

Report on the Known Economic Market and Non-Market Values of Water in Nevada's Spring, Cave, Dry Lake, and Delamar Valleys

Submitted by:


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Introduction

This report briefly enumerates and explains the economic values of the agricultural and recreational uses of water, as well as the 'existence value, also known as the non-use of water, in four valleys in the state of Nevada. The report also updates the existing estimates of the economic losses that are likely to result from the proposed withdrawal of groundwater from these valleys by the Southern Nevada Water Authority (SNWA). The Spring Valley Basin and Cave Valley Basin are in both White Pine and Lincoln Counties. Dry Lake and Delamar Basins (or watersheds) are in Lincoln County.

Figure 1 is a map showing the four basins in the two counties. Maps in the appendices show the associated communities, ranches, recreational, and other relevant sites. The four valleys host resident ranchers, thousands of acres of irrigated pastures and cropland, and public grazing land that support thousands of head of cattle and sheep. The valleys are also home to thousands of head of big game, springs, lakes, dozens of fishable streams, and a dozen unusual or endangered species of fauna and flora. Thus the area is also a recreational destination used by hikers, bikers, birdwatchers, nature photographers, and hunters from across the state and around the world.

All these activities and attractions are the basis of the livelihoods of about 6,000 people, plus public sector employment for about 1,000 more individuals. As this report shows, the water withdrawals may undermine employment of over 3,000 people, causing the unemployment rate in **White Pine County to rise to 53%** from 8% in April 2011, and **Lincoln County's unemployment rate to rise to 46%** from 12% in April, 2011.

Clearly the proposed water withdrawals would devastate the local economies. The relocation of the humans from the areas dependent upon the water would also add to the current unemployment burdens in other Nevada counties or states that the people displaced from White Pine and Lincoln counties relocate to.

Water cannot be in two places at once. If it is piped to the Las Vegas area it would not be available to maintain the pastures, cropland, streams, wetlands, forests or the water table in the basins of origin and downgradient basins that depend on interbasin flow from the basins of origin. Guzzlers would go dry. Livestock and game would not be able to graze. The fragile ecosystem would be altered and flora and fauna populations would dwindle. The water withdrawals could turn the region into an uninhabitable wasteland

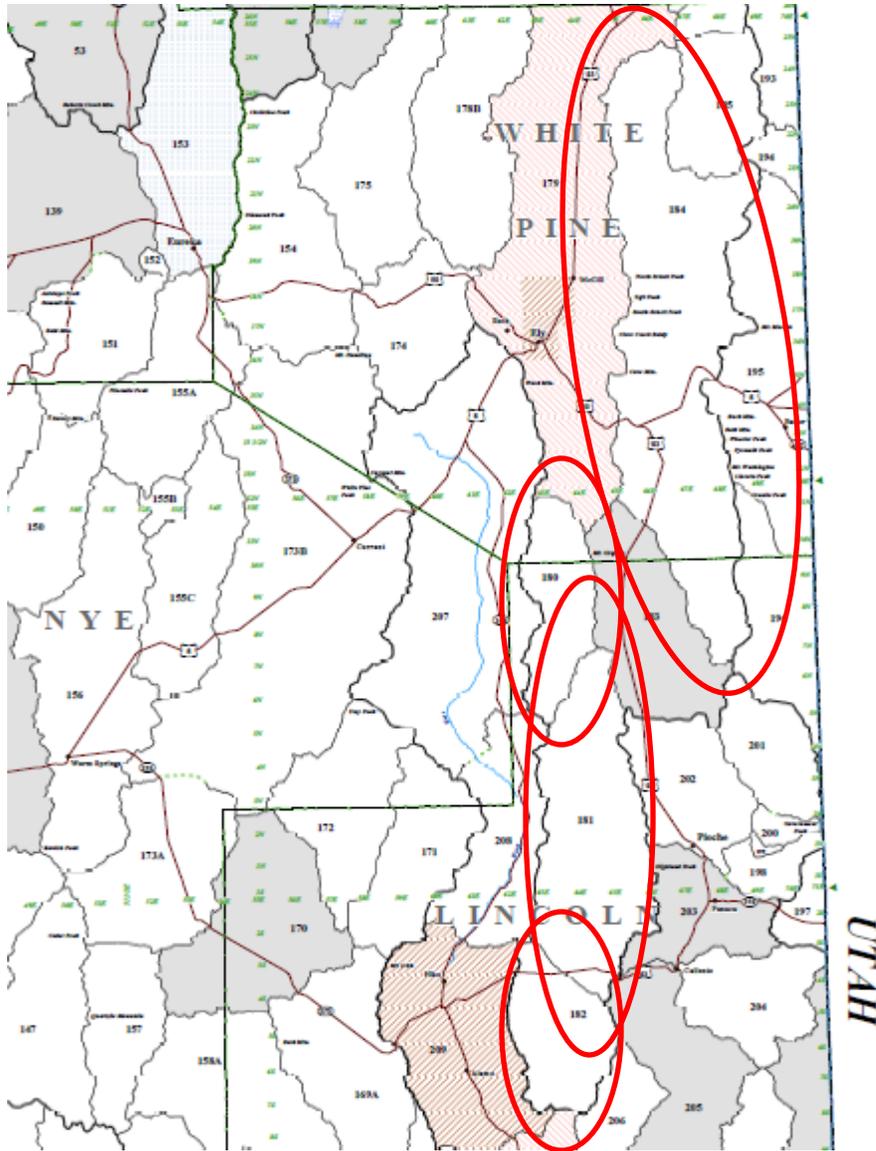


Figure 1. Spring (184), Cave (180), Drylake (181) and Delamar (182) Valley Basins
 Source: State of Nevada http://water.nv.gov/mapping/maps/designated_basinmap.pdf.

Although the natural and human communities in the basins are **priceless** in terms of the historical and cultural heritage they contribute to Nevada and the nation, and in terms of the biological and economic diversity they support, one is required to estimate the dollar values for use in deciding whether the loss of these values is reasonable as part of the price of SNWA's proposed groundwater withdrawal. However, it should be borne in mind that such an attempt to quantify these values in simple dollar terms carries a high risk of undervaluing them. This report updates all economic measures of industry or market uses of water in agriculture, hunting, and recreation. It updates or summarizes the existing estimates of the indirect or interindustry market economic values at stake due to the proposed water withdrawals as well. Furthermore, it summarizes the most recent estimates of the non-market values of the water resources and amenities in the counties where the basins are.

Water resources in a place provide at least five types of economic values. The first is the value of the industrial use of the water, measured by the income and employment directly related to the use of water by businesses such as agriculture and mining. The second is the market value of the use for recreational purposes, measured by the expenditures of the hunters and recreational users required to enjoy the natural resources. The third economic value is the interindustry spillover, measured by the indirect or inter-industry multiplier linkages that arise when businesses or people involved in direct use buy local inputs or services, or pay local employees.

The fourth is the *non-market* use value that people who visit the areas derive from experiencing the natural amenities, which are difficult to measure because no expenditure is required to use or directly experience them. The fifth benefit is the value that people anywhere -- even people who never visit the area or directly use the water -- place on the existence of the natural amenities in the place. This last type of economic benefit is the “existence” or “non-use” non-market value.

This report includes a summary of the existing non-market valuation of the uses and non-uses or existence values of the water-based natural resources and amenities in the four valleys. As noted by Moeltner (2006), non-market valuation became an essential aspect of environmental economic analysis in 1989, when a federal court of appeals ruled that non-use values should be included in environmental damage assessments and instructed the Department of the Interior to redraft the CERCLA stipulations (Mathis et al., 2003). CERCLA is the 1980 Comprehensive Environmental Response, Compensation, and Liability Act. It is administered by the Department of the Interior (DOI) and the U.S. Environmental Protection Agency (EPA). In 1992 a “Blue Ribbon” panel of economic experts convened by NOAA officially confirmed the legitimacy of non-market valuation techniques to assess environmental assets and damages within judicial process (Jones, 1997). Since then, non-market valuation has been employed in numerous legal proceedings around the country, including water management disputes (e.g. Loomis, 1997).

The report proceeds as follows. A summary of the five measures is presented in Table 1, below. The next section documents the people, places, and economic activities occurring today in the area of the basins, by county. The third section details the economic value of the ranching, hunting, tourism, picnicking, and other uses of the water in each basin that would be lost if the water is withdrawn. The fourth section presents the dollar *non-market* use values, and the non-market *existence*, (or non-use) *values* of the water-related natural amenities in one of the basins that would be lost if the water is withdrawn, as well as the discounted present value.

Table 1 summarizes all five types of economic values of the water in the four basins that have been estimated to date. . The **overall annual value is \$74 million, which has a cumulative discounted present value of \$2.85 billion** at 2% discount rate over the SNWA’s 70 year planning horizon. Note that this amount includes only the values of the portions of the resources in the four valleys that have been measured to date. It is therefore an incomplete measure that underestimates the economic value of the water in the four valleys.

Table 1. Summary: Market and Non-Market Value of Water in the Four Basins

activity	type		Measure or approach	Annual value	
Agriculture	Use	market	direct	production revenue	\$30,511,000
			interindustry	Input-Output	\$22,273,030
Hunting	Use	market	direct	expenditures	\$4,900,000
			interindustry	input-Output	\$3,000,000
Park Visitation	Use	market	direct	expenditures	\$6,750,000
			interindustry	Input-Output	\$4,000,000
Recreation	Use	non-market	direct	benefit transfer	\$756,000
Existence	non-use	non-market	direct	benefit transfer /meta regression	\$2,000,000
				Total:	\$74,190,030
Source: tabulated by author					

2. People, Places, and Economic Activity Status Quo

2a. White Pine County spans 8,876 square miles or 5.6 million acres. According to the 2010 Census, 10,030 people live in White Pine County. The county population grew 9.2% from 2000 to 2010. There are over 3,600 households and over 4,500 housing units.

The most recent official statistics indicate that 5,074 people worked in public service, as private business employees, or self-employed. They worked in 893 private firms, farming operations, and 752 non-farm establishments (See Figure 2. for data sources).

The State of Nevada’s Department of Agriculture reports that in 2008 there were 97 ranches or farms in White Pine County, raising 22,000 head of cattle, 18,000 head of sheep; and 12,000 acres of alfalfa hay yielding 43,000 tons. (Nevada Agricultural Statistics, 2009; http://www.nass.usda.gov/Statistics_by_State/Nevada/Publications/Annual_Statistical_Bulletin/Bulletin_Complete_with_Cover_09.pdf).

Figure 2 presents the most recent data on employment by sector in White Pine County, compiled using all four data sources, and reconciled to total the Bureau of Economic Analysis (BEA)’s 2009 official total employment count. The legend reports the number of employees or self-employed persons in each sector and the percentages show each sector’s relative contribution. For example, 11% of the jobs, or 535 people are employed or self-employed in hotel and restaurant businesses in White Pine County.

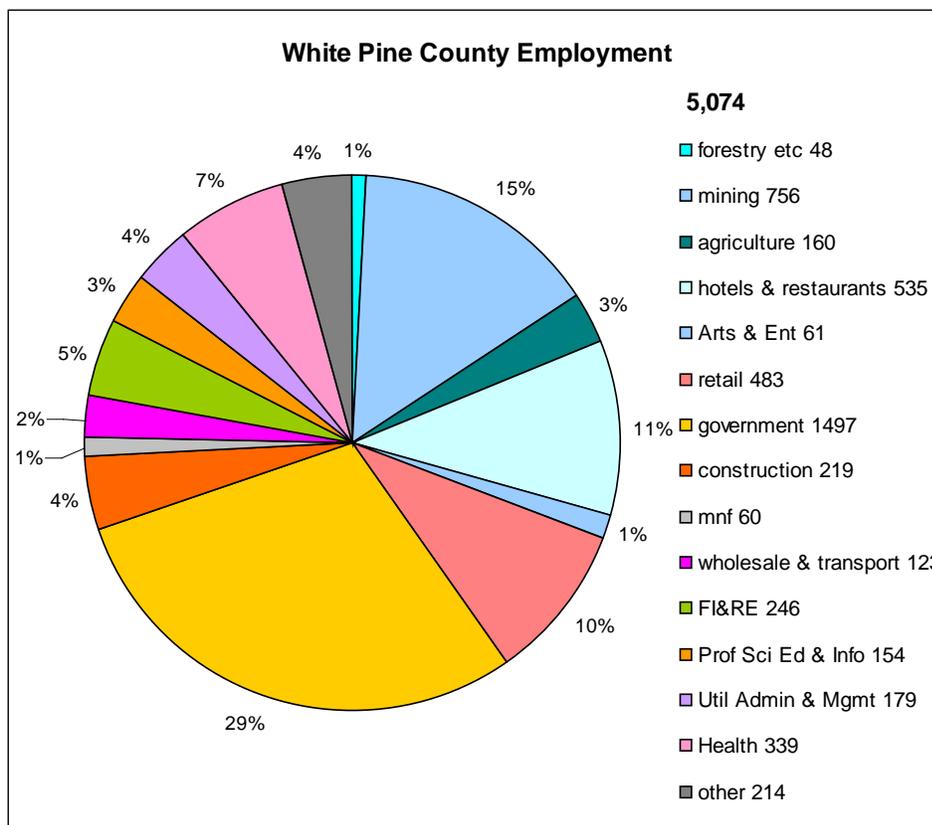


Figure 2. White Pine County employment by sector, 2009

Data Sources (reconciled by authors & used to estimate non-disclosed counts)

Bureau of Economic Analysis, 2009 Total Employment by NAICS Sector, Table CA25N

<http://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=5>

2008 County Business Patterns <http://censtats.census.gov/cgi-bin/cbpnaic/cbpsect.pl>

2008 Non-Employer Statistics <http://censtats.census.gov/cgi-bin/nonemployer/nonsect.pl>

2007 Census of Agriculture http://quickstats.nass.usda.gov/?source_desc=CENSUS

19% of the jobs, which is more than a quarter of White Pine County's *private sector* employment (27%, not shown) depends directly on water in the County. The sectors that would not be there without the local water are mining, ranching and farming, forestry and hunting sectors. Clearly associated with these are the tourism and recreation activities in the county such as hotels, restaurants, and the retail activity that accommodates the hunters and tourists in the area. Without the employment in all those sectors (57% of the *private* economy, not shown), it is possible that there would *be virtually no economic activity at all* in the county. The loss of that large a percentage of the economic base or activity in the county could well pass a tipping point that would undermine the viability of any other economic activity.

The proposed water withdrawals would directly displace 1,503 working people and farmers, and 1,173 people from linked sectors, according to the 1.78 employment multiplier estimated by Harris and Wright (2004). The estimated total employment impact would be 2,676 jobs lost in the county. If the displaced workers stay in the county, the proposed water withdrawals would **raise White Pine County's unemployment rate to 53%** from 8% (April 2011 county unemployment levels and rate source: NV DETR).

2.b. Lincoln County contains 10,633 square miles of land area, and 6.8 million acres. According to the 2010 Census, the population of Lincoln County was 5,345. Its growth rate of 28.3% since the year 2000 was much faster than the U.S.-wide 9.7% decennial rate of population growth. There are 1,480 households and 2,300 housing units in the County.

According to the most recent (2009) data there are about 2,172 people working in Lincoln County, of which 131 people are in the public sector, on agricultural operations, or in about 409 private firms as sole proprietors or employees in about 377 establishments (see Table 3 for data sources.) The State of Nevada Department of Agriculture reported that in 2008 there were 98 ranches or farms in Lincoln County raising 16,000 head of cattle, 800 sheep; and 12,000 acres of alfalfa hay yielding 63,000 tons (Nevada Agricultural Statistics, 2009; http://www.nass.usda.gov/Statistics_by_State/Nevada/Publications/Annual_Statistical_Bulletin/Bulletin_Complete_with_Cover_09.pdf).

Figure 3 presents the most recent data on employment by sector in Lincoln County, compiled using all four data sources, and reconciled to total the BEA’s 2009 official total employment count. Ten percent, or about 13% of the county’s employment in *private* sectors (not shown), depends directly on the water remaining in the county. The sectors that would not be there without the local water are mining, ranching and farming, forestry, hunting and recreation. Indirectly, all sectors, but especially the hotels, restaurants, and retail activity are dependent on the water without which there would not be recreational users, farmers, or ranchers in the area.

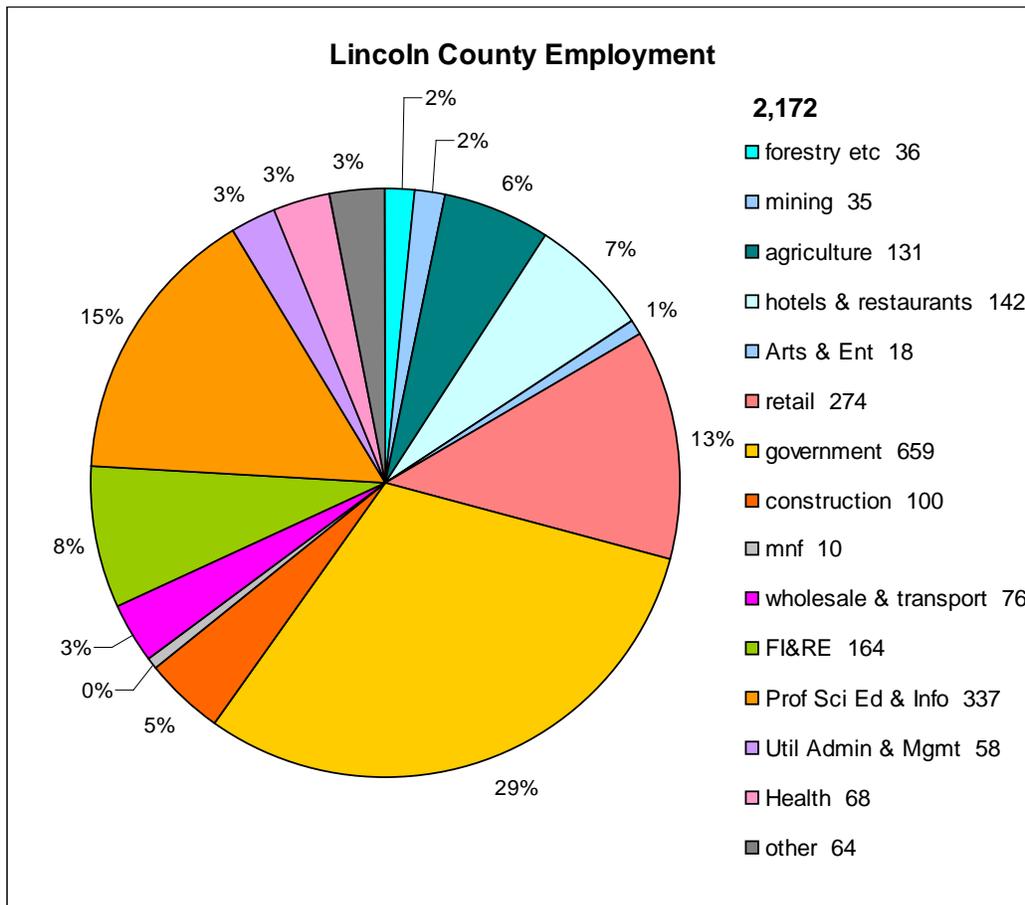


Figure 3. Lincoln County Employment by sector, 2009.

Data Sources (reconciled by authors & used to estimate non-disclosed counts)

Table 3 data sources, continued:

Bureau of Economic Analysis, 2009 Total Employment by NAICS Sector, Table CA25N

<http://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrnd=5>

2008 County Business Patterns <http://censtats.census.gov/cgi-bin/cbpnaic/cbpsect.pl>

2008 Non-Employer Statistics <http://censtats.census.gov/cgi-bin/nonemployer/nonsect.pl>

2007 Census of Agriculture http://quickstats.nass.usda.gov/?source_desc=CENSUS

The proposed water withdrawals would directly displace 419 people from their jobs in agriculture and hunting and recreation sectors, 327 people from jobs in linked sectors, to total an estimated loss of 746 jobs. **A deterioration of employment of that magnitude would raise Lincoln County's unemployment rate to 46%** from the current rate of 12% (current unemployment data source: NV DETR).

3. Economic Use Values

3.a. Agriculture

As noted above, of the five types of economic values of water-based ecosystem services, the first type is measured by the income from their use. The second is measured by the indirect inter-industry multiplier linkages that arise when the businesses serving the using industries buy other inputs and pay local employees. Agriculture-- alfalfa cropland and ranching --are the first of the water using industries we analyze. Table 2 summarizes the latest data about agriculture in the two counties.

**Table 2. Census of Agriculture
Lincoln and White Pine Counties**

	White Pine Co.	Lincoln Co.	units
Total Land Area	5,680,349	6,804,896	acres
Pasture Land	167,266	21,877	acres
Area In Farm Operations	113,147	44,648	acres
Irrigated	30,877	18,320	acres
Cropland	23,756	17,903	acres
Ag Woodland	1,551	368	acres
Total Commodity Sales	\$15,172,000	\$15,339,000	dollars
Total Animal Sales	\$10,836,000	\$7,649,000	dollars
Avg. Net Cash Farm Income	\$32,131	\$21,063	dollars/op
Hired Labor	193	120	workers
Ag Operations	97	98	operations

Source: USDA National Agricultural Statistics Service (NASS) http://quickstats.nass.usda.gov/?source_desc=CENSUS
tabulated by author

The most recent economic impact analysis by Harris and Wright (2004) estimates the dependence of the local non-farm economy on agricultural in White Pine County. The non-farm economy includes sectors that are directly related to farming such as farm and ranch supply

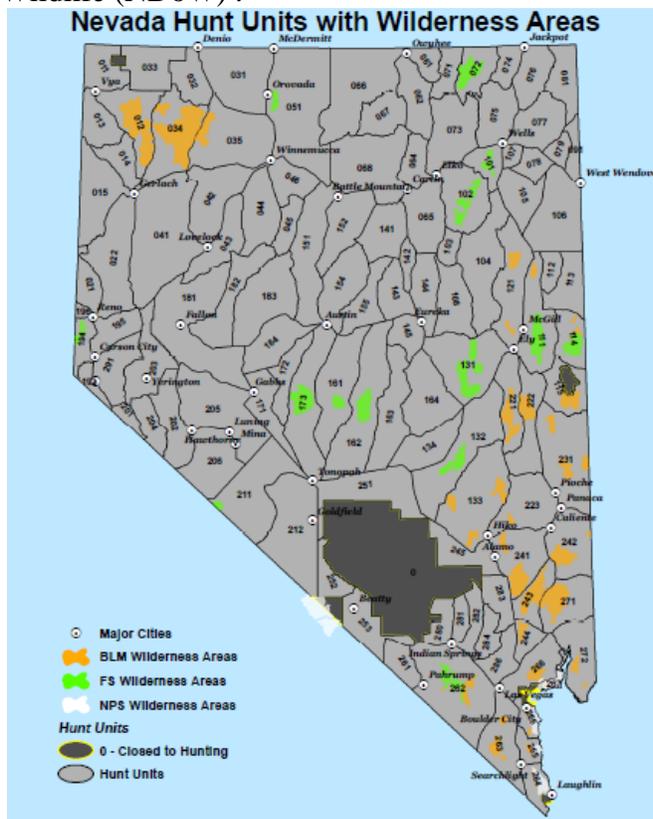
stores, implement dealers, fuel stations, feed, seed, fertilizer, vehicle repair, banks, and marketing services. It also includes sectoral activity that is indirectly related such as grocery markets and retail stores. Harris and Wright (2004) estimated that every dollar \$1.00 of agricultural output supports \$1.73 of total economic output. This is a very reasonable *output multiplier* of 1.73. Harris and Wright also estimated that every agricultural sector job is associated with 1.78 total jobs. This is a very reasonable employment multiplier of 1.78.

The data in Table 2 indicates total direct value of \$30 million in the two counties' agricultural sectors. Given the two multipliers noted above, the estimated impact of the closure of the farms and ranches associated with the SNWA's acquisition of the water rights in the two counties is calculated. **The estimated impact of the contraction in agricultural activity is a \$53 million dollar reduction in total economic output and 518 jobs lost from the two counties together.**

The local farm and ranch sector is expected to contract completely even if SNWA manages an operation with the same total head of livestock, because a single operation of that scale would purchase all inputs from suitably large suppliers located outside the local area.

3.b. Economic Use Values and Total Impacts from Hunting and Fishing

The four basins are home to deer, elk, native bighorn sheep, and antelope, that attract hunters from within Nevada and out of state, whose numbers are recorded by the Nevada Department of Wildlife (NDoW).



Source: NDoW http://ndow.org/hunt/maps/hunt_unit_wilderness.pdf

The basins are also home to waterfowl and upland game birds that attract upland game bird and waterfowl hunters. Although no lakes or reservoirs are developed for sport fishing, the Nevada Department of Wildlife (NDoW) lists twenty fishable streams in Spring Valley alone, and it reported fishing activity on Cleve and Kalamazoo Creeks.

Table 3 summarizes NDoW’s estimates of the big game populations in the eight hunt units in the four basins in 2010. Notably, Spring Valley (hunt units 111-112) is home to at least a third of Nevada’s entire elk population.

Table 3. 2010 Big Game populations in the four basins (by hunt unit)

		Nevada	hunt units				All basins	% NV
			111-113	114-115	221-223	241+		
Mule Deer	Table 22	107,000	5,200	2,200	4,900	750	13,050	12%
Elk	Table 23	12,300	4100			500	4,600	37%
Bighorn Sheep	Table 27	7690		90	40	250	380	5%
Pronghorn Antelope	Table 24	26,000	1500	400		290	2,190	8%

Source: Nevada DoW 2010-2011 Big Game Status Book: Appendix: Harvest, Survey, and Population Tables as indicated; 2010 estimates. Tabulated by author.

Table 4 summarizes NDoW’s reports about the amounts hunters pay to acquire the rights to hunt each species in the basins. All big game hunting in Nevada requires both a license and a tag for the specific hunt and hunt area. The hunters depend on the big game and the big game depend on the guzzlers at which they drink the water in the basins.

Table 4. 2009 Tag Receipts For hunting in the four basins

	All Tag purchases	Residents only	% out of state
Deer	\$77,160	\$40,020	48%
Elk	\$235,920	\$161,520	32%
Bighorn Sheep	\$600	\$600	0%
Pronghorn Antelope	\$16,440	\$11,640	29%
total	\$330,120	\$213,780	35%

Source: Nevada DoW, Hunt Units 111-115, 221-223, 241; tabulated by author

<http://www.ndow.org/hunt/resources/odds/>

According to the Nevada Department of Wildlife 2009 Nevada Hunter Information Sheet for big game hunting in Spring, Cave, Dry Lake and Delamar Valleys, hunting service providers are in the city of Ely in White Pine County. They also note that limited services can be found on Hwy. 93 at the Schellbourne and Lages Station, on SR 318 at Lund and Preston, and just off Hwy. 50 in Baker or at The Border Inn on the NV/UT state line. Public camping areas exist at Cave Lake State Park, at Timber Creek and East Creek on Forest Service lands in Duck Creek Basin of Unit 111, at Baker Creek and Lehman Creek on National Park lands in Unit 115, and at Cleve Creek in Unit 111 on BLM land. Primitive camping is allowed throughout the basins on both BLM and USFS lands.

Rajala (2006) estimated the direct impact of hunting and angling as a function of the number of hunter or angler days reported, times the conservative estimate of \$70 dollars spending per hunter or angler day. Table 5 below summarizes the hunting and angling days in Spring Valley or White Pine County as documented by Rajala (2006). Furthermore, it presents the estimated county-wide direct and total economic impact assuming an output multiplier of 1.6 (Harris, et al, 1994). The **total market economic impact of hunting in the basins was estimated to be \$7.9 million annually.**

Table 5. 2005 Hunter & Angler Days and Economic Impact in the 4 Basins

	Hunter days	Spending @\$70/hunter day
Mule Deer	6,351	\$444,570
Elk	11,395	\$797,650
Pronghorn Antelope	114	\$7,980
Small game and fowl	1,484	\$103,880
Angling	51,107	\$3,577,490
Total	70,451	\$4,931,570
<i>Economic Impact</i>		\$ 7,890,512

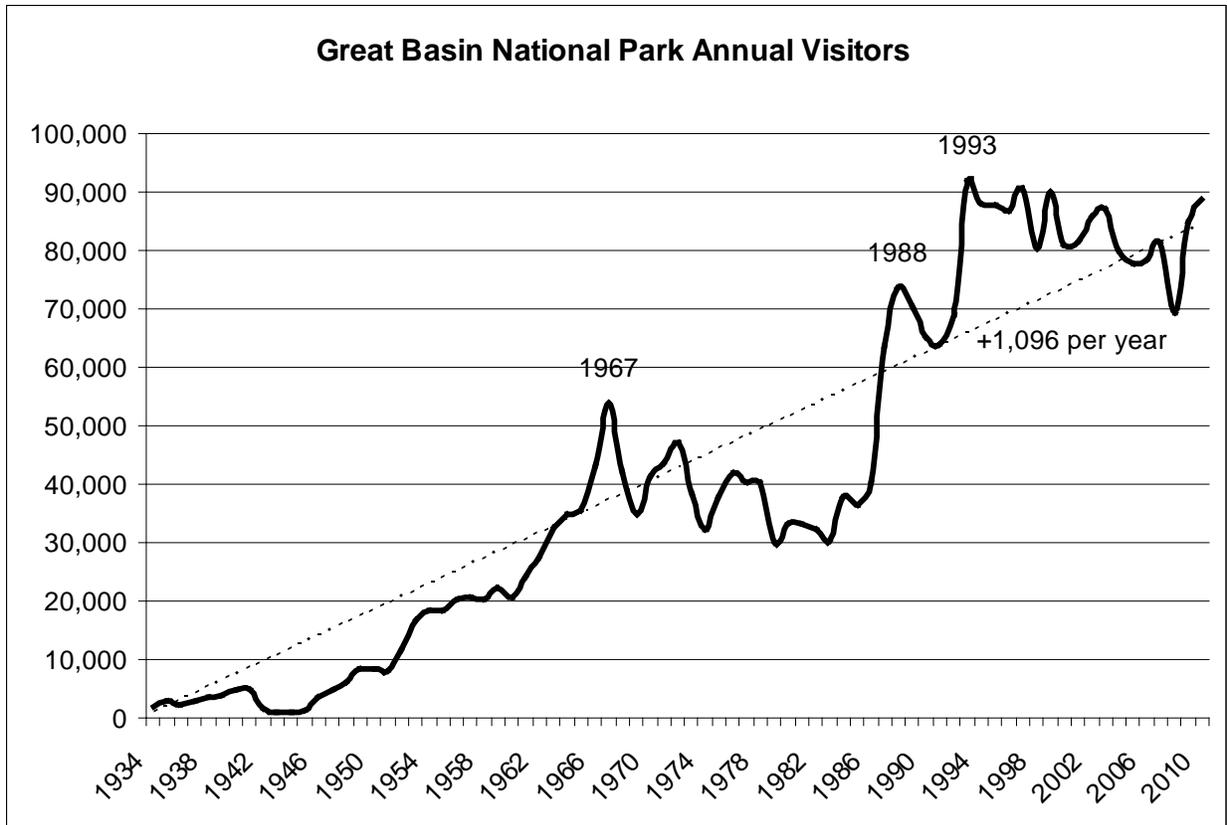
Sources: Rajala (2006), Harris, et al (1994), tabulated by author

3.c. Economic Use Values: Park Visitation

The mountains, foothills, and creeks in the four basins provide opportunities for not just hunting and fishing, but many other year round outdoor recreation activities such as hiking, biking, backpacking, camping, cross country skiing, pine nut gathering, sight seeing and photography, and rock hounding, for example.

Primitive camping is also allowed throughout the basins on both BLM and USFS lands. The right to sleep under the stars and to cook over a real campfire has become very rare. This area is one of the few left in the country where it is still allowed. Because entry, use, and camp site permits are not required there, much of the recreational use is not documented. Therefore this section can report the values of just the portion of visits that are documented. According to the 2006 testimony by Rajala, to measure the economic impact of park visitors, one first estimates the *party visitor days* from data on the number of visitations and the conservative average rate of \$70 local spending per party visitor day.

Great Basin National Park is located in White Pine County surrounding Mt. Wheeler in the Snake Range. Its western slope is in Spring Valley. According to the National Park Service there were 88,870 visitors to the Great Basin National Park in 2010 (figure below). At the visitor day:*party visitor day* conversion rate implicit in Rajala (2006), that amounts to 55,633 *party visitor days*. At \$70 spending per *party visitor day* this indicates \$3.89 million in recreational visitor related economic activity in the area.



Source: National Park Service, Public Use Statistics, Great Basin National Park Annual Visitation <http://www.nature.nps.gov/stats/park.cfm?parkid=382>, chart by author.

Furthermore, according to Harris, et al (1994) 1.59 is the output multiplier for the Amusement and Recreation Sector in White Pine County, as calculated by the IMPLAN model (Minnesota IMPLAN Group, 2000). This indicates that each dollar spent on recreation and amusement is associated with another \$0.59 dollars in the rest of the White Pine County economy. Thus, the **total annual economic impact** of the \$3.89 million spent by the 88,870 **annual park visitors** is estimated to be **\$6.2 million**.

Spring Valley is bordered by the Schell Creek Range on the west. However, according to Rajala (2006), The Bureau of Land Management maintains a campground at Cleve Creek and the U.S. Forest Service maintains a trail register at the Big Canyon Trailhead in the Mt. Moriah Wilderness Area. The Bureau of Land Management reported 65,900 visitors at Cleve Creek between October 1, 2004 and September 30, 2005 and the U.S. Forest Service reports that they have 100 people register at Mt. Moriah Wilderness Area each year (Rajala, 2006). These counts amount to 40,920 party visitor days at the conversion rate implicit in Rajala (2006). This leads to \$2.86 million in expenditures at \$70 per party visitor day, **and a total of \$4.55 million annual economic impact from the measured recreational uses of Spring Valley** alone.

4. Non-Market Values

This section presents the estimated *non-market* values associated directly with the water in the basins that would be lost if the water is withdrawn. Non-market valuation is “*The measurement and translation, into dollars, of the economic values society derives from environmental amenities and natural resources other than those that can be directly sold and bought in existing markets.*” Page 2, Moeltner, 2006. See Loomis and Walsh (1997) for a general reference that explains the non-market valuation of outdoor recreation and existence values of natural amenities.

4.a. Habitat and Species Diversity

Distinguishing features of Spring Valley include its high elevation (5500 – 6000 feet) and its relatively abundant surface water, arising from over 100 natural springs (Charlet, 2006). These springs, together with snowmelt retained by a hardpan soil layer (Lanner, 2006) support numerous wetlands throughout Spring Valley. At stake is not only our opportunity to look at the water in streams, ponds, lakes, and swamps; or to fish in the waters in the valleys. The valleys are also habitats that support critical and valuable species diversity.

Destruction of the habitat of protected species is prohibited by law. “Section 9 of the Federal ESA of 1973, as amended and Federal regulations prohibit the take of fish and wildlife species listed as endangered or threatened (16 U.S.C. 1538). The term “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (16 U.S.C. 1532). **Harm includes significant habitat modification or degradation** that actually kills or injures listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, and sheltering [50 CFR 17.3(c)];” (Emphasis added) Federal Register / Vol. 73, No. 178 / Friday, September 12, 2008 / Notices; http://www.fws.gov/nevada/highlights/comment/csi/091208_csi_fed_reg.pdf

The table below lists the protected species that would be harmed by the withdrawals of water from the four basins. The map below shows the geographic distribution of the Greater Sage-Grouse (bird) that is currently a candidate for federal endangered species protection. It has habitat in three of the four basins (Spring, Cave, and Dry Lake).

LINCOLN COUNTY

Birds

C	Greater sage-grouse	<i>Centrocercus urophasianus</i>
E	Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>
C	Yellow-billed cuckoo (Western U.S. Distinct Population Segment)	<i>Coccyzus americanus</i>

Fishes

T	Big Spring spinedace ●	<i>Lepidomeda mollispinis pratensis</i>
E	Hiko White River springfish ●	<i>Crenichthys baileyi grandis</i>
E	Pahranagat roundtail chub	<i>Gila robusta jordani</i>
E	White River springfish ●	<i>Crenichthys baileyi baileyi</i>

Plants

- C Las Vegas Buckwheat *Eriogonum corymbosum* var . *nilesii*
- T Ute lady's tresses *Spiranthes diluvialis*

Reptile

- T Desert tortoise (Mojave population) • *Gopherus agassizii*

WHITE PINE COUNTY

Birds

- C Greater sage-grouse *Centrocercus urophasianus*

Fishes

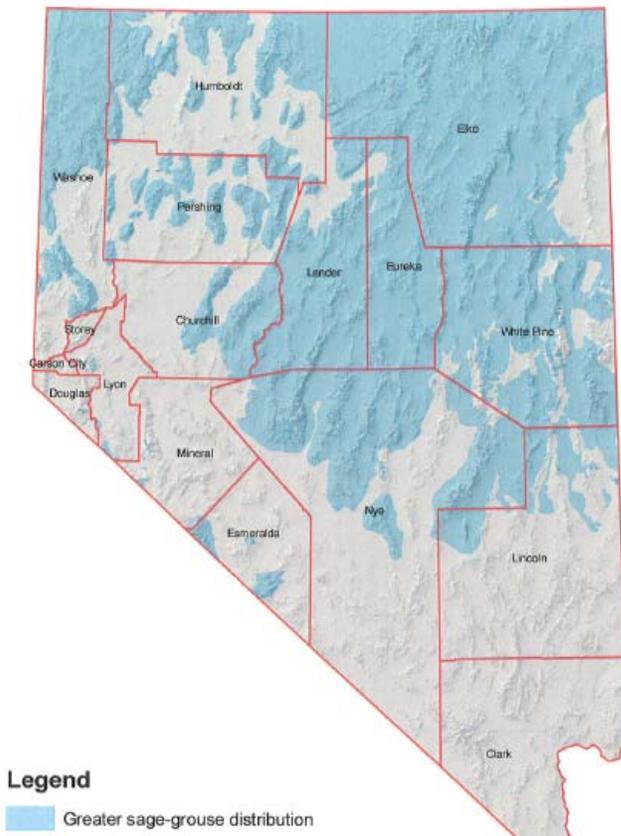
- E Pahrump poolfish *Empetrichthys latos*
- E White River spinedace *Lepidomeda albivallis*

E = Endangered T = Threatened C = Candidate
 Δ = Proposed for delisting • = Designated Critical Habitat in County * = Believed extirpated from Nevada

+ = Endangered only in the Virgin River, Muddy River population is a sensitive species.

Last updated: March 17, 2011

Source: U.S. Fish and Wildlife Service, Nevada Fish and Wildlife Office, http://www.fws.gov/nevada/protected_species/species_by_county.html



Source: Source: U.S. Fish and Wildlife Service, Nevada Fish and Wildlife Office, http://www.fws.gov/nevada/nv_species/documents/sage_grouse/NV_ssage-grouse_distribution_030510.pdf

4.b. Non-market Use Values

While endangered species are protected from being ‘used up’ by law, rational people do not ‘use up’ water and other natural amenities or wildlife either, because we value those resources. As noted in the beginning of this report, the fourth type of environmental economic value is the value that people who visit the areas derive from experiencing the natural amenities. These values are difficult to measure if no dollar outlay is required to use or directly experience them. Currently, no fees are charged for either day use or overnight stays in the recreation areas in the valleys. Lacking a market expenditure measure of value, the ideal non-market valuation technique entails directly surveying users’ with respect to their willingness-to-pay to enjoy the natural area. In the absence of a direct survey, the non-market valuation technique known as *Benefit Transfer* was employed by Moeltner (2006) regarding Spring Valley.

The "Benefit Transfer" (BT) technique has been widely embraced by government agencies such as the EPA (U.S. EPA, 2000, U.S. EPA, 2005). For a description of the technique and applications of Benefit Transfer, see Rosenberger and Loomis (2003) and Moeltner et al. (2007).

As noted earlier, Spring Valley has relatively abundant surface water provided by over 100 natural springs and numerous wetlands (Charlet, 2006; Lanner, 2006). Moeltner (2006) used a version of the BT technique to evaluate the non-market use value of two recreation areas with camping facilities located in or near Spring Valley: Cleve Creek (CCCG) and Sacramento Pass (SPRA). In that report he also used BT to evaluate the non-market existence value of the two specific wetland areas in Spring Valley: (i) the Swamp Cedar Natural Area (SCNA), and (ii) the Shoshone Ponds Natural Area (SPNA), which will be summarized in section 4.c.

Moeltner’s (2006) evaluation of the status quo use value benefits focused on the two recreation areas with camping facilities in the Spring Valley area: Cleve Creek and Sacramento Pass. Both are administered by the BLM. The Cleve Creek Campground (CCCG) is located at the western edge of Spring Valley on the East side of the Shell Creek Range approximately 45 miles east of Ely, and five air miles northwest of the Swamp Cedar Natural Area. It can be reached via a maintained dirt road off State Route 893. The camping area includes eight designated sites. It features a picnic area, toilets, and garbage facilities. Most sites are situated along Cleve Creek, a year-round stream that offers some fishing opportunities. The area also affords access to hiking trails and hunting opportunities. The campground is open year-round. Moeltner reported that according to the Ely BLM office, Cleve Creek received 5723 visitation days in the first nine months of 2006.

The Sacramento Pass Recreation Area (SPRA) is located off Highway 6-50, approximately 50 miles east of Ely, and five air miles east of the Swamp Cedar Natural Area. The area features shaded picnic facilities, toilets, and a fishing pond. It allows for dispersed camping in undesignated sites. It is open year-round and can also be used free-of-charge. Moeltner (2006) reported that the Ely BLM office recorded 11,503 visitation days during the first 9.5 months of 2006.

Moeltner (2006) relied on an existing BT study valuing outdoor recreation per visitation day by Rosenberger and Loomis (2001) to estimate the economic value of these two areas. His per visitation day use-value estimate is \$42. Rounding up the visitation counts slightly to 6,000 and

12,000 respectively, because the counts ended in mid October, he estimated that the **sum non-market use values for the CCCG and SPRA areas together is \$756,000 per year.**

4.c Existence (Non-Use) Value

The fifth type of environmental economic value is the existence (or non-use) value that people anywhere-- even people who never visit or use the environment in the area-- place on the existence of it. Moeltner (2006) evaluated the non-market values of the two wetland areas in Spring Valley: (i) the Swamp Cedar Natural Area (SCNA), and (ii) the Shoshone Ponds Natural Area (SPNA). He employed a state-of-the-art meta-regression Benefit Transfer approach (see also Moeltner and Woodward, 2009).

The Swamp Cedar Natural Area (SCNA) is a marshy ecosystem with natural ponds and meadows in Spring Valley that is approximately 23 air miles east of the town of Ely, NV. It contains 3200 acres of public land administered by the Bureau of Land Management. The SCNA area supports a large stand of Rocky Mountain Junipers (*Juniperus scopulorum*), commonly referred to as "Swamp Cedars." The Spring Valley Cedars merit recognition as their own unique variety (Lanner, 2006). The SCNA can be reached via dirt roads branching from Highway 50. It offers recreational opportunities for hiking, primitive camping, nature and wildlife viewing (BLM, 1980).

The Shoshone Pond Natural Area (SPNA) contains 1240 acres of public land managed by the BLM. It features two important natural resources: (i) a second stand of "Swamp Cedars" of the same ecotypical variety as those found in the SCNA, and (ii) three manmade, spring-fed pools and a stockpond that harbor two rare species of fish, the Relict Dace (*Relictus solitarius*) and the Pahrump poolfish (*Empetrichthys latos*). The Relict Dace is listed by the Nevada Natural Heritage database as "imperiled and vulnerable in Nevada and globally", while the Pahrump poolfish, for which the Shoshone ponds constitute one of only three remaining habitats, has been federally listed as an endangered species since 1969. The SPNA has a designated access road off of Highway 93. The SPNA also offers recreational opportunities for hiking, primitive camping, nature and wildlife viewing (BLM, 1980(b)).

The value of the two wetlands is estimated by associating the dollar non-use values reported by people about the features of other wetland areas to the features of the two wetlands in question. The *willingness to pay* (WTP) for the benefits associated with each feature of other wetland areas is 'transferred.' In particular, survey respondents contacted by other researchers about other similar areas were asked what they would be willing to pay into a nature conservation fund or as additional taxes to preserve other, similar, wetlands. The reported values reflect the value of the entire bundle of wetland services, including habitat and biodiversity provision, flood control, water filtration, and opportunities for non-consumptive uses (wildlife viewing, hiking, photography) and consumptive uses (hunting, fishing) recreational activities, as well as pure existence (non-use) values. The share of users that had visited the wetland under consideration in each survey, however, was very small. Therefore, Moeltner emphasized that the "lion's share of estimated economic benefits (i.e. reported WTP) is likely associated with non-use or existence values." (Moeltner, 2006; page 7). A summary of his findings are in Table 7.

Table 7. Non-Market Value of the SCNA and SPNA

concept	measure	data	Estimated average Willingness to Pay	Estimated Total Annual Value
Number of potential stakeholders (users and non-users)	Total # of households in Nevada and Utah (2000 Census)	1,452,446	\$1.35 per household per year	\$1,966,122
Ability to pay	Median HH Income in 2003 (expressed in 2006 dollars)	50,549		
Proportion of users	Estimated % of households who actually visit Spring Valley per year	1		
Source: adapted from Moeltner, 2006, Table 4; tabulated by author.				

In sum, conservatively estimating the stakeholding public by the number of households in just the two states of Nevada and Utah, **the estimated non-market value of the two wetlands together is more than \$2 million annually.** It must be emphasized that people who hate wetlands as well as people who are indifferent about the existence of wetlands are ‘stakeholders’ or potential beneficiaries. The total value estimates do not presume that every household has a positive value for wetlands. Some value wetlands much more than average. Others consider wetlands a net social cost. More people consider them a benefit. The average estimated WTP in Table 7 is the scientifically estimated average of the valuation by people with all types of preferences.

Finally, Moeltner also estimated the cumulative discounted present value of the annual WTP estimate to a 70-year time horizon. This time span reflects the amortization period for the proposed groundwater transfer projected by the Southern Nevada Water Authority (SNWA). He chose a rate of 2% for this application, as recommended by the U.S. Congressional Budget Office (CBO) for policies that have long-term social implications. It is considered the "Social Rate of Time Preference", i.e. the rate that best reflects society's collective preferences for trade-offs between present and future generations' consumption. The estimated **70 year horizon cumulative discounted present value of the wetlands status quo (no withdrawals) is \$74 million.**

5. Conclusion

The existing measures of the economic impact of the proposed water withdrawals from the four basins summarized in this report show that the proposed withdrawals would include:

- 1,503 direct job losses and 1,173 jobs lost in linked sectors, totaling 2,676 lost jobs; raising the unemployment rate to 53% in White Pine County
- 419 direct job losses and 327 jobs lost in linked sectors, totaling 746 lost jobs; raising the unemployment rate to 46% in Lincoln County
- \$42 million annual *direct* loss of market revenues due to the loss of farming, ranching, hunting, and recreation visitors in the areas
- \$29 million annual *indirect*/interindustry losses of market revenues due to the reduction in the demands for other linked sectors' goods or services due to the loss of farming, ranching, hunting, and recreation visitors
- \$2.8 million annual loss in *non-market* values of the ecosystem services, amenity, and existence values
- The sum loss of \$74 million in value annually
- Cumulative loss of \$2.8 billion in present discounted terms over the 70-year planning horizon

These losses are, however, an underestimate of the actual values at risk for many reasons, most notably because many of the non-consumptive uses of the water in the valleys have not been documented, and that the impacts of the loss of water in the downgradient valleys (White River, Pahranaagat, Snake, and other Valleys) have not even been considered.

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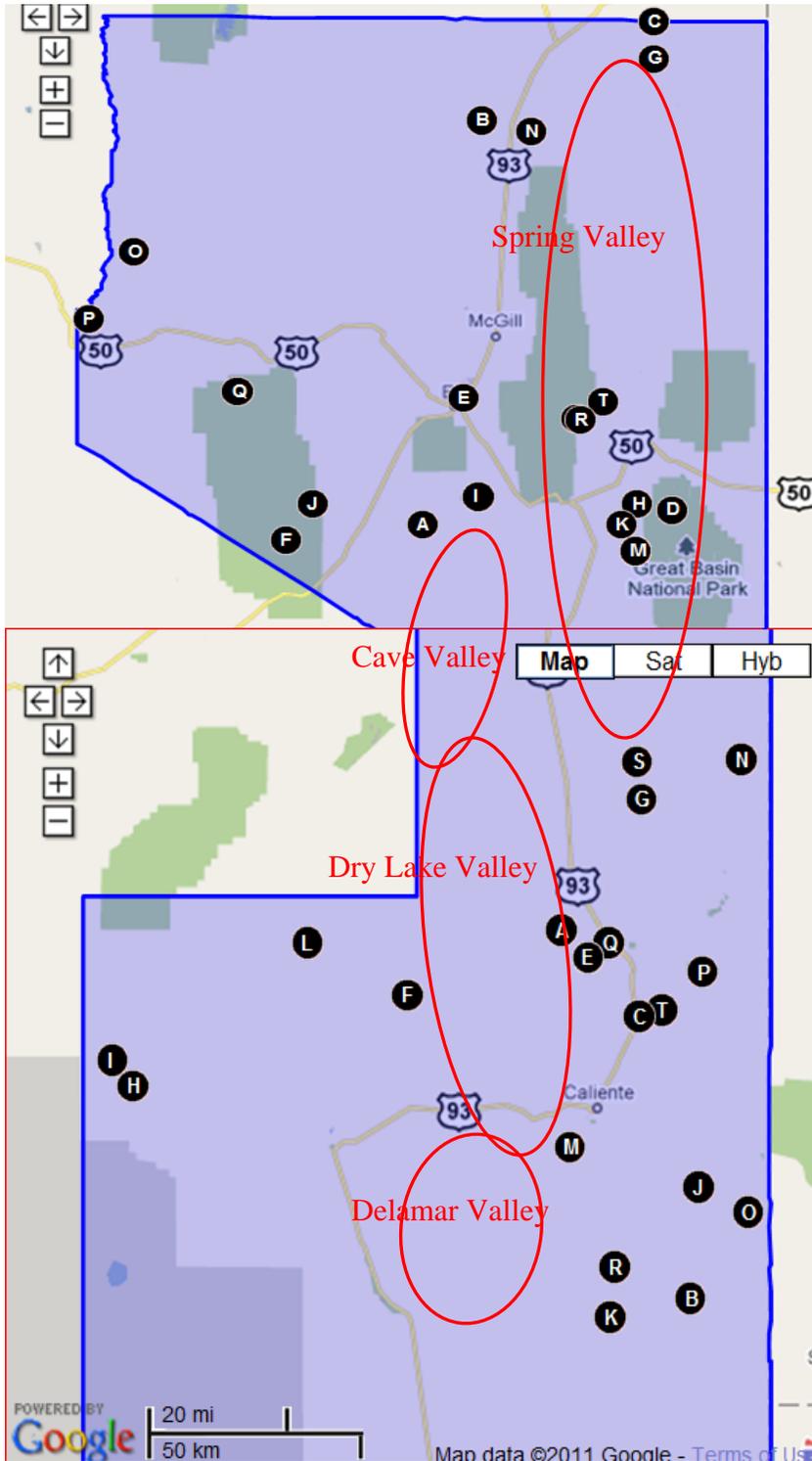
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APPENDIX: Maps of the Counties, Watersheds, Communities, and Relevant Sites

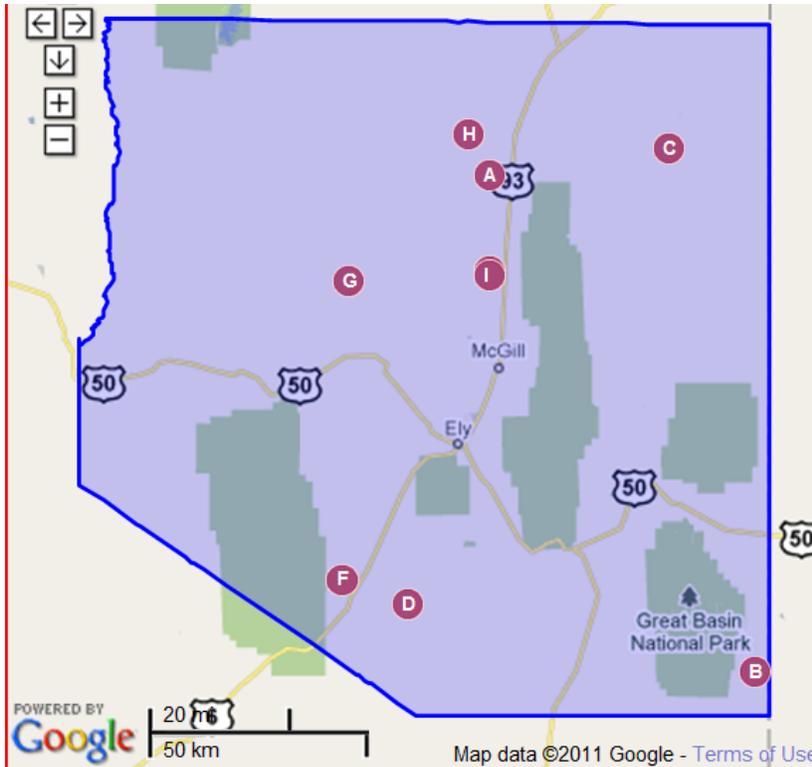


WHITE PINE COUNTY: Water Canyon Holding Corral (A), Cherry Creek Station (B), Western Marble Mining Camp (C), Wheeler Peak Campground (D), White Pine Golf Course (E), White River Campground (F), Chin Creek Ranch (G), Willard Creek Ranch (H), Willow Creek Ranch (I), Willow Grove (J), Yelland Ranch (K), Yelton Ranch (L), Ziege Ranch (M), Zips Cabin (N), Circle Ranch (O), Angelo Belli Cabin (P), Illipah Campground (Q), Cleve Creek Administrative Site (R), Cleve Creek Campground (S under R), Cleveland Ranch (T).

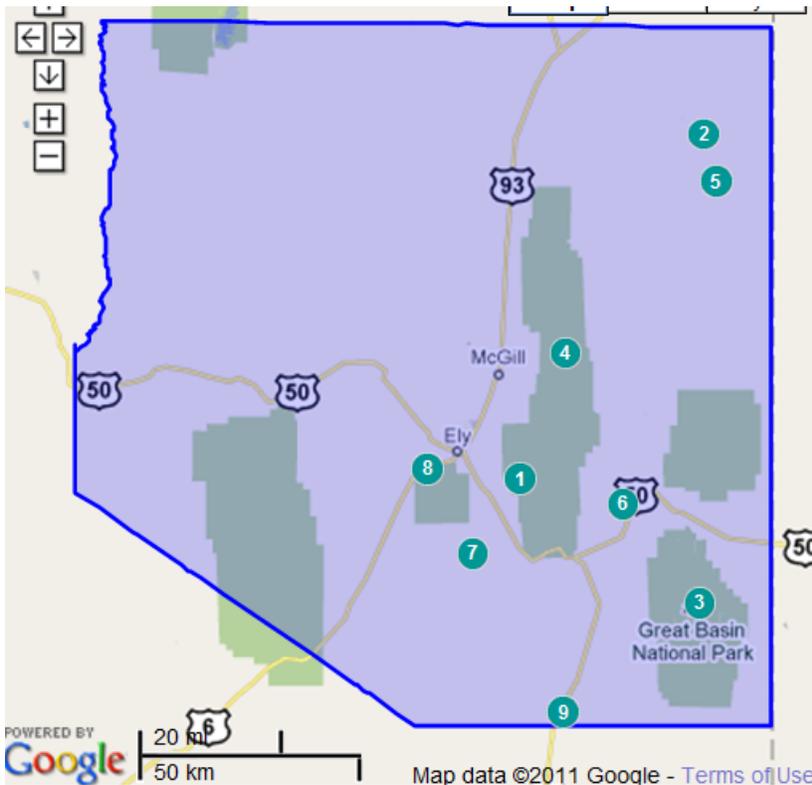
LINCOLN COUNTY: Abbotts Fork (A), West's Camp (B), Chicago Mill (C), Wheeler Mill (D), Wheeler Ranch (E), White River Petroglyphs Archeological Site (F), Wilson Creek VORTAC Station (G), Windmill Number One (H), Windmill Number Two (I), Wood Ranch (J), Cloud (K), Coal Valley Holding Field (L), Coburn Ranch (M), Johnson Ranch (N), Ash Spring Enclosure (O), Flatnose Ranch (P), Atlanta (Q), Kiernan Ranch (R), Cole and Dolan Ranch (S), Landmark Letter (T).

http://www.city-data.com/county/Lincoln_County-NV.html#ixzz1PlaDKLLL

Source: Google Maps



White Pine County streams, rivers, and creeks: Schell Creek (A), Chokecherry Creek (B), Chin Creek (C), Eph Creek (D), Third Creek (E-under I), Ellison Creek (F), Thirtymile Wash (G), Cherry Creek (H) Second Creek (I).



Parks in White Pine County include: Cave Lake State Park (1), Pony Express Historical Monument (2), Great Basin National Park (3), Schell Creek State Game Refuge Number 7 (4), State Game Refuge Number Twelve for Antelope (5), Swamp Cedar Natural Area (6), Ward Charcoal Ovens State Park (7), Ward Mountain Recreation Area (8), North Creek Scenic Area (9).