/ ECWRP Perennial Yield Esmeralda County	Permitted Allocations Esmeralda County AFA	1 13	P Al ECWR Esme Co
114	Teels Marsh	1400	1,400				1,529		10
116	Queens Valley	600	300	-			NA	2	N
117	Fish Lake Valley	30,000	19,000	36,373	*16	191%	51,490	2,15	27
118	Columbus Salt Marsh Valley	4,000	3,600	1		0%	3,998		11
136	Monte Cristo Valley	400	200	-		0%	398		19
137A	Big Smoky / Tonopah Flat	6,000	2,000	53		3%	22,541	3	11
142	Alkali Spring	3,000	2,000	70		4%	2,458		12
143	Clayton Valley	20,000	12,000	14,231		119%	23,727		19
144	Lida	350	300	12		4%	354		11
146	Sarcobatus Flat	3,000	200	-		0%	3,535		17
231	Grapevine Canyon	400	200	7		4%	12		6
232	Oriental Wash	150	100	12		12%	9		9
PWR 107 Federal Reserved Water ght for Wildlife							1,000	6	
Domestic well requirements based on parcels							3,000	7	
	Total		39,900	50,759		127%	112,522		28

Table 1 Groundwater Perennial Yield, Water Use and Permitted Allocations

Table 1 Groundwater Perennial Yield, Water Use and Permitted Allocations (Continued)

[1] ECWRP State and Federal allowable withdrawals are determined as the greater between ECWRP perennial yield or existing allocations.

[2] No allowable withdrawals are included because of the lack of significant public land and permitted water rights.

[3] Estimated total water rights within Esmeralda County included (not total appropriation within basin).

[4] ECWRP perennial yield for Alkali Springs basin reduced by 1,000 AFA because of declining water levels during periods of peak demand.

[5] ECWRP perennial yield for the Clayton basin reduced by 8,000 AFA because of declining water levels in the fresh water and brine aquifers.

[6] PWR 107 rights are unknown and the value of 1,000 is arbitrary.

[7] Domestic well credits occur and will continue to occur predominantly in Fish Lake Valley .

[8] Inflow into Columbus allocated as part of Fish Lake Valley over allocation.

[9] Resource has not been proven in the Monte Cristo Valley closed basin.

[10] Reduced perennial yield recommended by the ECWRP.

[11] Outflow previously allocated.

[12] Subsurface outflows to Death Valley National Park

[13] Permitting allocations were updated in 2022 based on available data

[14] Calculated with updated permitted allocations, divided over 2010 perennial yield estimates

[15] Fish Lake Valley does not include geothermal permits

[16] Fish Lake Valley usage is for 2022 water year

GUIDING PRINCIPLES

The guiding principles used to develop Esmeralda County's policies for water resource management include climate change or drought, the water right regulations managed by the Nevada Division of Water Resources and principles developed by the County that are presented below.

Water Rights

G-1 All of the water resources in the County, whether above or below ground, belong to the public. The State of Nevada operates under the prior appropriation doctrine known as "first in time, first in right."

G-2 The appropriation and beneficial use of the County's water resources are administered by the Nevada State Engineer (Nevada Division of Water Resources) in accordance with Nevada Water Law (NRS 533 and 534) and by state and federal court decrees and regulations.

G-3 Water rights in the County are private property that may be bought, sold, or traded under free market conditions.

G-4 Public springs and water holes can be controlled by Federal Reserved Water Rights under PWR 107.

G-5 Water use in California in shared basins with the County is not monitored or managed by a state authority and can have significant impacts to management of water resources in the County.

County Management

G-6. Water resource management in the County shall be based on sound science that integrates water supply, water quality, water use, and environmental issues, and guides decisions that affect the water resources of the County.

G-7 The water resources needs of future generations of the County residents must be protected with a balanced approach that provides for the County's economic goals without detriment to the social, aesthetic, cultural, and ecological values of the County.

G-8 Public education and public input are vital aspects of water resources planning and all units of local government, water users, and interested parties should be allowed to participate in the planning process.

G-9 All water resources development and use in the County should be conducted in a manner that is technically, environmentally, and economically sound, and consistent with state and federal laws.

G-10 Planned growth must consider water resources within the various Commission Districts of the County, along with the needs of the citizens within those Districts.

G-11 All proposed users of water resources in the County should demonstrate annually, the cumulative negative impacts that are projected for the next 50 years from permitted water rights on existing and proposed points of diversion.

G-12 Water conservation is an important component of the planning and management of the County's water resources.

G-13 Esmeralda County, in filing for ground and surface rights within the County, is only interested in augmenting and enhancing the water resources for Esmeralda County citizens and economic diversity within the County.

POLICIES

The policies provided below will contribute to sustainable water usage in, and adjacent to, Esmeralda County. The County will implement these policies through adoption of County Ordinances that relate to the specific policies. In addition, the specific policies will be incorporated into the Esmeralda County Master Plan with an established schedule for development and adoption. Annual reviews of the Plan are required to ensure the needs of the County are being met.

Water Rights

P-1 Transportation of water outside of County is prohibited. If County policy is over- ridden by state or federal agencies, then the County shall be compensated by an amount equal to replacing the water to the point of diversion. Financial compensation shall be equal to 1 ½ times the actual cost to replace the water to the point of diversion. The state or federal agency that approves transporting the water must prove that, using accepted scientific methods, no detrimental effects will occur to any water basin within the County.

P-2 The County shall review and respond to any applications involving inter-basin transfer of water affecting the County.

P-3 Unappropriated water rights shall not be granted to any federal, state, or local agency or any private entity without the express concurrence and approval of the Esmeralda County Board of County Commissioners.

P-4 The County shall support the Division of Water Resources to pursue forfeitures of water rights as allowable under the Nevada Revised Statutes. This support shall include limiting extensions for Proof of Beneficial Use.

~~P-5 The County shall support the Division of Water Resources to designate allhydrographic basins within and/or adjacent to the County.~~

County Management

P-5 County Commissioners approval of all subdivision maps filed in the County will require submittal of the subdivision map to the Division of Water Resources. This will provide assurance to the County that a minimum of 4 AFA has been dedicated for each new lot created in Hydrographic Basins 117, 137A, 143, 144, 231, 232 to account for domestic

water use and over appropriations; and 2 AFA has been dedicated for Hydrographic Basins 116, 118, 136, 142 and 146 which will account for domestic water use.

P-6 All projects, excluding domestic and agricultural, shall require Board of County Commission approval. The approval will ensure that water use in the County conforms to the County Master Plan. The approval shall find that subsections (1) through (4) are true.

1. Consistency. The proposed use is consistent with the action programs, policies, standards and maps of the Master Plan and the applicable area plan;
2. Improvements. Adequate utilities, roadway improvements, sanitation, water resources, water distribution, drainage, and other necessary facilities have been provided, the proposed improvements are properly related to existing and proposed roadways, and an adequate public facilities determination has been made;
3. Site Suitability. The site is physically suitable for the type and for the intensity of the development; and
4. Issuance Not Detrimental. Issuance of BOCC approval will not be significantly detrimental to public health, safety or welfare, injurious to the property or improvements of adjacent properties, or detrimental to the character of the surrounding area.

P-7 All area land use plans shall include projections of water demand to support future land use and economic development needs.

P-8 Water use shall utilize technologies that make the most efficient use of available water.

P-9 Encourage development of possible water sources (e.g., springs, streams) for potential recreation.

P-10 Source Water Protection Areas for municipal water supplies and other critical wetland and riparian areas shall have no development that could affect water quality or quantity.

P-11 The County Board of County Commissioners will annually review pumping withdrawals to ensure water resource projections are compatible with demand forecasts.

P-12 The County will select wells for long-term monitoring and water levels shall be recorded on a bi-annual basis at these wells. A minimum of two wells that are not in production will be selected within each hydrographic basin. Data recording and compilation shall be coordinated with federal, state or county agencies.

P-13 Landowners are responsible to prevent air quality hazards to public health.

P-14 Following mine-closures, water that was converted to mining and milling use should revert back to the original ~~use~~ and/or back to the basin.

Development

P-15 Developers shall pay for and construct water facilities to serve their developments, and the facilities may be dedicated to the County to own and operate. The water rights for the development shall be provided by the developer and dedicated to the County. All water system designs will be subject to the approval of the County Commissioners prior to contracting and construction.

P-16 Proposals for development or land use requiring County approval (e.g., a sub- division, energy generation) shall include accurate projections of water demand, identify the proposed source of supply, and include the process, action, and compensation to mitigate current or future detrimental effects. The developer should bear the cost of preparing these plans.

P-17 Development will be approved by the County Commissioners only where sufficient water resources exist.

P-18 Water supply planning and development shall not adversely impact adjacent water users or other existing uses of water.

P-19 To the maximum extent practical, new water facilities must integrate into existing County systems.

P-20 The County shall have planning, design, construction oversight, operation, and maintenance responsibility for all municipal water supply facilities.

P-21 Develop a project permitting process that addresses mitigation of possible future effects on water quality, quantity, and existing users.

P-22 Any permit to appropriate water within Township 2 South Range 38 East sections 32 through 35 and Township 3 South Range 38 East sections 2 through 5 must contain a condition that sufficient water to sustain a fish population be supplied to Silver Lake Certificate 8048 Nevada Department of Wildlife.

P-23 Trail Canyon Reservoir shall be preserved for fishing and recreation or any other use including fire protection.

P-24 All existing riparian areas utilized by the public for recreation, including retaining ponds and reservoirs, located on public lands shall be preserved consistent with existing water rights and law.

REGULATORY FRAMEWORK

The legal and regulatory framework under which water resource development and use are governed and the relationship between this plan and other planning documents are summarized in this section. The major local, county, state and federal laws that must be taken into consideration are briefly identified and discussed. For a more comprehensive overview of the federal, state, and local agencies and the regulatory framework governing the issues related to water resources, the reader is referred to the State Water Plan, Part 1, Section 7.

Nevada Statutory Requirements

The 2019 Nevada Legislature, through Senate Bill 150 requires Esmeralda County to develop and maintain a comprehensive water resource plan which must be updated at least every 10 years. N.R.S. §§ 278.0228.1-278.0228.3 (2019). The resource plan is required to include the following:

1. The identification of all known sources of surface water, groundwater and effluent that are physically and legally available for use in the county.
2. An analysis of the existing demand for water in the county. And expected demand for water in the county caused by projected growth.
3. An analysis of whether the sources of water identified above are of sufficient quality and quantity to satisfy the existing and expected demands for the next 10 years.
4. If the county's required analysis determines that the sources of water identified above are not of sufficient quality or quantity to satisfy the projected demands, a plan for obtaining additional water of sufficient quality and quantity must be developed.

The legislation additionally established a grant for counties "to pay the costs associated with developing and maintaining a water resource plan." N.R.S. § 349.981.1(f) (2019)

If any effluent resources are identified, as required by N.R.S. § 278.0228.1(a), must be approved by the BOCC.

All waters in Esmeralda County belong to the public and are managed by the State of Nevada in accordance with the provisions of Nevada Water Law (NRS 533 and 534). The Nevada State Engineer determines the limit and extent of water rights including the quantity of appropriative right and any conditions that must be met for the water to be placed to a beneficial use. In ruling on a water right application, the State Engineer must consider six criteria:

1. Is there unappropriated water available from the proposed source of supply?
2. Will the proposed use or change conflict with existing water rights or with protectable interest in existing domestic wells as set forth in NRS 533.024?
3. Does the proposed water use threaten to prove detrimental to public interest?
4. Is the proposed project feasible and not filed for speculative purposes?

5. Does the proposed use or change, if within an irrigation district, does not adversely affect the cost of water for other holders of water rights in the district or lessen the efficiency of the district in its delivery or use of water?
6. Does the applicant provide proof satisfactory to the State Engineer of the applicant's intent?

Three basic tenets of Nevada water law;

1. The Rule of Priority. "First in time, first in right."
2. The need to maintain beneficial use. "Use it or lose it."
3. Public ownership. "The water of all sources of water supply within the boundaries of the State whether above or beneath the surface of the ground, belongs to the public."

The 1999 Nevada Legislature, through Senate Bill 108, amended Nevada Water Law to add additional criteria governing interbasin transfers of water by adopting the following revisions to the provisions of NRS 533.370

In determining whether an application for an interbasin transfer of ground water must be rejected pursuant to the section, the state engineer shall consider:

1. Whether the applicant has justified the need to import the water from another basin;
2. If the state engineer determines that a plan for conservation of water is advisable for the basin into which the water is to be imported, whether the applicant has demonstrated that such a plan has been adopted and is being effectively carried out;
3. Whether the proposed action is environmentally sound as it relates to the basin from which the water is exported;
4. Whether the proposed action is an appropriate long-term use which will not unduly limit the future growth and development in the basin from which the water is exported; and
5. Any other factor the state engineer determines to be relevant.

Esmeralda County concurs with these provisions regarding interbasin transfers and has added additional provisions in the policies established in this Plan.

The 2019 Nevada Legislature, through Senate Bill 140, amended Nevada Water Law requiring that in each basin in which there is groundwater that has not been committed for use, the State Engineer shall reserve 10 percent of the total remaining uncommitted groundwater in the basin. The reserved groundwater in the basin is not available for any use. NRS 533.0241 (2019).

The 2017 Nevada Legislature, through Assembly Bill 138, allows for the collection of rainwater from the rooftop of a single-family home for non-potable domestic use. NRS 533.027 (2017).

Nevada Water Law governs the administration of the waters of the State of Nevada. The Nevada Department of Conservation and Natural Resources is the branch of State government responsible for management of water resources and the Division of Water Resources, directed by the Nevada State Engineer, is responsible for the allocation of the public waters of the State, administrating the law, and resolving disputes. The State Engineer's actions and decisions are bound by the water law and its implementing regulations as shown in the Table 2.

The Division of Water Resources provided input in the development of this plan and representatives discussed the plan with the County Commissioners. The Division of Water Planning (DWP) was created by legislation in 1977 and, after completion of the mandated State Water Plan in 1999, was incorporated into the Division of Water Resources in 2000. With the creation of the Water Planning Section as part of the Division of Water Resources by the legislature in 2005, the DWR is now responsible for water management and planning, conservation plans, and planning assistance to local governments. Prior to 2000 the State Water Planner administered community assistance and flood mitigation assistance under the national Flood Insurance Program and the Small Community Grant Program.

In 1999, the Nevada Division of Water Planning issued the Nevada State Water Plan. The State Water Plan provides information on the water resources and their use in Esmeralda County at the County-wide level. Thus, the State Water Plan serves as a useful framework for the more detailed information presented in this plan. The State Water Plan specifically addresses the need for local water planning and encourages that this planning be done at the basin and watershed level, the approach used in the development of the Esmeralda County Water Resources Plan. The State Water Plan was developed over a five-year period to serve as a guide to the development, management and use of Nevada's water resources. The State Water Plan made a number of recommendations concerning water resource issues. Many of the issues identified in the State Water Plan are reiterated in the appropriate sections of this plan.

Many local and state entities have statutory authorities related to water use, management, protection and development. Some of the authorities are summarized in Table 3. These tables are from the Nevada State Water Plan.

Table 2 State Agency Statutory Authority

Category	Agency	Program	Authority (NRS)
Water Supply and Allocation	State Engineer's Office (Division of Water Resources)	Water Right Adjudication and Appropriation	533
		Groundwater Regulation	534
		Geothermal Resources	534A
		Dissolved Mineral Resources	534B
	Water Planning Section	Small Community Grant Program	540
		Conservation Plans	540.121 - 540.151
	Division of Environmental Protection	Small Community Grant Program	349.980 - 349.987
	Public Utilities Commission	Regulation of Public Utilities	704.001 - 704.960
		Utility Environmental Protection Act	704.001 - 704.960
		Conservation Plans	704.662 - 704.6624
Water Quality	Division of Environmental Protection	Water Pollution Control Clean Water Act State Groundwater Permit Safe Drinking Water Act Mining Reclamation	445A.300 - 445.730 519A.010 – 519A.280 445A.800 - 445A.955
	Division of Agriculture	Control of Pesticides	586.010 - 586.520
	Bureau of Health Protection Services, health services	Safe Drinking Water Act	445A.800 - 445A.955
		Control of Septic Systems	444.650
Environment and Recreation	Division of Wildlife	Boating Safety	488, 501.243
		Wildlife Management and Propagation	504.140 - 504.490
		Protection of Threatened Species	503.584
	Natural Heritage Program	Threatened and Endangered Species Database	527.260 - 527.300
	Division of Parks	Park Facilities	407.011 - 407.250
	Division of Forestry	Protection and Preservation of Timbered Lands, Trees and Flora	527.010 - 527.330

Category	Agency	Program	Authority (NRS)
		Forest Practice and Reforestation	528.010 - 528.120
Flood Management Navigation Interstate Waters Compacts Other	Water Planning Section	National Flood Insurance Program	540
	Division of Water Resources	Dam Safety	535.005 - 535.110
		Ditches, Navigable Interstate	536 537 538
		Channel Clearance	532.220 - 532.230
	Emergency Management	Hazard Mitigation Grant	414
	Division of Forestry	Forest/Vegetative Cover for Flood Prevention	472.043
	Department of Conservation and Natural Resources	Flood Control Loans	543.090 - 543.140
Water Planning and Management	Water Planning Section	State Water Plan	540.101
		Planning Assistance	540.011 - 540.151

Table 3 Local Organizational Statutory Authority

Category	Agency	Program	Authority (NRS)
Water Supply	Cities	Water Facilities	266.285
	Counties	Water Facilities	244.366
	General Improvement Districts	Water Facilities	318.144
	Irrigation Districts	Irrigation	539.010 - 539.783
	Water Conservancy Districts	Water Supply	541.010 - 541.420
Water Quality	Cities	Sewer Facilities	266.285
	Counties	Sewer Facilities	244.366
	General Improvement Districts	Sewer Facilities	318.140
Environmental Uses	Conservation Districts	Conservation of Natural Resources	548.010 - 548.550
Flood Management	Flood Control Districts	Flood Control	543.170 - 543.830
	Water Conservancy Districts	Flood Control and Drainage	541.010 - 541.420
Water Planning and Management	Cities	Master Plan	278.150 - 278.230
	Counties	Regional Plan	278.0272 - 278.029
		Master Plan	278.150 - 278.230

It is the policy of Esmeralda County to cooperate and comply fully with Nevada Water Law and its implementing regulations, to encourage business and industry to comply fully with applicable regulations, and to foster a spirit of cooperation between the regulatory agencies and all of the stakeholders in Esmeralda County. Esmeralda County believes that sound long-term planning and management of the development and use of County's water resources is in the best interest of both the County and the State.

Federal Acts and Plans

Federal law and policy establish standards for clean water, controlling growth in flood plains, and protecting the environment. While each of these goals is beneficial and consistent with the long-term goals and values held by Esmeralda County and its citizens, the immediate impact of the legislation is often limiting. The Safe Drinking Water Act and its amendments require certain protections for sources of drinking water and the Clean Water Act establishes standards for surface and ground water protection.

The National Environmental Policy Act and Federal Land Policy Management Act determine how federal land management agencies can allow the lands they administer to be used. The Endangered Species Act protects certain species of plants, insects, fish, and birds that are native to Esmeralda County. Some of the provisions of these acts impose mandates that are costly for the County to implement, often forcing them to reduce or eliminate other programs that benefit the citizens of the area but are not mandated. Other provisions may hinder development by imposing costly controls on private industry wishing to use federal lands for mining exploration, mining activity, or other business or industrial uses. Esmeralda County maintains good working relationships through Memoranda of Understanding with the local offices of the Department of Energy, Bureau of Land Management and U.S. Forest Service, which helps to minimize the negative impacts while trying to achieve the goals outlined in the federal legislation. Esmeralda County residents believe that there must be a balance in the appropriation of water resources to protect the interests of rural communities whose populations do not afford them political strength in the state legislature.

Clean Water Act

The Clean Water Act is the primary federal law enacted to prevent pollution to surface waters. The act was established to "restore the chemical, physical, and biological integrity of the Nation's waters." It requires that states establish standards for surface water quality, provides federal funding for sewage treatment plants, and sets goals of zero toxic discharges to, and realization of "fishable" and "swimmable," surface waters. The Clean Water Act also mandates a regulatory system for reporting of hazardous spills to surface waters, and a wetlands preservation program. The Nevada Division of Environmental Protection (NDEP) has been delegated the authority to implement programs of the Clean Water Act. Enforceable provisions of the Clean Water Act include permitting programs (National Pollution Discharge Elimination System), technology- based effluent standards for point sources of pollution, and water quality standards. NDEP also implements federally mandated programs for the management of non-point sources of pollution, and a construction grants program to build or upgrade sewage systems. The State

Environmental Commission is responsible for developing water quality standards for specific water bodies within the State, and for developing a handbook of best management practices to control pollution from diffuse sources.

Additionally, the State of Nevada has adopted regulations that define State programs to implement the provisions of the Clean Water Act and Nevada Water Pollution Control laws. Nevada's Water Pollution Control laws, contained in Chapter 445A of the Nevada Revised Statutes, establish several non-federal water pollution control programs. These programs, implemented by the NDEP, include programs for issuing Water Pollution Control Permits with zero-discharge performance standards, and State Ground Water Permits for infiltration basins, land application of treated effluents, large septic systems, and industrial facilities.

It is the policy of Esmeralda County to cooperate and comply fully with state and federal regulatory programs of the Clean Water Act and the Nevada Water Pollution Control Laws, to encourage business and industry to comply fully with applicable regulations, and to ensure that the County's surface water resources are clean and free from pollution. Additionally, the County supports the use of the State Environmental Commission's Handbook of Best Management Practices for all activities that have the potential to degrade surface waters.

Safe Drinking Water Act

The Safe Drinking Water Act, an amendment to the Public Health Service Act, is the primary federal law enacted to protect underground sources of drinking water from pollution, and to ensure the quality of drinking water delivered at the tap. The Act established a program for setting primary and secondary standards for drinking water, a permit program for injection wells, and mandated a program of wellhead protection practices. The Nevada Water Pollution Control Act authorizes the NDEP to promulgate standards for tap and bottled drinking water.

Authority to implement the various programs of the Safe Drinking Water Act has been granted by the EPA to the Nevada Division of Environmental Protection. The Bureau of Safe Drinking Water has promulgated standards for over 100 contaminants in drinking water, consistent with federal standards. BSDW implements permitting programs for public suppliers of tap and bottled water, which include routine sampling and monitoring of public water supplies to demonstrate compliance with drinking water standards. BSDW also implements a permit program for domestic septic systems to ensure underground water supplies are adequately protected. Industrial waste water treatment systems, and waste and enhanced mineral and hydrocarbon recovery injection wells, are permitted through the NDEP. The Integrated Source Water Protection Program is implemented by the NDEP, in cooperation with local water supply systems. Elements of the wellhead protection program include delineating the wellhead protection area (WHPA), identifying potential pollution sources within the WHPA, defining constraints on setting of new wells, contingency planning and emergency response, and defining roles of state and local governments and water purveyors. Local governments are encouraged to support and participate in wellhead protection programs.

It is the policy of Esmeralda County to cooperate and comply fully with state and federal regulatory programs of the Safe Drinking Water Act as implemented through the Nevada Water

Pollution Control Laws. Esmeralda County encourages business and industry to comply fully with applicable regulations, to ensure that the County's public drinking water supplies are clean and free from contamination.

Endangered Species Act

The purpose of the Endangered Species Act is to ensure that any action, administrative or real, does not unduly jeopardize the continued existence of an endangered or threatened species or cause the destruction or adverse modification of a critical habitat. With respect to the water resources of Esmeralda County, the Endangered Species Act provides protection not only to threatened or endangered species, but also to the water resources that support the habitat for these, and other sensitive species. There are a number of threatened and endangered bird species, and a fish species that has been relocated to protect it from extinction, as well as sensitive species and species of concern. The State of Nevada has a number of statutes governing the protection of imperiled species that are administrated by the Division of Wildlife. The State has a listing of sensitive plant and wildlife species that have been designated as State- protected species.

It is the policy of Esmeralda County to cooperate and comply fully with the Endangered Species Act and all State laws and regulations governing wildlife. Esmeralda County encourages all of its citizens, visitors, and businesses to comply fully with these laws and regulations. Regulatory Issues - Federal laws, regulations, and policies establish standards for clean water, controlling growth in flood plains, and protecting the environment. While each of these goals is beneficial and consistent with the long-term goals and values held by Esmeralda County and its citizens, the immediate impact of the legislation is often limiting. Some of the provisions of these many levels of regulation impose mandates that are costly for the County or the towns within the County to implement, often forcing a local unit of government to reduce or eliminate other discretionary programs that benefit the citizens of the area. Other provisions may hinder development by imposing costly controls on private industry wishing to use federal lands for mining exploration, mining activity, or other business or industrial uses. Esmeralda County maintains working relationships through Memoranda of Understanding with the local offices of the BLM and U.S. Forest Service, which helps to minimize the negative impacts that may be associated with decisions regarding public land management.

Regional Plans

The federal agencies that have stewardship over areas in Esmeralda County have prepared a number of plans that must be taken into consideration in water resources planning:

- U.S. Forest Service - 1988 Inyo National Forest Land and Resource Management Plan
- U.S. Department of Energy - Nevada Test Site Resource Management Plan, 1998
- U.S. Department of Energy - Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada, 1996

- U.S. Department of Energy - Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada, 1999
- National Park Service - Draft Environmental Impact Statement and General Management Plan, 1999
- U.S. Air Force - Draft Environmental Impact Statement Proposed Fallon Range Training Complex
- U.S. Air Force - Integrated Natural Resources Management Plan, Nellis Air Force Base/Nellis Air Force Range, 1997
- U.S. Air Force - Water Requirement Study of the Nellis Air Force Range, 1998 Bureau of Land Management - Tonopah Planning Area Resource Management Plan, 1998

As 98 percent of Esmeralda County's lands are under the stewardship of federal agencies, these documents were important in formulating the issues and management practices contained in this plan. Information contained in these documents related to water resources was incorporated into the Esmeralda County Water Resources Plan either through direct incorporation or by reference. The Esmeralda County Public Lands Policy Plan provides policies for water resource management on public lands.

WATER RESOURCE ASSESSMENT

This chapter contains a summary of the surface water and groundwater resources of Esmeralda County. The summary provides information on the topography, climate, surface water springs and groundwater characteristics.

Topography

The County lies in a complex zone of disrupted structure between the northwest trending Sierra Nevada Mountain Range to the west and the north-south trending Basin and Range province to the east. Total relief in the basin is more than 9,000 feet, ranging from 13,145 feet above mean sea level at Boundary Peak in the White Mountains to approximately 3,700 feet where Oriental Wash enters Death Valley at the California border.

Climate

The general climate of the County is arid to semi-arid. In the upper portions of the mountain ranges, subhumid continental conditions occur, characterized by cold winters and moderate precipitation. The intervening valleys and the region exhibit mid-latitude steppe and mid-latitude desert conditions characterized by cold winters, hot summers, and semiarid to arid conditions. The lowest valley floors frequently include dry lake playas and have a typical low-latitude desert climate with very hot summers and arid conditions.

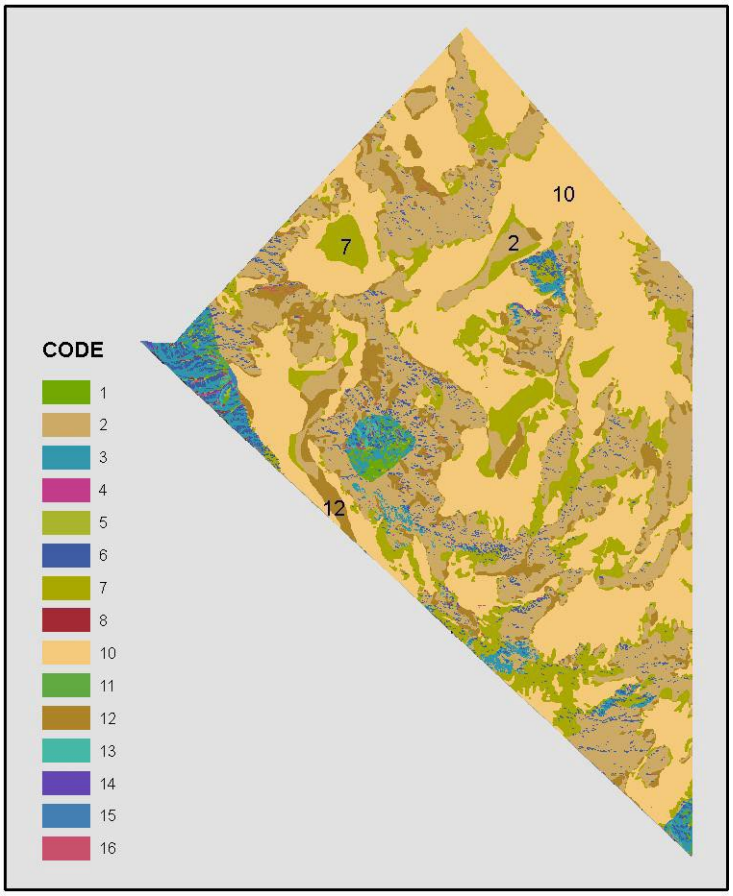
Precipitation during the course of a year typically has a bi-modal distribution with most precipitation occurring during either a winter rainy season or during the late summer months. During the winter months, high pressure conditions predominate resulting in west-to-east trending winds and precipitation patterns. During the summer months, low pressure conditions predominate, resulting in southwest-to-northeast trending precipitation patterns. Winter storm events tend to last longer and produce more precipitation than the summer events which tend to produce widely scattered showers of short duration. Drought is a common occurrence.

Most of Esmeralda County is currently in a period of ongoing and varying drought conditions.

The average potential evaporation rate exceeds the average annual precipitation, with potential average evaporation ranging from 51 to 72 inches. On an annual basis, as much as 95 percent of the total annual precipitation is lost through evaporation and transpiration; less than 10 percent recharges to groundwater. Precipitation and related information are presented in Figure 1.

The vast majority of groundwater comes from seasonal snow pack, not rainfall.

Figure 1 Hydrologic Landscape-Region (HLR) Characteristics



HLR	Precip.	Soil	Slope	Aspect	Area	Percent
1	>16	<=5	>3-25	S	14,390	13.1
2	<=8	<=5	>3-25	S	8,110	7.4
3	>8-16	>5-10	>25	S	6,750	6.1
4	>8-16	>5-10	<=3	S	5,700	5.2
5	>8-16	>5-10	>3-25	N	2,840	2.6
6	M >8-16	M >5-10	>25	N	2,660	2.4
7	<=8	>10	M >3-25	M S	2,570	2.3
8	>16	>10	>3-25	S	1,100	1.0
9	>8-16	>5-10	<=3	S	24,390	22.2
10	<=8	>10	M >3-25	M S	13,330	12.1
11	>16	<=5	>3-25	S	10,260	9.3
12	<=8	<=5	>3-25	S	6,750	6.1
13	>8-16	>5-10	>25	S	4,200	3.8
14	>8-16	>5-10	>3-25	N	3,210	2.9
15	>16	>10	>3-25	S	2,160	2.0
16	M >8-16	M >5-10	>25	N	1,440	1.3

Precip: precipitation in inches/year. Soil: soil permeability in feet/year. Slope: land surface slope in percent.
Aspect: S, 60 to 330 degrees or southerly facing; N, 0 to 59 and 331 to 360 degrees or northerly facing.Area: area in square miles.
Percent: percent area of Nevada. >, greater than. <, less than. M, mostly.The Value 0 has no data for soil permeability.
Values 1 to 8 are characterized by low hydraulic conductivity or <40 feet/day. Values 9 to 16 are characterized by high hydraulic conductivity or >40 feet/day.

Surface Water

Esmeralda County has no major lakes, reservoirs, or surface water flows with mean annual flows greater than 10 cubic feet per second (cfs). There are important surface water resources located at the west side of Fish Lake Valley. These surface water flows are important sources of irrigation water in the agricultural areas of Fish Lake Valley. Groundwater that discharges to the surface at springs is also an important surface water resource. Springs in Esmeralda County have been developed for irrigation, livestock watering, municipal and domestic water supplies, and the mining industry. Wildlife depend on the surface water flows and springs in Esmeralda County. Surface water resources are derived from the precipitation that falls over the County and adjacent recharge areas.

There are several creeks that drain the upland areas in the County. These streams derive their flow from three main sources: spring discharges, groundwater discharge along the stream channel, and snow melt. The U.S. Geological Survey has published discharge records for the Chiatovich Creek gauging station (USGS, 2009) with mean monthly flows generally ranging as low as 3 cfs and as high as 40 cfs with mean annual flows of 8 cfs. The discharge rates for this White Mountain stream is seasonal with elevated flows following the spring snow melt in the upland areas, and peak flows generally following late season thunderstorm events. In addition to Chiatovich Creek, the pumpage inventory for Basin 117 identifies surface water diversions for agriculture from the Leidy, Busher, Perry-Aiken, and McAfee Creek drainages (NDWR, 1989).

The streams of Esmeralda County provide limited aquatic habitat for several species of fish. The streams also support isolated riparian and wetland areas. The riparian areas of Esmeralda County provide not only habitat for fish and other aquatic species, they provide nesting for a number of bird species including the White-faced Ibis and a number of important raptors including the Bald Eagle, Ferruginous Hawk, and several species of owls.

The source water quality of Esmeralda County's surface water is presumably in compliance with the 1972 Clean Water Act based on limited potential impact to source water areas. Discharges that result in surface water flows from artesian wells and adits may exceed MCLs. As surface water is subject to natural processes and impacts from human activities the water quality degrades with contaminant concentrations that may exceed maximum contaminant levels (MCL). Surface water contamination within the County could affect groundwater quality including impacts from irrigation, grazing, mining transportation and residential and commercial activities. Surface water contaminants that have resulted in impacts to groundwater that exceed MCL are documented within the County in close proximity to storage ponds.

Springs

Esmeralda County has many springs that support a number of uses including community water supply, ranching, mining and wildlife management. Springs occur wherever groundwater intercepts the land surface and discharges water to the surface water regime. In addition to springs, groundwater discharges from artesian wells and mining adits within the County.

Groundwater

Esmeralda County's groundwater resources have been developed primarily for municipal, agricultural and mining purposes. Esmeralda groundwater basins are shown in Figure 2. The potentiometric head differences between basins indicate that in general the individual basins are not in hydrologic communication.

Demand on groundwater resources has increased in part reflecting the growth of the mining and agriculture economic sectors of the County. Concern over exporting water from Esmeralda County through large-scale inter-basin transfers of water has been expressed although no significant sources of unutilized water exist within the County. Since the surface and ground water resources of Esmeralda County are over appropriated and over utilized the only remaining source of water that is available to support the future well-being of the County, through diversification and expansion of the economy are the appropriated and utilized sources. Water level data for Esmeralda County and surrounding area basins are shown in Figure 3.

In this section, an overview of the groundwater resources of Esmeralda County is presented. This overview includes a description of the hydrology and sources of water, the quantity of water that is present, the quality of that water, the committed groundwater resources, and the issues associated with development and use of the groundwater resources.

With respect to their significance to groundwater, the geologic units of Esmeralda County may be grouped into eight categories: 1) valley-fill deposits, comprising mixtures of gravel, sand, silt and clay that include the alluvial and playa deposits; 2) younger volcanic rocks, comprising ash-flow tuff and basalt; 3) older volcanic rocks, comprising dacite, latite, andesite, and tuffs; 4) Triassic sediments outcropping only in the northern third of the County, comprise freshwater limestone, conglomerate, sandstone, and siltstone; 5) intrusive rocks, comprising granitic plutons; and 6) Paleozoic, Cambrian and Precambrian rocks outcropping in the southern two thirds of the County, comprising predominantly clastic rocks including shale and quartzite, but with some inter-bedded carbonate units. A summary of the geologic units present within the County is provided on the Nevada Bureau of Mines and Geology Bulletin 78, Geology and Mineral Resources of Esmeralda County, Nevada. A recent hydrogeological summary that includes most Esmeralda County is provided in the Unites States Geological Survey Professional Paper 1711, Death Valley Regional Groundwater Flow System, Nevada and California – Hydrologic Framework and Transient Groundwater Flow Model.

In general, the geologic units of Esmeralda County can be divided into two aquifer types including the valley-fill aquifers and local bedrock aquifers. In general, the local carbonate aquifers are comprised of siliciclastic carbonates that do not store or transport significant quantities of water and are not regionally connected.

Figure 2 Map of Groundwater Basins – UPDATED FEBRUARY 2022 FROM NDWR

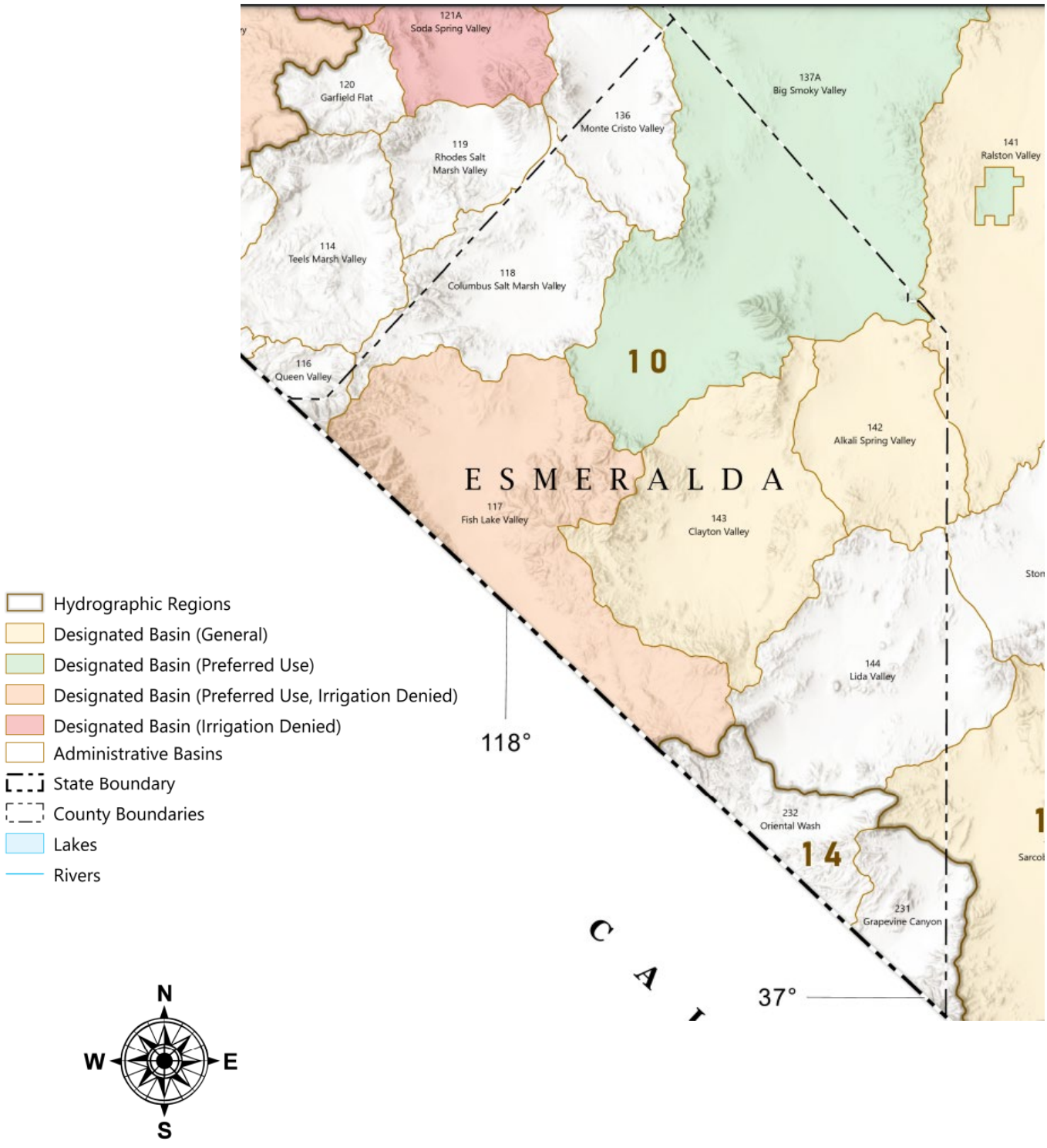
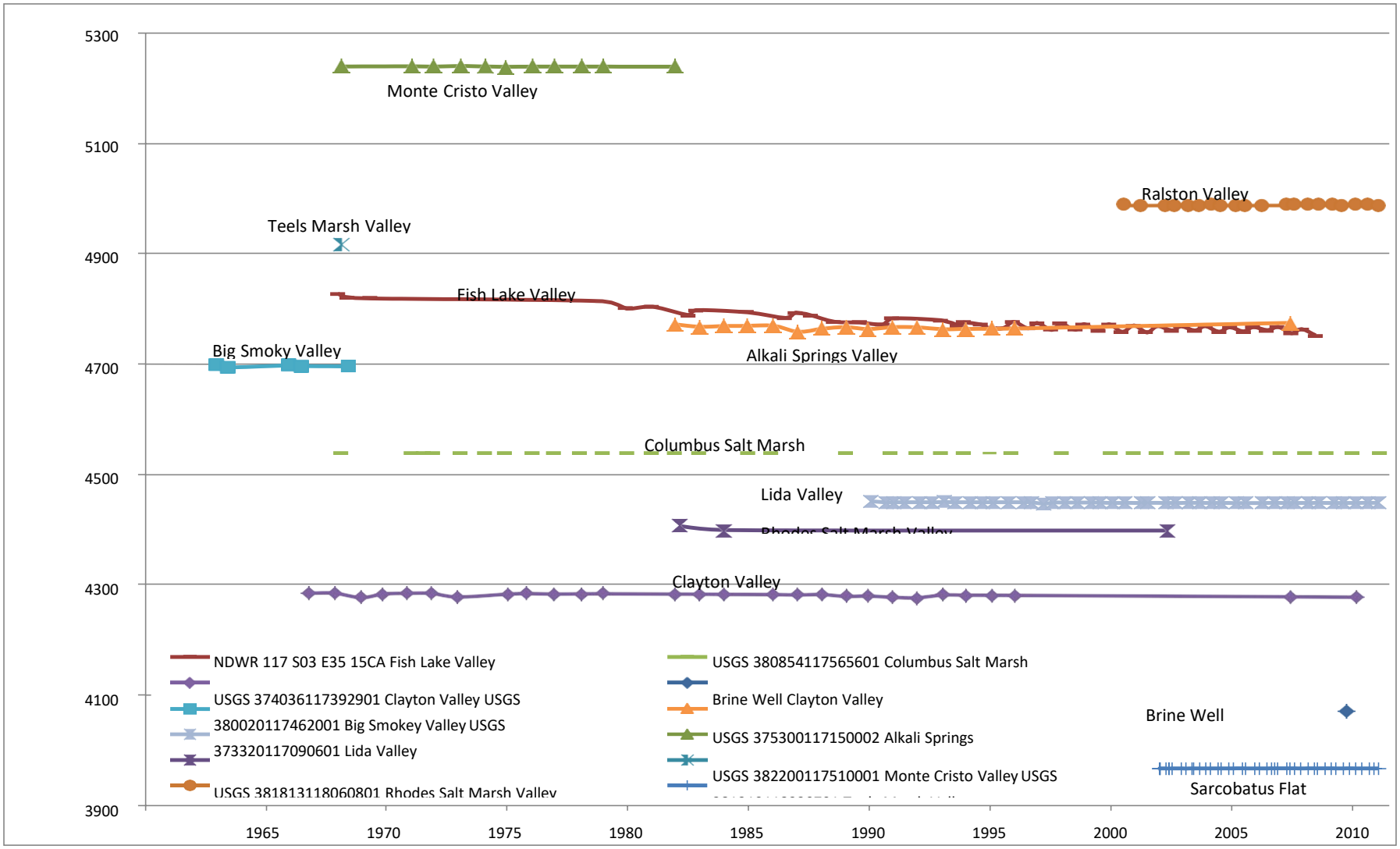
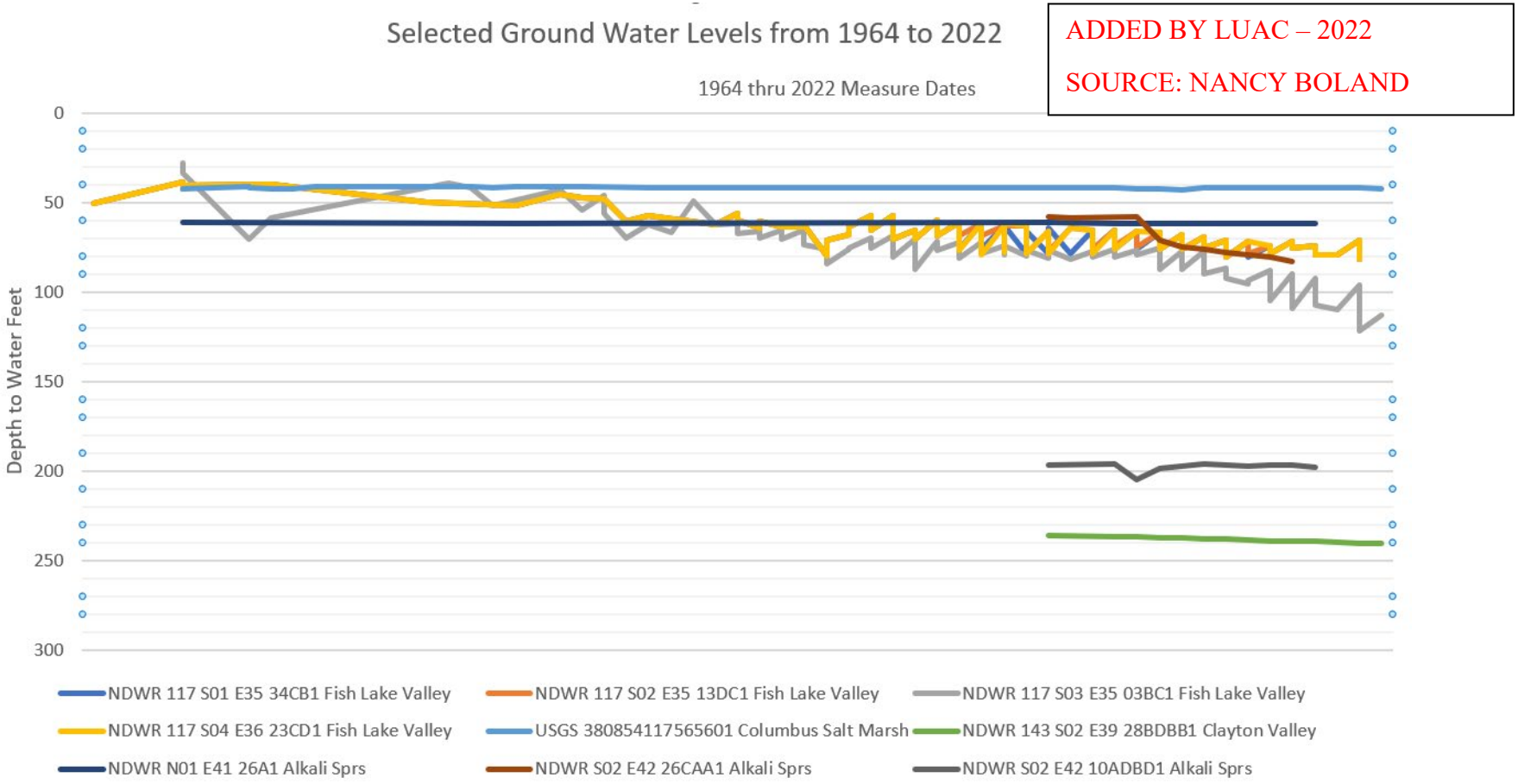


Figure 3 Representative Water Level Elevations 1960 to 2011



ADDED BY LUAC – 2022

SOURCE: NANCY BOLAND



The ability of the aquifer systems of Esmeralda County to store and transmit groundwater depends upon the type of aquifer and its characteristics. Alluvial deposits are more productive where they comprise coarse-grained gravels and sand deposits and exhibit low well yields in the playa areas where clay predominates. The groundwater production from bedrock aquifers generally depends on the degree of faulting and fracturing. The limestone and dolomite units, where fractured provide limited production compared to the carbonate aquifers encountered in Eastern Nevada. Some geologic units have little or no productivity because of the lack of primary porosity. These units include shale, quartzite, and granite. Where fractured, these units may be capable of producing low to moderate well yields but generally act as aquitards (units that tend to retard the movement of water horizontally and vertically between aquifers).

The distribution of geologic units and the relationships between aquifers and aquitards is quite variable because of the past geologic history of Esmeralda County. The carbonate and other sedimentary rock units that were originally deposited as flat lying sediments on the ocean floor have since been faulted, folded, fractured, and in some instances, intruded by granitic rocks. Low-angle faults have resulted in older rocks being thrust over younger rocks while high-angle basin and range faults have resulted in significant offsets in geologic units. The intrusion of plutons has further disturbed the rocks and aquifers. The net result of this deformation is that the aquifers in Esmeralda County are not continuous. Rather, they are broken into discrete compartments that are usually bounded either by fault zones or contacts between rocks with contrasting hydraulic properties. This compartmentalization is an important, but poorly understood, aspect of the regional hydrologic conditions. The volcanic and siliciclastic carbonate aquifers in Esmeralda County are broken up both horizontally and vertically into individual compartments as expressed in significant potentiometric head differences across the County. Potentiometric head differences between the hydrographic basins across the County indicate that only small quantities of groundwater flow between the basins. The most significant exceptions include inflows into the Alkali Springs and Lower Smoky hydrographic areas which are important for the local users but are relatively minor groundwater resources within the State of Nevada.

The general quality of the groundwater in Esmeralda County is suitable to marginally suitable with limited exceptions based on specific locations and proposed uses. The total dissolved solids concentration of groundwater in portions of Alkali Spring Valley, Big Smoky Valley, Clayton Valley, and Sarcobatus Flat typically exceed federal secondary drinking water standards (500 mg/L for Total Dissolved Solids). In these basins, the total dissolved solids are elevated because of the natural process of salt buildup by evaporation in areas of shallow groundwater. The community water system in Goldfield requires treatment for arsenic because the groundwater exceeds the MCL.

USE AND DEMAND

This section presents water use and historic demand through Esmeralda County and forecasts future demand for the year 2050 The data presented indicates that the water use has exceeded the availability of water on an annual basis. The County will need to reduce use and conserve water in the future not to exceed available water resources. Therefore, water resources are not available for exportation out of the County boundaries. Any water resources within the County that are not fully utilized will be required to support existing overdraft conditions in other parts of the County. Beneficial use for mining, residential and federal lands is briefly discussed in this section.

Mining

Mining has been a volatile sector of the County's economy. Fluctuations in lithium, gold, silver, and copper prices have created wide swings in population and employment. Over the next decade the pattern of population, employment, economic fortunes, and water use will likely change. While much uncertainty surrounds the political and technological forces that shape the mining industry, one important fact is certain; Esmeralda County has mineral resources, metal and non-metal, available to be mined. When market conditions, policy, and technology converge to produce a favorable climate for mining, the mineral resources in the County will be developed and mined.

New lithium and gold mines currently in the planning and permitting process are looking to reallocate water from agriculture to mining in several Esmeralda water basins.

Water supplies are used throughout mining and post-mining reclamation operations. The quantities of water required depend primarily on the type of operation, whether or not milling and a town site are included, and the requirements for dewatering and reclamation. Mining operations may require hundreds to thousands of acre feet per year. Water supplies for a given mining project are usually required for temporary periods ranging from a few years to a few decades.

Water supplies in Esmeralda County are limited for meeting the probable demand of future mining activities. As such activities are usually in remote locales and water development for mining operations involves the installation of water supply wells. The availability of water within the vicinity of any given mining property varies depending upon the local hydrologic conditions, water chemistry, and environmental constraints. As most new mining activities are expected to occur on federal lands, the appropriate environmental assessments and evaluations will be performed under the National Environmental Policy Act.

Historically, water availability has not been a binding constraint on the mining industry. In many areas of Nevada where reliable water supplies are absent, water has been conveyed via pipelines considerable distances to support mining and milling activities. Dewatering is still largely a technical issue although requirements for monitoring, treatment, and environmental mitigation now impose somewhat larger costs on these types of operations. The feasibility of the various

alternatives for developing water for any given mining property can only be evaluated on a case-by-case basis.

The following recommendations are made with regard to mining water use:

- Continue working with the mining industry in the management of the water resources in Esmeralda County.
- Facilitate cooperation between the mining industry and state and federal regulatory authorities in the development of water resources and the mitigation of past and future adverse impacts related to mining activities.

Domestic Requirements

There are greater than 200 domestic wells (Table 4) in Esmeralda County. Domestic water use could account for between 200- and 400-acre feet per year.

Water use for domestic purposes can vary widely depending upon the size of the household and individual habits and preferences. A single domestic well will pump about one acre foot of water per year for an average household and may not exceed two-acre feet. With the exception of the Silver Peak and Goldfield areas, domestic water supplies throughout portions of Esmeralda County are not served by public water supply systems. The depth and yield of domestic water wells varies from place-to-place.

Under Nevada's system of prior appropriation, domestic wells often have the most junior priority, meaning they may be denied water if a curtailment were ordered by the state engineer. To give single family homes that rely on domestic wells some relief in such a scenario, AB 95 (2019) provides that if the state engineer or the courts order that withdrawals of groundwater be restricted to conform to priority rights, a domestic well with a water meter installed will still be allowed to withdraw 0.5 acre-feet of water per year. N.R.S. § 534.110.

Public systems can be established by private entities under the requirements of the Public Service Commission and/or under the various Nevada laws and regulations governing public water supply systems. However, growth in the Fish Lake Valley area could result in the expansion or creation of new systems. Any new public water supply systems will have to do design work, permitting, and compliance monitoring in accordance with the prevailing regulations.

The county is currently in process of acquiring water rights for Goldpoint.

Table 4 Estimation of Water Resource Allocation for Domestic Wells Based on Recorded Structures and Lots Outside of Municipal Service Areas

	Political Districts	Assessors Area Number	Existing Structures [1]	Ranches [1]	Existing Structures and Ranches	Water Resource Allocation based on Existing Structures and Ranches [3] AFA	Vacant Lots [1]	Pending Lots [1, 2]	Existing, Vacant and Pending Lots, Structures and Ranches	Water Resource Allocation based on Existing Lots [3] AFA
Goldfield	1	1			-	-			-	-
Silver Peak	2	2			-	-			-	-
Lida	2				-	-	38		38	76
Remaining District 2 Area	2	6	57		57	114	482		539	1,078
Fish Lake Valley	3	7	164	25	189	378	497	314	1,000	2,000
Total			221	25	246	492	1017		1,577	3,154

[1] Esmeralda County assessor data as of 1/12/2012

[2] Includes lots associated with Circle L, Arrowhead Meadows, T2S, R35E

[3] Assumes 2 AFA based on existing lots not served by a municipal supply

Ordinance requiring parcels to be greater that 5 acres in Fish Lake Valley was approved May 8, 2008

The 2010 estimate of water use in Fish Lake Valley by domestic wells provided by NDWR is 198 AFA

Federal Lands Requirements

Esmeralda County has approximately 98 percent of the county managed by federal agencies. There is a demand for water resources to meet the mission of each agency with stewardship over an area. As such, the water resource requirements for the continued management of federal lands in the County must be taken into account as part of the planning process.

The demand for water to meet federal needs in Esmeralda County has not been well defined. Federal water uses include preservation, conservation, wildlife management, construction and fire control. The direct demand for water to meet the infrastructure requirements for federal facilities in the County is not large. However, the demands placed on the water resources for environmental purposes are large and, in some areas, may pose a binding constraint of future water development.

In the past the County was selected for a federal rail alignment. In the future, the County may be called upon to host a federal activity of a similar nature. The location of such a facility would need to consider water resources during the planning stages and is not addressed in this plan.

The water to meet federal environmental water demands comes from numerous springs, streams, reservoirs, and wells. In recent years, an increased emphasis has been placed on the management and restoration of the water resources of springs, streams, and riparian areas. The U.S. Forest Service manages the water resources of the Inyo National Forest. It is Forest Service policy to file for water rights (in the name of the United States) for all water needed to support the proper use and management of National Forest administered lands.

The Bureau of Land Management is responsible for public lands, their management, use, and disposition. Present water filings by the BLM include 34 RES filings by the BLM on springs in Big Smoky, Ralston and Lida Valley per the DWR water right database. Any lands that are designated for disposal (privatization) will have an associated, but un- defined demand for water that is proportionate to the subsequent use of the land. Any developments on lands disposed by the BLM will have to obtain water rights in accordance with Nevada Water Law.

The U.S. Fish and Wildlife Service is responsible for the management of key lands in Esmeralda County and has regulatory authority over activities and developments on other federal lands. The interests of the Fish and Wildlife Service with respect to water resources management are shared with the County.

The National Park Service is responsible for management of Death Valley National Park. In this capacity, the Park Service has developed a well-defined water policy. Portions of three hydrographic basins discharge from subsurface flow to the Park.

Alternative actions in the management of federal lands are subject to periodic review under the National Environmental Policy Act. These reviews determine the feasibility and impacts associated with changes in management practices for the land under the stewardship of the various federal agencies. The federal agencies have implemented practices aimed at improving water quantity and quality; alternative practices have been evaluated and preferred actions established. These, and new alternatives are considered during the regular reviews of management plans.

Given the many shared interests between Esmeralda County and the federal agencies with stewardship over the federal lands, a policy of cooperation aimed at implementing sound water management practices should serve as the framework for interactions with the federal government. Such interactions cannot succeed without the participation and cooperation of the state agencies with regulatory authority over the water resources of the County.

Historical Demands

The historic demand for water is summarized in the State Water Plan for 1985, 1990 and 1995 from data obtained, for the most part, from the United States Geological Survey (USGS). The original USGS data is also tabulated and available on the USGS website in 5-year increments from 1995 to 2005. Pumpage data corresponding to individual water rights is available from the Division of Water Resources for some basins and individual producers of water in Esmeralda County. The estimated demand for 2050 as estimated in the Plan is also provided. The data is presented in Table 5. Different data reports vary in the quantities of the water use. This variance can be attributed to both data collection and accounting of water use data. Table 5 attempts to resolve many of the discrepancies in the data sets and provides estimates for omitted data. Esmeralda County will need to work in conjunction with the State to have all water use in the County documented accurately in a format that can be imported into the USGS database accurately.

Table of Population and Water Use in Esmeralda County 1985-2010, Projected 2050

		1985		1990		1995			
		NDWP	USGS	NDWP	USGS	NDWP	USGS	NDWR	
Population									
Total			1,380		1,340		1,180		
Served from Public V			840		820		820		
Manner of Water Use (AFA)									
Domestic									
Self Suppl	84	78	77	67	84	45			
Public Wa	146	146	134	134	213	213			
Total	**230**	**224**	**211**	**202**	**297**	**258**			
Commercial	22	22	56	56	45	45			
Domestic PS and Commercial T		**168**		**190**		**258**			
Irrigation									
Irrigation Surface		7,247		5,097		5,937			
Irrigation Groundwa		28,295		29,683		32,932			
Irrigation	1	1	12	11	44	45			
Total	35,542	**35,543**	34,780	**34,791**	49,687	**38,914**			**FLV**
Livestock	235	235	123	123	123	123			
Mining									
Unspecifi	4,850	4,850	15,660	12,837	12,613	12,613			
Clayton Valley									
DWR Pumpage Inventories									
Total		4,850		12,837		12,613			
Quasi Muni									
Recreational									
Source of Water for Use (AFA)									
Surface Water		**7,247**		**5,097**		**5,937**			
Groundwater		**33,628**		**42,912**		**46,016**			
Total									

Data Source: United States Geological Survey (USGS) with the addition of omitted data as described below:

1.) Data included in the category Irrigation Source omitted is required to reconcile totals provided
2.) * Indicates water use values from the previous period as required to reconcile totals
3.) Data provided from NDWR pumpage inventories was used to breakout mining because of the proprietary nature of the data
4.) Columns designated NDWP include USGS data modified by the Division of Water Planning
5.) Columns designated NDWR included USGS data and data obtained directly from the Division of Water Resources
6.) The USGS Water Use Total for 2000 is significantly below estimated water use provided in this table because of ommitted data
7.) Consumptive use for years 1985, 1990 and 1995 were provided in the NDWP report. Consumptive use for subsquent years were estimated at 70%
8.) Esmeralda County 2020 totals based on 2017 report

Current Demand

The current demand for water in Esmeralda County is estimated on the basis of flow meter recordings and estimates of water use based on agricultural acreage served. The majority of current water use falls into five categories: public water supply systems, domestic wells, mining, irrigation and livestock.

There are 6 water supply systems in Esmeralda County (see Table 6). The records of the Nevada Bureau of Health Protection Services indicate that 2 of these systems (Goldfield Town Water and Silver Peak Water System) are classified as community water supply systems. These systems provide most of the domestic water in the local communities. The remaining non community systems include 1 non transient system (Dyer Elementary School). Domestic water use in the Fish Lake Valley area is supplied by private wells.

Table Water Supply Systems in Esmeralda County

Water System Name	Type	Populations
GOLDFIELD TOWN WATER	Community	212*
SILVER PEAK WATER SYSTEM	Community	213*
DYER BAR AND CAFÉ	Noncommunity	25
ESMERALDA MARKET	Noncommunity	25
NDOT MILLERS NV ROADSIDE PARK RP801ES	Noncommunity	900
DYER ELEMENTARY SCHOOL	Nontransient Noncommunity	70
GOLD POINT WATER USERS ASSOC	Noncommunity	8

* Population 2022 US Census

Highlighted data is updated

The total number of domestic water wells in Esmeralda County is estimated at greater than 200 based on the number of structures and greater than 100 active domestic wells in the Fish Lake Valley basin as estimated by the DWR in 2010. Nevada Water Law allows for up to 2-acre feet per year for domestic use as provided in NRS 534.013 and 534.180. The DWR estimates a total self-supplied domestic water use allowance of 2 AFA per domestic well. Assuming this rate and a total of 100 domestic wells at the beginning of 2010, the corresponding water use is estimated to be approximately 200-acre feet per year for Fish Lake Valley alone. A rate of 2-acre foot per

year per domestic well assumes an equivalent of 1,780 gallons per day is used. This estimate of 2 AFA per domestic well is considered a conservative estimate.

Forecasted Demand

The forecasted demand for ~~2050~~ assumes that water resources across the county on average are fully utilized and will require conservation and reuse in the future. Therefore, all new uses of water will require that existing uses are decreased. The greatest potential for the change in use will be for the Clayton Valley mining, which relies on evaporation, to utilize less water intensive methods so that the water resources can be utilized in energy generation and other industrial ventures that the County approves.

Additional uses to track in the future may include solar and geothermal energy generation and industrial uses for providing economic development.

HYDROGRAPHIC BASINS

Water resources are managed by the Nevada Division of Water Resources within defined hydrographic basins referred to as Administrative Groundwater Basins. For the most part the individual basins in Esmeralda are under a larger hierarchy area referred to as the Central Hydrographic Region of Nevada.

A set of comprehensive tables that provide specific information regarding each basin is presented in Table 7, Table 8, Table 9, Table 10, Table 11, and Table 12. Brief descriptions of the hydrographic basins that are wholly, partially or adjacent to Esmeralda County are discussed below. The hydrographic basin descriptions include a brief statement regarding the flow of water between the basins and relevant water issues specific to the basin. Only the most important recommendations for each specific basin are provided and can be seen in Table 13. As this water plan evolves it is anticipated that the following description are expanded significantly. To facilitate ongoing updates numerical data is left in the data tables and not presented in the brief description. Information provided in the following tables is predominantly obtained from the Division of Water Resources publications.

If pending water rights applications are approved there will only be 2 basins remaining in the County with available water for future development, Grapevine Canyon, and Stonewall Flat with a total of 475-acre feet of unallocated water.

Table 5 Hydrographic Basins Water Budget Parameters - Inflow

		INFLOW								
Hydrographic Basins		Total	Recharge from Ppt.	Total Ground-water	Groundwater Source					
	Basin Region				Primary	Confidence	Elev. Between Basins	Secondary	Confidence	Elev. Between Basins
	Units	AFA	AFA	AFA			Feet			Feet
Teels Marsh Valley	114 CR (10)	1,300	1,300	-	Huntoon Valley	Low	-			
Queen Valley	116 CR (10)	2,000	2,000	-	-					
Fish Lake Valley	117 CR (10)	33,000	33,000	None	-					
Columbus Salt Marsh V.	118 CR (10)	4,000	700	3,300	Fish Lake Valley	High	193	Big Smoky Valley	Mod	235
Rhodes Salt Marsh	119 CR (10)			300	E. Soda Springs Valley	Mod	-	Garfield Flat	Mod	-
Monte Cristo Valley	136 CR (10)	500	500	-	-					
Big Smoky V./Tonopah Flat	137A CR (10)	14,000	12,000	2,000	Ione Valley	High	-			
Ralston Valley	141 CR (10)		5,000		Stone Cabin Valley	High	-	Big Smoky Valley	Mod	-
Alkali Spring Valley	142 CR (10)	5,500	100	5,500	Ralston Valley	High	355			
Clayton Valley	143 CR (10)	20,000	1,500	18,000	Big Smoky Valley 13,000AFA	High	472	Alkali Springs Valley 5,000AFA	High	567
Lida Valley	144 CR (10)	700	500	200	Stonewall Flat	High	43			
Stonewall Flat	145 CR (10)	200	100	100	Ralston Valley	Mod	550			
Sarcobatus Flat	146 CR (10)			700	Lida Valley	High	652	Stonewall Flat	Mod	695
Grapevine Canyon	231 DVB (14)	550	500	50	Sarcobatus Flat	Low	(231)			
Oriental Wash	232 DVB (14)	300	300	-	-					

Table 6 Hydrographic Basins Water Budget Parameters - Outflow

		OUTFLOW									
Hydrographic Basins		Total	Evapo-transpiration	Surface/ Spring Water	Total Ground-water	Destination					
	Basin Region		(ET)			Primary	Confidence	Elev. Between Basins	Secondary	Confidence	Elev. Between Basins
	Units	AFA	AFA	AFA	AFA			Feet			Feet
Teels Marsh Valley	114 CR (10)		1,400	-	-	Columbus Salt Marsh FWE?	Low	400	-		
Queen Valley	116 CR (10)	NA	-	900	1,100	California	High	-	-		
Fish Lake Valley	117 CR (10)	27,000	24,000	<100	3,000	Columbus Salt Marsh	High	193	Clayton Valley FWE?	Low	430
Columbus Salt Marsh V.	118 CR (10)	4,000	4,000	-	-	Closed	High		-		
Rhodes Salt Marsh	119 CR (10)		1,000			-			-		
Monte Cristo Valley	136 CR (10)	400	400			-			-		
Big Smoky V./Tonopah Flat	137A CR (10)	19,000	6,000	-	13,000	Clayton Valley	Mod	472	Columbus Salt Marsh	Low	235
Ralston Valley	141 CR (10)					Alkali Springs Valley	High	355	Stonewall Flat	Mod	550
Alkali Spring Valley	142 CR (10)	5,500	400	Minor	5,000	Clayton Valley	High	567	-		
Clayton Valley	143 CR (10)	24,000	24,000			Closed	High		-		
Lida Valley	144 CR (10)	700	Minor	700	700	Sarcobatus Flat	High	652	-		
Stonewall Flat	145 CR (10)	200			200	Lida Valley 200AFA	Mod	43	Sarcobatus Flat Minor AFA	Low	695
Sarcobatus Flat	146 CR (10)	500			500	Grapevine Canyon	Mod	231	-		
Grapevine Canyon	231 DVB (14)	400	Minor			California	High	2,000	-		
Oriental Wash	232 DVB (14)	300				California	High	2,000	-		

Table 7 Hydrographic Basins Index Wells- UP DATED

Hydrographic Basins	Basin Region	Approximate Basin Surface Elevation low point	Most Recent Recorded Water level Elevation	Proposed Additional Index Well or Springs by FWE	Period of Record	CNRWA Index Well or Spring	Period of Record and Number of Data Points
			(FWE Index Well)	**Existence, Access and Feasibility tobeVerified**	**Number of Data Points**		
	Units	Feet MSL	Feet MSL				
Teels Marsh Valley	114 CRfl0I	4,905	4,916	USGS 381319118230701	1968, 1		
Queen Valley	116 CRfl0I	5,800		No Existing W*ell* or Spring was Identified			
Fish lake Valley	117 CRfl0I	4,698	4,737	USGS374512118022501: NDWR 117S03 E3515CA	1951-2002,37, 1968-2005,42		
Columbus Salt Marsh V.	118 CRfl0I	4,505	4,538	USGS 380854117565601	1968·2019, 37		
Rhodes Salt Marsh	119 CRfl0I	4,370	4,398	USGS 381813118060801	1982·2002, 3		
Monte Cristo Valley	136 CRfl0I	5,265	5,239	USGS 382200117510001	1968·1982, 11		
Big Smoky V./Tonopah Flat	**137A** CRfl0I	4,740	4,nl	USGS 37571411741420	1963·2010, **8**	137AN01 E3812DAD81	2010, 1
Ralston Valley	141 CRfl0I	5,190	4,990	USGS 375533116580601	2000-2020, 20		
Alkali Spring Valley	142 CR(l0)	4,835	4,775	USGS 375300117150002	1982·2007, 16	142S01 E4210ADBD1; 142 NOl E4126A1; 142S02 E42 26CAA1	2007-2010, 2; 2007-2010, 2; 2007-2010, 2
Clayton Valley	143 CR(l0)	4,268	4,278 4,070	Brine Well	1967·2007, 29 2·1-10,1	143 S02 E39 2880881; 143S03 E3916CABB1/ USGS374036117392901	2007-2010, 2;1967-2010, 30
Lida Valley	144 CRfl0I	4,597	4,451	USGS 373320117090601	1990-2020, 43		
Stonewall Flat	145 CRfl0I	4,640	4,580	USGS 373623116565201	1907, 1		
Sarcobatus Flat	146 CRfl0I	3,945	3,970	USGS 371615117053601	2002·2020. 43		
Grapevine canyon	231 DVB(14)	4,176	2,000 3,200	Grapevine Springs, Strainingers Spring	1968, 1		

Oriental Wash	232 DVB(14)	3,721	3,140 3,020	Sand Spring; Little Sand Spring	1968, 1		

Table 8 Hydrographic Basins Water Budget Summary - UPDATED

		BASIN PERENIAL YIELD							
Hydrographic Basins		Perennial Yield	Approx. Percent of Basin in Esmeralda County	Perennial Yield	2010 Esmeralda Co Withdrawals	Calculated Difference	Storage	Declining Water Levels	Proposed Revision to Perennial Yield
	Basin Region	(not including California)		Based on % of Basin in Esmeralda County					
	Units	AFA	%	AFA	AFA	AFA	AF	ft/yr	AFA
Teels Marsh Valley	114 CR (10)	1,400	0	-		-	260,000		-
Queen Valley	116 CR (10)	600	5	30		30	100,000		-
Fish Lake Valley	117 CR (10)	30,000	72	30,000	29,142	858	1,600,000	0.5 - 2	22,000
Columbus Salt Marsh V.	118 CR (10)	4,000	90	3,600	1	3,599	530,000		No Change
Rhodes Salt Marsh	119 CR (10)	1,000	0	-		-	340,000		-
Monte Cristo Valley	136 CR (10)	400	40	160		160	720,000		No Change
Big Smoky V./Tonopah Flat	137A CR (10)	6,000	30	1,800	53	1,747	7,000,000		NA
Ralston Valley	141 CR (10)	6,000	2	120		120	2,700,000		-
Alkali Spring Valley	142 CR (10)	3,000	95	2,850	70	2,780	1,300,000	0 - 0.1	2,000
Clayton Valley	143 CR (10)	20,000	100	20,000	14,231	5,769	1,300,000	> 0.1 - 4	12,000
Lida Valley	144 CR (10)	350	85	298	12	286	1,500,000		No Change
Stonewall Flat	145 CR (10)	100	1	1		1	820,000		-
Sarcobatus Flat	146 CR (10)	3,000	3	90		90	2,400,000		-
Grapevine Canyon	231 DVB (14)	400	20	80	7	73	160,000		NA
Oriental Wash	232 DVB (14)	150	20	30	12	18	370,000		NA
	Total	76,400		59,059	43,528	15,531			43,059
		Perennial yield based on amount of recoverable and sustainable water							

Table 9 Hydrographic Basins Attributes

Hydrographic Basins		BASIN ATTRIBUTES						
		Yield Source	Size		General Direction of Basin Outside of ES Co	County(ies) within hydrographic basin	Nearest Town(s)	Designated Basin
	Basin Region							
	Units		Mi^2	Acres				
Teels Marsh Valley	114 CR (10)	USGS Recon. 52 (1970)	323	206,720	NW	Mineral	Mina, Benton Station	N
Queen Valley	116 CR (10)	USGS Recon. 52 (1970)	65	41,600	SW	Es, Mineral	Dyer, Benton Station	N
Fish Lake Valley	117 CR (10)	USGS Recon. 58 (1973)	706	451,840	SW	Es, California	Dyer	Y
Columbus Salt Marsh V.	118 CR (10)	USGS Recon. 52 (1970)	370	236,800	NW	Es, Mineral	Dyer, Mina	N
Rhodes Salt Marsh	119 CR (10)	USGS Recon. 52 (1970)	199	127,360	NW	Mineral		N
Monte Cristo Valley	136 CR (10)	USGS Recon. 52 (1970)	284	181,760	NW	Es, Mineral	Mina, Tonopah	N
Big Smoky V./Tonopah Flat	137A CR (10)	USGS Bulletin 41	1,603	1,025,920	NW	Es, Nye, Mineral	Tonopah, Manhattan	Y
Ralston Valley	141 CR (10)	USGS OFR 78-768 (1986)	971	621,440	NE	Nye	Tonopah	Y
Alkali Spring Valley	142 CR (10)	USGS Recon. 45 (1968)	313	200,320	E	Es, Nye	Goldfield, Tonopah	Y
Clayton Valley	143 CR (10)	USGS Recon. 45 (1968)	555	355,200	-	Esmeralda	Silver Peak	Y
Lida Valley	144 CR (10)	USGS Recon. 45 (1968)	535	342,400	E	Es, Nye	Lida, Goldfield	N
Stonewall Flat	145 CR (10)	USGS Recon. 45 (1968)	381	243,840	E	Nye	Goldfield	N
Sarcobatus Flat	146 CR (10)	USGS OFR 78-768 (1986)	812	519,680	SE	Es, Nye	Scotty's Jcnt., Beatty	Y
Grapevine Canyon	231 DVB (14)	USGS Rec 45	162	103,680	S	Es, Nye, California	Scotty's Junction	N
Oriental Wash	232 DVB (14)	USGS Rec 45	182	116,480	S	Es, California	Lida, Goldpoint	N
	Total		7,117	4,554,880				

Table 10 Hydrographic Basins Water Rights and Irrigation Requirements UP Dated

Hydrographic Basins		Decree	Permitted	Annual Stream Flow	Basin Total	Basin Total Available Based on Perennial Yield	Basin Total	Basin Total Available Based on Perennial Yield	Geo-thermal	., .: 0	Ref. Etos (ft):	Shallow Open Water	Alfalfa	low Managed Pasture Grass
	Basin Region						**Estimated within Esmeralda County**	**Estimated within Esmeralda County**						
		AFA	**AFA**	**AFA**	AFA	AFA	**AFA**	**AFA**	**AFA**	**AFA**	**AFA**	**AFA**	**AFA**	AFA
Teels Marsh Valley	114 CR(10)		10		1,530	(130)	0	0			5.0	4.8	4.0	3.0
Queen Valley	116 CR(10)		1,466		602	(2)	0	0			5.1	5.0	4.1	3.1
Fish lake Valley	117 CR(10)	8,809	36,455	24,000	51,940	(21,940)	52,031	(22,031)	5,914		5.5	5.4	4.2	3.2
Columbus Salt Marsh V.	118 CR(10)	24	326		3,996	4	1,772	1,828			5.5	5.4	4.4	3.3
Rhodes Salt Marsh	119 CR(10)		62		1,181	(181)	0	0			5.0	4.8	4.0	3.0
Monte Cristo Valley	136 CR(10)		53		399	1	86	1			5.0	4.9	4.0	3.0
Big Smoky V./Tonopah Flat	137A CR(10)		1,938		226,553	(220,553)	2,263	(463)			4.8	4.7	3.7	2.9
Ralston Valley	141 CR(10)		198		4,379	1,621	0	0			5.1	4.8	4.0	3.1
Alkali Spring Valley	142 CR(10)		271		2,516	484	2,811	189		56	5.2	5.1	4.2	3.2
Clayton Valley	143 CR(10)		245		23,910	(3,910)	23,910	(3,910)		181	5.5	5.3	4.4	3.4
Lida Valley	144 CR(10)		451		378	(28)	378	(28)			5.3	5.2	4.3	3.3
Stonewall Flat	145 CR(10)		55		21	79	0	79			5.2	5.0	4.2	3.2
Sarcobatus Flat	146 CR(10)		77		3,563	(563)	0	0			5.3	5.2	4.2	3.2
Grapevine canyon	231 DVB (14)				52	348	12	300			5.4	5.3	4.4	3.3
Oriental wash	232 DVB (14)		78		9	141	9	141			5.3	5.2	4.3	3.3
	Total				321,029	(244,629)	83,251	(24,307)						

Teels Marsh Valley 114

Basin Description

The Teels Marsh Valley hydrographic basin is immediately north of the Columbus Salt Marsh and is located within Mineral County. Some outflow from Teels Marsh Valley may contribute to the Columbus Salt Marsh basin although the quantity was not sufficient to quantify by the Nevada Division of Water Resources.

Basin Issues

Significant water withdrawals in Teels Marsh Valley could decrease outflow to Columbus Salt Marsh.

Basin is 109% appropriated.

There are no pending water right applications.

Basin Recommendations

- Promote and review data collection by USGS, DWR and CNRWA.
- Annually verify that water withdrawals from Teels Marsh basin do not decrease inflows into Columbus Salt Marsh through monitoring of water levels and water withdrawals.
- Preferential Use: Mining

Queen Valley 116

Basin Description

The majority of the Queens Valley basin is in California and the portion of the basin in Nevada discharges to basins in California. The areal extent of Queens Valley in Nevada is not significant and the basin does not receive significant recharge from other basins in Nevada.

The importance of the Queen Valley hydrographic basin to the County is limited. Preserving environmental aspects or preserving the availability to accommodate future water needs in this remote region that may include mining should be considered.

Queens Valley basin water is fully appropriated.

There are no pending water right applications.

Basin Issues

The potential for the removal of water resources at a greater than the average annual recharge rate for Queen Valley could come from within the basin in Nevada or California or from adjacent basins. The greatest potential for groundwater withdrawals in excess of annual recharge rates is from within the basin in California. Because of the large water exportation projects in western California there is a high probability that this basin has already been impacted by water

exportation. Data collection along the western margin of the basin near the state boundary including water levels and environmental characteristics would be beneficial.

Basin Recommendations

- Promote and review data collection by USGS, DWR, CNRWA, and BSDW.
- Initiate data collection along the western margin of the basin near state line.
- Document existing environmental characteristics for the basin.
- Preferential Use: Agriculture and Mining

Regularly monitoring of well(s) along the state boundary should be conducted and documented so that water level declines or degrading of water quality can be identified and withdrawals discontinued prior to depletion of water resources.

Fish Lake Valley 117

Basin Description

The Fish Lake Valley hydrographic basin receives significant recharge from the higher elevation mountain range to the west in California and to a lesser extent from the mountain range to the east in Nevada. Groundwater is naturally discharged from evaporation, transpiration and from groundwater flow to the Columbus Salt Marsh and possibly the Clayton Valley hydrographic basins based on previous reports.

Basin is 173% ~~172%~~ appropriated.

Water right applications – 1,568.81 acre feet

Pending applications listed as ready for action – 1,193 acre feet.

Pending geothermal water right applications listed as ready for action - 428 acre feet.

Basin Issues

The Fish Lake Valley basin is experiencing irreparable damage from water production that exceeds annual recharge. Historic groundwater levels for Fish Lake Valley are shown in Figure 4. This overdraft is resulting in collapse of aquifer storage. Quantifying the amount of collapse would require additional study and would depend on the type of materials that comprise the local aquifers. This decrease in pore space impacts the ability of the aquifer to store groundwater and cannot be reversed in the future. Additional impacts to the aquifers may include greater pumping lifts resulting in greater energy requirements for the local users. Reduction of pumping to stop aquifer collapse would rely on cooperation with California and possibly the Clayton Valley hydrographic basin.

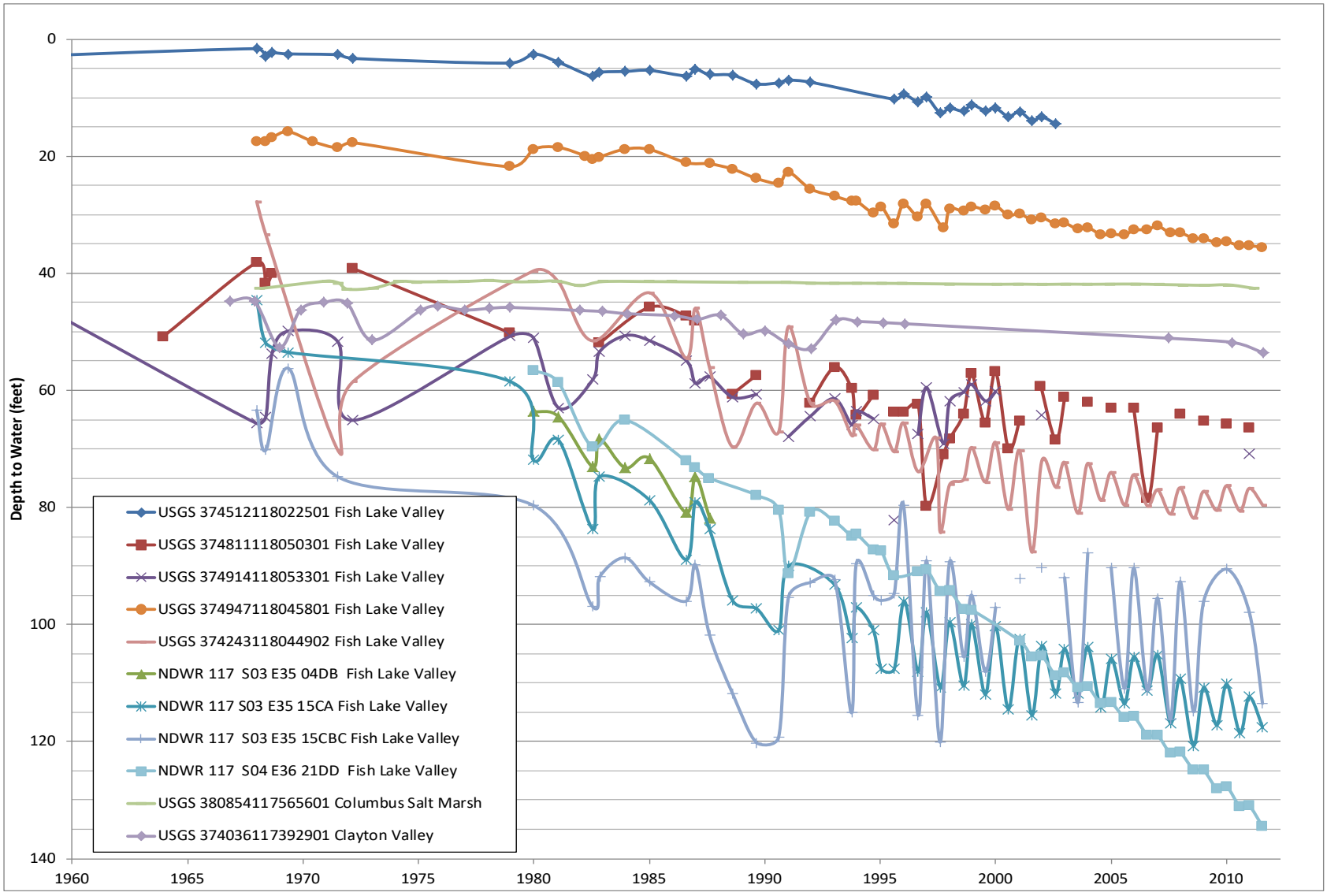
Preventing further decline of the water table in Fish Lake Valley and efforts to replace the water that has been removed from storage should be a priority for the County. This effort will require a combination of increasing agricultural efficiency, decreasing the irrigable area within the basin, preventing artesian flows from wells and limiting the groundwater withdrawals from California which would result in additional recharge to the basin.

Basin Recommendations

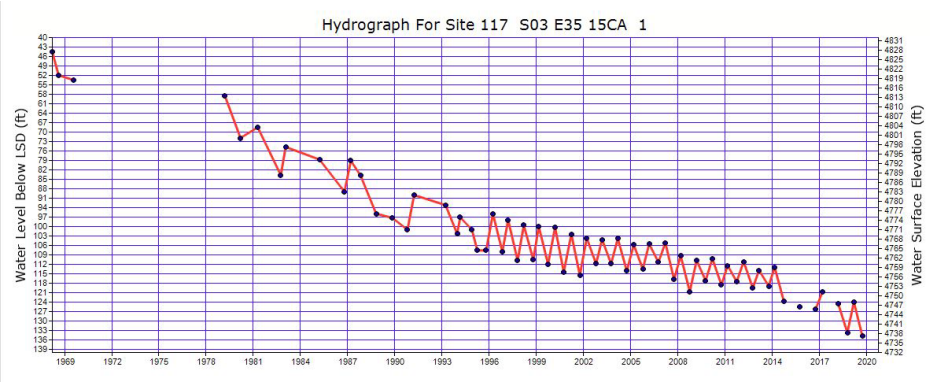
- Promote and review data collection by USGS, DWR, CNRWA, and BSDW.
- Document the increased pumping cost from groundwater withdrawals exceeding the annual recharge rate.
- Demonstrate when the existing rate of water level decline will make agriculture unprofitable for the local community.
- Investigate options for requiring greater irrigation efficiency.
- Investigate storage and recovery of unused surface water.
- Permitted water that is not being utilized for beneficial use should be cancelled or forfeited.
- Collaborate with public agency to utilize remote sensing data to document subsidence and changes in vegetation from groundwater withdrawals.
- Recommend a water budget study to re-evaluate the perennial yield in the basin.
- Create a detailed basin water resource plan.
- Preferential Use: Agriculture, Domestic, Mining, Geothermal, and Quasi-Municipal

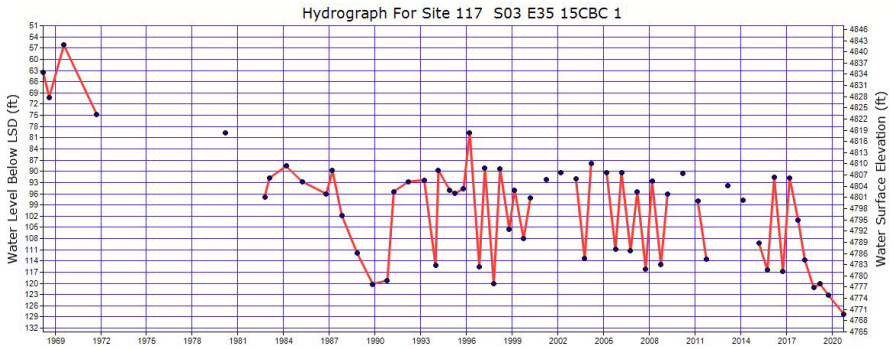
The cost benefit analysis should evaluate the benefit of agriculture in Fish Lake Valley to the residents of the County and take a life cycle approach to evaluate when agricultural will no longer be viable because of the depth to water and loss of storage. By the nature of the study the results will be subjective based on the future value of agricultural, energy and technology.

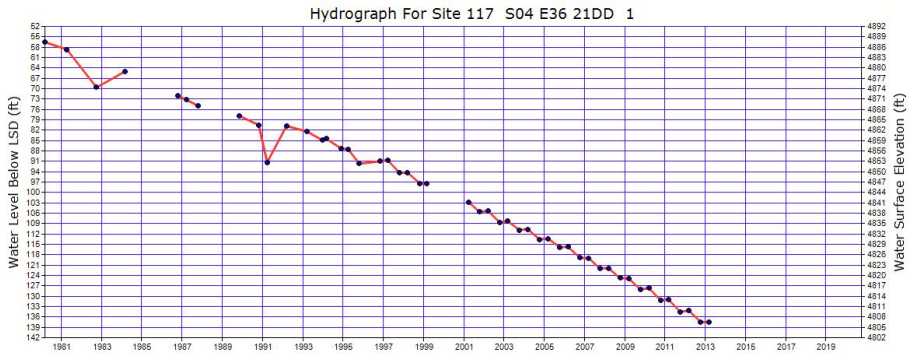
Figure 4 Selected Groundwater Water Level from 1960 to 2011

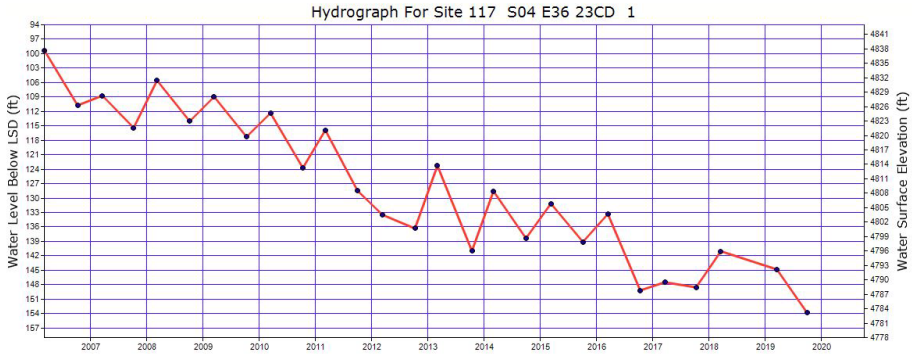


Examples of Fish Lake Valley Wells – ADDED GRAPHS









Columbus Salt Marsh Valley 118

Basin Description

The Columbus Salt Marsh Valley receives recharge from Fish Lake Valley and possibly Big Smoky Valley according to water budgets in the Water Resources Reconnaissance Series - Report 52. Contributions from higher elevations in adjoining basins including Queen Valley, Teels Salt Marsh, Rhodes Salt Marsh and Monte Cristo Valley are not recognized by the Division of Water Resources and therefore presumed to be insignificant.

Basin Issues

Significant unappropriated water rights are situated in this basin however the water quality of this closed basin is generally presumed to be poor. Existing water right holders in this basin may be impacted if the State Engineer does not decrease the available water in the basin because of the poor water quality and the overdraft conditions in the Fish Lake Valley basin. Verifying the perennial yield and determination of the water quality of Columbus Salt Marsh Valley is of importance.

Basin is 99% ~~%~~ appropriated with pending applications listed as ready for action - 1,360.10 acre feet. ~~for the remaining available water~~.

Basin Recommendations

- Promote and review data collection by USGS, DWR, and CNRWA.
- Verify perennial yield within basin to prevent over allocation of resources.
- Verify acceptability of water quality for intended uses.
- Recommend to the State Engineer to designate the basin.
- Preferential Use: Agriculture, Commercial, Geothermal and Mining

Much of the water in the basin is not satisfactory for quasi-municipal or agricultural use. Thus, the perennial yield within the basin should be based on water quality below 1000 mg/L for total dissolved solids (TDS). Therefore, the DWR should only allocate additional water rights up to the perennial yield for water greater than 1000 mg/l of total dissolved solids. This will assure that water below 1000 mg/L total dissolved solids is not over allocated and is available for existing water rights.

Rhodes Salt Marsh 119

Basin Description

The Rhodes Salt Marsh hydrographic basin is immediately north of Columbus Salt Marsh and is located outside of Esmeralda County. Some recharge from Rhodes Salt Marsh may contribute to

the Columbus Salt Marsh basin although the quantity was not sufficient to quantify by the Division of Water Resources.

Basin Issues

Water withdrawals from Rhodes Salt Marsh basin may decrease inflows into Columbus Salt Marsh which could be evaluated with monitoring of water levels and withdrawals.

Basin is 118% ~~54%~~ appropriated with pending applications listed as ready for action - 23.87 acre feet. ~~pending for more than the remaining available water.~~

Basin Recommendations

- Promote and review data collection by USGS, DWR, and CNRWA.
- Annually verify that water withdrawals from Rhodes Salt Marsh basin do not decrease inflows into Columbus Salt Marsh through monitoring of water levels and water withdrawals.
- Preferential Use: Geothermal and Mining

Monte Cristo 136

Basin Description

Esmeralda County shares this hydrographic basin with Mineral County. The Division of Water Resources has not quantified any groundwater discharge to adjacent basins.

Basin Issues

The greatest issue for the Monte Cristo Valley in Esmeralda County is the potential for impacts from upgradient water users in the northern portion of the Monte Cristo Valley in Mineral County. Water levels should be verified annually in the center of the valley to verify groundwater inflows to the southern portion of the basin.

Basin is fully appropriated with no pending water right applications.

Basin Recommendations

- Promote and review data collection by USGS, DWR, and CNRWA.
- Annually verify that water withdrawals in the basin.
- Establishing groundwater monitoring points in the central part of the Valley near the County boundary.
- Preferential Use: Geothermal and Mining

Big Smoky Valley / Tonopah Flat 137A

Basin Description

The lower portion of the Big Smoky Valley hydrographic basin discharges mostly to the Clayton Valley basin. The Division of Water Resources has indicated that some groundwater may discharge from Big Smoky Valley to Columbus Salt Marsh. Recharge to lower Big Smoky Valley is mostly from the northern portions of Big Smoky Valley.

Big Smoky Valley is a designated basin by NDWR.

Basin Issues

Water use from mining and associated infrastructure in the northern portion of Big Smoky Valley reduces groundwater flow from the northern portion of the Valley to the southern portion of the Valley. This results in reduced groundwater flow from Big Smoky Valley to Clayton Valley. Planned solar projects are projected to use minimal water.

Basin is 378% ~~388%~~ appropriated with pending applications listed as ready for action for 6,517.60 acre feet.

Basin Recommendations

- Promote and review data collection by USGS, DWR, CNRWA, and BSDW.
- Annually verify that water withdrawals do not reduce water levels in the basin.
- Create a detailed basin water resource plan.
- Preferential Use: Agriculture, Renewable Energy, and Mining

Ralston Valley 141

Basin Description

A small portion of the Ralston hydrographic basin is located in Esmeralda County with the majority of the basin located in Nye County. This hydrographic basin discharges groundwater into Alkali Springs Valley which is mostly within Esmeralda County and possibly into Stonewall Flat hydrographic basin which is mostly outside of Esmeralda County.

Basin Issues

Recharge from Ralston Valley is important to the Goldfield area because of the limited recharge from precipitation in the area surrounding Goldfield because of the elevations below 6500 feet.

Basin is 73% ~~%~~ appropriated with pending applications listed as ready for action – 6,517.60 acre feet. ~~pending for the remaining water~~.

Impacts to the basin will jeopardize the aquifers that the community of Goldfield relies on for water production

Basin Recommendations

- Promote and review data collection by USGS, DWR, CNRWA, and BSDW.
- Monitor groundwater levels and withdrawals so that inflows to Alkali Springs Valley are not reduced by withdrawals from the Ralston basin.
- Conduct study to determine if a groundwater source exists that could provide water to Goldfield that does not require treatment.
- Create a detailed basin water resource plan.
- Request water meters for all water users to accurately measure water production and use.
- Preferential Use: Agriculture, Renewable Energy, and Mining

Esmeralda County should work with Nye County and the Division of Water Resource to limit withdrawals from Ralston Valley to assure that the wells in Esmeralda County down gradient of the Ralston hydrographic basin are not impacted. Detailed monitoring in the Ralston hydrographic basin could provide assurances that withdrawals in the Ralston basin do not decrease the groundwater discharge to Alkali Springs Valley.

Alkali Spring Valley 142

Basin Description

The Alkali Spring Valley hydrographic basin receives groundwater from Ralston Valley basin and discharges groundwater to Clayton Valley according to DWR reconnaissance groundwater studies. Montezuma Peak, located on the southwestern boundary of the basin at an elevation of over 8000 feet, provides the only significant source of recharge within the basin from precipitation.

The community of Goldfield utilizes wells in Alkali Spring Valley that intercept local recharge from the higher elevations in the northeast part of the basin and groundwater flows from Ralston Valley hydrographic basin prior to discharge at the playa and subsurface flow to Clayton Valley. The water that Goldfield utilizes requires treatment for arsenic.

Basin is 84% ~~%~~ appropriated with pending applications listed as ready for action – 7,048.41 acre feet. ~~pending for more than the remaining water.~~

Basin Issues

Impacts to the basin will jeopardize the aquifers that Goldfield relies on for water production. Detailed monitoring of the basin water resources should be implemented. Future railroads that may be built could impact the basin.

Basin Recommendations

- Promote and review data collection by USGS, DWR, CNRWA, and BSDW.
- Implement detailed water level and water production monitoring of the basin water resources.
- Work with the Division of Water Resources to provide protection to water resources that are relied on for the community of Goldfield.
- Establish policies that mandate the Goldfield Water System serve temporary and permanent projects. Expand the service area and require new users in the area to be served water by the Goldfield Water System.
- Request designated status for the basin.
- Request water meters for all water users to accurately measure water use in the basin.
- Recommend to the State Engineer evaluate and consider reduction of the perennial yield in the basin.
- Create a detailed basin water resource plan.
- Expand the service area for the public water supply system.
- Preferential Use: Municipal, Quasi-Municipal, Agriculture, and Mining

Clayton Valley 143

Basin Description

The Clayton Valley hydrographic basin is centrally located in Esmeralda County and is the only basin located entirely within Esmeralda County. The basin receives groundwater inflows from Big Smoky Valley and to a lesser extent Alkali Springs Valley and may receive minor groundwater inflows from Fish Lake Valley and Lida Valley basins. Only the northeast portion of the hydrographic basin perimeter does not contain areas of elevation greater than 7000 feet that can contribute to the basins recharge. Local recharge provides 1500 AFA of recharge to the basin.

Basin Issues

The Clayton Valley hydrographic basin is permanently losing storage because of withdrawals of groundwater. Because of the saline nature of the aquifer the loss of aquifer storage may not be of economic concern to regulatory agencies at this time. Since the loss of storage is irreversible the loss of storage may become a concern if withdraws from storage result in aquifer collapse that extends to the freshwater aquifer. Monitoring of water levels in the aquifers surrounding the brine aquifer and monitoring of elevations with detailed surveys and/or remote sensing will document aquifer collapse and permanent loss of storage.

The impact of the groundwater withdrawals for mineral concentration by evaporation will take decades for the water levels to recover and the loss of groundwater storage will never be regained. The economic benefit of these losses must be balanced against future economic losses from not having the water available within the basin and the impact of the loss of storage. Because the aquifer is of poor water quality for most uses the loss of storage may even provide a benefit and should not be consider as detrimental as it would be considered in an aquifer with favorable water quality.

Evaporative Mining Techniques should be discouraged in favor of more water efficient or newly developed mechanical processes.

Basin is 120% appropriated with pending applications listed as ready for action – 92,053.02 acre feet that would increase appropriations to 580% of perennial yield ~~%~~ if approved.

Basin Recommendations

- Promote and review data collection by USGS, DWR, CNRWA, PWS, and BSDW.
- Provide guidance for modifying or additional data collection by mining operations.
- Investigate recharge, storage and recovery of unused surface water flows.
- Recommend to the State Engineer to reduce the perennial yield in the basin.
- Document the increased pumping cost associated with declining water levels from groundwater withdrawals exceeding the annual recharge rate.
- Conduct cost benefit analysis for water use.
- Request designated status to the basin.

Permitted water not being utilized for beneficial use should be forfeited or cancelled.

- Request water meters for all water users to accurately measure water use and enforce water rights withdrawals. Collaborate with public agency to review remote sensing data that may indicate subsidence and changes in vegetation from groundwater withdrawals.
- Preferential Use: Municipal, Renewable Energy, Agriculture and Mining

A cost benefit of water use should be conducted for the basin. Such a study would be cursory in nature because of significant unknowns however it could still provide the County some general guidelines for future water use. In general terms the study would determine the economic benefit to the County of evaporation for mineral concentration compared to other uses of water including agriculture, tourism, other forms of mining and energy production including solar and geothermal.

Lida Valley 144

Basin Description

The Lida Valley hydrographic basin receives groundwater from recharge and subsurface inflows from Stonewall Flat hydrographic basin which is mostly outside of the County. The portion of the basin within the County discharges underground to Sarcobatus Flat in Nye County.

Issues

The most significant issue for Lida Valley hydrographic basin is the limited perennial yield of 350 AFA. If the limited remaining unappropriated water rights were issued the County or State could be prevented from the use of water for transportation projects. The perennial yield and water quality of Lida Valley should be verified.

Basin is 108% ~~100%~~ appropriated with pending applications listed as ready for action – 328.95 acre feet. ~~pending from Esmeralda County for 65 AFA of the remaining available water.~~

Basin Recommendations

- Promote and review data collection by USGS, DWR, CNRWA, and BSDW.
- Verify perennial yield within basin to prevent over allocation of resources.
- Verify acceptability of water quality for intended uses.
- Esmeralda County should consider applying for all remaining unappropriated water rights for transportation and maintenance projects.
- Request designated status to the basin.
- Preferential Use: Domestic, Quasi-Municipal, Renewable Energy, Agriculture and Mining

Stonewall Flat 145

Basin Description

The Stonewall Flat hydrographic basin is located adjacent to Esmeralda County in Nye County. The basin discharges groundwater to Lida Valley.

Issues

This basin has limited groundwater information therefore at this time the importance of Stonewall Flat to the County is uncertain. If significant development occurs in this basin Esmeralda County will want to document water resource consumption due to its possible effect on Lida Valley.

Basin is 20% ~~12%~~ appropriated with no pending water right applications.

Basin Recommendations

- Promote and review data collection by USGS, DWR, and CNRWA.
- Request designated status to the basin.
- Preferential Use: Agriculture

Sarcobatus Flat 146

Basin Description

The Sarcobatus Flat hydrographic basin is mostly outside of Esmeralda County. The basin receives groundwater from Lida Valley hydrographic basin and from recharge within the basin. The Division of Water Resources has indicated that in addition to discharging internally through evapotranspiration that the hydrographic basin discharges to the Grape Vine hydrographic basin which eventually discharges to California.

Issues

The most significant issue to the Sarcobatus Flat hydrographic basin is the potential for dewatering of the aquifer from water users in Nye County. Regularly monitoring of wells along the County boundary should be documented so that aquifer water level declines or degrading of water quality can be identified and discontinued prior to irreparable damage to the water resources and storage potential.

Basin is 119% ~~118%~~ appropriated with applcations for 2,700 acre feet and ~~a~~ pending applications listed as ready for action – 328.95 acre feet. ~~that would increase appropriations to 125% if approved.~~

Basin Recommendations

- Promote and review data collection by USGS, DWR, and CNRWA.
- Preferential Use: Renewable Energy and Agriculture

Grapevine Canyon 231

Basin Description

The Grapevine Canyon hydrographic basin receives recharge from recharge within the basin and from the Sarcobatus Flat hydrographic basin which receives recharge from the Lida basin. The Grape Vine basin discharges to the western portion of the basin in California. Because of the evaporative discharge area in the Sarcobatus Flat hydrographic basin near Scotty's Junction, groundwater flow from Sarcobatus Flat to Grape Vine basin is not significant.

Issues

The most significant issue to the Grape Vine hydrographic basin is the potential for dewatering of the aquifer from water users in California. Regularly monitoring of wells along the State

Boundary should be documented so that aquifer water level declines or degrading of water quality can be identified and discontinued prior to irreparable damage to the water resources.

Basin is 13% appropriated with no pending water right applications.

Basin Recommendations

- Promote and review data collection by USGS, DWR, and CNRWA.
- Preferential Use: Agriculture and Mining

Oriental Wash 232

Basin Description

The Oriental Wash hydrographic basin receives recharge from within the basin and discharges to the western portion of the Oriental Wash hydrographic basin in California.

Issues

The most significant issue to the Oriental Wash hydrographic basin is the potential for dewatering of the aquifer from water users in California. Regularly monitoring of wells along the State Boundary should be documented so that aquifer water level declines or degrading of water quality can be identified and discontinued prior to irreparable damage to the water resources occurs.

Basin is 6% ~~8%~~ applications for the remaining water. ~~with with no pending water right applications.~~

Basin Recommendations

- Promote and review data collection by USGS, DWR, CNRWA, and BSDW.
- Preferential Use: Agriculture and Mining

PLANNING AND MONITORING

The potential for growth and development in Esmeralda County over the next 5-10 years requires water resource planning. Las Vegas is an example of unpredictable growth. All sectors of the Esmeralda County economy are subject to changes in market conditions, policies, and technology that are decided and controlled on a regional, national, and/or global level. These factors could change the economic outlook, population, employment patterns, and water use anticipated in the County by the year 2032-2050. There are a myriad of issues associated with planning, development, and management of the water resources that exist. This section provides an overview of issues that must be considered in developing a long-term water resource management strategy for the County.

Planning Issues

A number of key water supply issues are ranked below based on the potential impacts to the County:

1. **Inadequate water supplies to meet demands in Fish Lake Valley Basin**
    a. Agricultural demands
    b. Subdivision demands
    c. Mining Demands
    d. ~~Geothermal~~ Energy projects
    e. Ongoing drought conditions

    Over-appropriation of water in Fish Lake Valley persists.

    ~~*Existing overdraft conditions in Fish Lake Valley are the greatest in the County on water resources are below maximum contaminant levels (MCL's) for drinking water systems.*~~

2. **Inadequate water supplies to meet projected demands in Clayton Valley**

    Existing overdraft conditions in Clayton Valley are the greatest in the County on resources that exceed drinking water MCL's for public water systems. This issue is ranked below Issue 1 because overdraft to the aquifer adjacent to the saline aquifer although increasing is not significant at this time.

    a. Mining Demands
    b. Energy Projects
    c. Demand for potable water may exceed County's ability to provide.

d. Water quality issues.

3. **Management of groundwater in bi-state basins**

   Four of the hydrographic basins in Esmeralda County are shared with California and since California has significantly different water laws, management of the four hydrographic basins on the boundary between California creates additional management issues.

4. **Federal water use policies**

   Federal land use policies can have significant impact to the goals of the County that are closely tied to the ability to manage water resources within the County. This issue is ranked 4 but can have much greater impacts either by utilizing limited water resources on Federal projects or by limiting the use of water for objectives approved by the County.

5. **Water exportation and/or speculation**

   Based on the overuse of existing water, exportation from Esmeralda County basins is not allowed in the County and would not be approved by the Division of Water Resources based on existing water law.

6. **Protection of springs, the management and use of riparian areas, and the maintenance of surface water quality**.

   Spring discharges in Esmeralda County may be reduced by diversions for beneficial use (a permitted activity) or drought (a natural condition).

7. **Several issues raised in the Nevada State Water Plan (Nevada Division of Water Planning, 1999) are relevant to surface water resources in Esmeralda County.**

   According to the State Water Plan, surface water accounted for 47 percent of total water use in the County during 1985. By 1990, surface water had dropped to 13 percent of the total water use in Esmeralda County but by 1995 had risen to 17 percent of the total. The majority of surface water use is for agriculture.

8. **Management of groundwater in multi-county basins**

   Esmeralda County has limited management of water resources where inflows are received from an adjoining county (For example Ralston Basin in Nye County provides groundwater water to the Alkali Spring Valley which is the groundwater source for the Town of Goldfield).

Guiding principles and policies were developed and previously presented in this report to address the water planning issues for Esmeralda County. In addition, detailed recommendations are presented in Table 13.

Monitoring

Data collection and recording is one of the most important aspects of Water Resource Management for the County. Data collected must include water level, water production, water quality and other water resource related data. Esmeralda County should utilize its limited

resources to advocate for the collection and recording of data and refrain from being the primary agency by utilizing existing agencies that have the ability to store and retrieve defensible accurate data. A brief description of water resource related data and the agencies collecting the data are provided below.

Water Level

Monitoring of water levels, quality and production is necessary for management of water resources in Esmeralda County. Water level monitoring is being conducted by the following agencies:

United States Geological Survey
State of Nevada Division of Water Resources
Central Nevada Regional Water Authority

Additional efforts to fill in water level data gaps should be coordinated with these existing agencies. Maintaining defensible databases is costly and establishment of additional data sets should be avoided. Regardless of the agency, water level monitoring must be conducted to provide the greatest quality assurance to the data set.

Investigation of poorly constrained water resources is important for the County to properly manage the resources within the County. Since water resource management has been developed at the basin level understanding a basins subsurface discharge from each hydrographic basin within or adjacent to the County is important for groundwater management. Therefore, future data collection should have the goal of determining groundwater gradients between basins so that subsurface flows between hydrographic basins can be estimated with greater confidence.

Water Production

Monitoring of production is necessary for management of water resources in Esmeralda County so that the impacts of water withdrawals can be correlated to water production. Water production data is collected by:

State of Nevada Division of Water Resources

Additional efforts to fill in water production data gaps should be coordinated with Division of Water Resource. These gaps include requiring water right holders to provide greater accuracy to pumpage quantities. This should require all groundwater production in the County to utilize flow meters and report pumpage.

Water Quality

Monitoring of water quality is also critical for effective management of water resources in Esmeralda County. Water quality monitoring is being conducted by the following agencies:

- United States Geological Survey
- Nevada Department of Environmental Protection

- Bureau of Safe Drinking Water
- Bureau of Water Pollution Control
- Bureau of Mining Regulation and Reclamation

The ~~Bureau of Safe Drinking Water~~ NDEP water quality monitoring is limited to those areas within the County with population great enough to require a public water system. The Bureau of Water Pollution Control requires sampling of water quality related to the location of prospective or ongoing wastewater projects. Water wells should be selected for long-term monitoring and water levels should be monitored on at least a bi-annual basis at these wells.

Monitoring of groundwater quality is important so that Esmeralda County can utilize resources to the greater benefit. This could include utilizing water resource that exceed maximum contaminant levels for uses that can utilize poorer water quality and utilizing the best water quality within the County for drinking water and/or agricultural uses. Mining operations should provide water quality data directly to the county annually at minimum, and should remediate any adverse effects to said water quality caused by operations.

In addition to utilizing available data, supplementary water quality data should be pursued by the County. Because of the significant expense of sampling and laboratory work for the analysis the County will need to work with other agencies to assure that laboratory work can be funded. Obtaining water quality data in critical areas will require strategic planning to assure that existing water users assist with paying for data collection and recording and that the most important and critical data is collected and placed in a digital database.

Related Data

Monitoring of other parameters not directly related to water resources is necessary for management of water resources in Esmeralda County. The County needs to advocate for the collection of data within the County and proper recording of the data so that the data is retrievable.

These parameters may include but are not limited to meteorological, botanical and remote sensing data. The relationship between meteorological data to recharge and evapotranspiration is well understood. Botanical relationships for predicting recharge in the State have been utilized since the first reconnaissance reports. Remote sensing is still evolving and greatly facilitates other sciences in water management including the ability to quickly measure broad areas of ground subsidence resulting from overdraft condition.

RECOMMENDATIONS

Recommendations for water resource management are contained within the Policies Section of this Plan, within the Hydrographic Basin Descriptions and within this Section in Table 13. The recommendations within the Policies are County wide recommendations whereas the recommendations in the basin descriptions are specific to the individual basins. Table 13 summarizes all recommendations and provides them in a matrix format to facilitate prioritization and tracking of water resource efforts. The recommendations should evolve as the priorities within the County change and specific recommendations are accomplished. Priorities will change depending on the types of development and industry that the County encourages and approves within the County. Many of the recommendations will continue for example the monitoring of water levels and the quantity of groundwater pumped and surface water observed and diverted.

Table 11 Water Resource Recommendations

Esmeralda County Hydrographic Basins and Adjoining Areas		County Management	Teels Marsh Valley	Queen Valley	Fish Lake Valley Nevada	Fish Lake Valley California	Columbus Salt Marsh V.	Rhodes Salt Marsh	Monte Cristo Valley	B Smoky V/Tonopah Flat	Ralston Valley	Alkali Spring Valley	Clayton Valley	Lida Valley	Stonewall Flat	Sarcobatus Flat	Grapevine Canyon	Oriental Wash	
X Indicates basins requiring immediate action. Actions in additional basins should be pursued as funding or water demand increases.			**114**	**116**	**117**		**118**	**119**	**136**	**137A**	**141**	**142**	**143**	**144**	**145**	**146**	**231**	**232**	**Basin**
			10	**10**	**10**		**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**14**	**14**	**Region #**
			CR	**CR**	**CR**		**CR**	**CR**	**CR**	**CR**	**CR**	**CR**	**CR**	**CR**	**CR**	**CR**	**DV**	**DV**	**Region**
WATER RESOURCE DATA																			
D-1	Promote and review data collection by USGS, NDWR, CDWR, CNRWA and BSDW.	Specific index wells are recommended in the Water Resource Plan Appendix																	
	o Water level		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	o Water Quality				X		X						X						
	o Water withdrawals		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	
D-2	Collaborate with public agency to review remote sensing data to evaluate affects of groundwater withdrawals:																		
	o Subsidence				X								X						
	o Plant Species				X								X						
	Document impacts from existing or future water use																		
	o Wildlife				X								X						
	o Plant Species				X								X						
RESOURCE ANALYSIS																			
R-1	Verify perennial yield within basin to prevent over				X		X							X					
R-2	Evaluate acceptability of water quality for potential						X												
R-3	Evaluate WQ degradation with water level decline																		

Table 13 Water Resource Recommendations (Continued)

Esmeralda County Hydrographic Basins and Adjoining Areas		County Management	Teels Marsh Valley	Queen Valley	Fish Lake Valley Nevada	Fish Lake Valley California	Columbus Salt Marsh V.	Rhodes Salt Marsh	Monte Cristo Valley	B Smoky V/Tonopah Flat	Ralston Valley	Alkali Spring Valley	Clayton Valley	Lida Valley	Stonewall Flat	Sarcobatus Flat	Grapevine Canyon	Oriental Wash	
X Indicates basins requiring immediate action. Actions in additional basins should be pursued as funding or water demand increases.			**114**	**116**	**117**		**118**	**119**	**136**	**137A**	**141**	**142**	**143**	**144**	**145**	**146**	**231**	**232**	**Basin**
			10	**10**	**10**		**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**14**	**14**	**Region #**
			CR	**CR**	**CR**		**CR**	**CR**	**CR**	**CR**	**CR**	**CR**	**CR**	**CR**	**CR**	**CR**	**DV**	**DV**	**Region**
REQUEST ACTION BY STATE ENGINEER																			
S-1	Request that the Division of Water Resources provide designated basin status to basins that are not designated						X		X			X	X	X	X				
	Basin management budget may apply																		
S-2	Utilize NRS 533.460, 530 and NRS 534.070, 0165 and 020 to prevent misuse of water that could be recharged into the basin aquifers				X								X						
	Eliminate direct waste of decreed/permitted water																		
	Require conservation/water efficiency																		
	Develop programs for artificial recharge																		
S-3	Reduce the perennial yield				X							X	X						
S-4	Water rights enforcement																		
	Pursue forfitures				X								X						
	Implement fines for violations	X			X							X	X						
	Request meters for all water use				X			X			X	X							
	Limit extensions for PBU				X								X						

Table 13 Water Resource Recommendations (Continued)

Esmeralda County Hydrographic Basins and Adjoining Areas		County Management	Teels Marsh Valley	Queen Valley	Fish Lake Valley Nevada	Fish Lake Valley California	Columbus Salt Marsh V.	Rhodes Salt Marsh	Monte Cristo Valley	B Smoky V/Tonopah Flat	Ralston Valley	Alkali Spring Valley	Clayton Valley	Lida Valley	Stonewall Flat	Sarcobatus Flat	Grapevine Canyon	Oriental Wash	
X Indicates basins requiring immediate action. Actions in additional basins should be pursued as funding or water demand increases.			114	116	117		118	119	136	137A	141	142	143	144	145	146	231	232	Basin
			10	10	10		10	10	10	10	10	10	10	10	10	10	14	14	Region #
			CR	CR	CR		CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	DV	DV	Region
ECONOMIC ANALYSIS																			
E-1	Conduct cost analysis for water use in each basin. Calculate economic benefit to the county from water use.				X								X						
E-2	Document the increased cost from groundwater withdrawals as the annual recharge rate is exceeded				X														
COUNTY ACTION																			
C-1	File applications to appropriate remaining water													X					
C-2	Develop regulations for water resource projects	X																	
	C-2a permitting																		
	contaminant sources	X																	
	existing wells	X																	
	springs, riparian areas, streams	X																	
	C-2b requirements for water resource projects	X																	
C-3	Evaluate County Water Resource Management																		
	District, Commission, Authority, Etc.																		
C-4	Expand service areas for public water systems											X							
C-5	Water Resource Plan																		
	Regular Updates																		
	County	X																	
	Detailed Basin				X					X	X	X							

RELATED STUDIES

Many studies, reports and data sources regarding water resources and related information have been completed within Esmeralda County. This report represents a compilation of these studies and reports by various individuals including Eric Matranga. In addition, Water Resource Plans from other counties and planning documents from Esmeralda County were incorporated into this informal planning document. Efforts by community members including but not limited to the County Commissioners and Esmeralda County Land Use Advisory Committee are incorporated into the Plan. The documents cited below are considered to have significant information and data regarding the water resources of Esmeralda County. The data sources and related studies listed below are not complete and should be expanded with new, updated and previously un- cited references during the regularly scheduled updates to the Plan.

Geology

Nevada Bureau of Mines and Geology (NBMG)

Nevada Bureau of Mines and Geology (NBMG), 1964. Bulletin 65 Mineral and Water Resources of Nevada. University of Nevada, Reno. http://www.nbmg.unr.edu/dox/b65.pdf

Nevada Bureau of Mines and Geology (NBMG), 1972. Bulletin 78 Geology and Mineral Deposits of Esmeralda County, Nevada. University of Nevada, Reno. Hard copy available from NBMG

Hydrology

Nevada Division of Water Resources (DWR)

Nevada Division of Water Planning (Nevada Division of Water Resources), 1999. Nevada State Water Plan. Carson City, Nevada.
http://water.nv.gov/programs/planning/stateplan/documents/NV_State_Water_Plan-complete.pdf

Pumpage Inventory for Fish Lake Valley Basin No. 117. Carson City, Nevada.
http://water.nv.gov/data/pumpage/117%20-%20Fish%20Lake%20Valley/117%20-%202010%20-%20Fish%20Lake%20Valley.pdf

State of Nevada – Drought Plan July 2003
http://water.nv.gov/programs/planning/July2003DroughtPlan.pdf

Reconnaissance Series Reports (USGS / DWR)

1970 Water-resources appraisal of the Columbus Salt Marsh – Soda Spring Valley Nevada: Nevada Division of Water Resources Reconnaissance Report Resource 52
http://images.water.nv.gov/images/publications/recon%20reports/rpt52- soda_spring_valley.pdf

1973 Water-resources appraisal of the Fish Lake Valley Nevada: Nevada Division of Water Resources Reconnaissance Report Resource 58
http://images.water.nv.gov/images/publications/recon%20reports/rpt58-fish_lake_valley.pdf

1968 Water-resources appraisal of the Clayton Valley – Stonewall Flat Nevada: Nevada Division of Water Resources Reconnaissance Report Resource 45
http://images.water.nv.gov/images/publications/recon%20reports/rpt45-clayton_valley_stonewall_flat.pdf

19XX Water-resources appraisal of the Sarcobatus Flat Nevada: Nevada Division of Water Resources Reconnaissance Report Resource 10
http://images.water.nv.gov/images/publications/recon%20reports/rpt10-Sarcobatus_flat.pdf

19XX Water-resources appraisal of the Ralston and Stonecabin Valleys, Nevada: Nevada Division of Water Resources Reconnaissance Report Resource 12
http://images.water.nv.gov/images/publications/recon%20reports/rpt12-ralston_stonecabin_valleys.pdf

Nevada Division of Water Resources (NDWR), 1989. Summary of Ground Water

United States Geological Survey (USGS)

State of Nevada Department of Conservation and Natural Resources Division of Water Resources Water Resource Bulletin No. 41, Water Resources of Big Smoky Valley, Lander, Nye, and Esmeralda Counties, Nevada.
http://images.water.nv.gov/images/publications/water%20resources%20bulletins/Bulletin41.pdf

A ground-water-quality monitoring program for Nevada, 1986 USGS OFR 78-768
http://pubs.er.usgs.gov/#search:basic/query=78-768/page=1/page_size=100:0

Industry Reports

Precious Metal Water Resources

Hydro-Search Mineral Ridge Mine Water Supply (not located)

Hydro-Search Sunshine Mine Water Supply/Dewatering (not located)

Chemetall Foote Minerals

Zampirro, Danny, 2004, Hydrogeology of Clayton Valley brine deposits, Esmeralda County, Nevada: Nevada Bureau of Mines and Geology Special Publication 33, p. 271-280.

Jennings, Melissa, 2010, Re-analysis of Groundwater Supply Fresh Water Aquifer of Clayton Valley, Nevada Chemetall Foote Corp. (CFC).

Plans - Federal

U.S. Forest Service - 1988 Inyo National Forest Land and Resource Management Plan

U.S. Department of Energy - Nevada Test Site Resource Management Plan, 1998

U.S. Department of Energy - Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada, 1996

U.S. Department of Energy - Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca

Mountain, Nye County, Nevada, 1999

National Park Service - Draft Environmental Impact Statement and General Management Plan, 1999

U.S. Air Force - Draft Environmental Impact Statement Proposed Fallon Range Training Complex

U.S. Air Force - Integrated Natural Resources Management Plan, Nellis Air Force Base/Nellis Air Force Range, 1997

U.S. Air Force - Water Requirement Study of the Nellis Air Force Range, 1998

Bureau of Land Management - Tonopah Planning Area Resource Management Plan, 1998

Plans – County

Esmeralda County Master Plan

Esmeralda County ~~Federal~~ Public Lands Policy

Plans – Geothermal / Solar /Wind Resources

Crescent Project

Sand Dunes Solar Project