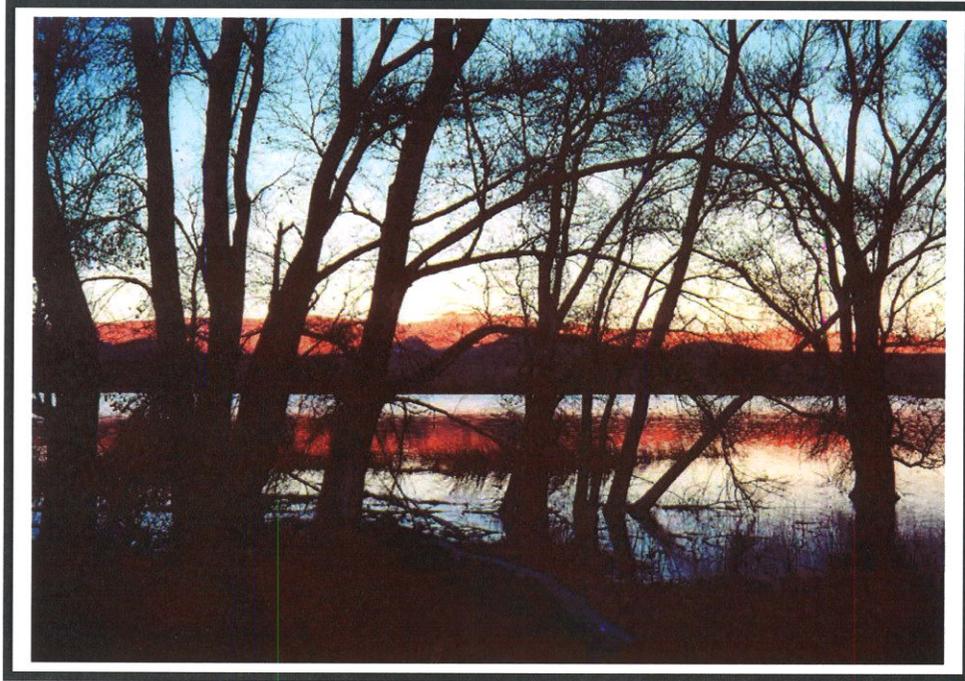


A Water Plan for Lincoln County



*Final Plan
March 20, 2001*

Prepared for:

*Lincoln County Commission
Post Office Box 90
Pioche, Nevada 89043*

And

*Vidler Water Company
3264 Goni Road, Suite 153
Carson City, Nevada 89706-7925*

Prepared by:



Engineering ✧ Planning ✧ Resource Management

RESOURCE CONCEPTS, INC.

CARSON CITY OFFICE

340 N. Minnesota St. ✧ Carson City, Nevada 89703-4152

Office: (775) 883-1600 Fax: (775) 883-1656

www.rci-nv.com

TABLE OF CONTENTS

	<u>PAGE</u>
<i>Chapter One - INTRODUCTION</i>	1
<i>Chapter Two - PLANNING PROCESS AND GOALS</i>	2
<i>Chapter Three - EXISTING CONDITIONS AND WATER USES</i>	4
3.1 <i>Land Resources</i>	4
3.2 <i>Population and Demographics</i>	7
3.3 <i>Water Resources And Use</i>	9
3.4 <i>Infrastructure and Public Services</i>	13
3.4.1 <i>Transportation (Road, Rail, and Air)</i>	14
3.4.2 <i>Electrical</i>	14
3.4.3 <i>Telephone/Fiber Optic</i>	15
3.4.4 <i>Sewer and Water</i>	15
3.4.5 <i>Natural Gas</i>	15
3.4.6 <i>Police</i>	16
3.4.7 <i>Solid Waste Removal</i>	16
3.4.8 <i>Fire Protection</i>	16
3.4.9 <i>Medical and Ambulance Services</i>	16
3.4.10 <i>School Facilities</i>	16
3.4.11 <i>Recreation</i>	17
3.5 <i>Land Use Plans, Policies, and Guidelines</i>	17
3.5.1 <i>Lincoln County</i>	18
3.5.2 <i>State of Nevada</i>	20
3.5.3 <i>Bureau of Land Management</i>	21
3.5.4 <i>Fish and Wildlife Service</i>	24
3.5.4.1 <i>Refuge Management Division Activities</i>	24
3.5.4.2 <i>Regulatory Division Activities</i>	25
3.5.5 <i>U.S. Forest Service</i>	26
3.5.6 <i>Department of Defense Nellis Air Force Bombing and Gunnery Range</i>	26
3.5.7 <i>Department of Energy Nevada Test Site</i>	26
3.6 <i>Economic Development Activities</i>	27
<i>Chapter Four - PROJECTED CONDITIONS AND WATER NEEDS</i>	29
4.1 <i>Land Resources</i>	29
4.2 <i>Population and Demographics</i>	30
4.3 <i>Infrastructure and Public Services</i>	32
4.4 <i>Plans, Policies, and Guidelines</i>	34
4.5 <i>Economic Development Activities</i>	34
<i>Chapter Five – IMPLEMENTATION PLAN</i>	36
5.1 <i>Overview</i>	36
5.2 <i>Staff and Funds to Implement the Water Plan</i>	37

TABLE OF CONTENTS

	<u>PAGE</u>
5.3 Land, New Water Rights, and Beneficial Use	37
5.4 Existing Water Rights and Beneficial Use.....	37
Chapter Six - REFERENCES CITED.....	39

LIST OF TABLES

Table 3.1. Lincoln County Land Status.....	7
Table 3.2. Groundwater Data For Basins in Lincoln County (in acre-feet)	12
Table 3.3. 1995 Lincoln County Water Withdrawals (acre-feet per year)	13
Table 3.4. Public and Self-Supplied Water, 1995 (acre-feet per year)	15
Table 3.5. Visitation Rates, Developed Recreation Sites	17
Table 3.6. Lincoln-Douglas County Exchange Parcels	18
Table 3.7. BLM Wilderness Area Recommendations (in acres)	23
Table 3.8. Federal Lands Suitable for Disposal under Proposed Caliente Management Framework Plan Amendment	23
Table 4.1. Lincoln County Population Estimate and Forecast	30
Table 4.2. Nevada State Water Use Forecasts (in acre-feet per year) for Lincoln County	31
Table 4.3. Estimated Sewage System Capacities (in units)	33
Table 4.4. Estimated Water System Capacities (in units)	33
Table 4.5. Economic Development Activity Projected Water Needs.	34

LIST OF FIGURES

Figure 1 – County Location	5
Figure 2 – Lincoln County Plan Area	6
Figure 3 – Lincoln County Land Status.....	8
Figure 4 – Hydrographic Basins and Regions in Lincoln County.....	10
Figure 5 – Potential Land Exchange Parcels.....	19
Figure 6 – Special Land Use Designations.....	22

Chapter One - INTRODUCTION

The Lincoln County Water Plan (Water Plan) includes a review of existing water uses, existing water systems and their capacities, and projections of future water needs. The plan generally outlines the County's vision and describes the water resources available within Lincoln County. Future water needs associated with projected population growth, planned and potential economic development programs, and proposed land releases are included. Finally, implementation of the Water Plan is described.

This Water Plan is programmed to address the next twenty years, or until 2020. It is intended to serve as one of the elements of the overall Lincoln County Master Plan. The plan was developed in accordance with guidelines contained in the Nevada State Water Plan, Public Review Draft (Draft State Water Plan) (Nevada Division of Water Planning, 1999). Much of the information employed in the current plan was drawn from the State Water Plan. This planning report was prepared for Lincoln County under their cooperative agreement with Vidler Water Company (Vidler).

Chapter Two - PLANNING PROCESS AND GOALS

A Draft Lincoln County Water Plan was prepared and distributed for review by the Planning Commission, communities, and residents of Lincoln County in October 1999. Public hearings in Panaca, Pioche, Caliente, and Alamo were held in January 2000.

The Draft Lincoln County Water Plan contained four planning alternatives as follows:

Program One – Limited County involvement (go with the flow);

Program Two – Assist to develop water resources in support of local economic development projects;

Program Three – More broadly assist in development of water resources in support of countywide domestic, municipal, and industrial needs; and

Program Four – View County water resources from a regional perspective and provide County leadership and development of water resources for the overall benefit of Lincoln County.

Comments to the Draft Plan overwhelmingly recommended that Program Four, the most aggressive alternative, be the County's preferred water planning concept. Under this program, the County will take a proactive stand with regard to the appropriation and development of its water resources for the benefit of the County, local communities and their residents, as well as communities and developments adjacent to the County. County development of water resources and delivery facilities will create a major new source of revenue. At the meeting of March 20, 2000, the Board of County Commissioners adopted the recorded Program Four version and directed staff to finalize the plan in accordance with the approval. Further hearings by the County Commission were held on February 5 and March 5, 2001.

With the help of County selected partners, Lincoln County will develop its water resources under Nevada water law and place the developed resources to beneficial use. The goals of the Water Plan include development of water resources both inside and outside of Lincoln County. The County will serve as a water wholesaler and will:

- Produce and distribute water to assist and support the needs of local communities;
- Produce and distribute water to meet the needs of future economic development within County boundaries;
- Produce, purchase, wholesale and transport water from sources inside and outside of the County to meet customer water needs across the region.

Lincoln County will view the water resources of the County as a whole, with the County acting as the central management entity. County developed or transported water resources may be made available for use within the County or may be made available to adjacent county users with appropriate consideration of future County needs, revenues, and the beneficial use of the resource. The County will carefully monitor and manage its water withdrawals, in conjunction with the Nevada Division of Water Resources, to ensure that pumpage is conducted for a sustainable long-term yield.

Planning goals include the support of local economic development, domestic, municipal, and industrial systems and the aggressive development and management of water resources within Lincoln County. The County will take an active role in the support of economic development efforts sponsored by communities. County support in the development of water resources and delivery facilities will create a new revenue source and attract business and other economic development.

As discussed in this Water Plan, most of the development associated with projected increases in water demand occurs in the Alamo - Ash Springs area, Caliente, and in the Mesquite and Moapa Valley areas at the Lincoln/Clark County boundary. The County will be a water provider, supplementing resources currently available including improvements to convey the water. New infrastructure will be developed to serve growth. The County will develop new water resources to assist communities and local industry in meeting their water needs. County development of water resources and delivery facilities will create a new source of revenue.

The purpose of aggressively developing Lincoln County's water resources is to ensure that the needs and priorities of its residents are met. Under Nevada water law, water resources are subject to prior appropriation that must be supported by beneficial use. "Use it or lose it" is the way the law is sometimes described.

Lincoln County residents strongly support economic development and new jobs within the County. However, growth and the level of economic development necessary to fully utilize Lincoln County's water resources is not only unlikely, it would probably result in an unacceptable reduction in what County residents see as their high quality of life.

The Water Plan recognizes the need to meet Nevada water laws in the beneficial use of water by anticipating the sharing of this renewable resource. This will be accomplished through County development, transportation, and wholesaling water to its neighbors in a manner carefully planned to best meet Lincoln County's long-term needs.

Chapter Three - EXISTING CONDITIONS AND WATER USES

This chapter characterizes key land and water use conditions in Lincoln County at the present time. This information provides a basis against which to evaluate water needs associated with previously identified and reasonably foreseeable land use planning and economic development actions.

3.1 LAND RESOURCES

Located in southeast Nevada, Lincoln County is bordered on the north by White Pine County, on the west by Nye County, on the south by Clark County, and on the east by the states of Utah and Arizona (Figure 1). The topography of Lincoln County is typical of the Basin and Range Province in which it is located. Alternating north-south trending mountain ranges are separated by broad valleys (Figure 2). While many of these valleys drain either to the north or south, some exhibit internal drainage and have no outlet. Others are part of the Colorado River drainage system. County elevations range from a high of 9,398 feet at Highland Peak to a low of 1,900 feet in the Tule Wash area.

Although streams with a perennial surface flow are few, numerous springs are located throughout the County. Precipitation in the County is limited. Most moisture falls as snow during the winter months, or as rain during high intensity summer thundershowers. Precipitation ranges from about six inches at lower elevations to about seventeen inches at higher mountainous terrain.

Lincoln County is 10,650 square miles (6,816,000 acres) in area, almost 96 percent of which is federally administered. The remaining lands are administered by the State of Nevada or local governments (one percent) and three percent is under private ownership (Lincoln County, 1998:37, 47). The distribution of lands by administrative agency is characterized in Table 3.1.

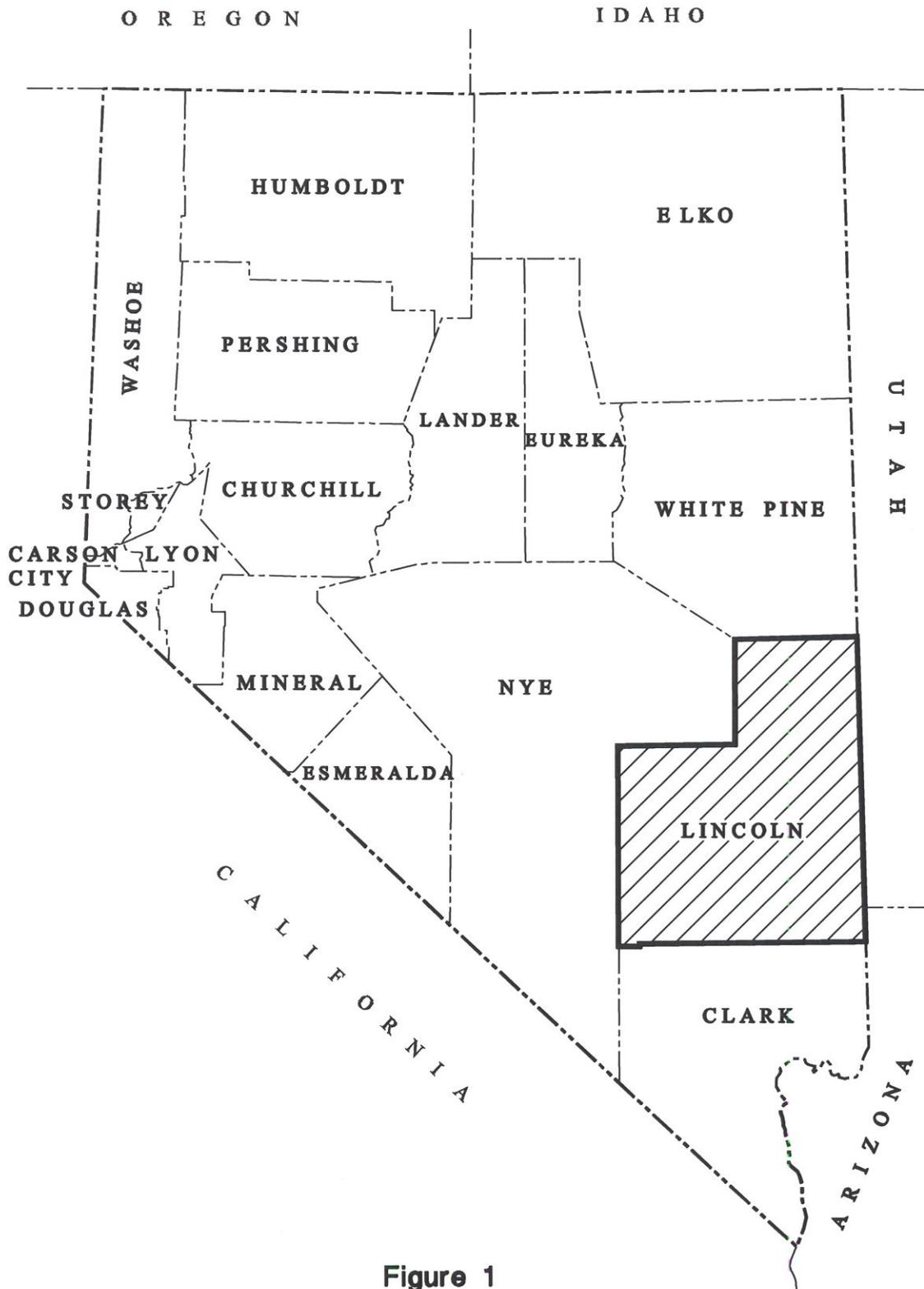


Figure 1
County Location



Source: Synthetic Natural Color Landset
 Photomosaic of Nevada. From the Depart.
 of Interior, United States Geological Survey

Figure 2
Lincoln County Plan Area



Table 3.1. Lincoln County Land Status

Agency	Area (acres)
Federal Agencies	
Bureau of Land Management	5,749,938
Forest Service	30,762
Corps of Engineers	671
Fish and Wildlife Service	761,335
Total Federal	6,542,616
State Agencies	
Parks	12,500
Total State	12,500
Private	273,384
TOTAL	6,816,000

Source: Lincoln County, 1998:37,47
 Lincoln County Form 1 Fiscal Year 2000-2001

Federal facilities located in, or that extend into the County include Nellis Air Force Bombing and Gunnery Range, the Desert National Wildlife Range, the Pahrangat National Wildlife Refuge, and a portion of the Nevada Test Site. Forest Service lands are limited to the southern tip of the Grant Range in northwest Lincoln County (Figure 3).

Five Nevada state parks comprise a majority of the state land present in Lincoln County. The parks are Beaver Dam State Park, Cathedral Gorge State Park, Echo Canyon State Park, Spring Valley State Park, and Kershaw-Ryan State Park. All five are located in the east portion of the County, close to Pioche, Panaca, and Caliente. Other state lands include the Key Pittman Wildlife Management Area near Hiko, the Prison Honor Camp near Pioche, and the Youth Training Center at Caliente.

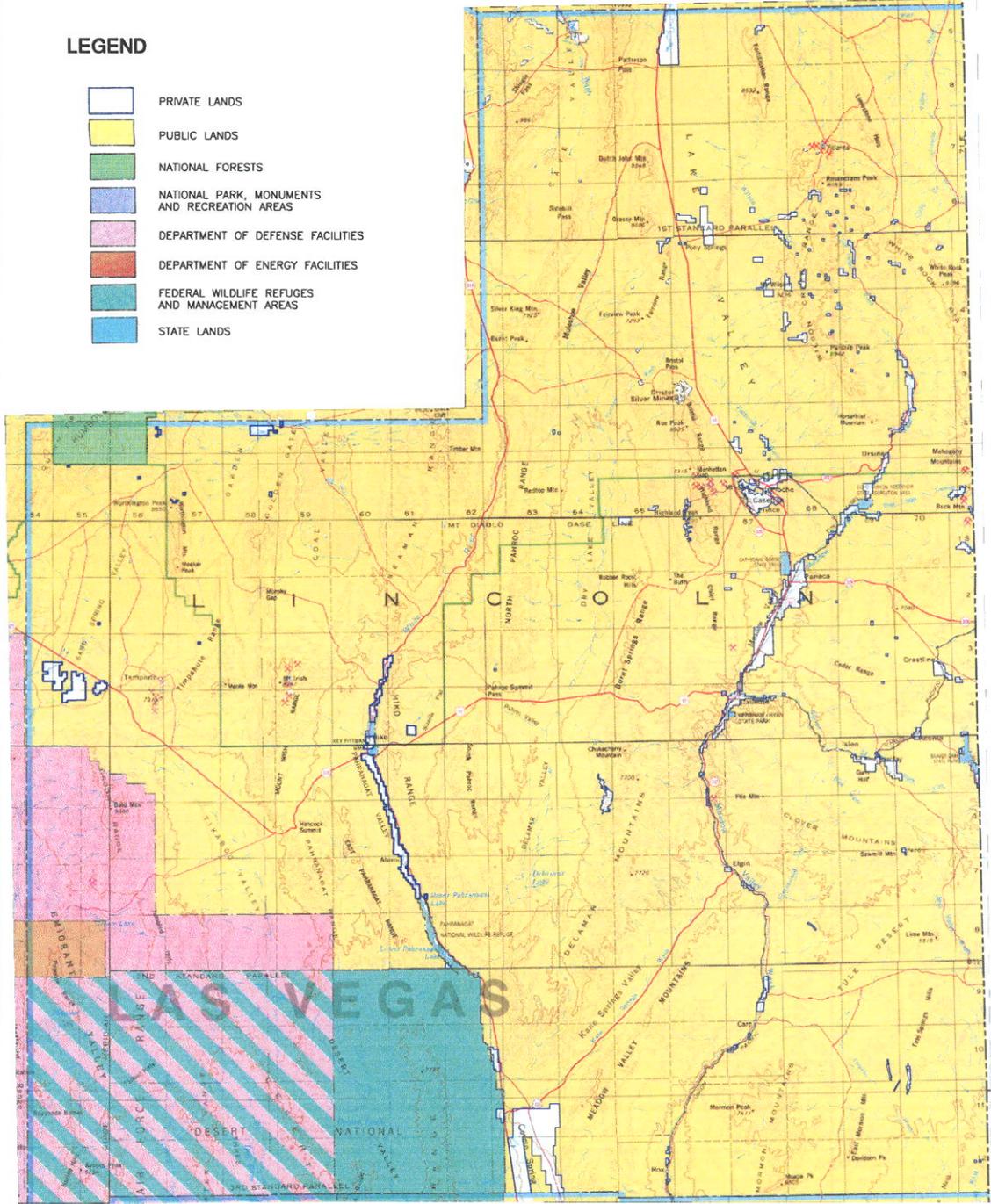
3.2 POPULATION AND DEMOGRAPHICS

The population of Lincoln County in 1995 was estimated to be 4,110 persons in 1,429 households (Nevada Department of Administration, 1996:133). The average number of persons per occupied housing unit was 2.9; the average number of workers was 1.1. Over the 1970s and 1980s, the population of the County generally increased, largely due to increased mining activities and growth in the governmental and service sectors. Subsequent closure of the Bunker Hill and Tempiute mines resulted in a reduction in the county population. Over the last several years, population levels have remained fairly stable.

Most of the county's population is found in the communities of Caliente, Pioche, Panaca, and Alamo. Other named places that support smaller populations include Ursine (Eagle Valley), Hiko, Rachel, Rose Valley, Ash Springs, and Caselton. A series of named maintenance stations are present along the Union Pacific Railroad (Crestline, Brown, Acoma, Barclay, Islen, Eccles, Stine, Boyd, Elgin, Carp, Hoya, and Rox, from north to south), but none are occupied currently.

LEGEND

- PRIVATE LANDS
- PUBLIC LANDS
- NATIONAL FORESTS
- NATIONAL PARK, MONUMENTS AND RECREATION AREAS
- DEPARTMENT OF DEFENSE FACILITIES
- DEPARTMENT OF ENERGY FACILITIES
- FEDERAL WILDLIFE REFUGES AND MANAGEMENT AREAS
- STATE LANDS



Source: Bureau of Land Management
 Surface Management Status Map
 State of Nevada 1992

Figure 3
Lincoln County Land Status



Distribution of the work force in 1994 by market reveals that services and government are the largest employers (48.2 and 34.8 percent, respectively). The trades; transportation and public utilities; and finance, insurance, and real estate comprise much of the remainder (11.0, 2.6, and 2.2 percent, respectively). Mining, construction, and manufacturing each represent less than one percent of the work force (Nevada Department of Administration, 1996:65). Some 66 County businesses employed 1,665 people with an annual payroll of \$43,686,000 (Nevada Department of Administration, 1996:66).

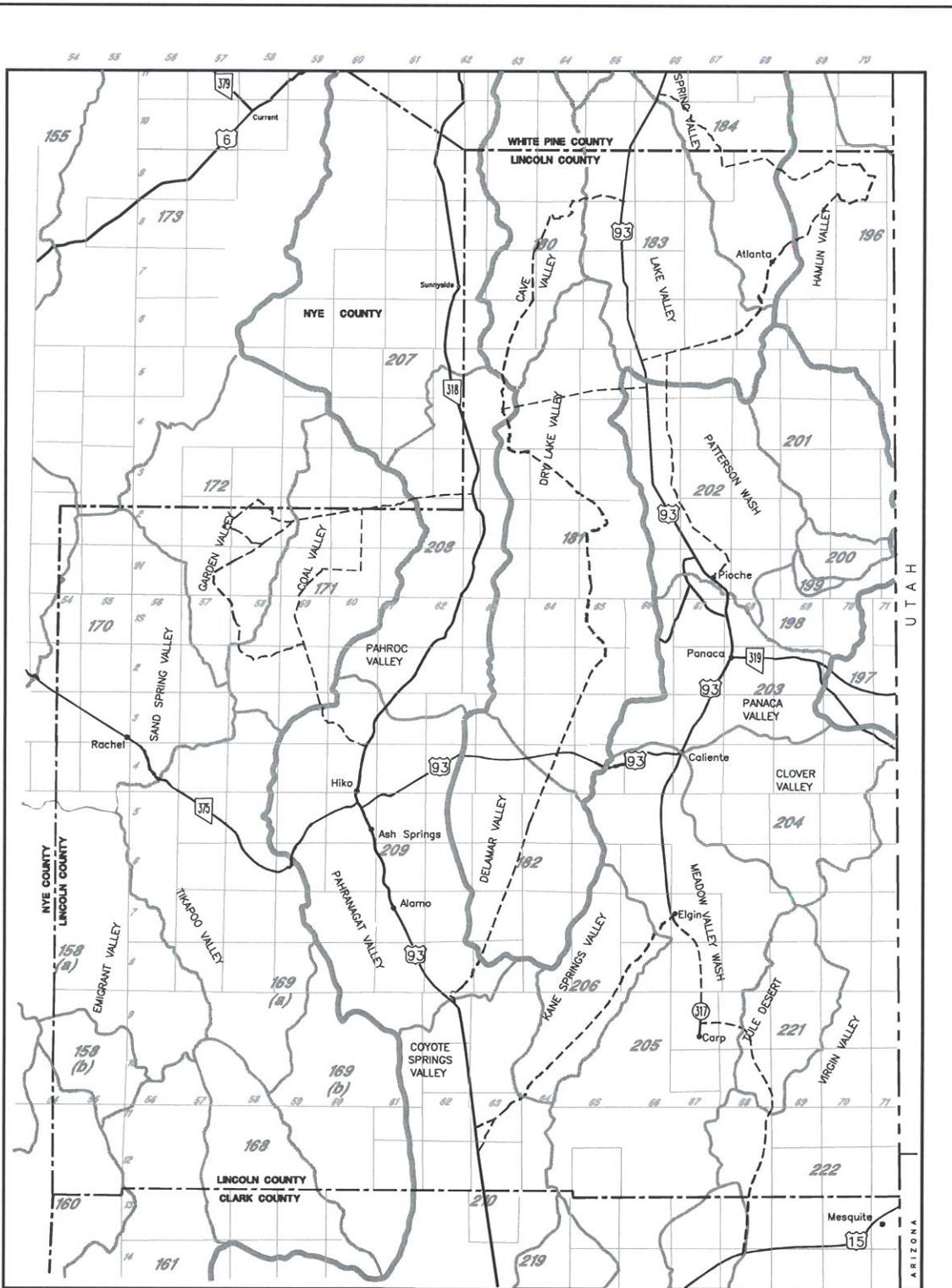
As of 1995, the total labor force in Lincoln County was 1,250 persons of whom 1,100 were employed. The 140 unemployed persons represents a rate of 11.2 percent, the highest such rate for Nevada counties as of that year. This also reflects a 210 person reduction in the size of the overall labor force when compared with the previous year, 1994 (Nevada Department of Administration, 1996:60). The per capita income in Lincoln County in 1993 was \$19,189, compared to a statewide figure of \$22,894 (Nevada Department of Administration, 1996:93).

In 1992, there were 122 farms or ranches in Lincoln County, comprising 48,968 acres. Cash receipts for crops in 1994 were \$6.2 million. The inventory of cattle and calves was 16,000 in 1996, and has been at that level for the previous three years (Nevada Department of Administration, 1996:4, 8, 13).

3.3 WATER RESOURCES AND USE

Lincoln County watersheds represent portions of two primary hydrographic regions (Figure 4). White River and Meadow Valley Wash comprise a portion of the Colorado River Hydrographic Basin, while several valleys in the western and central portions of the County are within the Central Hydrographic Region. Basins in the Central Region drain internally with surface waters collecting in the valley bottoms. Basins in the Colorado River Basin exhibit external drainage, flowing into the Muddy River, the Virgin River, or Meadow Valley Wash on their way to the Colorado River. In the Central Region, surface waters tend to remain in a particular basin; there is little apparent inter-basin flow. In contrast, there is considerable inter-basin flow from higher elevation to lower elevation basins in the Colorado River Basin.

Small portions of two other hydrographic basins are present in the County. Hamlin Valley in the northeast corner of the County is a part of the Great Salt Lake Hydrographic Basin, and Escalante Basin area along the eastern edge of the County is a portion of the Escalante Desert Hydrographic Basin.



- Designated Hydrographic Basin
- Hydrographic Region or Basin Boundary
- Hydrographic Area Boundary

Source: State of Nevada, Division of Water Resources
Designated Groundwater Basins of Nevada, 1992.



Scale 1:750,000

Figure 4
Lincoln County Hydrographic Basin Locations

Recent work by the Nevada Division of Water Resources, USGS, and the Las Vegas Valley Water District is helping to define a regional carbonate aquifer system. A significant portion of Lincoln County is underlain by carbonates. Preliminary studies indicate that recharge and regional flows that pass through the carbonate system may explain the apparently low earlier estimates of surface water runoff and ground water recharge in this part of Nevada.

Numerous individual ground water basins are represented in Lincoln County. The Nevada Division of Water Resources administers ground and surface water rights in these basins. Table 3.2 contains ground water information drawn from reports prepared for the Division, and from records on file at the Division. This table reflects historical estimates and does not reflect possible changes resulting from carbonate aquifer research and studies. The first two columns provide descriptive information on the ground water system in each valley. The amount of runoff that occurs typically in each basin is followed by an estimate as to the amount of water that could be withdrawn on a perennial basis without causing a reduction in the amount of estimated storage.

Under normal circumstances, the State Engineer does not approve additional water rights in basins where appropriations have exceeded the perennial yield. Table 3.2 provides a rough estimate as to how many acre-feet of ground water had been appropriated in each basin as of November 1998. In several basins, appropriations exceed the estimated perennial yield. As a result, Penoyer Valley, Lake Valley, Panaca Valley, Lower Meadow Valley Wash, Coyote Spring Valley and Virgin Valley have been formally designated by the State Engineer as critical ground water basins. Although not designated, Indian Springs Valley, Spring Valley, Patterson Valley, Rose Valley, and Eagle Valley are near, or are at the estimated perennial yield. The final column in Table 3.2 presents information on pending water rights applications as of November 1998.

Table 3.2. Groundwater Data For Basins in Lincoln County (in acre-feet)

		Estimated Annual Runoff	Estimated Perennial Yield	Permitted Water Rights	Pending Application (Note 1)
<u>Central Region</u>					
158*	Emigrant Valley **	1,000	3,000	0	0
160*	Frenchman Flat **	M	16,000	0	0
161*	Indian Springs Valley **	2,000	1,000	1,000	0
168*	Three Lakes Valley **	M	4,000	0	0
169*	Tikapoo Valley	2,000	4,000	9	38,000
170*	Penoyer Valley	2,000	5,000	19,000	4,000
171*	Coal Valley	M	6,000	30	23,000
172*	Garden Valley	8,000	6,000	700	33,000
180*	Cave Valley	10,000	2,000	10	0
181	Dry Lake Valley	6,000	3,000	50	16,000
182	Delemar Valley	3,000	3,000	7	12,000
183*	Lake Valley	8,000	12,000	22	10,000
184*	Spring Valley	90,000	100,000	(Note 2)	(Note 2)
	Subtotal	132,000	165,000	20,828	136,000
<u>Colorado River Basin</u>					
198	Dry Valley	M	1,000	4,000	1,000
199	Rose Valley	M	M	300	0
200	Eagle Valley	M	M	300	1,000
201	Spring Valley	6,000	1,000	1,000	1,000
202	Patterson Valley	3,000	5,000	6,000	23,000
203	Panaca Valley	M	9,000	16,000	1,000
204	Clover Valley	M	1,000	4,000	0
205*	L. Meadow Valley Wash	M	5,000	23,000	300
206	Kane Springs Valley	M	M	0	0
208*	Pahroc Valley	1,000	21,000	7	0
209	Pahranagat Valley	1,000	25,000	9,000	268,000
210*	Coyote Spring Valley	2,000	18,000	18,000	28,000
221	Tule Desert	1,000	1,000	4	0
222*	Virgin Valley	6,000	100,000***	12,000	250,857
	Subtotal	20,000	187,000	93,611	508,300
<u>Great Salt Lake Basin</u>					
196*	Hamlin Valley	5,000	5,000	400	0
<u>Escalante Desert Basin</u>					
197	Escalante Basin	3,000	1,000	2	0
	Grand Total	160,000	358,000	114,841	644,300

Sources: Division of Water Resources map titled "State of Nevada Water Resources and Inter-Basin Flows" dated 1971, Nevada Division of Water Resources abstracts dated November 1998.

Shaded Basins have been listed by the Nevada Division of Water Resources as "Designated."

* A portion of this basin is located in an adjacent county.

** The Lincoln County portion of these basins is located in part, or in whole within the Nellis Air Force Range.

*** The yield figure reported for Virgin Valley is a system yield that takes into account surface as well as ground waters. All other yield estimates are perennial yields based on ground water only.

M = Minor quantity, either less than 500 acre-feet per year, or small in comparison to other reported quantities.

Note 1: Enumerated pending applications include those filed by Lincoln County - Vidler Water Company, by the Virgin Valley Water District, and other applicants prior to October 1999.

Note 2: All permits and applications are in that portion of Spring Valley contained within White Pine County. Permits account for approximately 19,000 acre-feet of water, while filed applications account for approximately 153,000 acre-feet.

In reviewing these data, one must recall that some basins extend outside the limits of Lincoln County. For example, a comparatively small amount of Spring Valley is located within Lincoln County. Most of Spring Valley is located to the north in White Pine County. On the other hand, while Lower Meadow Valley Wash does extend into Clark County, most of the basin is in Lincoln County. As a result, only a portion of the 114,841 acre-feet of permitted water rights documented in Table 3.2 is within Lincoln County. For discussion purposes, it is estimated that about 80 percent, or about 92,000 acre-feet of the water rights listed in Table 3.2 are permitted within Lincoln County.

Estimated actual water withdrawals for Lincoln County are provided in Table 3.3. This information is from 1995 and is specific to the County. The total withdrawal from all sources (ground and surface water) was 65,537 acre-feet. Of that amount, some 42,980 acre-feet, or about 66 percent were consumed. Agricultural and domestic uses accounted for a majority of the withdrawals. Based on 1997 U.S. Department of Agriculture figures, there are 15,527 acres of irrigated cropland in Lincoln County.

Table 3.3. 1995 Lincoln County Water Withdrawals (acre-feet per year)

	Self Supplied Withdrawal		Public Supply Withdrawal		Total Withdrawal	Consumptive Use
	Ground Water	Surface Water	Ground Water	Surface Water		
Domestic Water Use	258	15	1,082	0	1,355	671
Commercial Water Use	34	0	330	0	364	94
Industrial Use	0	0	0	0	0	0
Thermo-Electric Use	0	0	0	0	0	0
Mining Water Use	0	0	0	0	0	0
Livestock Water Use	22	101	0	0	123	34
Irrigation Water Use	42,024	23,513	0	0	65,537	42,980
Total Water Use					67,516	43,745

Source: Nevada State Water Plan (1999: Appendix A)

3.4 INFRASTRUCTURE AND PUBLIC SERVICES

For the most part, the County's population is concentrated in a few developed areas. Infrastructure and services tend to focus on these more populated locations. Basic information is

provided regarding public services and the condition of existing elements of County infrastructure.

3.4.1 Transportation (Road, Rail, and Air)

Highway US 93 extends north-south through the County. This federal highway is often called the NAFTA (North America Free Trade Act) Highway because it offers a direct corridor between Canada and Mexico. All four major population centers in the County (Pioche, Panaca, Caliente, and Alamo) are located along US 93. State Route 375 extends west from Hiko through Rachel and on to Tonopah. State Route 318 extends north from Hiko along the White River to Ely. State Route 319 extends east from Panaca to Cedar City, Utah. The Nevada Department of Transportation maintains all of these highways.

Lincoln County maintains a system consisting of 3,447 miles roads. These roads fall under the administration of the Lincoln County Road Department and the Lincoln County Regional Transportation Commission. A map showing the location of County roads is currently under preparation by Lincoln County.

The Union Pacific Railroad is a main east-west line that passes through Lincoln County. It enters the County from Utah, follows Clover Creek to Caliente, then turns south and extends into Clark County. Freight service is available to Caliente and to Panaca via a rail spur. No passenger service is presently available.

Two airports are present in the County. The Panaca airport has a 5,000 foot, paved and lit landing strip; limited services are available. The Alamo airport has a dirt strip approximately one mile in length; no services are available. Neither commercial nor charter services are available in Lincoln County. The nearest such services are in Las Vegas. It should be noted that several landing strips are shown on topographic maps of the County. Presumably, these are dirt strips developed by local ranchers or mining ventures.

Lincoln County Transportation provides public transportation among communities within the County, and to communities located north and south of the County.

3.4.2 Electrical

Lincoln County Power District No. 1 provides electrical service to customers located throughout the County. The District receives power from Boulder Canyon (Hoover Dam) and as needed from the Nevada Power Company. The District serves residential, irrigation, and commercial customers in outlying portions of the County. Also, it offers power for resale to public utilities and power districts in the County. Smaller entities that purchase power from the District include the Alamo Power District No. 3, Caliente Public Utilities, Pioche Public Utilities, and Panaca Power and Light.

To date, only one large distribution line has been constructed through the County. The IPP 500 KV line extends across the southeast corner of the County. Several large electrical transmission

lines have been proposed that if constructed would pass through Lincoln County. Those lines would transmit power from northeast Nevada or Utah through Las Vegas and on to Los Angeles.

3.4.3 Telephone/Fiber Optic

Telephone service in the County is provided by the Lincoln County Telephone Company and by Sprint. Both providers have placed fiber optic lines throughout developed portions of the County. Telephone, cellular, internet, and cable television services are provided by the local telephone company. Internet access is also offered by two private companies within portions of the County. A major fiber optic line has recently been constructed through the County. This line services regional needs; no local trunk lines are available in the County.

3.4.4 Sewer and Water

Community sewer and water services are provided only around the four principal developed areas in the County. Services are provided by Pioche Public Utilities, City of Caliente Public Utilities, Panaca Farmstead Water Association, and the Alamo Water and Sewer General Improvement District. Sewer and water services are not available outside the service areas of these four community systems. Information contained in the draft Lincoln County Economic Development Plan (Lincoln County Commissioners 1998) indicates that to accommodate growth, three of these systems require substantial improvement including system upgrades and expansions. Only the Pioche system was noted as being in good shape and as having excess system capacity.

Public and self-supplied water use for Lincoln County in 1995 is documented in Table 3.4. According to the Nevada State Water Plan, the domestic withdrawal per person in 1995 was 294 gallons per day, or 846 gallons per day per household countywide. Some 3,211 persons, or 78 percent of the County population, are served by public supplied water. The public supplied withdrawal per person is 301 gallons per day, or 865 gallons per day per household.

A study completed by CES (1999) estimated that, for the Town of Caliente, the demand for water is highly seasonal and high relative to other Nevada Communities. The per capita water use between May of 1997 and August of 1998 ranged from 265 to 1160 gallons per capita per day.

Table 3.4. Public and Self-Supplied Water, 1995 (acre-feet per year)

	Domestic	Commercial	Public Uses, Losses	Total
Public Supplied	1,082	330	138	1,550
Self Supplied	273	34	0	307
Total	1,355	364	138	1,857

Source: Nevada State Water Plan (1999: Appendices, Part A)

3.4.5 Natural Gas

Natural gas providers do not serve communities in the County. The large Kern River transmission line passes through the southeast corner of the County. Propane delivery is available throughout the County area.

3.4.6 Police

The Lincoln County Sheriff's Department is the sole law enforcement agency in the County. Its main office is located in Pioche, with substations in Caliente, Alamo, and Rachel. In addition, there are five Nevada Highway patrolmen stationed in Lincoln County.

3.4.7 Solid Waste Removal

Currently, the County contracts with Crestline Disposal and Recycling to haul solid waste. Transfer facilities are located in each community and in populated rural areas. The waste is taken to the Crestline landfill, located on private land located east of Panaca, near the Utah State line. The landfill used by the City of Mesquite is located in Lincoln County. Aside from these two sites, the County has closed all landfills that were previously in operation.

3.4.8 Fire Protection

The Pioche Fire Protection District, the Caliente Volunteer Fire Department, the Panaca Volunteer Fire Department, and the Pahrnagat Valley Fire Protection District (Alamo) provide fire protection on private property. The Bureau of Land Management and the Nevada Division of Forestry provide fire protection on public lands.

3.4.9 Medical and Ambulance Services

Medical facilities are limited to the Lincoln County Hospital and the Lincoln County Health Clinic, both of which are located in Caliente. Ambulance service is provided by Meadow Valley Ambulance, stationed in Panaca. The Pahrnagat Valley Fire Protection District provides ambulance service in the Alamo area. Service in Pioche is provided through the Volunteer Fire Department.

3.4.10 School Facilities

The Lincoln County School District oversees primary and secondary schooling activities throughout the County. The District administers four elementary schools (Pioche, Caliente, Panaca, and Alamo) and two high schools (Alamo and Panaca). Public school enrollment in 1995-1996 was 1,109: 18 in pre-kindergarten, 66 in kindergarten, 409 in elementary grades, and 613 secondary in grades (Nevada 1996:31). The Southern Nevada Community College provides post-secondary education at the Alamo and Panaca centers, and continuing education programs are offered through the University of Nevada, Las Vegas.

3.4.11 Recreation

The 1992 Nevada Statewide Comprehensive Outdoor Recreation Plan provides a profile of recreation facilities in Lincoln County. Outdoor recreation facilities present in the County include playfields (4), outdoor swimming pools (2), city/county parks (7), state parks (5), tennis courts (3), golf courses (1), playgrounds (4), developed picnic areas (8), developed campgrounds (7), primitive picnic areas (1), primitive campgrounds (1), and historic sites (15). Also, there are approximately six miles of maintained, designated non-motorized trails, and approximate 72 miles of designated motorized trails in the County, including the Mount Wilson Backcountry Byway.

Table 3.5. Visitation Rates, Developed Recreation Sites

State Park	1990	1995	1997	1998
Beaver Dam	8,728	8,220	7,357	5,849
Cathedral Gorge	39,800	42,434	59,433	57,914
Echo Canyon	47,084	57,695	49,250	45,526
Kershaw-Ryan	Closed	Closed	8,349	18,319
Spring Valley	92,854	118,007	118,673	106,197
Total	188,466	226,356	243,062	233,805

Sources: Nevada Statistical Abstract, 1996

Table 3.5 lists State Park visitation rates by year. If use levels increase by two percent per year, then visitation in State parks would increase by approximately 5,000 persons per year. By the year 2020, annual visitation may near 340,000 persons. Visitation rates are expected to increase as the population in Clark County continues to grow.

BLM manages a ten-acre recreation facility at Ash Springs. The facility is located at the hot springs that make up a part of Ash Springs. Limited to day use, picnic tables and vault toilets are available at this facility.

3.5 LAND USE PLANS, POLICIES, AND GUIDELINES

Several agencies exercise management authority over various portions of Lincoln County. These agencies include Lincoln County, the State of Nevada, the Bureau of Land Management, the U.S. Fish and Wildlife Service, the U.S. Forest Service, the Department of Defense, and the Department of Energy. Each of these agencies has issued plans, policies, and/or guidelines that set land use parameters. Those plans that are appropriate within the context of this Water Plan are reviewed. Special consideration is given to any elements or actions that would have an impact on water use or the public/private land ownership balance within Lincoln County.

3.5.1 Lincoln County

The Lincoln County Board of Commissioners addresses administrative matters throughout most of Lincoln County. Caliente is an incorporated city. City government deals with matters that occur within the city's limits. The County planning commission is responsible for planning activities countywide. Also, the County has established a Public Lands Commission and an Economic Development Program Committee. Activities are conducted in accordance with a master plan, but the County has expressed an interest in updating that plan. To that end, a draft master plan update was presented to the Commission in late 1998, but has not been formally adopted. This Water Plan is envisioned as an element of that updated master plan.

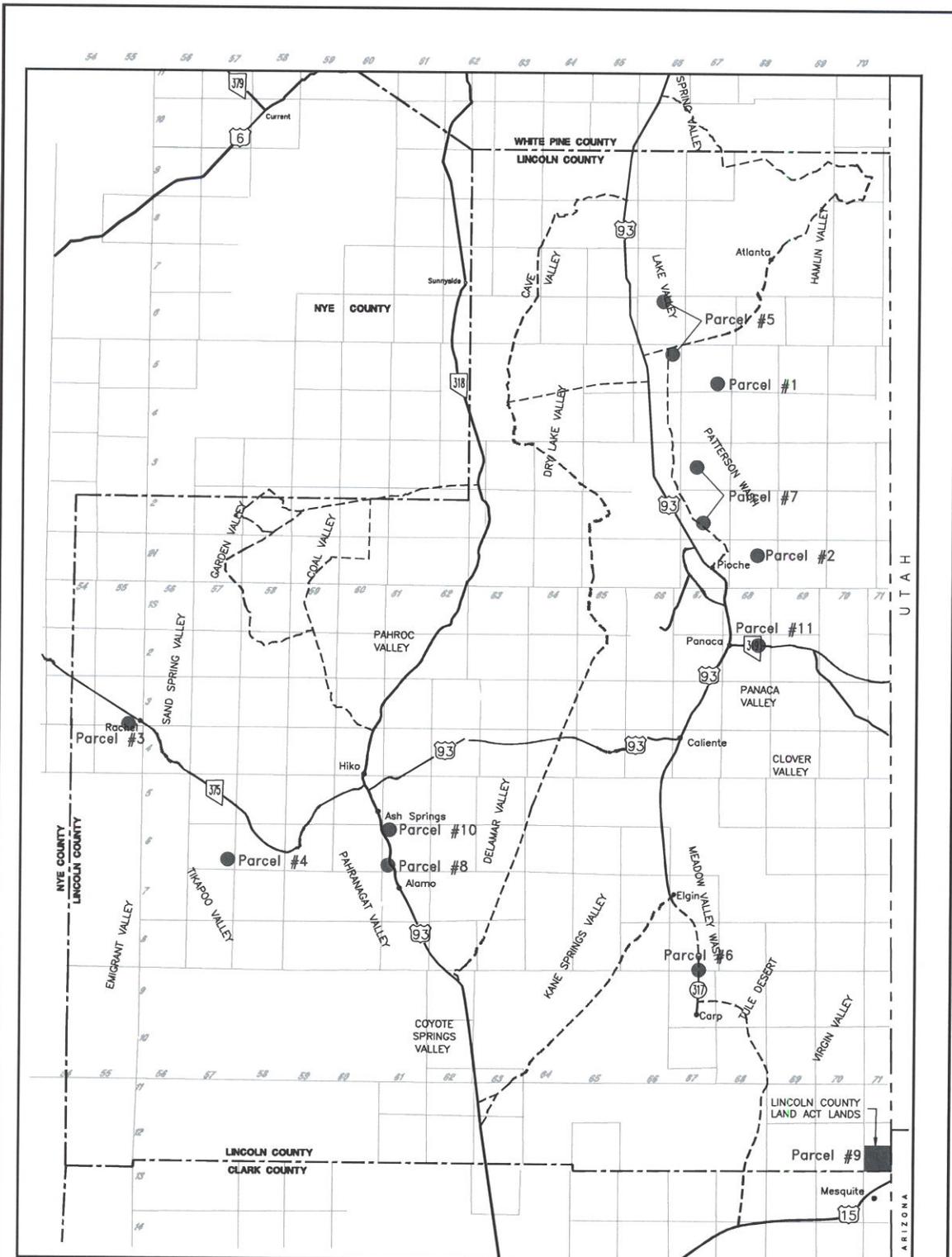
Lincoln County maintains numerous county roads and intends to retain as many roads as possible. The County goals are to ensure that the public has access to recreation lands located throughout the County, and to maintain access to private property.

Two processes have been proposed by which federal lands within Lincoln County could be released to private ownership: 1) the Lincoln-Douglas County Exchange and 2) the Lincoln County Land Act. Recently, the Lincoln-Douglas County Exchange has been put on hold and the Lincoln County Land Act was adopted by U.S. Congress. Both processes are described below.

The Lincoln-Douglas County Exchange (Exchange), as originally proposed, would release 16,377.32 acres of federal lands in Lincoln County to private ownership in exchange for the purchase of development rights on agricultural lands located in Douglas County. Eleven Lincoln County parcels have been identified in the Exchange (Table 3.6, Figure 5). Four parcels represent comparatively small consolidations on the part of individual property owners, three represent somewhat larger exchanges that would accommodate agricultural activities, three would facilitate community development, and one would accommodate a sand and gravel operation.

Table 3.6. Lincoln-Douglas County Exchange Parcels

Parcel	Location	Acres	Likely Use
1	Lake Valley	120.00	Parcel Consolidation
2	Near Pioche	80.00	Parcel Consolidation
3	Near Rachel	360.00	Agricultural Operation
4	Tikapoo Valley	40.00	Parcel Consolidation
5	Lake Valley	5,192.50	Agricultural Operation
6	Rainbow Canyon	1,030.00	Sand and Gravel Operation
7	Near Pioche	240.00	Agricultural Operation
8	Near Alamo	80.00	Parcel Consolidation
9	Mesquite	6,344.00	Community Development
10	Ash Springs	451.32	Community Development
11	Panaca	2,440.00	Community Development



Source: General Highway Map, Nevada Department of Transportation, Planning Division



Figure 5
Land Act & Potential Land Exchange Parcels

Parcels 8 and 10 and a portion of parcel 9 have been identified in the Caliente Management Framework Plan Amendment (BLM 1999) as suitable for disposal. The disposal process allows for individual parcels to be exchanged, assuming that a Douglas County exchange parcel is available, that a buyer is identified, and that the Douglas County development rights are purchased. Because not all parcels have been identified for disposal, the Caliente management framework plan would require further amendment before the parcels could be considered suitable for disposal. The person-hours required to write and approve a plan amendment is prohibitive for small parcels. Thus, the Exchange, as originally conceived, has been put on hold and the Lincoln County Land Act has taken a priority within the BLM (Gene Kolkman, BLM, Pers. Comm. 8-1-00).

The Lincoln County Land Act (the Act) grants Lincoln County the exclusive right to purchase specified public land in the County for a ten-year period. This specified land includes approximately 14,000 acres in Township 12 South, Range 71 East, directly north of Mesquite. Under the Act, five percent of gross proceeds of land sales will be paid to Nevada for use in the State's general education program; ten percent will be returned to the County for use as determined through normal county budget procedures; and the remainder shall be deposited in a special account in the Treasury and will be available to the U.S. Secretary of Interior for the cost of acquisition of environmentally sensitive land in Nevada, creation of a multi-species habitat conservation plan in Lincoln County and the reimbursement of costs incurred by the BLM in preparing sales under the Act or other authorized land sales or exchanges within Lincoln County (S.1331. Bill Summary and Status for the 106th Congress as of 7-1-99).

3.5.2 State of Nevada

The Nevada Division of State Parks, in the State Department of Conservation and Natural Resources, has its statutory authority under NRS 232 and NRS 407. State Parks plans, develops and maintains a system of parks and recreation areas for the use and enjoyment of residents and visitors. The Division also preserves areas of scenic, historic and scientific significance in Nevada. The Division of State Parks manages and maintains five parks in Lincoln County through the Panaca regional office. Key objectives of the Division of State Parks include:

- Continue to manage, protect, operate and maintain existing and future units of the Nevada State Park System.
- Acquire, plan for and develop a well-balanced system of areas of outstanding scenic, recreational, scientific and historical importance.
- Continue to manage and interpret the natural, cultural and recreational resources of the State Park System.

The Nevada Division of Wildlife manages the Key-Pittman Wildlife Management area near Hiko. Excluding Nevada Department of Transportation Rights of Way, this 1,332 acre area brings the lands managed by the State of Nevada to just under 8,000 acres.

3.5.3 Bureau of Land Management

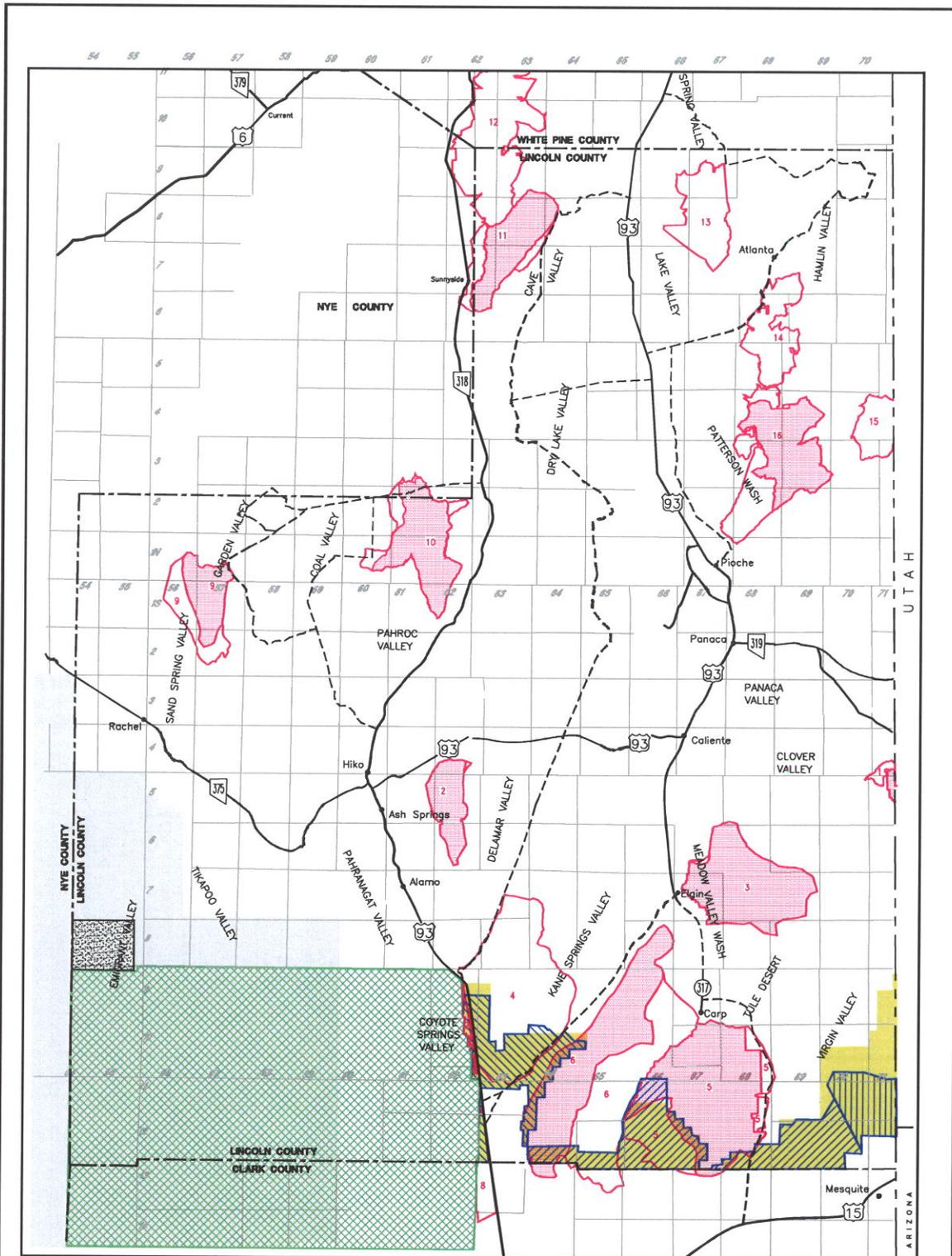
The Bureau of Land Management (BLM) is the largest single land manager in Lincoln County. Those lands are administered in accordance to one of three general land use plans:

- the Egan Resource Area Resource Management Plan (only the southeast most tip of the resource area extends into Lincoln County) (BLM 1983);
- the Schell Resource Area Management Framework Plan (BLM 1982); and,
- the Caliente Resource Area Management Framework Plan (BLM 1979).

Each plan was prepared with the intent of providing the BLM management direction for land use and resource management issues. An amendment to the Caliente Resource Area Management Framework Plan (MFP) was prepared and finalized in the fall of 2000.

In 1991, the BLM issued a statewide wilderness report (BLM 1991a, 1991b). Several Wilderness Study Areas were defined that are located within, or extend into, Lincoln County. Those study areas are listed in Table 3.7 and their location is shown in Figure 6. In its wilderness report, the BLM recommended some study areas for designation as wilderness. Other areas, or portions of areas, were not recommended for designation. Those recommendations were included in an act submitted to Congress. Until such time as Congress acts on the proposed Nevada Wilderness Act, all of the identified lands are managed by the BLM as if they were formally designated as wilderness. Combined, these wilderness study areas (recommended and not recommended) comprise some 1,056,330 acres, or about 15.5 percent of the County area.

In June of 1999, the BLM issued a final environmental impact statement (BLM 1999) addressing the proposed designation of three Areas of Critical Environmental Concern (ACECs) in southern Lincoln County (see Figure 6). Those areas, designated the Kane Spring, Mormon Mesa, and Beaver Dam Slope ACECs, account for 212,500 acres of BLM administered lands. The ACECs are intended to facilitate Desert Tortoise habitat conservation. The EIS also addresses management prescriptions that would be imposed in desert tortoise habitat (both in and outside of the proposed ACECs) and anticipated monitoring activities. If designated as ACECs, livestock grazing would be discontinued, resulting in the removal of 5,658 AUMs, and wild horses and burros would be removed. No land disposals would be allowed and utilities and rights-of-way would be restricted to selected corridors. The areas would be closed to all speed competitive off-highway vehicle use and most types of organized off-highway vehicle use. Extraneous routes would be closed and off-road driving would be prohibited. Some portions of the ACECs would be withdrawn from mineral entry, and some portions would be closed to many forms of non-energy leasing or mineral material disposal.



Source: Bureau of Land Management, 1983, 1991a, 1991b, 1999.

- Nevada Test Site
- Desert National Wildlife Range
- Nellis Airforce Bombing and Gunnery Range
- Critical Habitat
- Kane Springs ACEC
- Mormon Mesa ACEC
- Beaver Dam Slope ACEC

- Non Recommended for Designation as Wilderness
- Recommended for Designation as wilderness

WILDERNESS STUDY AREAS

- 1 Tunnel Spring
- 2 South Pahroc Range
- 3 Clover Mountains
- 4 Delmor Mountains
- 5 Mormon Mountains
- 6 Meadow Valley Range
- 7 Evergreen ABC
- 8 Fish & Wildlife #1
- 9 Worthington Mountains
- 10 Weepah Spring
- 11 For South Egans
- 12 South Egan Range
- 13 Fortification Range
- 14 Table Mountain
- 15 White Rock Range
- 16 Parantip Peak



Scale 1:750,000

Figure 6
Special Land Use Designations

Table 3.7. BLM Wilderness Area Recommendations (in acres)

	Recommended	Not Recommended
Las Vegas District		
Tunnel Spring	2,180	3,220
South Pahroc Range	28,395	205
Clover Mountains	84,875	60
Delamar Mountains	0	126,257
Mormon Mountains	123,130	39,757
Meadow Valley Range	97,180	88,564
Evergreen ABC	0	2,694
Fish & Wildlife # 1	0	11,090
Total	335,760	271,847
Ely District		
Worthington Mountains	26,587	21,046
Weepah Spring	50,499	10,638
Far South Egans	42,316	10,908
South Egan Range	0	96,916
Fortification Range	0	41,615
Table Mountain	0	35,958
White Rock Range	24,065	0
Parsnip Peak	53,560	34,615
Total	197,027	251,696

Source: BLM 1991a, 1991b.

In the Caliente Area MFP Amendment (BLM 1999), BLM identified lands suitable for disposal. These lands are summarized in Table 3.8 and include: 1) those suitable for sale or exchange (2,683.95 acres in the Alamo area, 110 acres near Carp, and 11,420 acres in the southeast corner of the County); and 2) lands suitable for airport patents (633.13 acres near Alamo and 2,080 acres in the southeast corner of the County).

Table 3.8. Federal Lands Suitable for Disposal under the Caliente Management Framework Plan Amendment

Location	Acres	Likely Use
Alamo	2,683.95	Community Development
Alamo	633.13	Airport
Carp	110	Not specified
Mesquite	11,420	Community Development
Mesquite	2,080	Airport
	16,927.08	Total

Source: BLM, 1999 Appendix C

Discussions with BLM personnel resulted in the identification of several projects currently being worked on and several other projects the BLM feels may be likely to proceed in the future. Only those projects that would result in the transfer of lands from public to private ownership, and those that may have an associated water need are reviewed herein. Those projects are as follows.

- The BLM is currently working on several land sales that would result in about 160 acres transferring into private ownership. These sales will resolve outstanding trespass issues, boundary errors, and the like.
- Cleanup of the Caselton tailings is ongoing. The tailings are on public lands. There is a potential need for water to support this effort.
- A right-of-way has been authorized to allow for the placement of a well at the proposed Alamo industrial park. The well has been drilled and the site appears to be suitable. The BLM anticipates that Lincoln County will pursue action to acquire the parcel.
- The Virgin Valley Water District has recently begun construction on two, three million gallon water tanks and a six-mile long distribution line from the tanks to Mesquite.
- Mr. Mathews has filed a Desert Land Entry application that, if approved, would move 320 acres from public to private ownership in Dry Valley. Mr. Mathews provided proof that an application was submitted to the Nevada State Engineer for 1,500 acre-feet of water.
- Mr. Pearson has submitted a letter of interest regarding the purchase of 200 acres in Spring Valley that would be placed into agricultural use.
- An application in Caliente has been made for a tire recycling facility.
- A new grade school site has been acquired in Pioche and the school is presently under construction.
- Discussions have been held with Mr. Humphries regarding twenty-one proposed Desert Land Entry applications. Those applications will address approximately 6,000 acres located in Lincoln and White Pine County. The applicant will need to demonstrate how water will be made available to each of the parcels.
- The BLM remains interested in what is proposed to occur on lands exchanged into private ownership in Coyote Springs Valley.

3.5.4 Fish and Wildlife Service

The U.S. Fish and Wildlife Service manages the Pahrnat National Wildlife Refuge and the Desert Wildlife Range, and plays a major role in implementing the Endangered Species Act. It is important to make a clear differentiation between the refuge management and the regulatory divisions within the Service as described below.

3.5.4.1 Refuge Management Division Activities

The Refuge Management Division is responsible for preparing and implementing refuge master plans. Several years ago, the Service set about updating existing refuge master plans. Each refuge is charged with the preparation of a Comprehensive Conservation Plan (CCP). The Pahrnat Refuge is scheduled to complete its CCP in 2008. Prior to that time, some plan components may

be developed to address particular needs. A Habitat Management Plan and a Public Use Plan are two components that may be prepared over the twenty year span of this Water Plan.

Developed recreation facilities are limited at the Pahrnatag Refuge. Eight primitive camp spots are provided. Each has a picnic table, a fire pit, and a tent pad. Water and electricity are not provided. Sani-huts constitute the only form of restroom facility. The refuge does not expect to increase the number of camp spots during CCP development.

Use of the Pahrnatag Refuge is changing. Before the rapid increase of population in Las Vegas, fishing and hunting were the predominant uses of the refuge. Now, there is a far greater emphasis on bird watching, hiking, looking at pictographs and petroglyphs, and other more leisure related activities. Refuge managers see this trend as continuing. The refuge as a place is becoming a refuge for humans as well as wildlife. User numbers have not been kept for the Pahrnatag Refuge until recently. A vehicle counter was installed along the Upper Lake road in late February 2000. Between late February and the first of August (five months), the counter registered 39,000 vehicles entering the refuge.

Several years ago, Congress authorized funds for the purchase of lands by the U.S. Fish and Wildlife Service. The goal was to preserve habitat or to enhance the survival potential of species of concern. The intent was to limit the need to list species as threatened, or to shorten the time a species would need to be listed. Over the last few years, the Service has been reviewing individual refuges with the intent of identifying those where the purchase of land or easements would best meet program goals. The Pahrnatag Refuge is one of several refuges nationwide that is being considered for selection. The federal selection process may not be completed for several years. Only then will the Refuge know whether it has been selected for funding. If selected, funds would be made available for the purchase of land or easements. Any such purchase would occur on a "willing seller, willing buyer" basis.

3.5.4.2 Regulatory Division Activities

The regulatory division of the U.S. Fish and Wildlife Service oversees the designation of endangered and threatened species, and the preparation and implementation of recovery plans. Several actions by this division require consideration herein.

The Pahrnatag Valley supports three endangered species of fish: the Pahrnatag roundtail chub, the White River springfish, and the Hiko White River springfish. A recovery plan has been developed (USFWS 1998) that if implemented would allow for the delisting of these species. Among other actions, that plan calls for the development of a minimum year round in-stream flow of 1.75 cfs at the point where Pahrnatag Ditch begins and the enhancement of the riparian corridor along the outflow of Crystal Spring.

The Big Spring spinedace is found in the Condor Canyon reach of Meadow Valley Wash. This species is listed as threatened by the U.S. Fish and Wildlife Service. A recovery plan has been developed (USFWS 1994a) that if implemented would allow for delisting of the species. Among other actions, that plan calls for the protection of ground waters in the vicinity of Big Spring, and, as necessary, the acquisition of additional instream flow water rights. A rangeland fire occurred in Condor Canyon during the summer of 1999. Apparently, some of the riparian vegetation along the stream was burned.

Desert tortoise are found in the southern portions of Lincoln County. This species is listed as threatened by the U.S. Fish and Wildlife Service. A recovery plan has been developed (USFWS 1994b) that if implemented would allow for delisting of the species. The southern portion of Lincoln County is contained within the Northeastern Mojave Recovery Unit as defined by that plan. Examination of proposed desert wildlife management areas contained in Appendix F of the recovery plan indicate that the proposed activities do not have an associated water need.

In conjunction with Lincoln County and the Bureau of Land Management, the Fish and Wildlife Service is involved in preliminary discussions regarding a multi-species habitat conservation plan that would encompass portions of the County. The plan is necessary to comply with new BLM management prescriptions regarding activities in tortoise habitat located outside the proposed Areas of Critical Environmental Concern. Those prescriptions call for the development of a habitat conservation plan (HCP) prior to any major action. The HCP will address federally listed species as well as anticipated species to be listed during the next 30-year period. Initially the HCP will cover the southern portion of Lincoln County. Eventually the HCP will cover the rest of Lincoln County as development and public need requires.

3.5.5 U.S. Forest Service

The Toiyabe-Humboldt National Forest administers lands located in several mountainous areas of Nevada. The southern most portion of the Grant Range in northwestern Lincoln County is one such area, referred to as the Quinn Division Management Area. Information regarding this area was derived from the 1985 Humboldt Forest Land and Resource Management Plan (USFS 1985). Comparatively little of the area is located in Lincoln County. The portion in the County does not contain developed recreation facilities or administrative sites. Dispersed recreation in the area is focused along Cherry and Pine creeks to the north, in Nye County. Existing water uses on Forest Service lands in Lincoln County are limited to providing for livestock needs.

3.5.6 Department of Defense Nellis Air Force Bombing and Gunnery Range

The Nellis Air Force Range encompasses a sizable portion of southwest Lincoln County. This area is withdrawn from all forms of public entry. Management of the area is carried out in accordance with the Nellis Air Force Range Resource Plan (BLM 1992). The range is used extensively for air combat training, evaluation, and testing activities. Air-to-ground and targeting activities occur in some portions of the Range. Types and levels of water usage are not readily available.

3.5.7 Department of Energy Nevada Test Site

The portion of the Nevada Test Site located in Lincoln County is situated around Groom Lake. Information is not readily available regarding activities conducted at Groom Lake or their associated water uses. This portion of the Test Site is located in the Emigrant Valley hydrographic basin.

3.6 ECONOMIC DEVELOPMENT ACTIVITIES

Historically, the Lincoln County economy has been supported by mining, agriculture and railroad operations. Farming and ranching operations are common in the south (Pahranagat Valley from Alamo to Hiko) and in the north (Meadow Valley from Caliente through Panaca to Pioche). Agriculture has been and continues to be one of the steadiest sources of employment in Lincoln County. Much of the public land in the County is utilized for the grazing of domestic livestock. Increasing restrictions on such activities have significantly impacted the ranching industry. While cash receipts for agriculture continue to increase, receipts for livestock production have been declining. Federal defense research and development at the Nevada Test Site became more prominent in the second half of the twentieth century, but has declined in the past few years.

The pronounced decline in the level of mining activities, a shift in the structure of railroad operations toward larger more centralized facilities, and the continued decline of rural agricultural communities have caused a pronounced and continuing effect on the County's economic base. The need for economic development at both the community and the county level has been identified.

Since the early 1980s, the County has participated in several economic development planning activities. Initially, a community development corporation was chartered. The early 1990s saw development of an Overall Economic Development Committee at the County level. In 1993, the Lincoln County Economic Development Task Force was formed. Later that year, the Task Force issued an economic development plan. Due to limited funding, the Task Force was abandoned. In 1998, the County once again appointed an Overall Economic Development Committee which developed a draft economic development plan (Lincoln County 1998) and conceptual layouts for two industrial parks.

Several potential economic development activities have been identified. It is possible that one or more of these activities may come to fruition in the near future. Potential projects include the following:

- The Meadow Valley and Alamo industrial parks (CES 1998a, 1998b), each of which would be about 300 acres in size. The Meadow Valley facility would be located on lands owned by the City of Caliente. Lands for the Alamo facility would be requested of the Bureau of Land Management. Water right applications for the Alamo facility have been filed by the Nevada Test Site Development Corporation and Lincoln County. A well has been drilled and water quality and quantity are reported to be satisfactory.
- Pioche and Panaca are conducting studies to determine the viability of developing a bottled water facility.
- The Department of Energy and BHP Copper are considering development of a rail-to-truck inter-modal facility in Caliente.

- The City of Caliente has entered into a partnership with MHF Logistical Solutions, Inc., and Tri-State Motor Transport to develop and operate a commercial inter-modal facility in Caliente.
- The City of Caliente is currently studying the development of facilities that would allow for the loading of cubed hay onto railroad cars for shipping.
- Extrudex Environmental Technologies has applied for 120 acres of BLM land at the western edge of Caliente.
- The Air Force has expressed an interest in upgrading the Alamo airport.
- The Nevada Nuclear Waste Project's office has identified several small projects in the Caliente area.
- The Monsoon Corporation has discussed mining lime and constructing a wallboard plant in southeast Lincoln County. The plant would be located near Mesquite.
- The County and the Bureau of Land Management have met to discuss a large biomass project whereby selected stands of pinyon/juniper would be utilized for whole-tree harvest. The chipped wood would be used to fuel a five-megawatt power plant.
- The Corning Glass Company retains claims on silica ledges throughout the eastern portion of the County.
- Panaca and Caliente are marketing the availability of geothermal water as a means of attempting to draw in industries that need such a resource.
- Potential Residential/Commercial/Industrial developments are being discussed for the area north of Mesquite.
- A power plant is in the advanced planning stages in the southern portion of Lincoln County by Cogentrix.

Chapter Four - PROJECTED CONDITIONS AND WATER NEEDS

This chapter attempts to identify and quantify projected water needs within Lincoln County over the next twenty years. This time period was selected because it corresponds with projections contained in the Draft Nevada State Water Plan (Division of Water Planning, 1999) and the Nevada State Statistical Abstract (Nevada Department of Administration 1996). The Draft State Water Plan offers projections of future water needs in Lincoln County. Those projections, however, are based on historic demographic trends. The Lincoln County Water Plan reflects a more current and a more detailed review of potential growth in County water needs. This assessment differs from the State's assessment in that this Plan specifically considers the impact of projected economic development and land exchange activities that are outside the scope of the Draft State Water Plan.

4.1 LAND RESOURCES

Currently, about 96 percent of the land in Lincoln County is administered by federal agencies. Some of that land is withdrawn from any type or level of potential development from which the public may derive a benefit. Primary examples include the Nellis Air Force Bombing and Gunnery Range and the Nevada Test Site. Other federally managed areas offer recreational opportunities (sometimes of a limited spectrum) but little development potential. Examples that fall into this class include the Desert National Wildlife Range, the Pahrangat National Wildlife Refuge, proposed wilderness areas, and State Parks. Federal land management actions have a pronounced affect in many cases. Recently, 212,500 acres of BLM administered land in southern Lincoln County were designated as Areas of Critical Environmental Concern. This designation will have an affect on what types of activities can be conducted in the designated areas. Changes in livestock grazing permits have had an impact on the County's agricultural returns.

Over the recent past, the amount of privately owned lands and publicly administered lands available for potential development has declined. The Lincoln County Land Act and the Caliente MFP amendment (BLM 1999) represent a reversal of this trend. Through the Land Act and the MFP amendment, some 14,000 acres of public lands in Lincoln County will become available for purchase in the southeastern portion of the County. Additionally 3,000 acres will be available for sale or patent in the Alamo area and 110 acres available for sale near Carp. These figures represent a six percent increase in the amount of privately owned land in the County. The parcels that would become available are located near developed areas (Mesquite, Ash Springs, and Alamo) and would, presumably, be opened to residential and commercial development. The capacity of the existing infrastructure may act - and in some cases has acted - as a limiting factor affecting any future development efforts. The potential for economic development activities is similarly affected by this ceiling, as is the ability of the County to generate property taxes. Understanding these factors is central to the water planning process. Implications of the exchange are discussed in other sections of this chapter.

Other activities identified by the BLM (see Section 3.5.2) would also result in the transfer of lands from federal to private ownership. These actions include land sales (about 360 acres), the possibly purchase/exchange of lands to accommodate the Alamo Industrial Park, and Desert Land Entry applications (6,320 acres).

4.2 POPULATION AND DEMOGRAPHICS

Changes in patterns of water use will occur over the planning period, largely in response to changes in population and the level of industrial or other economic development. Two sources of population estimates for Lincoln County over the next 20 years were reviewed (Table 4.1). Estimates presented by the Nevada State Demographer suggest a near-term increase in population followed by a much more gradual increase. Estimates provided by the Nevada Division of Water Planning tend to be more conservative in magnitude and more gradual in their ascent.

Table 4.1. Lincoln County Population Estimate and Forecast

	State Demographer Estimates			Division of Water Planning Estimates		
	Population	Change	Percent Change	Population	Change	Percent Change
1995	4,110	-		4,110	-	
2000	4,410	300	7.2	4,167	57	1.4
2005	4,400	-10	-0.2	4,247	80	1.9
2010	4,430	30	0.7	4,307	60	1.4
2015	4,510	80	1.8	4,345	38	0.9
2020				4,363	18	0.4

Sources: State Demographer's data current as of April 13, 1998;
Division of Water Planning (1999, Appendix A).

The Draft State Water Plan information presented in Table 4.2 suggests that water use will actually decline over the planning period, even in the face of a gradually increasing population. Further analysis of the table indicates that the decline will be due largely to reductions in the amount of irrigation water use. Slight declines in commercial and livestock related uses add to the trend. Domestic uses, both public and self-supplied, are projected to increase slightly over the planning period.

**Table 4.2. Nevada State Water Use and Forecasts (in acre-feet per year)
for Lincoln County**

	1995	2000	2005	2010	2015	2020
Resident Population	4,110	4,167	4,247	4,307	4,345	4,363
Number on Public Supply	3,211	3,260	3,326	3,377	3,412	3,430
Number Self Supplied	899	907	921	929	933	933
Domestic Use - Public Supplied	1,082	1,098	1,121	1,138	1,150	1,156
Domestic Use - Self Supplied	273	276	280	282	283	283
Public Uses and Losses	138	140	143	145	146	147
Municipal and Industrial Use	1,550	1,573	1,604	1,628	1,645	1,653
Commercial – Industrial Use	364	349	352	352	351	349
Thermoelectric Use	0	0	0	0	0	0
Mining Use	0	0	0	0	0	0
Irrigation Water Use	65,660	65,021	64,747	64,313	63,720	63,128
Livestock Water Use	123	122	121	120	119	118
Total	67,516	66,884	66,642	66,230	65,651	65,063

Source: Draft State Water Plan (1999: Appendices Part A)

The Draft State Water Plan water use estimates are based on historic trends. They reflect and project recent downward trends in the County's population and economic fortune. They do not reflect any increases that may occur as a result of the Lincoln County Land Act, other sales and exchanges, or the success of economic development activities. However, under two scenarios, 1) the Lincoln-Douglas County Exchange and 2) the Lincoln County Land Act, additional land would be available for new development and water use would potentially increase dramatically.

Under the Lincoln-Douglas County Exchange or the Lincoln County Land Act, increased water use would occur due to residential and commercial construction on new acres made available for community development. The following scenario illustrates the increased water need if all of the 9,235 acres of community land was acquired under the Lincoln-Douglas County Exchange (see Table 3.6).

Scenario: 9,235 acres available for development:

Assuming full build-out and an 80/20 split between residential and commercial use, about 7,385 acres of new residential development and 1,850 acres of new commercial development would occur.

Assuming ½ acre per residence, as many as 14,770 new households could be constructed. The Nevada State Water Plan uses a figure of 2.88 persons per household for Lincoln County. If correct, then the 14,770 new homes would house 42,538 people, or ten times the current population of Lincoln County. Most of this increase would occur near Mesquite (an estimated 10,000 residences housing 28,800 people) and Panaca (an estimated 3,900 residences housing 11,232 people). Based on an average domestic withdrawal of 846 gallons per day per household, or 0.948 acre-feet per year per household (Nevada State Water Plan 1999: Appendices, Part B, Table 1), ***these additional residences would require about 38.4 acre-feet per day, or 14,000 acre-feet per year.***

Water needs associated with prospective commercial and industrial developments are estimated based on an average withdrawal of 1.7 acre-feet per acre per year (1,500 gallons per day per acre). Based on this estimate, the 1,850 acres of *commercial development would require about 3,145 acre-feet per year.*

Under the Proposed Caliente Management Framework Plan Amendment, and the Lincoln County Land Act, approximately 14,000 acres would be made available. Thus the estimates provided in the scenario above would increase by approximately 50 percent for a combined residential/commercial/industrial need of 25,717 acre feet per year.

There also has been discussion of a hotel and golf course being constructed on the parcel near Ash Springs. Although this possible use has not been identified on the County's list of economic development activities (see Section 3.6 of this document) and no details were available, a potential water use of 750 acre-feet per year is estimated.

While not reflected as a separate use in Table 4.2, countywide recreation levels are likely to exhibit a steady increase (see Section 3.4.11). This will occur due to regional population increases, especially in the greater Las Vegas area. As user levels increase, State Park facilities may be expanded and recreation activities may be enhanced on adjacent public lands. Cooperative planning efforts between the County, the State, and federal agencies would help ensure that any such facilities are planned in a mutually beneficial manner. The County and other governmental or private entities may want to explore the possibility of jointly encouraging tourist and recreation opportunities. That increased level of recreational use will carry with it an increased need for water. For planning purposes, it is assumed that gradual development of recreation facilities in the County will require approximately 100 acre-feet per year.

4.3 INFRASTRUCTURE AND PUBLIC SERVICES

Sewer and water systems are susceptible to impact due to increased residential and commercial water needs that may occur due to economic development. While examination of existing systems shows that some capacity remains, some issues have been identified. Growth will bring the need for system upgrades and expansions. These needs will occur in different places at different times. Also, Lincoln County and the City of Mesquite will share in the development of systems needed to accommodate Mesquite's growth.

In general, sewer systems in Alamo and Panaca require improvement (Table 4.3). These systems are old, dating to the 1960s and 1970s, and would benefit from general system upgrades (Panaca), and system expansion (Alamo). The Caliente system has been worked on recently and is in relatively good condition, although it has comparatively little remaining capacity. Pioche's sewer system is in relatively good condition and has available system capacity.

Table 4.3. Estimated Sewage System Capacities (in units)

System	Existing Customers			Current Operating Level	Estimated System Capacity	Estimated Remaining Capacity
	Residential	Commercial	Total			
Alamo	213	22	235	90%	260	25
Caliente	440	50	490	80%	615	125
Panaca	294	12	306	40%	765	459
Pioche	372	20	392	50%	785	393

Source: Lincoln County (1998)

Existing capacity is not sufficient to accommodate increased sewage treatment needs associated with projected population increases based on the commercial uses that may occur in response to potential economic development activities. Comparison of Table 4.3 with projections discussed in Section 4.2 of this report indicate that the Panaca and Alamo systems will not accommodate anticipated population increases.

Essentially the same condition exists with regard to drinking water systems (Table 4.4). Remaining capacity in Panaca and Alamo is quite limited compared to the projected need. Potential residential and commercial development would soon exceed system capabilities.

Table 4.4. Estimated Water System Capacities (in units)

System	Existing Customers			Current Operating Level	Estimated System Capacity	Estimated Remaining Capacity
	Residential	Commercial	Total			
Alamo	300	20	320	90%	355	35
Caliente	440	50	490	30%	1,635	1,145
Panaca	310	30	340	*	-	-
Pioche	372	23	395	40%	990	595

* No estimated system capacity was provided in the source document.

Source: Lincoln County (1998)

The City of Caliente has three active water supply wells and all three wells have exhibited declining water yields. Deficiencies in the water system were identified in a study by CES (1999:30). The existing wells are susceptible to contamination. Additional fire flow and fire storage is necessary to support the forecast population. Due to problems with sanding and the falling yield of current operational wells, it is necessary to plan for the rehabilitation of the wells or construction of new wells. Per capita water consumption in Caliente has been very high. This causes high pumping costs and high costs for capital facilities due to the need to maintain several wells to meet demand. Due to the large per capita water usage, leaks from the distribution system are suspected.

The City of Caliente is currently addressing the water system deficiencies with a top priority given to an industrial park water storage tank. Other tasks include improving fire flow in the area south of the railroad tracks, leak detection and repair, metered conservation, new well construction, and

improvement to fire flows in commercial buildings adjacent to US Highway 93 as well as to the west end of the City.

4.4 PLANS, POLICIES, AND GUIDELINES

Project planning and policy development activities are ongoing at the federal and County level. Immediately relevant plans and programs have been discussed elsewhere in this Plan. Other, more prospective federal and County plans, policies and guidelines are under development but lack sufficient definition to determine any water resource related needs or effects.

4.5 ECONOMIC DEVELOPMENT ACTIVITIES

Potential economic development projects that have been identified by the Lincoln County Economic Development Committee are listed in Section 3.6 of this Water Plan. At this time, it is difficult to predict which projects will occur when. In some cases, where they will occur is not necessarily clear. Answers to these unknowns will provide direction, establish priorities, and set timing for the development of water resources needed to serve the projects.

The purpose of the present discussion is to estimate water needs associated with the potential economic development activities that have been identified. Table 4.5 provides initial estimates based on the water needs of economic development activities that may occur in discrete geographic areas. These preliminary estimates suggest that the water needs associated with current economic development proposals may range from approximately 4,400 to 5,725 acre-feet per year.

Table 4.5. Economic Development Activity Projected Water Needs

Location	Economic Development Activity	Potential Water Need
Alamo	Alamo Industrial Park, Upgrade Alamo Airport, Hydroponics Plant	500 – 750 af/yr
Alamo	Community Development	500-750 af/yr
Ash Springs	Resort-Golf Course	600 – 800 af/yr
Caliente	Meadow Valley Industrial Park, Rail-to-truck Inter-modal Facility, Commercial Inter-modal Facility, Cubed Hay On-loading Facility, “Hot Water” Industries	750 – 1,000 af/yr
Near Mesquite	Monsoon Wallboard Mine & Plant	1,500 – 1,750 af/yr
Near Mesquite	Community Development, Airport	20,000 – 25,000 af/yr
Panaca	Bottled Water Facility, “Hot Water” Facilities	150 – 200 af/yr
Pioche	Bottled Water Facility	50 – 75 af/yr
NE Area of County	Pinyon Juniper Biomass Project	750 – 1,000 af/yr
East ½ of County	Corning Glass	100 – 150 af/yr

Most of the identified economic development activities are proposed for the Alamo – Ash Springs area, the Caliente area, and the Mesquite area. While the existing Caliente infrastructure may be able to accommodate some or all of the proposed activities, the systems present in the Alamo – Ash Springs and Mesquite areas could not. New systems would need to be constructed or existing systems would need to be upgraded.

Chapter Five – IMPLEMENTATION PLAN

5.1 OVERVIEW

As a result of an extensive public listening and discussion process regarding Lincoln County's water resources and water future, a series of potential water planning scenarios was developed in the Lincoln County Draft Water Plan. These alternatives were presented in a series of public meetings and public hearings with the Lincoln County Public Lands Commission, the Lincoln County Planning Commission, and the Lincoln County Commission. At each public meeting the overwhelming desire of the citizens of Lincoln County and their representatives was to be proactive in their water plan and development of the water resources of the County.

With this background, Lincoln County has developed a unique vision for its water resources. In full recognition of State water law and the concept of beneficial use, this vision includes the development and use of the water resources of the County for the long-term economic, social, and environmental benefit of its citizens. Water resources and water infrastructure will be developed under a countywide district to allow development, transportation and use of water on a sustainable, renewable resource basis. The County water district will recognize existing rights and uses, providing additional protection from outside efforts to appropriate water resources within the County.

Because Lincoln County is limited in both non-federal land and monetary resources, implementation of the County's vision requires significant financial and technical assistance. In furtherance of this effort, Lincoln County and Vidler Water Company (Vidler) have entered into a joint agreement creating a 50/50 partnership to develop water resources and related infrastructure. This implementation of the Lincoln County Water Plan will be accomplished under the joint agreement and partnership of Lincoln County and Vidler Water Company.

As a water company, Vidler's interests lay within long-term investments in water. As such, Vidler has property and capital to assist Lincoln County with their water resources. Vidler's parent company also owns Nevada Land and Resource Company, LLC, which purchased the checkerboard properties across the state of Nevada from Santa Fe Pacific Railroad and is the largest private landowner in Nevada. Some of these properties are desirable to the BLM and Lincoln County/Vidler are working with the BLM to trade some of this property for selected BLM lands within Lincoln County. These lands will be used for agricultural, industrial, commercial, or other purposes. They will be developed utilizing the water rights acquired by Lincoln County and Vidler.

The beneficial use of this renewable resource can be accomplished in many ways. Development of water rights and related infrastructure will allow Lincoln County and Vidler

to supply water to new and existing developments within Lincoln County as well as outside the County boundaries.

The Lincoln County/Vidler resource development under the Lincoln County Water Plan will also provide existing water right holders with new options for their water. These might include transportation of water to different places of use, purchase, sale, lease and exchange.

5.2 STAFF AND FUNDS TO IMPLEMENT THE WATER PLAN

Initially, the number of staff required to implement the Water Plan would be minimal. The County staff may expand as the water program grows and becomes established. At first, existing county staff, in conjunction with Vidler and contracted technical services, will be used to implement the Water Plan. Eventually, as funding allows and the needs arise, the County may choose to organize a water department in order to efficiently manage the water resources and related infrastructure.

Under the joint agreement, and with the progressive implementation of the Water Plan, Lincoln County will work with Vidler in the assessment and procurement of both funding and manpower. Vidler will also assist the County in the pursuit of donations, grants, loans, or other forms of monetary and/or technical assistance.

5.3 LAND, NEW WATER RIGHTS, AND BENEFICIAL USE

Jointly, Lincoln County and Vidler have applied for numerous water rights in hydrographic basins within Lincoln County. These have been filed carefully to minimize any potential impact on existing water right holders in the County. Concurrently, Lincoln County/Vidler are working with the BLM in the trade of Vidler's checkerboard properties for other BLM land within Lincoln County that is suitable for agricultural or other types of development. The acquisition of land together with new water rights will help Lincoln County to grow, generate new revenue and employment and expand the County's tax base. Using the water beneficially will secure water rights.

Lincoln County is working to acquire federal lands through the Lincoln County Land Act and the Lincoln-Douglas County Land Exchange. Each of these proposals could create more than 10,000 acres of new private land base within the County. Lincoln/Vidler water resources may be developed and provided to municipal, commercial, agricultural, industrial, and other private developments on these new lands.

Lincoln County/Vidler are currently drilling wells in Tule Desert Valley in the southern part of the County to better understand the available water quality and quantity for a proposed power plant. Determining aquifer characteristics will allow Lincoln County/Vidler to develop and sustain the groundwater resource.

5.4 EXISTING WATER RIGHTS AND BENEFICIAL USE

Lincoln County/Vidler will be available to assist the holders of existing water rights with their water resources. Countywide management or administration may be implemented by means of an irrigation or water district. Development of a countywide water district and water infrastructure will facilitate the lease, trade, sale, exchange, or transport of water and water rights among users within or outside the boundaries of Lincoln County. Various types of County-wide districts are being explored at this time.

5.5 WATER TRANSFER TO OTHER BENEFICIAL USES

Lincoln County/Vidler's vision includes having the ability to transfer and transport water within the County. Developed resources in excess of county needs could be considered for export by Lincoln County/Vidler or by private water holders.

Under the "use it or lose it" concept of Nevada water law, Lincoln County/Vidler will be required to keep the water resources under beneficial use. Lincoln County could become a water wholesaler by developing the infrastructure to transport water across the county to locations within the county or to locations outside of county boundaries. One possible scenario would be to move water from Lincoln County to the Mesquite area. The County could also import water from adjacent counties, use the water internally or export the water outside of its boundaries.

As areas within and adjacent to Lincoln County grow, Lincoln County will make decisions regarding the import, export, transportation of water and provide direction to Vidler to assist in the plan implementation. Activities associated with Las Vegas, Mesquite, Moapa, and Yucca Mountain may impact the priority and direction of the Lincoln County water resources and the implementation of this Water Plan.

Chapter Six - REFERENCES CITED

Bureau of Land Management (BLM)

- 1979 Final Environmental Impact Statement, Proposed Domestic Livestock Grazing Management Program for the Caliente Area. Prepared by the Las Vegas District Office, Las Vegas, Nevada.
- 1982 Draft Environmental Impact Statement, Proposed Domestic Livestock Grazing Management Program for the Schell Resource Area, Nevada. Prepared by the Ely District Office, Ely, Nevada.
- 1983 Draft Resource Management Plan and Environmental Impact Statement for the Egan Resource Area, Nevada. Prepared by the Ely District Office, Ely, Nevada.
- 1991a Nevada BLM Statewide Wilderness Report, Volume IV: Carson City and Ely Districts. Prepared by the Nevada State Office, Reno, Nevada.
- 1991b Nevada BLM Statewide Wilderness Report, Volume V: Las Vegas District. Prepared by the Nevada State Office, Reno, Nevada.
- 1992 Nellis Air Force Range Resource Plan and Record of Decision. Las Vegas District Office, Las Vegas, Nevada.
- 1999 Final Caliente Management Framework Plan Amendment and Environmental Impact Statement for the Management of Desert Tortoise Habitat. Prepared by the Ely Field Office, Ely, Nevada.

Consulting Engineering Services, Inc. (CES)

- 1998a Meadow Valley Industrial Park Conceptual Engineering and Construction Cost Estimates. Technical report submitted to the Lincoln County Commissioners, Pioche, Nevada.
- 1998b Alamo Industrial Park Conceptual Engineering and Construction Cost Estimates. Technical report submitted to the Lincoln County Commissioners, Pioche, Nevada.
- 1999 Water System Study for the City of Caliente, Lincoln County, Nevada.

Lincoln County Commissioners

- 1998 1998 Lincoln County Overall Economic Development Plan. Submitted to the Economic Development Administration, U.S. Department of Commerce, Washington, D.C.

Nevada, State of

- 1992 Designated Groundwater Basins of Nevada. Division of Water Resources.

- 1996 Nevada Statistical Abstract. Nevada Department of Administration, Planning Division, Carson City, Nevada.
- 1999 Nevada State Water Plan, Public Review Draft. Nevada Department of Conservation and Natural Resources, Division of Water Planning, Carson City, Nevada.

Resource Concepts, Inc.

- 1995 The Ash Springs Water Alternative Capital Improvement Plan, Alamo Sewer and Water General Improvement District, Alamo, Nevada. Technical report prepared for the Lincoln County Board of Commissioners.
- 1999 A Water Plan for Lincoln County, Draft, Technical Report prepared for the Lincoln County Board of Commissioners and Vidler Water Company.

Restrepo Consulting Group

- 1998 Target Industry Analysis and Construction Financing Initiative for Two Industrial Park Sites in Lincoln County, Nevada. Technical report submitted to the Lincoln County Commissioners, Pioche, Nevada.

U.S. Air Force

- 1985 Environmental Impact Statement, Groom Mountain Range, Lincoln County, Nevada.

U.S. Forest Service

- 1985 Humboldt National Forest Land and Resource Management Plan. U. S. Department of Agriculture, Humboldt National Forest, Elko, Nevada.

U.S. Fish and Wildlife Service

- 1994a Big Spring Spinedace Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon.
- 1994b Desert Tortoise (Mojave Population) Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon.
- 1998 Recovery Plan for the Aquatic and Riparian Species of Pahrnagat Valley. U.S. Fish and Wildlife Service, Portland, Oregon.