Appendix F3.5

Vegetation Resources

Contents

Table F3.5-1

Wildfire Frequency and Succession Information for Vegetation Communities Common in the ROW

Table F3.5-1 Wildfire Frequency and Succession Information for Vegetation Communities Common in the ROW

Vegetation Community	Current Fuel Descriptions	Historic Fire Return Interval	Succession Timeframe
Great Basin			
Invaded grasslands and forblands	Invasive and noxious weed species frequently dominate. Annual invasive grasses and forbs, such as red brome and cheatgrass increase the fine fuel load, and alter the fire regime (Brown and Minnich 1986)	2 to 10 years	Two to three years for grasses; early successional perennial plants dominate after few decades. Common postfire species include Mediterranean grass, cheatgrass and red brome.
Pinyon-juniper woodlands	Sparse understory grasses due to high tree densities limit the fine fuel load, and continuity of fuels. Woody fuel loads are widespread, and contain highly flammable resin and pitch	100 to 500 years; Understory fires burn more frequently.	300 years. Twenty five years or so grasses and forbs dominate, than shrubs increase, leading to the dominance of trees species (Miller and Heyerdahl 2008).
Semi-desert grasslands/shrub steppe	Fuel loads vary depending on site conditions. Native grass distribution keeps fuel loads low, except where invasive annual grasses dominate. Increased precipitation can increase fuel loads.	10 years	Two to three years for grasses. Due to increased spread of invasive species, common postfire species include cheatgrass and red brome. Native perennial grasses well adapted to fire, regenerate easily. Bunch grass species and needle grasses are vulnerable to fire. For areas with a shrub component, long lived, non-sprouting shrubs such as blackbrush (*Coleogyne ramosissima*), big sagebrush, and Wyoming sagebrush may take centuries to recolonize areas (Abella and Newton 2009), while sprouting shrubs such as rabbitbrush may recolonize quickly.
Sagebrush Shrubland/ Steppe	Fuel loads vary substantially depending on site condition and history. Increased precipitation can increase fine fuel loads.	Varies depending on shrub community. Wyoming big sagebrush 90 to 140 years; Basin big sagebrush 12 to 25 years.	Areas dominated by black sagebrush, big sagebrush, Wyoming sagebrush, and bunchgrasses will take longer to recover if at all. Greasewood will frequently resprout, while shadscale saltbush, winterfat, and fourwing saltbush will are moderate sprouters and will occasionally resprout following fire (BLM 2005). Timeline: 50+years.
Woodland and Shrubland	Fuel loads are variable, depending on site conditions such as accumulations of down and dead woody fuels, and fuel continuity of vertical and horizontal gradients.	100 to 500 years (Depends on age of stands, younger stands burn more frequently).	Dependent on fire intensity and spread.

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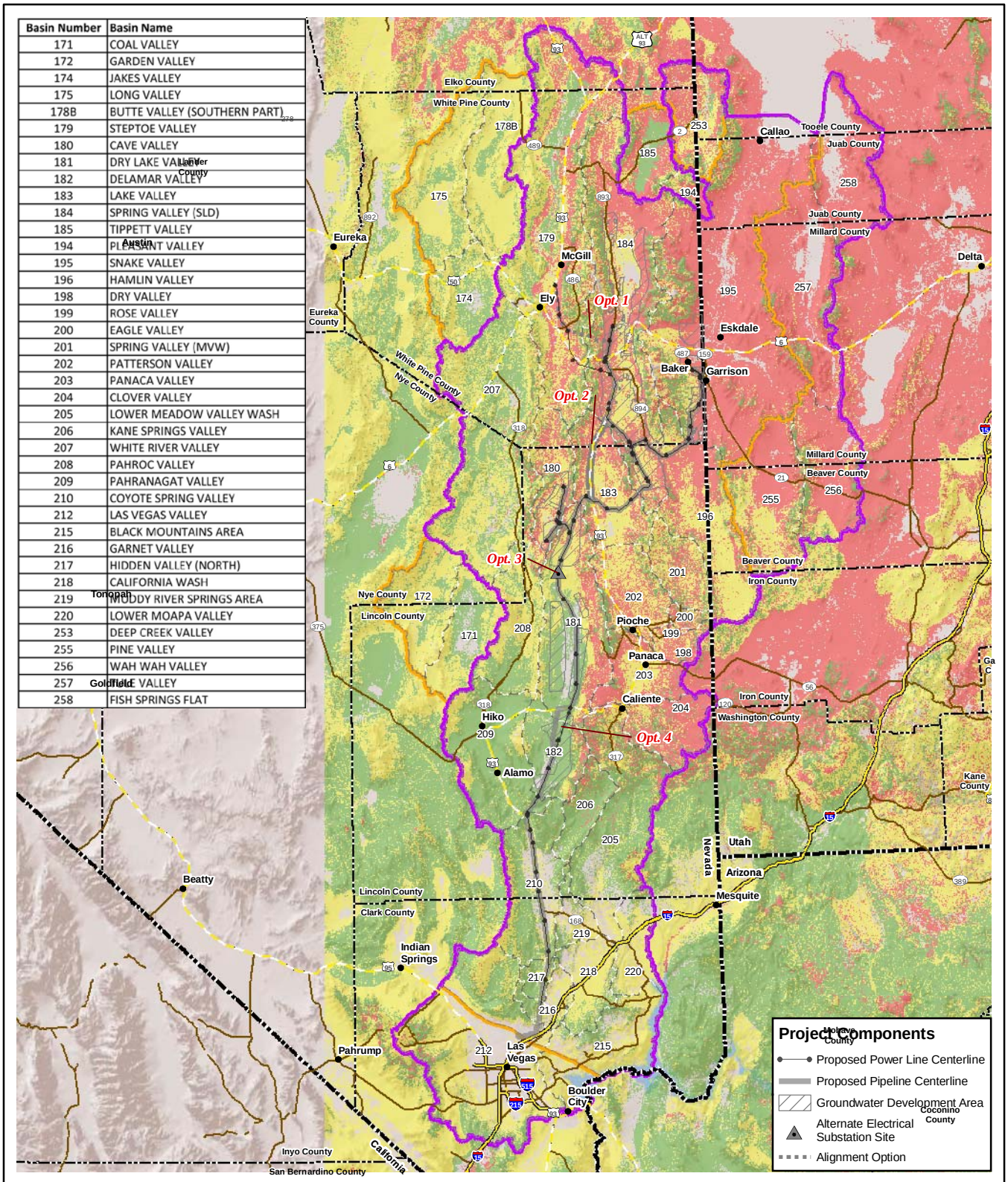
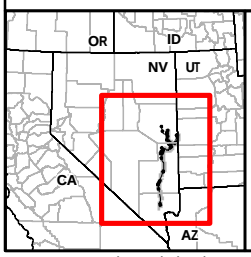
Mixed Salt Desert Scrub	Fuel loads generally are low.	1,000 years.	Two to three years for grasses; followed by early successional perennial plants and sprouting shrub species. Long lived, non-sprouting shrubs may take decades to recolonize areas (Abella and Newton 2009), Species such as spiny hopsage (*Grayia spinosa*) might not return at all (Abella and Newton 2009). Winterfat mortality is dependent on fire intensity, from fires, recovery is slow even for survivors, taking 9+ years (Parmenter 2008). Shadscale, fourwing saltbush will are moderate sprouters and will occasionally resprout following fire. Timeline: 100-200+ years.
Greasewood Flat	Variable.	Variable. Dependent on adjacent communities.	Greasewood will frequently resprout following fires. Timeline 10-50 years
Mojave Desert			
Mixed Desert Scrub, and Mixed Salt Desert Scrub.	Fuel loads generally are low, especially in areas where blackbrush is present. Typically fuel loading is low due to limited understory. High moisture years can produce greater understory which increases the fuel load.	1000 years (very variable due to soils that range from wet to extremely droughty, and variable annual precipitation amounts).	Two to three years for grasses; early successional perennial plants dominate after few decades. Common postfire species include cheatgrass and red brome. Blackbrush may take centuries to recolonize areas (Abella and Newton 2009). Timeline: 30-90+ years.
Creosotebush-White Bursage Desert Scrub	Fuel loads were historically low, but have increased with the spread of red brome into these areas. Red brome density is determined by precipitation amounts, with high precipitation years increasing red brome densities.	Unknown (Fires were typically infrequent, but with increases in invasive species such as red brome, the fire interval has decreased dramatically.)	Creosote bush (*Larrea tridentata*) has heavy mortality from fires, and does not appear to persist with increased fire frequency (Brown and Minnich 1986, Lovich & Bainbridge 1999). Other desert shrubs may recover, but native desert annuals may be lost due to increased colonization abilities of invasive annuals. (Brooks 2002). Annual seed banks of bromus species can be reduced the first one to four years following the fire, while other annual invasive grass species can increase after fire (Brook 2002). Timeline: Grasses and forbs two to three years, shrubs 100 to + years, if at all (Cave and Patten 1984).
Wetland/riparian areas	Variable.	Variable. Dependent on adjacent communities.	Greasewood, tamarisk, and willow will frequently resprout following fires. Timeline 10-50 years

Figure F3.5-1

Fire Regime Condition Classes in the Project Area

Basin Number	Basin Name
171	COAL VALLEY
172	GARDEN VALLEY
174	JAKES VALLEY
175	LONG VALLEY
178B	BUTTE VALLEY (SOUTHERN PART)
179	STEPTOE VALLEY
180	CAVE VALLEY
181	DRY LAKE VALLEY
182	DELAMAR VALLEY
183	LAKE VALLEY
184	SPRING VALLEY (SLD)
185	TIPPETT VALLEY
194	PLEASANT VALLEY
195	SNAKE VALLEY
196	HAMLIN VALLEY
198	DRY VALLEY
199	ROSE VALLEY
200	EAGLE VALLEY
201	SPRING VALLEY (MVW)
202	PATTERSON VALLEY
203	PANACA VALLEY
204	CLOVER VALLEY
205	LOWER MEADOW VALLEY WASH
206	KANE SPRINGS VALLEY
207	WHITE RIVER VALLEY
208	PAHROC VALLEY
209	PAHRANAGAT VALLEY
210	COYOTE SPRING VALLEY
212	LAS VEGAS VALLEY
215	BLACK MOUNTAINS AREA
216	GARNET VALLEY
217	HIDDEN VALLEY (NORTH)
218	CALIFORNIA WASH
219	MUDDY RIVER SPRINGS AREA
220	LOWER MOAPA VALLEY
253	DEEP CREEK VALLEY
255	PINE VALLEY
256	WAH WAH VALLEY
257	GOLDFIELD VALLEY
258	FISH SPRINGS FLAT





Natural Resources Region of Study
Water Resources Region of Study
Interstate Highway
US Highway
Major Road
State Boundary
County Boundary
Hydrographic Basins

Fire Regime Condition Class

FRCC 1
FRCC 2
FRCC 3

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure F3.5-1

Fire Regime Condition Classes

0 10 20 40 60 Miles
0 15 30 60 Kilometers
1 inch equals 40 miles

N

Fire Regime Condition Class Attributes

Condition Class	Fire Regime	Example Management Options	Examples of Key Ecosystem Component Susceptibility to Changing Fire Regime Condition Classes (Figure F3.5-1)			
			Species composition and structure	Invasion by non-native species	Smoke production hydrology, and Soils	Insects and disease
Condition Class 1	Fire regimes are within the natural (historical) range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition, structure, and pattern) are intact and functioning within the natural (historical) range.	Where appropriate, these areas can be maintained within the natural (historical) fire regime by treatments such as fire use.	Species composition and structure are functioning within their natural (historical) range at both patch and landscape scales.	Non-native species are currently not present or present in limited extent. Through time or following disturbance sites are potential vulnerable to invasion by non-native species.	Functioning within their natural (historical) range.	Insect and disease populations functioning within their natural (historical) range.
Condition Class 2	Fire regimes have been moderately altered from their natural (historical) range. Risk of losing key ecosystem components is moderate. Fire frequencies have departed from natural frequencies by one or more return intervals (either increased or decreased). This result in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation and fuel attributes have been moderately altered from their natural (historical) range.	Where appropriate, these areas may need moderate levels of restoration treatments, such as fire use and hand or mechanical treatments, to be restored to the natural fire regime.	Species composition and structure have been moderately altered from their historical range at patch and landscape scales. For example: Grasslands – Moderate encroachment of shrubs and trees and/or invasive exotic species. Shrublands – Moderate encroachment of trees, increased shrubs, or invasive exotic species. Forestland/Woodland – Moderate increases in density, encroachment of shade tolerant tree species, or moderate loss of shade intolerant tree species caused by fire exclusion, logging, or exotic insects or disease. Replacement of surface shrub/grass with woody fuels and litter.	Populations of non- native invasive species may have increased, thereby increasing the potential risk for these populations to expand following disturbances, such as wildfires.	Have been moderately altered from their natural (historical) range. Water flow typically less. Smoke and soil erosion following fire typically greater.	Insect and disease population have been moderately altered from their natural (historical) range.
Condition Class 3	Fire regimes have been substantially altered from their natural (historical) range. The risk of losing key ecosystem components is high. Fire frequencies have departed from natural frequencies by multiple return intervals. Dramatic changes occur to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been substantially altered from their natural (historical) range.	Where appropriate, these areas may need high levels of restoration treatments, such as hand or mechanical treatments, before fire can be used to restore the natural fire regime.	Species composition and structure have been substantially altered from their historical range at patch and landscape scales. For example: Grasslands – High encroachment and establishment of shrubs, trees, or invasive exotic species. Shrublands – High encroachment and establishment of trees, increased shrubs, or invasive exotic species. Forestland/Woodland High increases in density, encroachment of shade tolerant tree species, or high loss of shade intolerant tree species caused by fire exclusion, logging, or exotic insects or disease.	Invasive species may be common and in some cases the dominant species on the landscape. Any disturbance will likely increase both the dominance and geographic extent of these invasive species.	Have been substantially altered from their historical range.	Insect and disease population have been substantially altered from their natural (historical) range. Typically higher mortality or defoliation.

Weed Species Known to Occur Within the Study Area

Weed Species Known to Occur within the Study Area

Following is a description of the 20 noxious or invasive weeds known to occur within the study area. Each species discussion includes, 1) status; 2) general distribution in world, United States (U.S.) or North America; 3) general habitat; 4) growth form, reproductive options (if not just seed), and flowering period; 5) any details regarding a species propensity to invade wildlands and any specific mechanisms for doing so (if available); and 6) any preferred control measures (if available). Descriptions are alphabetical by scientific name.

Nevada and Utah both classify certain species as Noxious Weeds (NW), although the lists of these species differ somewhat. The Nevada Department of Agriculture has divided noxious weeds found within the state into the following categories:

- Category ”A”: Weeds not found or limited in distribution throughout the state; actively excluded from the state and actively eradicated wherever found; actively eradicated from nursery stock dealer premises; control required by the state in all infestations.
- Category "B": Weeds established in scattered populations in some counties of the state; actively excluded where possible, actively eradicated from nursery stock dealer premises; control required by the state in areas where populations are not well established or previously not known to occur.
- Category "C": Weeds currently established and generally widespread in many counties of the state; actively eradicated from nursery stock dealer premises; abatement at the discretion of the state quarantine officer.

The Utah Weed Control Association (UWCA) has divided its noxious weed list between state noxious weeds which are considered invasive across the state and noxious weeds that are only threats within certain counties.

An invasive weed is a species whose introduction does or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112, 1999). Neither the State of Nevada nor the State of Utah have an official list of invasive weeds.

Russian knapweed (*Acroptilon repens*) is classified as NW (category B) in Nevada and as a state NW in Utah. This perennial has pinkish flowers which bloom from May to September and grows 2 to 3 feet tall. This species reproduces primarily by vegetative shoots from rhizomes. Plants usually produce small quantities of viable seed. This species grows in fields, cultivated sites, orchards, vineyards, roadsides, ditchbanks, and waste places, inhabiting many soil types. Plants exhibit allelopathic effects and are aggressively competitive, facilitating rapid colonization and development of dense stands. Hand pulling of this species provides limited effectiveness. Strategies using biological and chemical control and burning can be effective for this species.

Sahara mustard (Asian mustard) (*Brassica tournefortii*) is listed as NW (category B) in Nevada. This species is distributed throughout the southwest from Texas to California. Sahara mustard is an annual herb that is especially common in areas with wind-blown sediments and disturbed sites such as roadsides and abandoned fields. This species contains dull-yellow flowers which bloom in December or January. It appears to suppress native wildflowers by monopolizing available soil moisture as it builds canopy and matures seed long before many native species have begun to flower (IUCN-WCN 2007). In small areas Sahara mustard can be eradicated by pulling plants before seed becomes mature. In selected areas herbicide treatment may be effective. Sahara mustard tends to be the first annual to germinate after a rain, so early treatment may reduce its abundance and allow later-germinating natives to establish.

Red brome (foxtail brome) (*Bromus rubens*) occurs throughout most western states and is also found in selected eastern states. It is commonly found growing on shallow dry soil or poor textured, clayey soil. It grows on south facing slopes, and is a common constituent in steppe regions. It is common along roadsides, waste places, rangelands, and cultivated fields. Red brome is a dominant species on some rangeland that, previous to the destruction of the vegetation, were abundant in perennial native grasses. This species reproduces by seeds and flowers in April and May. Seeds are able to move in seed grain, feed, and forage. Effective methods of control consist of the physical removal of seeds heads annually or chemical herbicides.

Cheatgrass (*Bromus tectorum*) is a winter annual that is found throughout the U.S. It grows on rangelands, pastures, prairies, fields, waste areas, eroded sites, and roadsides. It exists in many climatic areas but primarily in the 6- to 27-inch precipitation zone. Cheatgrass reproduces by seed that germinates in the fall, over winters as a seedling, then flowers in the spring. Seeds have the potential to remain viable in the seed bank for 2 to 5 years. Many of the ecosystems that cheatgrass has invaded are seriously altered, and no longer support the vegetation of the potential natural community. Manual and chemical control has proven effective while biological control is limited.

Hoary cress (*Cardaria draba*) is classified as NW (category C) in Nevada and is listed as a state NW in Utah. This species occurs throughout the majority of the U.S. with the exception of the southeast. This erect perennial reproduces from seeds or from buds on underground rhizomes. It prefers soils with neutral to alkaline pH and disturbed sites, including excessively grazed areas. It can be found in a variety of non-shaded habitats such as fields, meadows, pastures, open grasslands, waste areas, roadsides, gardens, feed lots, watercourses, along irrigation ditches, and at the edge of riparian habitats. Spreading rapidly, a single plant can eventually form a large colony, producing a dense monoculture that can crowd out native species. In the absence of a competitor, a single plant can spread over an area 12 feet in diameter in 1 year. Control methods include pulling and grubbing which should be done within 10 days of plant emergence and before flowering and seed set. Successful chemical control usually requires repeated applications with foliar herbicides.

Musk thistle (*Carduus nutans*) is classified as NW (category B) in Nevada and as a state NW in Utah. This species occurs throughout the U.S. Musk thistle reproduces by seeds and contains violet flowers that bloom in June and July. This species is found in meadows, prairies, grassy balds (alpine areas below the timberline that are devoid of trees and dominated by grasses and shrubs), and other open areas. This biennial or winter annual grows to heights of 6 feet and is found in areas disturbed by frequent flooding or landslides. It does not grow well in excessively wet, dry, or shady conditions. Musk thistle seeds appear to possess allelopathic qualities. They can inhibit germination and radicle growth in other pasture species, but stimulate or have no affect on other seeds of their own species. This species competes poorly with healthy established grasses and other vegetation. Disturbances such as fire, overgrazing, or trampling create prime sites for thistle colonization. Control measures include mechanical, biological, chemical and burning. Preferred application is dependent on size and location of infestation.

Diffuse knapweed (*Centaurea diffusa*) is classified as NW (category B) in Nevada and a state NW in Utah. Typically biennial, occasionally annual or triennial, this weed usually forms large, dense infestations. Introduced from Eurasia, diffuse knapweed prefers fields, roadsides, disturbed open sites, grasslands, overgrazed rangelands, and logged areas. Plants seldom persist in shaded places and colonize most soil types with a disturbed A horizon. This species reproduces by seeds which disperse when stems break off near the ground and tumble along with wind. This annual or short-lived perennial averages 1 to 2 feet tall and contains flowers from white to rose in color that bloom throughout summer. Hand pulling of small infestations has shown considerable success. The use of fire has demonstrated mixed results for managing diffuse knapweed. Biological and chemical control of this species exists but requires long term treatment. Knapweeds release chemical compounds into the ground that inhibit the growth of competing species.

Malta star-thistle (*Centaurea melitensis*) is listed as NW (category A) in Nevada. This species is an erect winter annual with a spiny, yellow-flowered head that typically reaches 3 feet tall. This species occurs in open, disturbed sites, grasslands, rangeland, open woodlands, fields, pastures, roadsides, and waste places. *C. melitensis* also occurs in cultivated fields. Seedlings are more likely to establish in soils with deep silt loam and loam with few coarse fragments. This species reproduces by seeds and yellow flowers that bloom from April to September. Currently, there are a number of control options available for the management of yellow star-thistle, including grazing, mowing, manual removal, clover or perennial grass reseeding, burning, chemical, and biological control.

Spotted knapweed (*Centaurea maculosa*) is classified as NW (category A) in Nevada and as a state NW in Utah. Spotted knapweed is an herbaceous biennial or short-lived perennial that is found throughout most of the U.S. It is most common in sunny habitats with well-drained or gravelly soils. It grows on heavily disturbed sites, roadsides, agricultural field margins, undisturbed dry prairies, oak and pine barrens, rangeland, lake dunes, and sandy ridges. This species has pink flowers that bloom from June to October. Reproduction is primarily by seed production and sprouting from lateral roots to a lesser extent. This species releases a toxin into the soil that hinders or prevents the growth of neighboring species. Control measures include mechanical, biological, chemical, burning or a combination of these.

Squarrose knapweed (star thistle) (*Centaurea virgata ssp. squarrosa*) is classified as NW (category A) in Nevada and as a state NW in Utah. This species is found in western and northern states. It reproduces by seeds that disperse with the seed head as a unit from August through winter. Squarrose knapweed contains pink to rose colored flowers that bloom in early to mid-summer. This long-lived perennial grows to 18 inches tall and often grows on degraded rangeland soils and is more adaptable to drought and cold temperatures than spotted and diffuse knapweed. Management measures including mechanical, biological, chemical, and burning can be effective but must be continuous or reinfestation is inevitable. Knapweeds release chemical compounds into the ground that inhibit the growth of competing species.

Water hemlock (*Cicuta maculate*) is classified as NW (category C) in Nevada. This perennial native plant is found throughout the U.S. It contains umbrella-like clusters of small white flowers that bloom from June to September. This species is 3 to 6 feet tall, branching occasionally. This species is found on edges of ponds, lakes, and streams; shallow waters, wet meadows, marshes, swamps, springs, roadside ditches, and other wet places.

Canada thistle (*Cirsium arvense*) is classified as NW in Nevada (category C) and as a state NW in Utah. This perennial is native to Eurasia, but has adapted to a diverse range of habitats in North America. This species grows best in moist soils and prefers open disturbed sites, roadsides, fields, pastures, hillsides, rangeland, and forest openings. Canada thistle flowers in June through October and reproduces both by seed and by its roots, which extend both horizontally and vertically deep underground. These creeping roots are able to spread rapidly over large areas (Parker 2007). Repeated cultivation, mowing, or hand-cutting reduces and can eventually eliminate infestations. Other control measures include burning and chemical application; however, rate, timing, and effectiveness of these treatments may vary.

Bull thistle (*Cirsium vulgare*) is classified as NW in Beaver County Utah. This species is native to Europe but is widespread in North America and much of the world. Bull thistle is often found in pastures, fields, roadsides, and disturbed sites, usually on heavier soils in moist areas. This biennial thistle reproduces by seeds and can grow up to 6 feet tall. This species is supported by a fleshy taproot that can extend to 70 centimeters deep. Flowers bloom from June to October and consist of several overlapping rows of spine-tipped phyllaries and numerous disk flowers interspersed with bristles on the receptacle. Heavy grazing and disturbances that create bare soil patches facilitate seedling establishment and survival. Cultivation, mowing, or hand-pulling just before flowering can control infestations.

Halogeton (*Halogeton glomeratus*) is an erect winter to summer annual that is found throughout the western U.S. It typically invades disturbed arid and semi-arid sites with alkaline to saline soils. This species prefers disturbed open sites, dry lakebeds, shrublands, roadsides, typically where native vegetation is sparse. It reproduces by seeds that disperse with wind, water, human activities, seed-gathering ants, animals, and when dry plants break off at ground level and tumble with the wind. Overgrazing, human disturbance, and fire typically reduce desirable vegetation and increase open sites with bare soil, encouraging invasion and establishment of halogeton. Mechanical and chemical control methods can effectively control the spread of this species.

Black henbane (*Hyoscyamus niger*) is classified as NW (category C) in Nevada. This species occurs occasionally throughout the U.S., repeatedly escaping from cultivation. Black henbane reproduces by seeds and is found in disturbed open sites, roadsides, fields, waste places, and abandoned gardens. This henbane grows best in sandy or well-drained loam soils with moderate fertility and does not tolerate waterlogged soils. Black henbane is an annual or biennial plant that grows up to 3 feet tall. Control measures include hand pulling or digging plants making sure that the thick, fleshy, taproot is completely removed. Plants detected with mature fruits should be carefully placed in bags to prevent seed dispersal, and the area should be monitored for new seedling emergence for at least 4 years. If the infestation is too large for hand pulling, a systemic herbicide, such as glyphosate should be applied. Glyphosate is nonselective, but should provide effective control. This species is poisonous to both animals and humans.

Tall white-top (perennial pepperweed) (*Lepidium latifolium*) is classified as NW (category C) in Nevada and as a state NW in Utah. This herbaceous perennial occurs in a few states along the eastern seaboard, in several Midwestern states, and in all far western states. Perennial pepperweed occurs in riparian (stream) areas, coastal wetlands, marshes, roadsides, railways, ditches, hay meadows, pastures, cropland, and waste places. It can invade a wide range of habitats including riparian areas, wetlands, marshes, and floodplains. It adapts readily to natural and disturbed wetlands. Deep-seated rootstocks make pepperweed difficult to control. Mechanical control methods are unlikely to eradicate infestations however chemical control methods have proven effective.

Dalmatian toadflax (*Linaria dalmatica*) is classified as NW (category A) in. This species is found throughout the western, northern, and northeastern U.S. This herbaceous perennial grows best in cool, semi-arid climates and dry, coarse soils at neutral to slightly alkaline pH. This species prefers fields, pastures, degraded rangelands, roadsides, agronomic, and perennial crops and can tolerate a broad range of climatic conditions and soil types. Dalmatian toadflax reproduces by seed and vegetatively from creeping lateral roots. This species can grow to nearly 3 feet tall and contains yellow flowers that bloom from late spring to early summer. Overgrazing, soil disturbance, or removal of established perennial vegetation enhances survival, especially of seedlings. Grubbing or hand pulling may be effective for controlling small infestations, but must be repeated several times a year for many years. Chemical control of this species is highly variable.

Scotch thistle (*Onopordum acanthium*) is classified as NW (category B) in Nevada and listed as state NW in Utah. This plant is found in throughout most of the U.S. This species may grow to 12 feet tall and is found in waste areas, pastures, rangelands as well as along canals and streams. This biennial plant reproduces by seeds and contains violet to reddish flowers that bloom in mid-summer. Buried seed can remain viable in the soil seed bank for at least 7 years and possibly to 20 years or more. Seedbank longevity is a major factor in managing this species. Small infestations should be physically removed or cut a few inches below the soil surface. Other long term control measures include biological and chemical methods.

Black locust (*Robinia pseudoacacia*) is a fast growing deciduous tree that can grow to 100 feet tall. Native to the southeastern U.S., this species has spread to western and southern states. This species is an early successional plant, preferring full sun, well drained soils, and little competition. Fragrant white flowers appear in drooping clusters in May and June and have a yellow blotch on the uppermost petal. Black locust poses a serious threat to native vegetation in dry and sand prairies, oak savannas and upland forest edges, outside of its historic North American range. Measures to control the spread of young shoots from a clone or parent tree include mowing and burning. To kill a clone, cutting alone is ineffective. Herbicides applied to the stems or cut stumps spread into the root system and provide better control.

Saltcedar (*Tamarix ramosissima*) is classified as NW (category C) in Nevada. This species is found throughout the western and central U.S. Saltcedar is a deciduous shrub and can appear as a small tree that can grow in many different substrates. It can be found where its roots reach the water table, such as floodplains, along irrigation ditches and on lake shores and it can tolerate a wide range of saline or alkaline soils. This species can replace or displace native woody species. It is able to dominate floodplain communities in the deserts of the southwest U.S. due to its ability to tolerate water stress for extended periods of time. Saltcedar spreads vegetatively, by adventitious roots or submerged stems, and by seeds. This species blooms from March to September when large numbers of pink to white flowers appear in dense masses on 2-inch long spikes at branch tips. Management of saltcedar requires a long term commitment to maintain at low levels and prevent reinfestation. A variety of methods have been used in the management of saltcedar, including mechanical, chemical and biological. The most effective management probably involves a combination of these.

Table F3.5-2

Noxious Weed Species Documented in ROW Areas, Groundwater Development Areas and Associated Hydrologic Basins

Table F3.5-2 Noxious Weed Species Documented in ROW areas, Groundwater Development Areas and Associated Hydrologic Basins

Noxious Weed Species[1]	Hydrologic Basins												
	Las Vegas Valley	Garnet Valley	Hidden Valley (North)	Coyote Springs Valley	Pahranagat Valley	Delamar Valley	Dry Lake Valley	Cave Valley	Lake Valley	Steptoe Valley	Snake Valley	Spring Valley (basin #184)	Hamlin Valley
Russian Knapweed *(Acroptilon repens)*					S		R	S	R	S	S	E	
Sahara Mustard *(Brassica tournefortii)*	R	R	R	R									
Hoary Cress *(Cardaria draba)*					S			S	R	R	S	E	
Musk Thistle *(Carduus nutans)*							S			S	S	E	S
Diffuse Knapweed *(Centaurea diffusa)*									S	S			S
Malta Star-Thistle *(Centaurea melitensis)*	S		S										
Spotted Knapweed *(Centaurea maculosa)*						S	S		R	S	E	R,E	S
Squarrose Knapweed (*Centaurea virgata squarrosa*)										S			
Water Hemlock *(Cicuta maculata)*										S		E	
Canada Thistle *(Cirsium arvense)*								S		S	S	E	S
Black Henbane *(Hyoscyamus niger)*										S			
Tall White-Top *(Lepidium latifolium)*					S		E			S		S	
Dalmatian Toadflax *(Linaria dalmatica)*									S				S
Scotch Thistle *(Onopordum acanthium)*					S	E	S		S	S			S
Saltcedar *(Tamarix* ssp.*)*	S	S	S	R,E	S	E	E	S	S	S	E	E	S

R = Species is present in the ROWs, S = species is potentially present in that basin.

[1]Noxious weed species nomenclature are consistent with State and Federal Weed lists.

Sources: TCWCP 2007.

Risk Assessment for Noxious and Invasive Weeds: Clark, Lincoln, and White Pine Counties Groundwater Development Project – Right of Way for Main Pipeline

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Ely District Office
HC 33 Box 33500 (702 No. Industrial Way)
Ely, Nevada 89301-9408

RISK ASSESSMENT FOR NOXIOUS & INVASIVE WEEDS

Clark, Lincoln, and White Pine Counties Groundwater Development Project – Right of Way for Main Pipeline

Regulatory Framework

The BLM defines an invasive weed as "a non-native plant that disrupts or has the potential to disrupt or alter the natural ecosystem function, composition and diversity of the site it occupies. Its presence deteriorates the health of the site, it makes efficient use of natural resources difficult and it may interfere with management objectives for that site. It is an invasive species that requires a concerted effort (manpower and resources) to remove from its current location, if it can be removed at all" (BLM National List of Invasive Weed Species of Concern). They have the ability to readily establish and spread rapidly, particularly in disturbed areas, and may cause damage to agriculture, range resources, and forestry, as well as increase fire susceptibility. Nevada BLM defines "noxious" weeds as those plant species "that interfere with management objectives for a given area of land at a given point in time" (http://www.nv.blm.gov/Resources/noxious_weeds.htm). Noxious and non-native, invasive weeds considered for effect under this study include:

- Plant species listed or considered as federal noxious weeds by the United States Department of Agriculture
- Plant species listed as noxious by the State of Nevada per NAC 555.010
- Plant species considered invasive weed species of concern to the BLM

Federal Executive Order 13112, *Prevention and Control of Invasive Species* (3 February 1999), defines invasive species as "alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health." This order requires any federal agency whose action may affect the status of invasive species to undertake reasonable and appropriate measures to prevent or minimize the spread of invasive species, and to monitor and manage their conditions. A number of additional federal laws address identification, treatment, and monitoring of invasive species, including the following:

- Lacey Act as amended (18 U.S.C. 42)
- Nuisance Prevention and Control Act of 1990 as amended (16 U.S.C. 4701 et. seq.)
- Federal Noxious Weed Act of 1974 as amended by the Food, Agriculture, Conservation and Trade Act of 1990 (Section 1453 "Management of Undesirable Plants on Federal Lands" U.S.C. 2801 et. seq.)
- Federal Plant Pest Act (7 U.S.C. 150aa et. seq.)
- Carlson-Fogey Act of 1968 (Public Law 90-583)
- Salt Cedar and Russian Olive Control Demonstration Act (Public Law 109-320)
- Safe, Accountable, Flexible, Efficient Transportation Equity Act (Public Law 109-59)
- Noxious Weed Control and Eradication Act (Public Law 108-412)

In addition to federal regulations, the State of Nevada Department of Agriculture serves to regulate noxious and non-native, invasive weed presence. According to NAC 555.010,

it is the responsibility of the landowner, both public and private, to manage and control listed noxious species.

Risk Assessment

On February 5, 2010, a Noxious & Invasive Weed Risk Assessment was completed for the Clark, Lincoln, and White Pine Counties Groundwater Development Project – Right of Way for Main Pipeline. This Risk Assessment is a required tool for any ground disturbing project within the Ely District to help measure the possibility and consequence of noxious or invasive weed invasion of the project area. The data for this document is specific to public lands within White Pine and Lincoln Counties.

This is a site-specific analysis for proposed ROWs for mainline facilities, including pipelines, pumping stations, storage facilities, a treatment facility, access roads, and power facilities. This analysis will focus on the direct and indirect effects of noxious and invasive weeds from constructing, operating, and maintaining project facilities. The locations, functions, and resource requirements for these facilities are described in detail in the SNWA Plan of Development (POD), and in Section 2.3, Facility Components and Design Common to All Alternatives; and Section 2.4, Proposed Action and Action Alternatives. The table below depicts the six alternatives that have detailed analysis. Both permanent and temporary impacts would occur as a result of the project.

This Risk Assessment does not include the programmatic analysis outlined in the EIS. Once site specific locations are determined for pumping, then weed risk assessment(s) for these locations and impacts based on the applicable drawdown ground water models would need to be completed. Also, due to the length of time to complete construction of this pipeline and operations, the weed risk assessment needs to be reviewed and updated as new data, guidance and regulations become available.

Table 2.1-2 Comparison of Groundwater Pumping Alternatives

	No Action	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Groundwater Development Plan						
Current Groundwater Consumption (afy) [1]	~100,000	0	0	0	0	0
Volume of Conveyed Water (afy)	0	155,755	155,755	42,000 to 155,755[2]	119,755	40,000 to 119,755[2]
Year of Full Development	Present	2050	2050	2050	2043	2043
Well Locations	NA	5 basins; dispersed well sites	5 basins; well sites within 1 mile of 29 Points of Diversion	5 basins; dispersed well sites	4 basins; dispersed well sites	4 basins; dispersed well sites
Intermittent Pumping	No	No	No	Yes	No	Yes
ROW and Facility Requirements						
Pipeline (miles)	0	306	306	306	225	225
Electric Power Lines (miles)	0	322	322	322	208	208
Electrical Substations (number)	0	7	7	7	4	4
Pumping Stations (number)	0	5	5	5	2	2
Regulating Tanks (number)	0	6	6	6	5	5
Pressure Reducing Stations (number)	0	3	3	3	3	3
Water Treatment Facility/Buried Storage Reservoir (number, location)	0	1 (Garnet Valley)	1 (Garnet Valley)	1 (Garnet Valley)	1 (Garnet Valley)	1 (Garnet Valley)
Access Roads (total miles)	0	352	352	352	248	248
Power Requirements (megawatts)	0	74.4	74.4	74.4	54.2	54.2
Permanent ROW (acres)	0	7,872	7,872	7,872	5,481	5,481
Temporary ROW (acres)	0	4,354	4,354	4,354	3,272	3,272
Future Facilities [3]						
Groundwater Production Wells (number, distribution)	0	108 to 131 within 5 basins; dispersed within exploratory area	116 within 5 basins; within 1-mile radius of 29 Points of Diversion	108 to 131 within 5 basins; dispersed within exploratory area	69 to 83 within 4 basins; dispersed within exploratory area	69 to 83 within 4 basins; dispersed within exploratory area
Collector Pipelines (miles)	0	106 to 258	186	106 to 258	58 to 198	58 to 198
Staging Areas (number of 1-acre sites)	0	35 to 86	62	35 to 86	19 to 66	19 to 66
Electric Power Lines (miles)	0	106 to 258	186	Up to 258	58 to 198	58 to 198
Permanent ROW (acres)	0	1,459 to 3,338	2,448	1,459 to 3,338	1,238 to 2,586	1,238 to 2,586
Temporary ROW (acres)	0	742 to 1,727	1,261	742 to 1,727	834 to 1,368	834 to 1,368

[1] Current groundwater consumption is identified within the No Action alternative but is not included in other alternatives. Rather, current consumption is considered under the cumulative impact analysis.

[2] Range of values is based on minimum and maximum conveyance volumes during intermittent pumping.

[3] Future facilities may include additional pumping stations and electrical substations, depending on future conditions and volumes of groundwater obtained from future production wells.

No field weed surveys were completed for this assessment. Instead the Ely District weed inventory data was consulted. The following are known infestations within or immediately adjacent (within 1000 ft of either side) to the right of ways for all alternatives:

Acroptilon repens	Russian knapweed
Centaurea stoebe	Spotted knapweed
Cirsium arvense	Canada thistle
Cirsium vulgare	Bull thistle
Conium maculatum	Poison hemlock
Lepidium draba	Hoary cress

Lepidium latifolium	Tall whitetop
Linaria dalmatica	Dalmatian toadflax
Onopordum acanthium	Scotch thistle
Tamarix spp.	Salt cedar
Centaurea solstitialis	Malta starthistle

There are currently several mapped weed infestions found within three miles of the project area along roads or drainages:

Acroptilon repens	Russian knapweed
Ailanthus altissima	Tree of heaven
Brassica tournefortii	Sahara mustard
Carduus nutans	Musk thistle
Centaurea stoebe	Spotted knapweed
Cirsium arvense	Canada thistle
Cirsium vulgare	Bull thistle
Conium maculatum	Poison hemlock
Lepidium draba	White top/Hoary cress
Lepidium latifolium	Tall whitetop
Linaria dalmatica	Dalmatian toadflax
Onopordum acanthium	Scotch thistle
Robinia pseudoacacia L.	Black locust
Tamarix spp.	Salt cedar

There is also cheatgrass (*Bromus tectorum*), red brome (*Bromus rubens*), bur buttercup (*Ceratocephala testiculata),* tumble mustard (*Sysimbrium altissimum),* halogeton (*Halogeton glomeratus*), horehound (*Marrubium vulgare*), and Russian thistle (*Salsola kali)* scattered along roads and drainages in the area. All parts of the project area have been inventoried during different years ranging from 2001 to 2008.

Factor 1 assesses the likelihood of noxious/invasive weed species spreading to the project area.

None (0)	Noxious/invasive weed species are not located within or adjacent to the project area. Project activity is not likely to result in the establishment of noxious/invasive weed species in the project area.
Low (1-3)	Noxious/invasive weed species are present in the areas adjacent to but not within the project area. Project activities can be implemented and prevent the spread of noxious/invasive weeds into the project area.
Moderate (4-7)	Noxious/invasive weed species located immediately adjacent to or within the project area. Project activities are likely to result in some areas becoming infested with noxious/invasive weed species even when preventative management actions are followed. Control measures are essential to prevent the spread of noxious/invasive weeds within the project area.
High (8-10)	Heavy infestations of noxious/invasive weeds are located within or immediately adjacent to the project area. Project activities, even with preventative management actions, are likely to result in the establishment and spread of noxious/invasive weeds on disturbed sites throughout much of the project area.

For this project, the factor rates as High (10) at the present time. Heavy infestations of noxious weeds are found in areas where the right of way will occur. Due to the long

linear disturbance of the project it is expected that weed species inhabiting localized areas, such as Sahara mustard, hoary cress, and spotted knapweed could be spread along the right of way beyond where they currently occur. Based on the equipment being used for this project and the weed species in the area it is likely to result in the establishment and spread of noxious and invasive weeds on disturbed sites throughout much of the project area.

Factor 2 assesses the consequences of noxious/invasive weed establishment in the project area.

Low to Nonexistent (1-3)	None. No cumulative effects expected.
Moderate (4-7)	Possible adverse effects on site and possible expansion of infestation within the project area. Cumulative effects on native plant communities are likely but limited.
High (8-10)	Obvious adverse effects within the project area and probable expansion of noxious/invasive weed infestations to areas outside the project area. Adverse cumulative effects on native plant communities are probable.

This project rates as High (10) at the present time. Portions of the project area have heavy weed infestions present and cumulative effects on native plant communities are likely. Other areas of the project are considered weed free, and are susceptible to weed infestations due to the disturbances of the project. Areas of concern that are currently weed free include the two power line routes through the Schell Range (see Map 1); the pipeline spur route to Snake Valley (see Map 2); the pipeline as it goes on the east side of the Fortification Range (see Map 2); the pipeline spur route to Cave Valley (see Map 3); and the main pipeline route through Muleshoe Valley, Dry Lake Valley and Delamar Valley (see Maps 3, 4 and 5). Due to the time line and linear nature of the right of way it is likely that weeds will establish in these areas currently considered weed free. This would have a significant impact on native plant communities in these areas. There are also several fires adjacent to the right of way that are likely to have non native invasives present in higher densities than unburned areas. An increase of red brome or cheatgrass could alter the fire regime throughout the project area and increase the fire frequency. This would have detrimental impacts on native vegetation.

The Risk Rating is obtained by multiplying Factor 1 by Factor 2.

None (0)	Proceed as planned.
Low (1-10)	Proceed as planned. Initiate control treatment on noxious/invasive weed populations that get established in the area.
Moderate (11-49)	Develop preventative management measures for the proposed project to reduce the risk of introduction of spread of noxious/invasive weeds into the area. Preventative management measures should include modifying the project to include seeding the area to occupy disturbed sites with desirable species. Monitor the area for at least 3 consecutive years and provide for control of newly established populations of noxious/invasive weeds and follow-up treatment for previously treated infestations.
High (50-100)	Project must be modified to reduce risk level through preventative management measures, including seeding with desirable species to occupy disturbed site and controlling existing infestations of noxious/invasive weeds prior to project activity. Project must provide at least 5 consecutive years of monitoring. Projects must also provide for control of newly established populations of noxious/invasive weeds and follow-up treatment for previously treated infestations.

For this project, the Risk Rating is High (100). This indicates that the project must be modified to reduce the risk level through preventive management measures. Also an Integrated Weed Management Plan needs to be prepared as part of the COM Plan and

approved by the BLM Weed Coordinator for this project that address the control of noxious weed communities in the project area, taking into account that no single control method, or any single year treatment program will ever achieve effective control of an area infested, and that weed free areas should have a goal that prevents establishment of weeds. It should be understood that weeds will outcompete native plant species due to fast growth, high seed viability, and long seed dormancy. Due to these factors a long-term integrated management plan needs to be implemented to contain current weeds and prevent establishment of new infestations.

Preventive management measures necessary for this project include:

- Continue to use integrated weed management to treat weed infestations and use principles of integrated pest management to meet management objectives and to reestablish resistant and resilient native vegetation communities. This includes at a minimum, annual treatments for any noxious weed infestations.
- Develop weed management plans that address weed vectors, minimize the movement of weeds within public lands, consider disturbance regimes, and address existing weed infestations.
- When manual weed control is conducted, remove the cut weeds and weed parts and dispose of them in a manner designed to kill seeds and weed parts.
- All straw, hay, straw/hay, or other organic products used for reclamation or stabilization activities, must be certified that all materials are free of plant species listed on the Nevada noxious weed list or specifically identified by the Ely District Office.
- Where appropriate, inspect source sites such as borrow pits, fill sources, or gravel pits used to supply inorganic materials used for construction, maintenance, or reclamation to ensure they are free of plant species listed on the Nevada noxious weed list or specifically identified by the Ely District Office. Inspections will be conducted by a weed scientist of qualified biologist.
- Where appropriate, vehicles and heavy equipment used for the completion, maintenance, inspection, or monitoring of ground disturbing activities; for emergency fire suppression; or for authorized off-road driving will be free of soil and debris capable of transporting weed propagules. Vehicles and equipment will be cleaned with power or high pressure equipment prior to entering or leaving the work site or project area. Vehicles used for emergency fire suppression will be cleaned as a part of check-in and demobilization procedures. Cleaning efforts will concentrate on tracks, feet and tires, and on the undercarriage. Special emphasis will be applied to axels, frames, cross members, motor mounts, on and underneath steps, running boards, and front bumper/brush guard assemblies. Vehicle cabs will be swept out and refuse will be disposed of in waste receptacles. Cleaning sites will be recorded using global positioning systems or other mutually acceptable equipment and provided to the Ely District Office Weed Coordinator or designated contact person.
- Prior to entry of vehicles and equipment to a planned disturbance area, a weed scientist or qualified biologist will identify and flag areas of concern. The flagging will alert personnel or participants to avoid areas of concern.

- To minimize the transport of soil-borne noxious weed seeds, roots, or rhizomes, infested soils or materials will not be moved and redistributed on weed-free or relatively weed-free areas. In areas where infestations are identified or noted and infested soils, rock, or overburden must be moved, these materials will be salvaged and stockpiled adjacent to the area from which they were stripped. Appropriate measures will be taken to minimize wind and water erosion of these stockpiles. During reclamation, the materials will be returned to the area from which they were stripped.
- Prior to project approval a site-specific weed survey will occur and a weed risk assessment will be completed. Monitoring by BLM will be conducted for a period no shorter than the life of the permit or until bond release and monitoring reports will be provided to the Ely District Office. If the presence and/or spread of noxious weeds is noted, appropriated weed control procedures will be determined in consultation with Ely District Office personnel and will be in compliance with the appropriate BLM Handbook sections and applicable laws and regulations. All weed control efforts on BLM-administered lands will be in compliance with BLM Handbook H-9011, H-9011-1 Chemical Pest Control, H-9014 Use of Biological Control Agents of Pests on Public Lands, and H-9015 Integrated Pest Management. **Submission of Pesticide Use Proposals and Pesticide Application Records will be required.**
- Determine seed mixes on a site specific basis dependant on the probability of successful establishment. Use native and adapted species that compete with annual invasive species or meet other objectives.
- For soil disturbing actions which will require reclamation, salvage and stockpile all available growth medium prior to surface disturbances. Seed stockpiles if they are to be left for more than one growing season. Re-contour all disturbance areas to blend as nearly as possible with the natural topography prior to re-vegetation. Rip all compacted portions of the disturbance to an appropriate depth based on site characteristics. Establish an adequate seed bed to provide good seed-to-soil contact.
- Prior to use on lands administered by the Ely District Office, all fire suppression equipment from outside the planning area utilized to extract water from lakes, streams, ponds, or spring sources (e.g. helicopter buckets, draft hoses, and screens) will be thoroughly rinsed to remove mud and debris and then disinfested to prevent the spread of invasive aquatic species. Rinsing equipment with disinfectant solution will not occur within 100 feet of natural water sources (i.e. lakes, streams, or springs). Ely suppression equipment utilized to extract water from water sources known to be contaminated with invasive aquatic species, as identified by the U.S. Fish and Wildlife Service and Nevada Department of Wildlife, also will be disinfected prior to use elsewhere on lands administered by the Ely District Office.
- Conduct mixing of herbicides and rinsing of herbicide containers and spray equipment only in areas that are a safe distance from environmentally sensitive areas and points of entry to bodies of water (storm drains, irrigation ditches, streams, lakes, or wells).
- Keep removal and disturbance of vegetation would be kept to a minimum through construction site management (e.g. using previously disturbed areas and existing easements, limiting equipment/materials storage and staging area sites, etc.)

- Generally, conduct reclamation with native seeds that are representative of the indigenous species present in the adjacent habitat. Document rationale for potential seeding with selected nonnative species. Possible exceptions would include use of nonnative species for a temporary cover crop to out-compete weeds. Also for green stripping to prevent weed spread and fire. In all cases, ensure seed mixes are approved by the BLM Authorized Officer prior to planting.
- Certify that all interim and final seed mixes, hay, straw, and hay/straw products are free of plant species listed on the Nevada noxious weed list.
- Respread weed-free vegetation removed from the right-of-way to provide protection, nutrient recycling, and seed source.
- When managing in areas of special status species, carefully consider the impacts of the treatment on such species. Wherever possible, hand spraying of herbicides is preferred over other methods.
- Do not conduct noxious and invasive weed control within 0.5 mile of nesting and brood rearing areas for special status species during the nesting and brood rearing season.
- When maintaining unpaved roads on BLM-administered lands, avoid the unnecessary disturbance of adjacent native vegetation and spread of weeds. Grade roads shoulders or barrow ditches only when necessary to provide for adequate drainage. Minimize the width of grading operations. The BLM Authorized Officer will meet with equipment operators to ensure that they understand this objective.
- Consider nozzle type, nozzle size, boom pressure, and adjuvant use and take appropriate measures for each herbicide application project to reduce the chance of chemical drift.
- All applications of approved pesticides will be conducted only be certified pesticide applicators or by personnel under the direct supervision of a certified applicator.
- Prior to commencing any chemical control program, and on a daily basis for the duration of the project, the certified applicator will provide a suitable safety briefing to all personnel working with or in the vicinity of the herbicide application. This briefing will include safe handling, spill prevention, cleanup, and first aid procedures.
- Store all pesticides in areas where access can be controlled to prevent unauthorized/untrained people from gaining access to chemicals.
- Do not apply pesticides within 440 yards (0.25 mile) of residences without prior notification of the resident.
- Areas treated with pesticides will be adequately posted to notify the public of the activity and of safe re-entry dates, if a public notification requirement is specified on the label of the product applied. The public notice signs will be at least 8 ½" x 11" in size and will contain the date of application and the date of safe re-entry.
- No noxious weeds will be allowed on the site at the time of reclamation release. Any noxious weeds that become established will be controlled.
- Prior to entering public lands, the contractor, operator, or permit holder will provide information and annual training regarding noxious weed management and identification to all personnel who will be affiliated with the implementation of the project. The

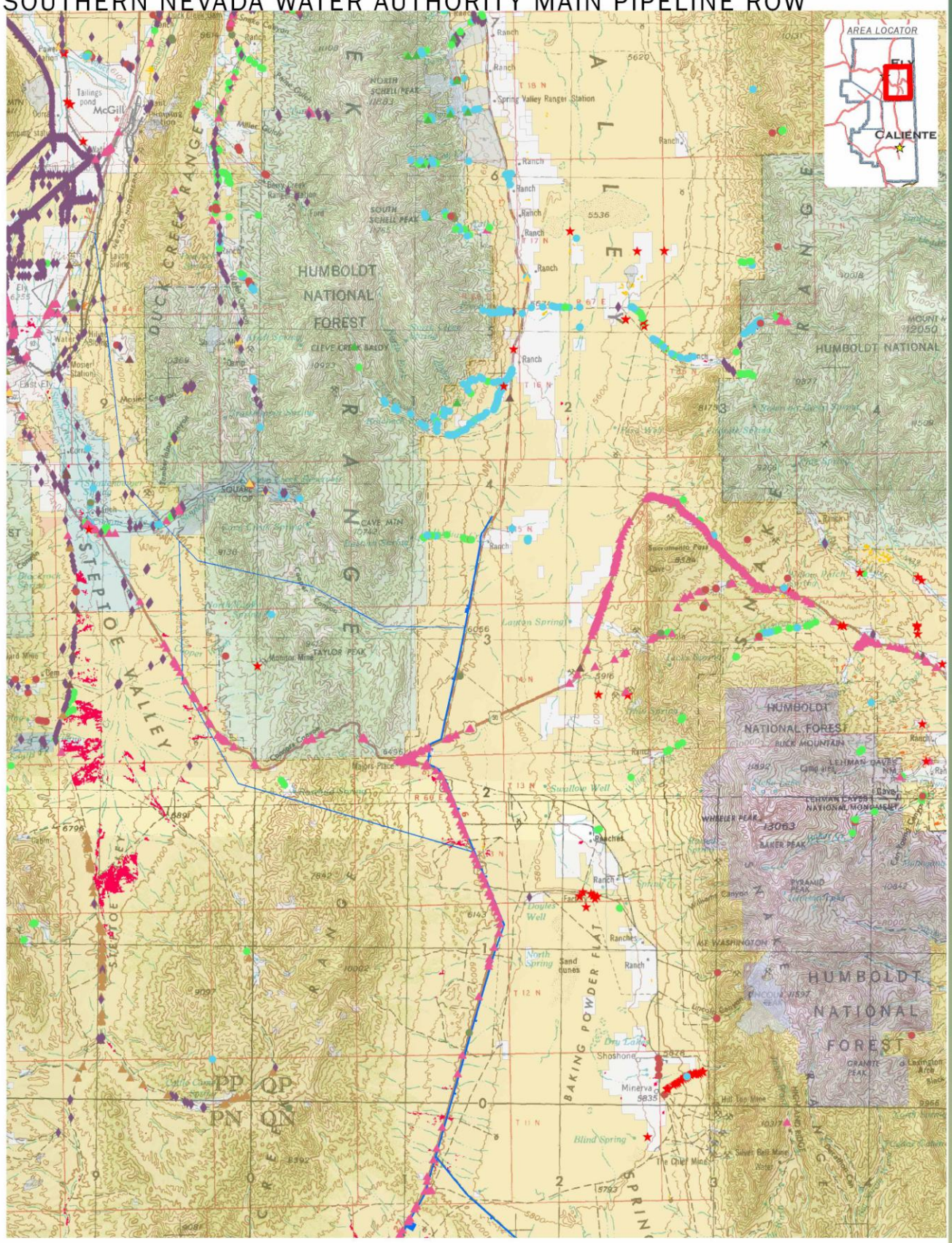
importance of preventing the spread of weeds to uninfested areas and importance of controlling existing populations of weeds will be explained.

- Whenever possible, hand spraying of herbicides is preferred over other methods at heavily used recreation sites (i.e. campgrounds, trailheads, etc.).
- Proponent would be responsible for weeds within the right of way, and any infestations spreading from the ROW including costs for treatments, reclamation, surveys, monitoring, compliance inspections and regulatory requirements.
- Utilize new technologies and treatments as they become available and are approved by BLM to minimize pad/road/pipeline/ancillary facility footprints with regard to noxious and invasive weeds.
- Green stripping needs to be considered as part of an integrated weed management plan. Green stripping would prevent wildfires caused on the ROW, and prevent other wildfires from reaching the ROW. It would also help prevent annual invasives from spreading, since the species used for green stripping usually outcompete the annuals for resources. Per Mike Pellant - History and Application of the Intermountain Green Stripping Program, greenstripping can reduce loss of plant diversity and shrub cover on sagebrush-steppe and salt-desert shrublands. Reduce loss of private structures and properties..... Reduced fire suppression and rehabilitation costs. There are visual impacts that can be reduced by avoiding straight-line seedings and increasing plant and structural diversity in greenstrip plantings." Grazing by wildlife, horses and livestock can be discouraged and reduced on greenstrips by using plants less desirable for grazing. Green stripping should also be considered for the Mojave landscapes to prevent the spread of fire and the impacts of the increases of red brome.

Reviewed by: /s/Mindy Seal 2/5/2010

Mindy Seal Date
Natural Resource Specialist

WEED RISK ASSESSMENT - MAP 1
SOUTHERN NEVADA WATER AUTHORITY MAIN PIPELINE ROW



Legend

ROW Main Pipeline

Ely Dist. Noxious Weed Inventory

Commonname

- BLACK HENBANE
- BLACK LOCUST
- BULL THISTLE
- CANADA THISTLE
- COMMON MULLEIN
- DALMATIAN TOADFLAX
- DIFFUSE KNAPWEED
- DYER'S WOAD
- JOHNSON GRASS
- LEAFY SPURGE
- MALTA STARTHISTLE
- MUSK THISTLE
- POISON HEMLOCK
- PUNCTUREVINE
- RUSSIAN KNAPWEED
- SAHARA MUSTARD
- SALT CEDAR
- SCOTCH THISTLE
- SPOTTED KNAPWEED
- SQUARROSE KNAPWEED
- TALL WHITETOP
- TREE OF HEAVEN
- WATER HEMLOCK
- WHITETOP/HOARY CRESS
- YELLOW TOADFLAX
- Invasive Annual and Biennial Forbland
- Invasive Annual Grassland
- Invasive Perennial Grassland

- Past Large Fires
- Bureau of Land Management
- Bureau of Reclamation
- U.S. Forest Service
- Natl. Park Service
- Bureau of Indian Affairs
- Fish & Wildlife Service
- Dept. of Energy
- Dept. of Defense
- Parks
- NV State Lands
- Private
- Water

N

1:250,000

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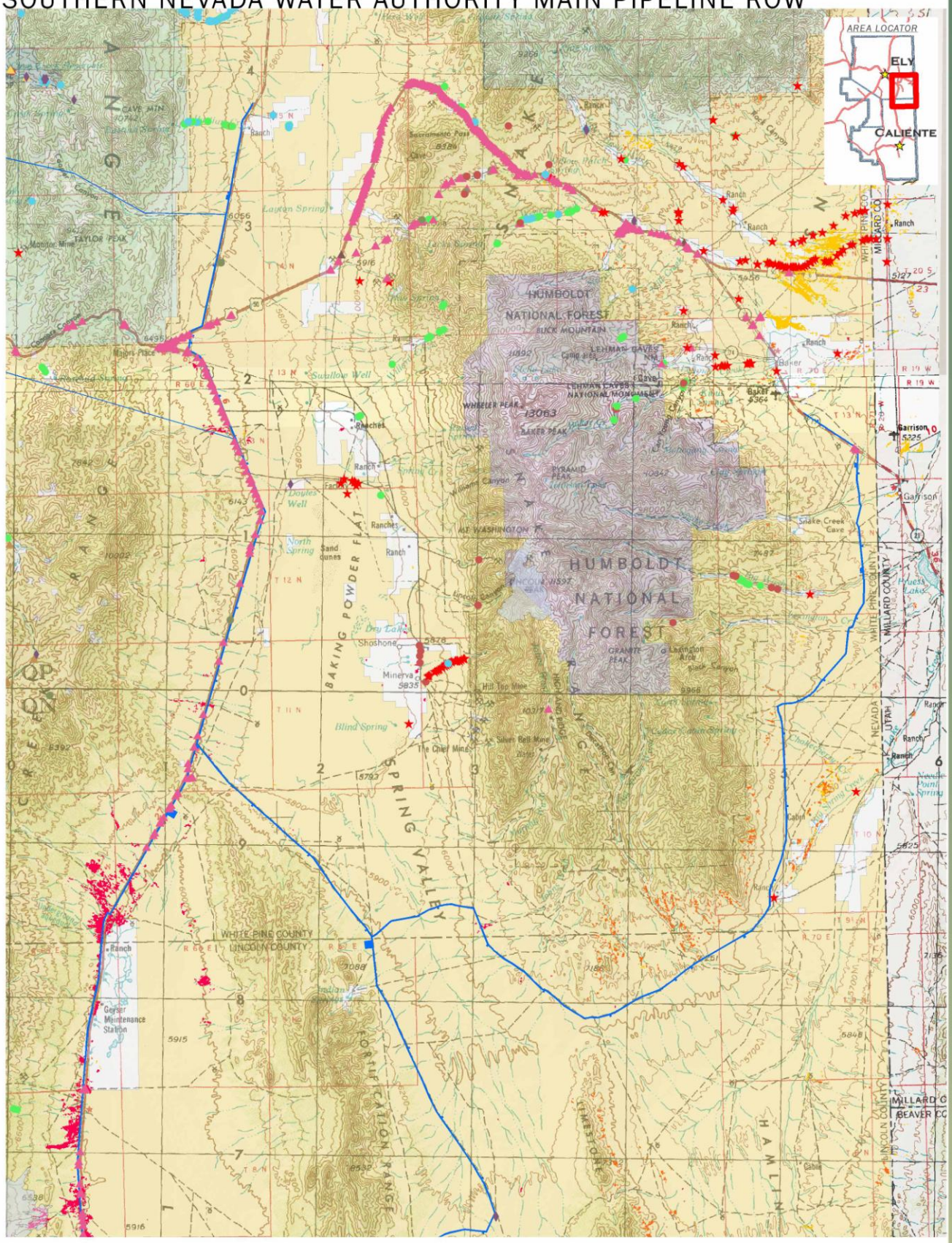
Ely District Office

WEED RISK ASSESSMENT - MAP 2
SOUTHERN NEVADA WATER AUTHORITY MAIN PIPELINE ROW

BLM



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ROW Main Pipeline

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Commonname

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- BULL THISTLE
- CANADA THISTLE
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- Past Large Fires
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- Bureau of Reclamation
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- Fish & Wildlife Service
- Dept. of Energy
- Dept. of Defense
- Parks
- NV State Lands
- Private
- Water

N

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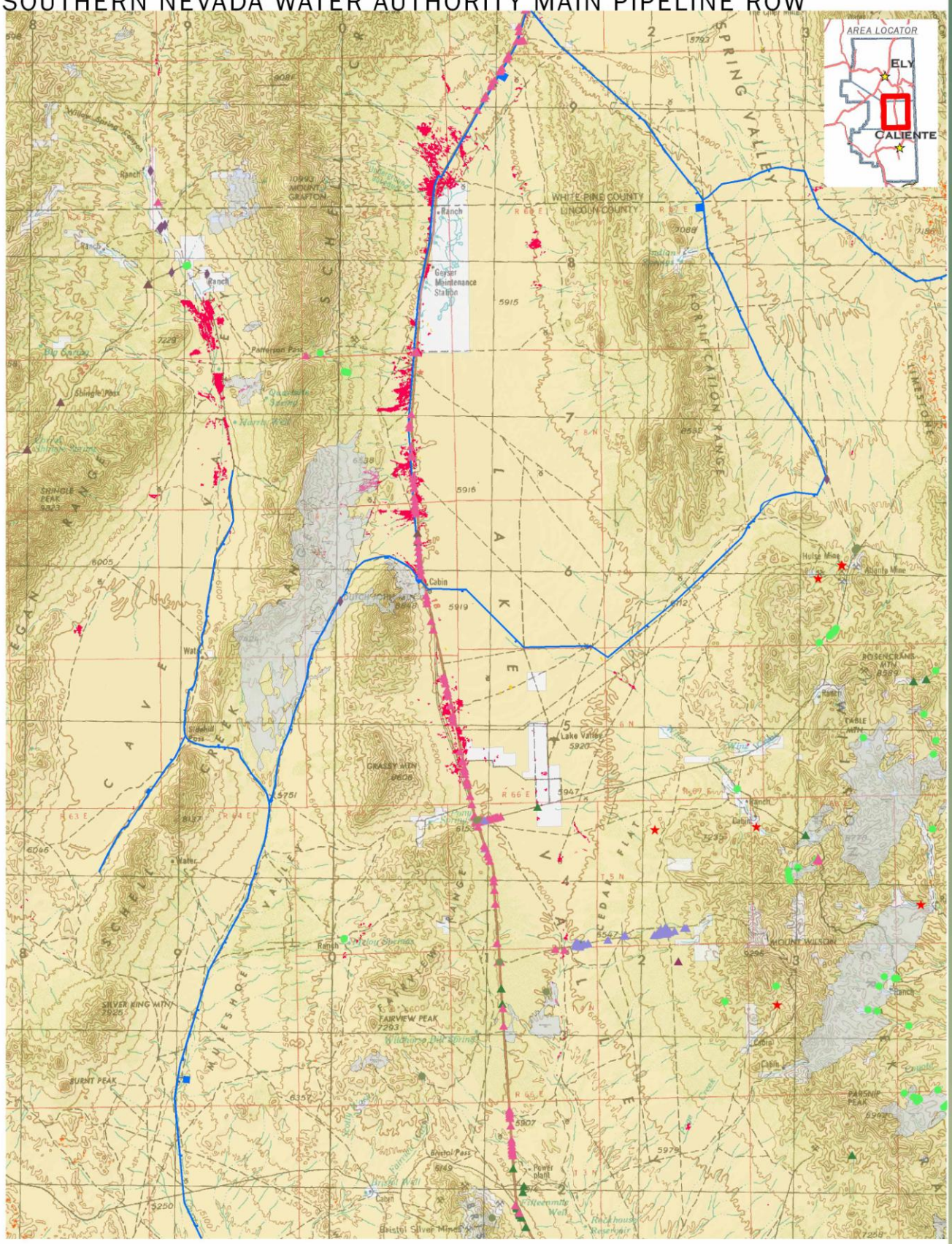
Ely District Office

WEED RISK ASSESSMENT - MAP 3
SOUTHERN NEVADA WATER AUTHORITY MAIN PIPELINE ROW



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ROW Main Pipeline

Ely Dist. Noxious Weed Inventory

Commonname

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- BLACK LOCUST
- BULL THISTLE
- CANADA THISTLE
- COMMON MULLEIN
- DALMATIAN TOADFLAX
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- JOHNSON GRASS
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- Invasive Annual Grassland
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- Past Large Fires
- Bureau of Land Management
- Bureau of Reclamation
- U.S. Forest Service
- Natl. Park Service
- Bureau of Indian Affairs
- Fish & Wildlife Service
- Dept. of Energy
- Dept. of Defense
- Parks
- NV State Lands
- Private
- Water

N

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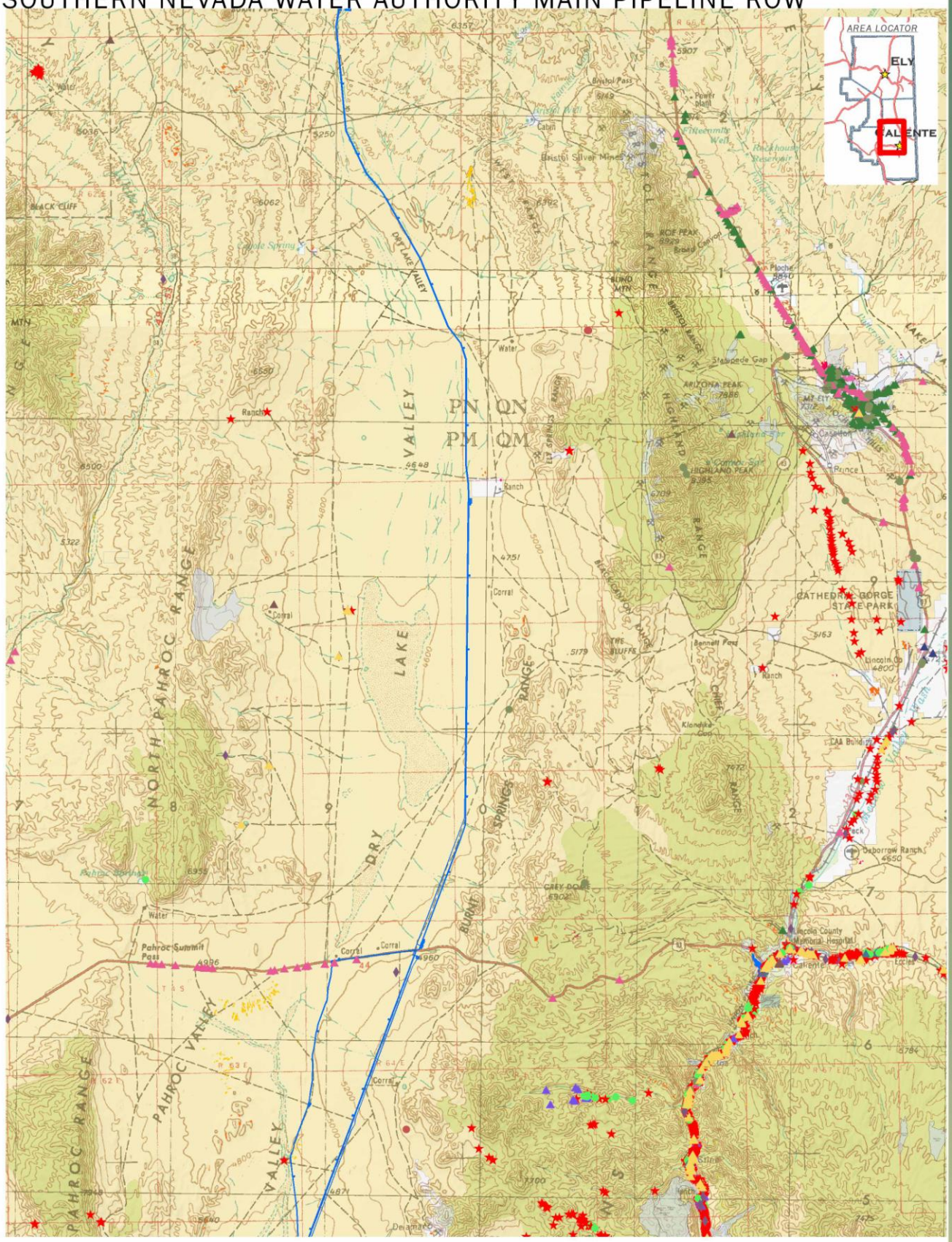
BLM

Ely District Office

WEED RISK ASSESSMENT - MAP 4
SOUTHERN NEVADA WATER AUTHORITY MAIN PIPELINE ROW

BLM



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ROW Main Pipeline

Ely Dist. Noxious Weed Inventory

Commonname

- BLACK HENBANE
- BLACK LOCUST
- BULL THISTLE
- CANADA THISTLE
- COMMON MULLEIN
- DALMATIAN TOADFLAX
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- Invasive Annual Grassland
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- Past Large Fires
- Bureau of Land Management
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- Dept. of Energy
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- Parks
- NV State Lands
- Private
- Water

N

1:250,000

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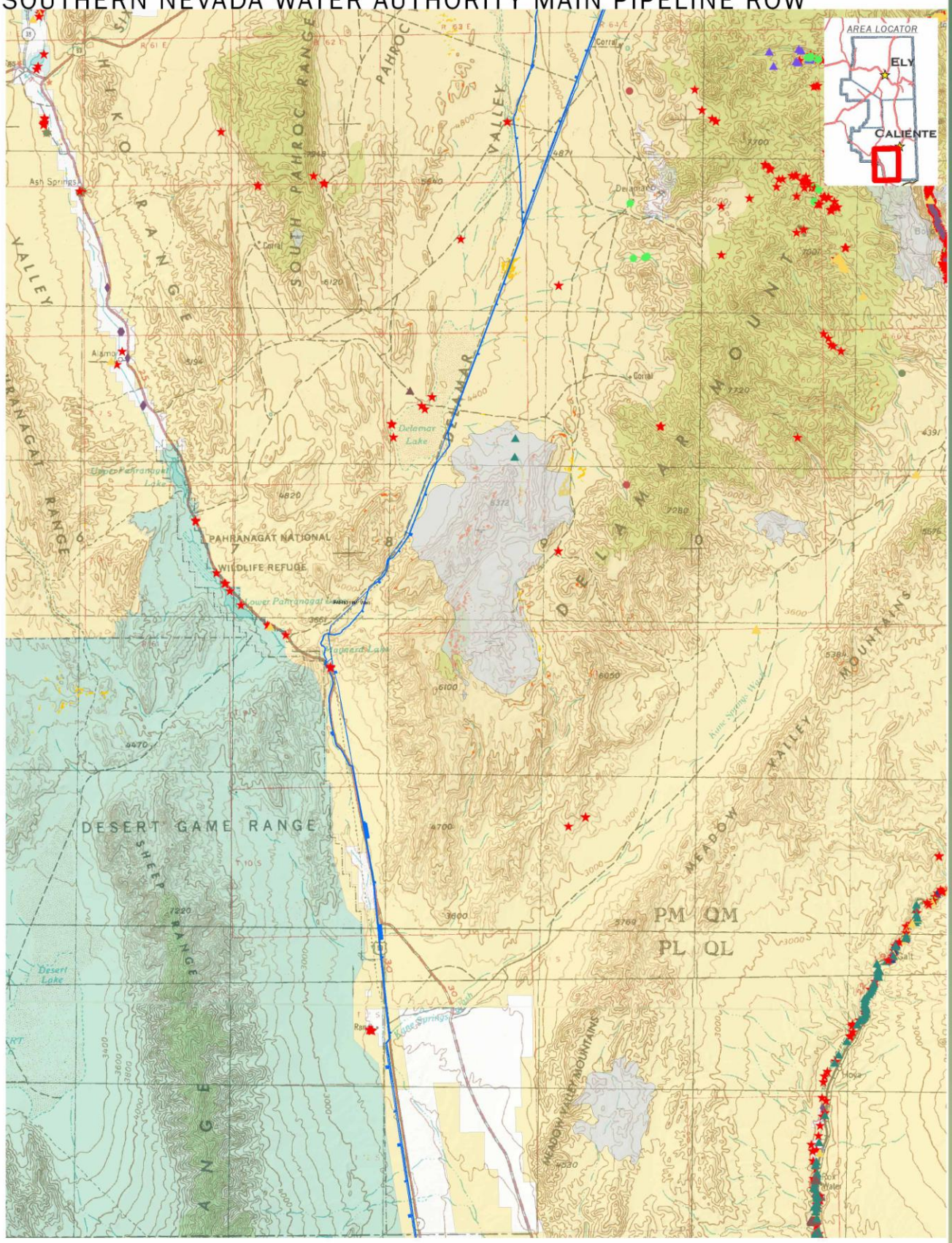
Ely District Office

WEED RISK ASSESSMENT - MAP 5
SOUTHERN NEVADA WATER AUTHORITY MAIN PIPELINE ROW



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ROW Main Pipeline

Ely Dist. Noxious Weed Inventory

Commonname

- BLACK HENBANE
- BLACK LOCUST
- BULL THISTLE
- CANADA THISTLE
- COMMON MULLEIN
- DALMATIAN TOADFLAX
- DIFFUSE KNAPWEED
- DYER'S WOAD
- JOHNSON GRASS
- LEAFY SPURGE
- MALTA STARTHISTLE
- MUSK THISTLE
- POISON HEMLOCK
- PUNCTUREVINE
- RUSSIAN KNAPWEED
- SAHARA MUSTARD
- SALT CEDAR
- SCOTCH THISTLE
- SPOTTED KNAPWEED
- SQUARROSE KNAPWEED
- TALL WHITETOP
- TREE OF HEAVEN
- WATER HEMLOCK
- WHITETOP/HOARY CRESS
- YELLOW TOADFLAX
- Invasive Annual and Biennial Forbland
- Invasive Annual Grassland
- Invasive Perennial Grassland

- Past Large Fires
- Bureau of Land Management
- Bureau of Reclamation
- U.S. Forest Service
- Natl. Park Service
- Bureau of Indian Affairs
- Fish & Wildlife Service
- Dept. of Energy
- Dept. of Defense
- Parks
- NV State Lands
- Private
- Water

N

1:250,000

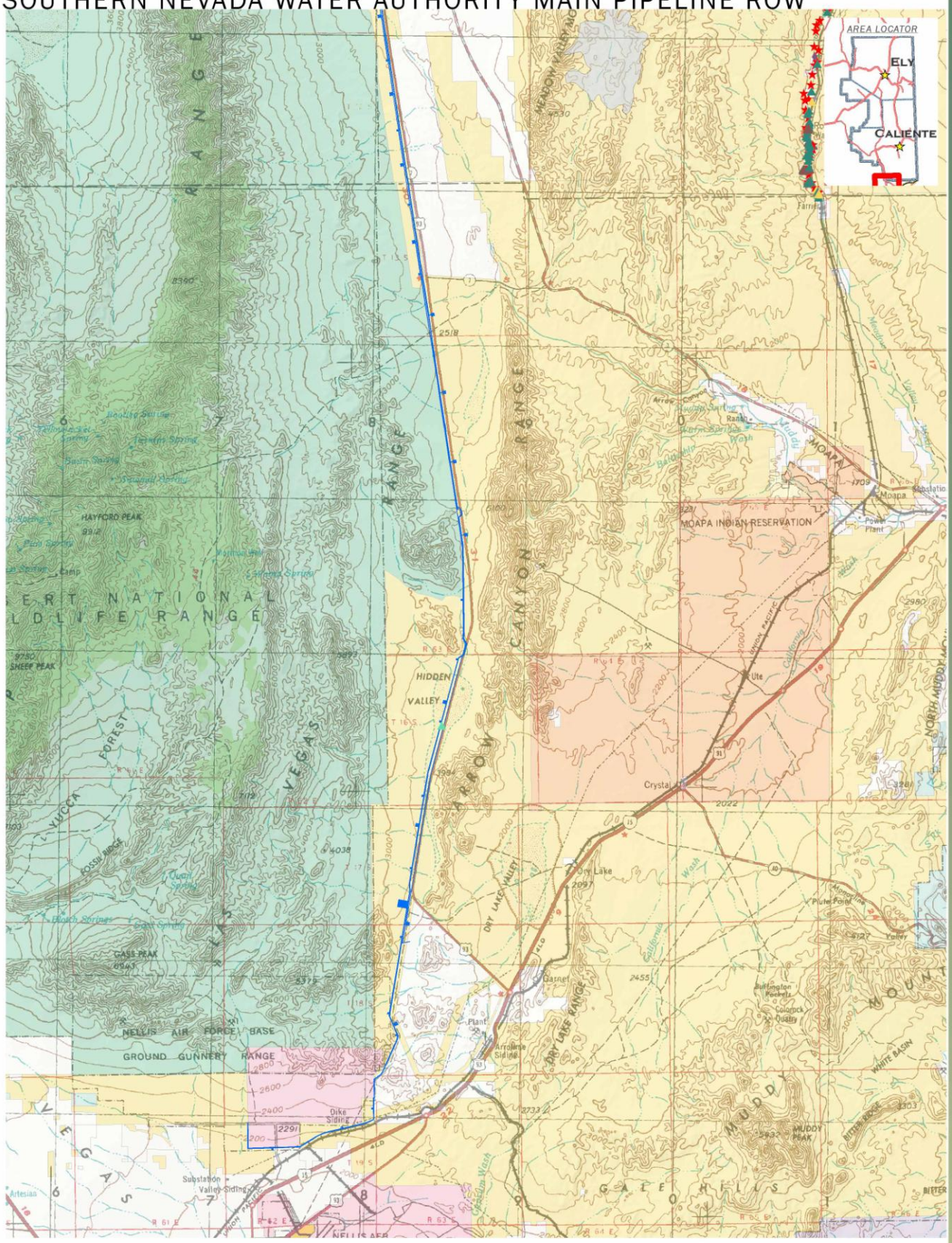
No warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual use or aggregate use with other data.

BLM

Ely District Office

WEED RISK ASSESSMENT - MAP 6
SOUTHERN NEVADA WATER AUTHORITY MAIN PIPELINE ROW

BLM



Legend

ROW Main Pipeline

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Table F3.5-3

Cactus and Yucca Species Inventoried Within the ROW

Table F-3.5-3 Cactus and Yucca Species Inventoried Within the ROW

	Las Vegas Valley	Garnet Valley	Coyote Springs Valley	Pahranagat Valley	Delamar Valley	Dry Lake Valley	Cave Valley	Lake Valley	Spring Valley (basin #201)	Snake Valley	Spring Valley (basin #184)	Hamlin Valley
Wiggins' Cholla *(Cylindropuntia echinocarpa)*	R	R	R	R	R	R						
Branched Pencil Cholla *(Cylindropuntia ramosissima)*	R		R									
Cottontop Cactus (*Echinocactus polycephalus*)	R	R	R	R								
Engelmann's Hedgehog Cactus (*Echinocereus engelmannii*)	R	R	R	R	R	R				R		
Kingcup Cactus (*Echinocereus triglochidiatus)*			R									
Johnson's Fishhook Cactus (*Echinomastus johnsonii*)	R	R										
New Mexico Spiny Star *(Escobaria vivipara var. vivipara)*					R	R	R	R		R	R	R
Leconte's Barrel Cactus *(Ferocactus cylindraceus)*	R	R	R									
Matted Cholla *(Grusonia parishii)*			R									
Sagebrush Cholla *(Grusonia pulchella)*										R		
Common Fishhook Cactus (*Mammillaria tetrancistra)*		R	R	R								
Beavertail Pricklypear (*Opuntia basilaris*)	R	R	R	R								
Tulip Pricklypear Cactus (*Opuntia phaeacantha*)			R									
Grizzlybear Pricklypear (*Opuntia polyacantha* var.*erinacea*)			R	R	R	R	R	R		R	R	
Plains Pricklypear (*Opuntia polyacantha* var *hystricina*)						R	R					
Mountain Ball Cactus *(Pediocactus simpsonii)*							R	R			R	
Blaine Fishhook Cactus *(Sclerocactus blainei)*						R						
Great Basin Fishhook Cactus *(Sclerocactus pubispinus)*												R
Desert Valley Fishhook Cactus (*Sclerocactus spinosior*)												R

Table F-3.5-3 Cactus and Yucca Species Inventoried Within the ROW

	Las Vegas Valley	Garnet Valley	Coyote Springs Valley	Pahranagat Valley	Delamar Valley	Dry Lake Valley	Cave Valley	Lake Valley	Spring Valley (basin #201)	Snake Valley	Spring Valley (basin #184)	Hamlin Valley
Banana Yucca *(Yucca baccata)*			R	R	R							
Joshua Tree *(Yucca brevifolia)*			R	R	R	R						
Spanish Bayonet *(Yucca harrimaniae)*							R			R	R	
Mojave Yucca (*Yucca schidigera*)	R	R	R	R								

R = Species is present in the ROWs.

Table F3.5-4

Special Status Plant Species Potentially Occurring Within the Project Area

Table F3.5-4 Special Status Plant Species Potentially Occurring Within the Project Area

Species	Status	Blooming Period	Habitat Requirements
Perennial Herb			
Coville Abronia (*Abronia nana covillei*)	USFS	May – August	Found on carbonate, sandy soils in Great Basin scrub, Joshua tree woodlands, pinyon-juniper woodlands, subalpine coniferous forest and upper montane coniferous forests. Grows at elevations of 5,250 to 10,170 feet.
Shockley's Rockcress (*Arabis shockleyi*)	USFS	May – June	Found in shadscale-galleta, ephedra-matchweed, sagebrush, mountain mahogany, and pinyon-juniper communities. Recorded in Clark, Lincoln, Mineral, Nye, and White Pine counties and possibly exists in Esmeralda County, Nevada. Grows at elevations of 4,000 to 8,000 feet.
Las Vegas Bearpoppy (*Arctomecon californica*)	NVCE	April – May	Found on open, dry soils with high gypsum content in areas of generally low relief with a sparse cover of other gypsum-tolerant species. Recorded in Clark County, Nevada. Grows at elevations of 1,060 to 3,642 feet.
White Bearpoppy (*Arctomecon merriamii*)	USFS	April – June	Found on a wide variety of dry to sometimes moist basic soils, including alkaline clay and sand, gypsum, calcareous alluvial gravels and carbonate rock outcrops. Grows at elevations of 2,000 to 6,280 feet.
Eastwood Milkweed (*Asclepias eastwoodiana*)	USFS	April – June	Found in open areas on a wide variety of basic soils. Frequent in small washes or other moisture-accumulating microsites in the shadscale, mixed-shrub, sagebrush, and lower pinyon-juniper zones. Grows at elevations of 4,680 to 7,080 feet.
Sheep Mountain Milkvetch (*Astragalus amphioxys* var. *musimonum*)	BLM	April – May	Found in carbonate alluvial gravels particularly along drainages, roadsides, and in other microsites with enhanced run-off in mixed desert shrub communities. Grows at elevations from 4,400 to 6,000 feet.
Meadow Milkvetch (*Astragalus diversifolius*)	USFS	June – August	Found in moist, often alkaline meadows and swales in sagebrush valleys. Recorded in White Pine County, Nevada. Grows at elevations of 4,400 to 6,300 feet.
Needle Mountains Milkvetch (*Astragalus eurylobus*)	BLM	April – July	Found in generally deep, barren, sandy, gravelly, or clay soils derived from sandstone or siliceous volcanics. Frequent in or along drainages. Grows at elevations of 4,600 to 5,750 feet.
Funeral Milkvetch (*Astragalus funereus*)	BLM USFS	March – April	Found in dry, open scree, talus, or gravelly alluvium derived from light colored volcanic tuff, commonly on east, south-facing aspects. Grows at elevations of 3,200 to 7,680 feet.
Long-Calyx Eggvetch (*Astragalus oophorus* var. *lonchocalyx*)	BLM	April – June	Found on calcareous soils with gravels and fragments, coarse sandy gravel, and volcanics in pinyon-juniper woodlands, sagebrush, and mixed desert shrub habitat. Grows at elevations of 6,000 to 7,480 feet.
Alkali Mariposa Lily (*Calochortus striatus*)	BLM USFS	April – June	Found in moist alkaline meadows and around springs in the creosote bush zone. Recorded in Clark and Nye counties, Nevada. Grows at elevations of 2,100 to 3,700 feet.
Monte Neva Paintbrush (*Castilleja salsuginosa)*	BLM NVCE	June – July	Found in damp, open, and alkaline to saline clay soils of hummocks and drainages on travertine hot-spring mounds. Recorded in Eureka and White Pine counties, Nevada. Grows at elevations of 5,950 to 6,150 feet.
Las Vegas Catseye (*Cryptantha insolita*)	BLM NVCE	April – June	Found on light-colored, alkaline clay flats and low hills in the creosote bush zone. Recorded in Clark County, Nevada. Grows at elevations of 1,900 to 2,000 feet.

Table F3.5-4 Special Status Plant Species Potentially Occurring Within the Project Area

Species	Status	Blooming Period	Habitat Requirements
White River Catseye (*Cryptantha welshii*)	BLM	May – June	Found on dry, open, sparsely vegetated outcrops, mostly in *Juniperus – Artemesia - Chrysothamnus* vegetation. Grows at elevation of 4,540 to 6,660 feet.
Silverleaf Sunray (*Enceliopsis argophylla*)	BLM	Continuous	Found in dry, open, relatively barren areas on gypsum badlands, volcanic gravels, and loose sands in the creosote-bursage zone. Found in Clark County Nevada. Grows at elevations of 1,165 to 2,380 feet.
Sheep Fleabane (*Erigeron ovinus*)	BLM	June	Found in crevices in carbonate cliffs and ridgeline outcrops in the pinyon-juniper and montane conifer zones. Recorded in Clark and Lincoln counties, Nevada. Grows at elevations of 3,600 to 8,400 feet.
Sunnyside Green Gentian (*Frasera gypsicola*)	BLM NVCE	June – July	Found in open, dry, whitish, alkaline, often salt crusted and spongy silty clay soils on calcareous flats and barrens surrounded by sagebrush, greasewood, and occasionally barberry and swamp cedar vegetation. Recorded in Nye and White Pine counties, Nevada. Grows at elevations of 5,180 to 5,510 feet.
Rock Purpusia (*Ivesia arizonica* var. *saxosa*)	BLM	May – July	Found on cliffs and boulders on volcanic and possibly carbonate rocks in the upper mixed-shrub, sagebrush, and pinyon-juniper zones. Recorded in Lincoln and Nye counties, Nevada. Grows at elevations of 4,925 to 6,800 feet.
Jaeger Ivesia (*Ivesia jaegeri)*	BLM USFS	June – August	Found in rock crevices of limestone cliffs and lower-angle bedrock outcrops. Recorded in Clark County, Nevada. Grows at elevations of 5,200 to 11,060 feet.
Yellow Two-Tone Beardtongue (*Penstemon bicolor bicolor*)	BLM USFS	May – June	Found in calcareous or carbonate soils in washes, roadsides, rock crevices, outcrops, or similar places receiving enhanced runoff in the creosote-bursage, blackbrush, mixed-shrub, and lower juniper zones. Recorded in Clark County, Nevada. Grows at elevations of 2,500 to 5,480 feet.
Rosy Two-Tone Beardtongue (*Penstemon bicolor roseus*)	USFS	March – April	Found in rocky calcareous, granitic, or volcanic soils in washes, roadsides, scree at outcrop bases, rock crevices, or similar places receiving enhanced runoff in the creosote-bursage, blackbrush, and mixed-shrub zones. Recorded in Clark and Nye counties Nevada. Grows at elevations of 1,800 to 4,950 feet.
Pygmy Poreleaf (*Porophyllum pygmaeum*)	BLM	June	Found in dry, open, relatively deep, rocky carbonate soils of alluvial fans and hillsides in moisture-enhanced microsites in the blackbrush, mixed-shrub, and lower pinyon-juniper zones. Recorded in Clark and Lincoln counties, Nevada. Grows at elevations of 4,200 to 6,800 feet.
Jone's Globe-Mallow (*Sphaeralcea caespitosa*)	BLM	Not available	Found in Sevy Dolomite rock calcareous soils in mixed shrub, pinyon-juniper, and grass communities. Recorded in Nye County, Nevada. Grows at elevations of 4,770 to 5,310 feet.
Ute Ladies' Tresses (*Spiranthes diluvialis*)	BLM USFS FT	August – September	Found on moist to very wet, somewhat alkaline or calcareous native meadows near streams, springs, seeps, lake shores, or in abandoned stream meanders that retain ample groundwater. Recorded in Lincoln and White Pine counties, Nevada. Grows at elevations of 4,200 to 5,300 feet.
Charleston Grounddaisy (*Townsendia jonesii* var. *tumulosa*)	BLM USFS	May – June	Found in open, sparsely vegetated calcareous areas, in shallow gravelly carbonate soils on slopes and exposed knolls of forest clearings mostly in the montane conifer zone extending to the pinyon-juniper, mountain mahogany, and lower subalpine conifer zones. Recorded in Clark and Nye counties, Nevada. Grows at elevations of 5,300 to 11,060 feet.

Table F3.5-4 Special Status Plant Species Potentially Occurring Within the Project Area

Species	Status	Blooming Period	Habitat Requirements
Annual Herb			
Threecorner Milkvetch (*Astragalus geyeri var. triquetrus*)	BLM NVCE	February – April	Found in open, deep sandy soil or dunes, generally stabilized by vegetation and/or a gravel veneer. Recorded on Clark and Lincoln counties Nevada. Grows at elevations of 1,100 to 2,400 feet.
Half-ring Milkvetch (*Astragalus mohavensis* var. *hemigyrus*)	BLM USFS	March – April	Found in carbonate gravels and derivative soils on terraced hills and ledges, open slopes, and along washes in the creosote-bursage, blackbrush, and mixed-shrub zones. Grows at elevations of 3,000 to 5,600 feet.
Sticky Buckwheat (*Eriogonum viscidulum*)	BLM NVCE	April – May	Found on deep loose sandy soils in washes, flats, roadsides, steep Aeolian slopes, and stabilized dune areas. Recorded in Clark and Lincoln counties, Nevada. Grows at elevations of 1,200 to 2,200 feet.
Parish Phacelia (*Phacelia parishii*)	BLM	May – June	Found in moist to superficially dry, open flat to hummocky, mostly barren, often salt crusted silty-clay soils on valley bottom flats, lake deposits, and playa edges surrounded by saltbrush scrub vegetation. Recorded in Clark, Lincoln, Nye, and White Pine counties, Nevada. Grows at elevations of 2,190 to 5,950 feet.
Perennial Tree/Shrub			
Spiny Star *(Coryphantha vivipara)*	NVCY	April – August	Found on diverse substrates in desert scrub to conifer forests, mostly on low hills or mountaintops. Grows at elevations of 650 to 8,900 feet.
Silver Cholla *(Cylindropuntia echinocarpa)*	NVCY	March – June	Found in sandy, loam, and alluvial to gravelly substrates in desert grasslands, juniper, oak-juniper woodlands, flats, bajadas and canyons in the Mojave and Sonoran deserts. Grows at elevations of 160 to 5,600 feet.
Pencil Cholla *(Cylindropuntia ramosissima)*	NVCY	April – August	Found on sandy loam, desert pavement, and stony volcanic substrates in washes, flats, and bajadas in the Mojave and Sonoran deserts. Grows at elevations of 160 to 3,610 feet.
Hedgehog Cactus *(Echinocereus engelmannii*)	NVCY	April – May	Found on gravelly, sandy, or rocky soils of hillsides, washes, and canyons in the desert, plains, piney woods, chaparral and grass communities. Grows at elevations of 650 to 7,900 feet.
Cottontop Cactus *(Echinocactus polycephalus*)	NVCY	May – July	Found on rocky bajadas and outcrops in the Mohave Desert scrub community. Grows at elevations of 0 to 3,290 feet.
Claret-cup Cactus (*Echinocereus triglochidiatus)*	NVCY	April – June	Found in gravelly soils in grasslands, shrublands, pinyon/juniper, or aspen communities. Grows at elevations of 3000 to 8,000 feet in elevation.
Johnson's Fishhook Cactus (*Echinomastus johnsonii*)	NVCY	February – May	Mojave desert scrub and upper edge of Sonoran desert scrub, rocky slopes, gravelly hills. Grows at elevations of 1,640 to 4,600 feet.
Las Vegas Buckwheat (*Eriogonum corymbosum* var. *nilesii*)	BLM	August – November	Found in and near gypsum soils, often forming low mounds or outcrops in washes and drainages, or in areas of low relief. Recorded in Clark County, Nevada. Grows at elevations of 1,900 to 3,840 feet.
Clokey Buckwheat (*Eriogonum heermannii* var. *clokeyi*)	BLM USFS	June – August	Found on carbonate outcrops, talus, scree, and gravelly washes and banks in the creosote-bursage shadscale and blackbrush zones. Recorded in Clark and Nye counties, Nevada. Grows at elevations of 4,000 to 6,000 feet.

Table F3.5-4 Special Status Plant Species Potentially Occurring Within the Project Area

Species	Status	Blooming Period	Habitat Requirements
Barrel Cactus *(Ferocactus cylindraceus)*	NVCY	March – June	Found on rocky slopes, igneous and limestone substrates in interior chaparral, Mojave desert scrub, and Sonoran desert scrub areas. Grows at elevations of 0 to 4,900 feet.
Matted Cholla *(Grusonia parishii)*	NVCY	May – June	Found in sandy and rocky soils in Joshua tree woodlands, Mojave desert scrub, and Sonoran desert scrub areas. Grows at elevations of 980 to 5,000 feet.
Sagebrush Cholla *(Grusonia pulchella)*	NVCY	May – July	Found on sandy to rocky flats or slopes, often at edges of dry washes and lakes in the Mojave Desert and Great Plains. Grows at elevations of 3,900 to 6,250 feet.
Waxflower (*Jamesia tetrapetala*)	BLM USFS	Not available	Found in crevices on limestone cliffs. Recorded in Lincoln, Nye, and White Pine counties, Nevada. Grows at elevations of 7,000 to 10,720 feet.
Fishhook Cactus (*Mammillaria tetrancistra)*	NVCY	June – July	Found on dry, well-drained gravelly and rocky flats, bajadas, and moderate slopes in the lower mountains in the Mojave Desert scrub and pinyon-juniper woodland communities. Grows at elevations of 0 to 4,500 feet.
Pioche Blazingstar (*Mentzelia argillicola*)	BLM	Not available	Found in clay soils in relatively barren areas. Recorded in Lincoln County, Nevada.
Tiehm Blazingstar (*Mentzelia tiehmii*)	BLM	Not available	Found in clay soils in relatively barren areas.
Beavertail Pricklypear *(Opuntia basilaris)*	NVCY	July – August	Found on well-drained sandy, gravelly, and rocky soils on desert flats, upper bajadas, and moderate slopes into the lower mountains in creosote-bursage flats, Mojave desert scrub and pinyon-juniper woodland communities. Grows at elevations of 0 to 7,000 feet.
Pricklypear Cactus (*Opuntia phaeacantha*)	NVCY	June – July	Found on well-drained sandy, gravelly, and rocky soils along washes and on upper bajadas and moderate slopes into the lower mountains in the creosote-bursage flats and Mojave desert scrub and pinyon-juniper woodland communities. Grows at elevations of 0 to 7,300 feet.
Grizzlybear Pricklypear *(Opuntia polyacantha* var. *erinacea)*	NVCY	June – July	Found in well-drained sandy, gravelly, and rocky soils along washes, canyons, and on upper bajadas and moderate slopes into the lower mountains in the Upper Sonoran Mojave Desert scrub and pinyon-juniper woodland communities. Grows at elevations of 3,000 to 7,000 feet.
Plains Pricklypear *(Opuntia polyacantha* var. *hystricina)*	NVCY	April – May	Found in clay or limestone soils in grasslands and pinyon-juniper woodlands. Grows at elevations of 4,250 to 6,250 feet.
Sand Cholla (*Opuntia pulchella*)	NVCY	May	Found in sandy soils on desert dunes in the Great Basin scrub and Mojave desert scrub areas. Grows at elevations of 4,900 to 6,500 feet.
Simpson Hedgehog Cactus *(Pediocactus simpsonii)*	NVCY	May – July	Found in pinyon-juniper woodlands, sagebrush, montane, prairie grasslands and coniferous forests. Grows at elevations of 4,550 to 11,490 feet.
Blaine Fishhook Cactus *(Sclerocactus blainei)*	BLM NVCY	June – August	Found in alkaline calcareous and volcanic gravelly-clay soils in open valley bottom areas in the shadscale and lower sagebrush zones. Recorded in Nye County, Nevada. Grows at elevations of 5,100 to 5,300 feet.
Great Basin Fishhook Cactus *(Sclerocactus pubispinus)*	NVCY	April – May	Found in light colored soils of limestone or dolostone origin on sagebrush and shadscale flats in pinyon-juniper woodlands. Grows at elevations of 4,550 to 7,250 feet.

Table F3.5-4 Special Status Plant Species Potentially Occurring Within the Project Area

Species	Status	Blooming Period	Habitat Requirements
Desert Valley Fishhook Cactus (*Sclerocactus spinosior*)	NVCY	April – May	Found on Igneous or calcareous gravels, sagebrush and shadscale flats in pinyon-juniper woodlands. Grows at elevations of 4,900 to 6,600 feet.
Banana Yucca *(Yucca baccata)*	NVCY	April – June	Generally found on west- and south-facing aspects of dry slopes and washes where precipitation averages 6 inches. It is widespread throughout the southwestern U.S. Grows at elevations of 2,700 to 8,000 feet.
Joshua Tree *(Yucca brevifolia)*	NVCY	February – April	Found in silts, loams, and or fine, loose, well drained, and or gravelly soils. Its distribution follows the boundary of the Mojave Desert. Grows at elevations of 2,600 to 7,200 feet.
Spanish Bayonet *(Yucca harrimaniae)*	NVCY	April – June	Found on desert slopes, foothills, and plateaus in limestone and volcanic outcrops. Grows at elevations of 3,280 to 8,200 feet.
Mojave Yucca *(Yucca schidigera)*	NVCY	April – June	Found on rocky desert slopes and Creosote desert flats. Found throughout the Mojave and Sonoran deserts. Grows at elevations below 7,000 feet.
Perennial Subshrub			
Mound Cryptantha (*Cryptantha compacta*)	BLM	May – July	Found on Sevey dolomite and gravelly loam on open slopes and ridges in salt desert shrub and mixed desert shrub communities. Grows at elevations of 6,200 and 7,400 feet.
New York Mountains Catseye (*Cryptantha tumulosa*)	USFS	April – June	Found in gravel or clay, granitic or limestone soils in the desert mountains. Recorded in Clark and Nye counties Nevada. Grows at elevations of 4,480 to 9,900 feet.
Ibex Buckwheat (*Eriogonum nummulare* var. *ammophilum*)	BLM	June – August	Found on alluvium and sandy soils in shadscale, horsebrush, winterfat, rabbitbrush, and pinyon-juniper communities. Grows at elevations of 4,800 to 6,000 feet.
Rough Dwarf Greasebush (*Glossopetalon pungens* var. *pungens*)	BLM	April – July	Found in crevices of carbonate cliffs and outcrops, generally avoiding southerly exposures, mainly in the lower pinyon-juniper and montane conifer zones. Recorded in Clark and Nye counties, Nevada. Grows at elevations of 4,400 to 7,800 feet.
Tunnel Springs Beardtongue (*Penstemon concinnus*)	BLM USFS	Not available	Recorded in Lincoln and White Pine counties, Nevada. Grows at elevations of 6,200 to 6,600 feet.
Frisco Clover (*Trifolium friscanum*)	BLM	June	Found in volcanic gravels and limestone soils in pinyon-juniper woodlands. Grows at elevations of 6,900 to 7,300 feet.
Woody Perennial			
Remote Rabbitbrush (*Chrysothamnus eremobius*)	BLM	August – September	Found in crevices or rubble of north-facing carbonate cliffs in and just below the pinyon-juniper-*Artemesia* zone. Grows at elevations of 4,850 to 6,400 feet.
Semi-Woody Perennial			
Scarlet Buckwheat (*Eriogonum phoeniceum*)	BLM	June – July	Found on white tuffaceous knolls, bluffs, rocky flats and openings in pinyon-juniper woodlands. Recorded in Lincoln County, Nevada. Grows at elevations of 6,700 to 7,200 feet.

Status: FT = Federally threatened; USFS = Forest Service sensitive species; BLM = Bureau of Land Management sensitive species;
NV = Nevada protected species: CE = critically endangered; CE# = recommended for listing as critically endangered; and CY = protected as a cactus or yucca under NRS 527.060-.120.

Culturally Significant Plants and Animals Lists

- **Confederated Tribes of the Goshute Reservation**
- **Ely Shoshone Culturally Sensitive Plants**
- **The Paiute Indian Tribe of Utah**

CONFEDERATED TRIBES
of the
GOSHUTE RESERVATION
P.O. BOX 6104
IBAPAH, UTAH 84034
PHONE (435) 234-1138
FAX (435) 234-1162

April 27, 2010

Ms. Penelope Woods, Project Manager
Nevada Groundwater Projects Office
Bureau of Land Management
P.O. Box 12000
Reno, Nevada 89520

RE: ***Confederated Tribes of the Goshute Reservation's List of Culturally Significant Plants and Animals to be Included in the Clark, Lincoln, and White Pine Groundwater Development Project EIS***

Dear Ms. Woods:

This letter is in response to an email dated March 15, 2010, to Dr. Monte Sanford at EchoHawk Law Offices requesting tribal participation in providing a list of plants and animals that the Confederated Tribes of the Goshute Reservation (CTGR) consider to be culturally significant that may occur within the SNWA Groundwater Development Project areas of potential environmental impact.

Animals that are culturally significant to CTGR people include elk, bighorn sheep, antelope, deer, rabbits, bears, mountain lions, sage grouse, rock chuck, and various species of raptors and fishes. These animals occur throughout our historical aboriginal territories and throughout the proposed GWD Project area. These animal species have cultural significance to our people in many forms, including food resources, spiritual resources, and resources as traditional values.

Table 1 (Page 2) are the plant species that have cultural significance to CTGR people as food, medicines, or tools.

Please take these culturally significant plant and animal species into consideration in the GWD Project EIS.

Sincerely,

/s/ Rupert Steele
Rupert Steele, Chairman

CTGR Tribal Council
Confederated Tribes of the Goshute Reservation

cc: CTGR Tribal Council
Tribal Executive Director
Paul EchoHawk, Tribal Attorney
Monte P. Sanford, Ph.D.

Table 1. List of plants that are culturally significant to CTGR people.

Scientific Name	**Common Name**
Apocynum androsaemifolium	Dogbane or Indian Hemp
Balsamorhiza sagittata	arrowroot
Cymopterus longipes	longstalk spring parsley
Eriogonum jamesii	antelope sage
Eriogonum umbellatum	sulfur flower
Cnicus eutoni	plumed thistle
Circium eatoni	mountain thistle
Circium undulatum	wavy-leaved thistle
Scirpus lacustris var. occidentalis	tule (bulrush)
Lomatium multifida	biscuit root
Calochortus nuttallii	sego lily
Fritillaria pudica	lily
Erythronium grandiflorum	fawn lily
Camassia quamash	blue camas
Allium bisceptrum	wild onion
Claytonia caroliniana	common spring beauty
Carum gairdneri	edible-rooted caraway
Atriplex confertifolia	shadscale
Atriplex truncata	wedgescale saltbush
Salicornia herbacea	brittlewort
Salicornia europaea	glasswort
Sisymbrium canescens	tansy mustard
Dracocephalum parviflorum	dragonhead mint
Lophanthus urticifolius	horsemint giant hyssop
Agastache urticifolia	
Balsamorhiza hookeri	arrowroot
Wyethia amplexicaulis	mule's ear
Gymnolomia multiflora	showy goldeneye
Helianthus annuus lenticularis	sunflower
Triglochin maritima	sea arrow grass
Typha latifolia	cattail
Pinus monophylla	pinion pine-nuts
Quercus undulata	scrub oak
Amelanchier alnifolia	service berry
Ribes cereum	currants
Rosa californica	rose hips
Rosa fendleri	rose hips
Mentha canadensis	mint
Mentha arvensis	mint
Ephedra sp.	mountain tea
Pseudotsuga douglasii	douglas fir
Bigelovia douglasii	greater rabbit brush
Nicotiana attenuata	native tobacco
Cornus stolonifera	
Salix sp.	willows
Amelanchier alnijolia	service berry
Malvastrum munroanum	mucilage
Cercocarpus ledifolius	mountain mahogany
Artemisia tridentata	sagebrush
Juniperus osteosperma	cedar
Shepherdia sp.	buffalo berry
Ipomopsis aggregata	skyrocket
Gilia aggregata	
Peucedanum graveolens	dill
Anethum graveolens	
Lomatium multifidum	biscuit root
Prunus demissa	chokecherry
Zygadenus nuttallii	poison sego
Zigadenus elegans	death camas
Anticlea elegans	
Eurotia lanata	white sage/winterfat
Chrysothamnus nauseosus	

2800(NV910)
N-78803

Ely Shoshone Culturally Sensitive Plants (*)

Dichelostemma pulchellum	Desert Hyacinth	sigo
Allium nevadense S. Wats	Nevada Onion	gunk
Calochortus flexuosus S. Wats	Winding Mariposa Lily	sigo
Leymus cinereus	Basin Wild Grass	wa:vi
Achnatherum hymenoides	Indian Ricegrass	wai
Phragmites australis	Common Reed	behabe
Juncus balticus	Baltic Rush	sonohpi, sineva or pondaseep
Aquilegua Formosa	Crimson Columbine	enga-moh-wanya
Phlox longifolia	Longleaf Phlox	din-ah-ee-go
Penstemon eatonii	Firecracker Penstemon	toh-quah-bag-um
Rumex salicifolius	Willow Dock	be-ja-no-ko , dim-woo-ee
Urtica dioica	Stinging Nettle	tin'-ai-gop
Chenopodium atrovirens	Goosefoot	uyup
Linum lewisii	Prairie Flax	boo-ee-nut-ah-zoom
Argemone munita	Flatbud Prickly Poppy	sag-ee-da
Orobanche spp,	Broomrape	too-ee
Castilleja agustifloria	Indian Paintbrush	taqua-winnop
Salvia columbariae	Chia	pacita
Apocynum cannabinum	Indian Hemp	wana
Sambucus curulea	Blue Elderberry	
Ribes spp.	Gooseberry or Current	dembogen

(*) THIS LIST AGUMENTS THE LIST SUBMITTED BY CTGR!

Rosa woodsii	Woods Rose	see-am-bip
Camassia esculenta	Camas	pasigo
Elaegnus argentea	Bull Berry	weyumb

THE PAIUTE INDIAN TRIBE OF UTAH

440 North Paiute Drive • Cedar City, Utah 84721 • (435) 586-1112

June 8 , 2010

Ms. Penelope Woods, Project Manager
Nevada Groundwater Projects Office
Bureau of Land Management
P. O. Box 12000
Reno, Nevada 89520

Dear Ms. Woods,

Subject: ***Tribal Culturally Sensitive Species of Plants and Animals to be identified for Analysis in the Clark, Lincoln and White Pine Counties Groundwater Development EIS***

The Paiute Indian Tribe of Utah is receipt of your letter June 02, 2010 and have made a listing of the Paiute Indian Tribe of Utah's culturally significant plants. All animals are and should be culturally significant to the American Indian peoples. The Deers, Antelopes, Elks, Mt. Sheep, Jack/Cottontail Rabbits, Bears, and the Desert Tortoises have always been a source for food and clothing and many traditional/cultural uses. Including the fish in the streams and lakes, Eagles and Hawks are also very important like every thing that was put here on this planet for us to take care of and preserve. We need to protect these resources so that these sites may remain in their present state and the overall integrity of the area be preserved as they are a part of **ALL** our interest.

The Paiute Indian Tribe of Utah sincerely appreciates the consideration and efforts you and your staff have made to consult with the tribes.

Sincerely,

Dorena Martineau

Dorena Martineau
Cultural Resources
Paiute Indian Tribe of Utah
440 North Paiute Drive
Cedar City, Utah 84721

CULTURALLY SIGNIFICANT PLANTS

Common yarrow: Used as a dressing to stop bleeding and infection, also you can boil the Yarrow and use it as a fever medicine.

Twincrest onion: Edible, boil the flowers and the leaves, also they were used as a flavoring in foods. The bulbs were also eaten.

Yerba mansa: Reduces inflammation from infection and injury.

Groundnut: Put in foods and used as a flavoring,edible.

Indianhemp: It was used for many purposes they used it to make rope and cordage, the Indian Hemp cordage was also used into the making of the Rabbit Skin Blankets.

Field sagewort:

Tarragon:

Prairie sagewort:

White sagebrush: Boiling the leaves to make a tea can help with colds and fever.

Mexican whorled milkweed: It was also used for many purposes, it made stout twine that was made into rabbit nets and mats, clothing, many other articles.

Showy milkweed: This was a very important source of fiber, this was made into fine twine that was made into clothing, nets, and many other items.The milky substance was also used as a medicine for warts, corns, calluses.

Butterfly milkweed:

Fringed redmaids:

Saguro:

Jersey tea:

Sugarberry:

Eastern redbud:

California redbud: This was used for Basket making, the leaves were used as an incense.

Redosier dogwood: This wood was useful for many items like cradle boards, and the rim of baskets, because it is very flexible.

Western dogwood:

Bluedicks:

Blacksamson echinacea:

Nevada joinfir:

Mormon tea: This plant is known as Indian tea, you can break and boil the stems to make a delicious tea.Can be dryed and stored for later
use, and it is still used to this day.

Philadelphia fleabane: This plant was made into a tea and used to break fevers.

Woodland:

Strawberry: Eaten fresh or could be dried and stored for later use. Strawberry leaves and roots were steeped and used in bowel complaints.

Virginia strawberry:

Checker lily:

Broom snakeweed:

Common sunflower: These would be collected and could be dried for later use. they would roast them, also they could be ground into flour
and by adding water to the ground pinyon nuts and cooking it, it would make a rich and delicious mush.

Northern sweetgrass:

Rocky mountain iris:

Baltic rush: The stem base were cooked and eaten, also the rushes were used for basket making.

Common rush: The rushes were used for basket making, insulation for dwelling walls.

Pinchot`s juniper:

Rocky mountain juniper:

Bitter root:

Cardinaflower:

Great blue lobelia:

Bushy blazingstar:

Wild bergamot:

Deergrass:

Sacahuista:

Common evening rimrose:

Buckhorn cholla: The fruit is eaten from the cactus.

Large beardtongue:

Singleleaf pinyon: The cones were taken off the tree and the seeds were beaten out with a stick, the nuts were then roasted and eaten.
Also the nuts were taken out off the shell and ground to flour on a metate and you could cook with some water to make
a delicious mush. The pine pitch from the tree is called sunup. Hardened pieces of pitch were also used as chewing gum.
The pitch was also heated on the fire and was used to put on basket water jugs to make it water proof. The pitch was also
used on arrows and hafting stone knives. Also the pitch was used as a disinfectant when applied to cuts and wounds.

Frosted mint:

Fremont cottonwood: The inner bark was made into clothing.

Doubleclaw:

Honey mesquite: The seed pods are yellow when ripe, when they have dried they are then pounded in a mortar to a flour, after they are mixed
with water and spread out in the sun to dry, then they are broken up and could be used on long trips, stored for the winter,or
cooked and eaten. When the pods are not yet dried they are pounded in

the mortar and mashed and you could make a sweet drink out of them. The mesquite wood is a excellant source of fire wood, the coals hold high heat for a long time.

Western honey mesquite: The dried beans were pounded on a mortar and made in to a flour and could be stored for the winter when formed into little cakes.

Screwbean mesquite: This was a highly flavored food, pods were collected and pounded into meal. The small hard seeds were grounded separately and mixed with water to make a nutritious drink.

American plum:

Douglas-fir: The boughs of the fir trees were used to make a pine bough bed because the needles are not sharp.

Upright prarie coneflower:

Golden current: Arrows were made out of this wood.

American red rashberry: The berries were eaten fresh, or could be gathered and dried for the winter. The leaves were made into a strong tea for the loosening of the bowels.

Salmonberry:

Arumleaf arrowhead:

Broadleaf arrowhead:

Peachleaf willow:

Narrowleaf willow: The young and straight willows would be used in the making of cradle boards, baskets, basket hats, and winnowers.

Shinning willow:

Chia: The chia seeds were collected in the spring or early summer after flowers had dried, using a seed beater the seeds were then collected in a basket. Or you could collect the whole flowers and then beat the seeds out of the flowers. Then roast the seeds and ground them and mix with water to make a thick beverage or mush. The ground seeds were also used in the eye to relieve eye irritation.

Common elderberry: They were eaten fresh or you could mash and form into cakes to dry and

store for the winter or later use. You could also put into stews, or roasted over the coals and then eaten. Also you could boil the berries and make a delicious drink.

Tule: The tules were used to line the pits that were made for roasting foods. The roots were also edible.

California bulrush:

Common threesquare:

Russet buffaloberry:

Alkali sacaton:

Cows clover:

Southern cattail:

Broadleaf cattail: The cattails are still used to this day, they make a soft bedding, or used to cover the floor as carpet. The pollen is rich in food energy, in the spring they would cut off the tender young shoots, roast and eat them.

Cascade bilberry:

Thinleaf huckleberry:

California fan palm:

Chapparral yucca:

White fir:

Subalpine fir:

Saskatoon seviceberry: The seviceberry is excellant wood for making bows and arrows. The berries are also eaten when fresh or even dried for winter use. The berries can be made into a drink, and the leaves made into a tea.

Kinnikinnick:

Big sagebrush: The sagebrush is still used to this day for many useful purposes.Leaves were boiled and used for a fever and cold medicine. If you put the leaves up to your nose after rubbing them togeather and

inhale deeply to clear nose,sage acts as a disinfectant.
The dead leaves were for diaper padding.

Arrowleaf balsamroot:

Dwarf oregongrape:

Ross sedge:

Cull leaf mountain mahogany: This wood was a very strong and made good arrowshafts, also made strong sturdy digging sticks.

Green rabbitbrush:

Blue wildrye: The seeds were a good source of food by grinding into flour. Also the grass seved as bedding or matting.

Sheep fescue:

Common juniper: The dryed juniper bark is used to smoke the deer hides. The seeds were also strung and made into necklaces. The berries
were boiled and used as a medicine for a cough and cold remedy. Also the leaves were burned as a ceremonial purifier.

Two needle pinyon pine:

Ponderosa pine:

Aspen:

Chokecherry: The berries are edible but are very bitter.

Bluebunch wheatgrass:

Antelope bitterbrush:

Gamble oak:

Wood`s rose:

Schouler`s willow:

Red elderberry:

Bottlebrush squirreltail:

Figure F3.5-2

No Action – Cumulative Projected Drawdown Greater Than 10’ Phreatophytes, Springs and Streams

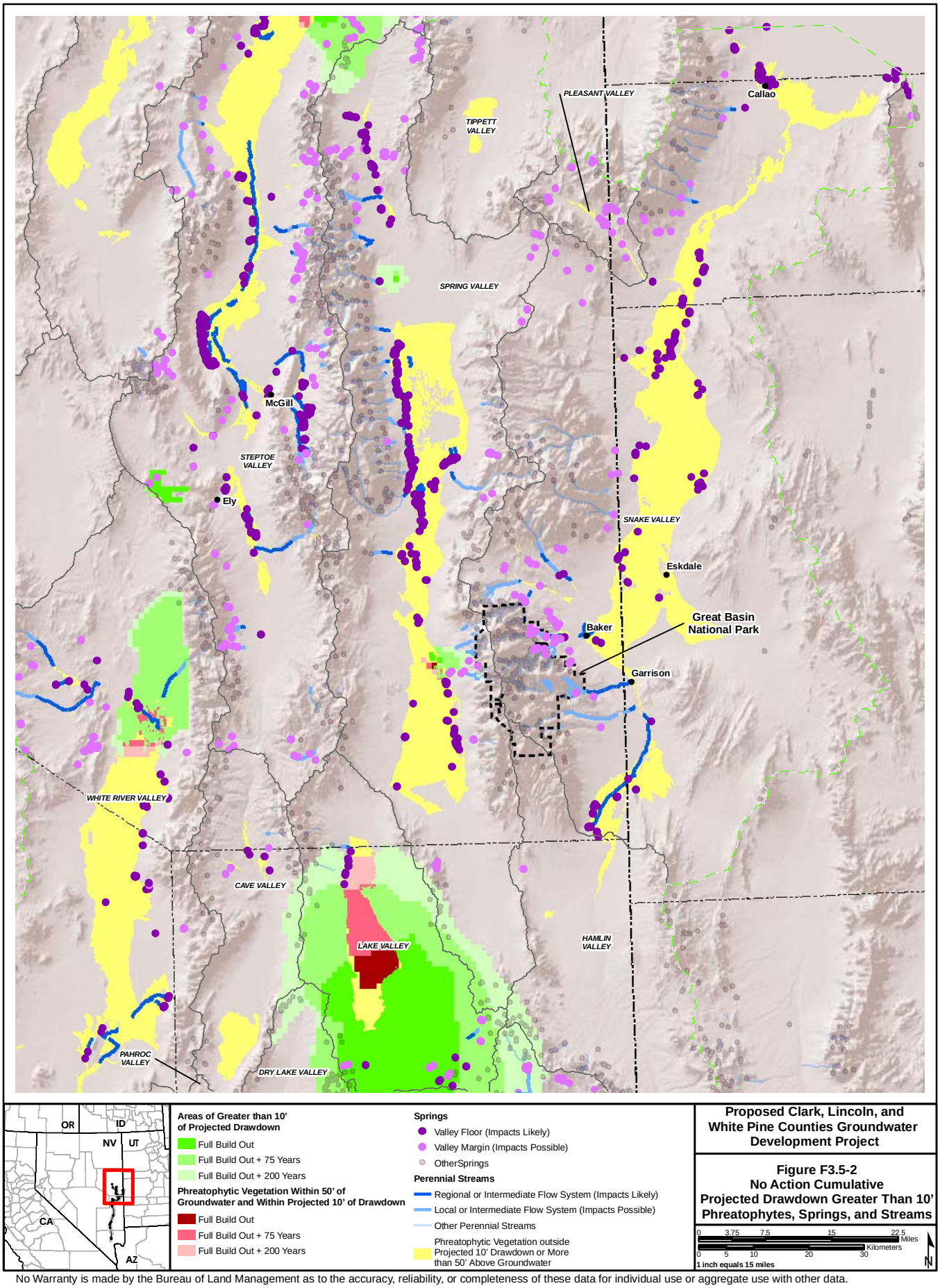


Figure F3.5-3

Proposed Action – Cumulative Projected Drawdown Greater Than 10’ Phreatophytes, Springs, and Streams

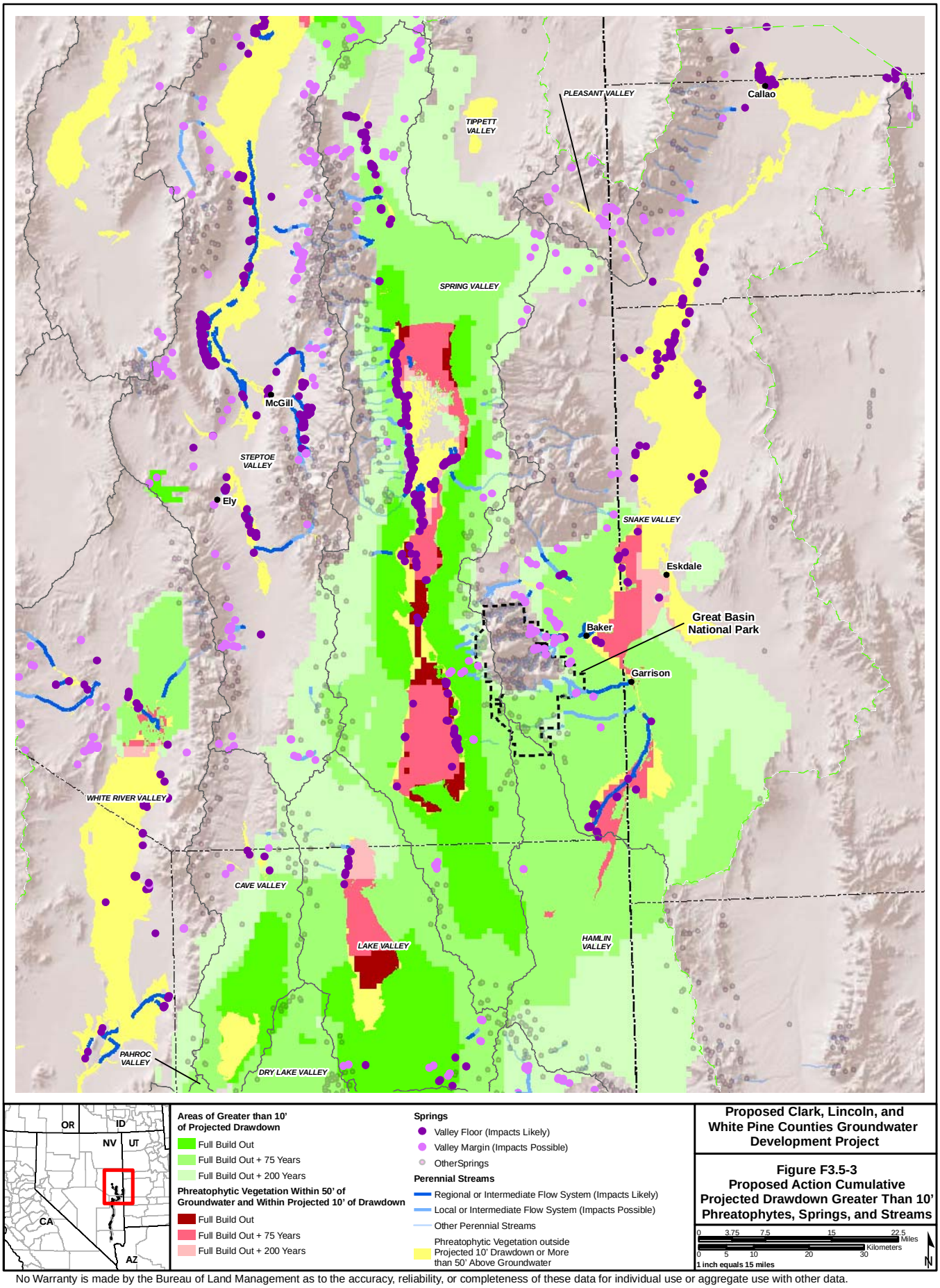
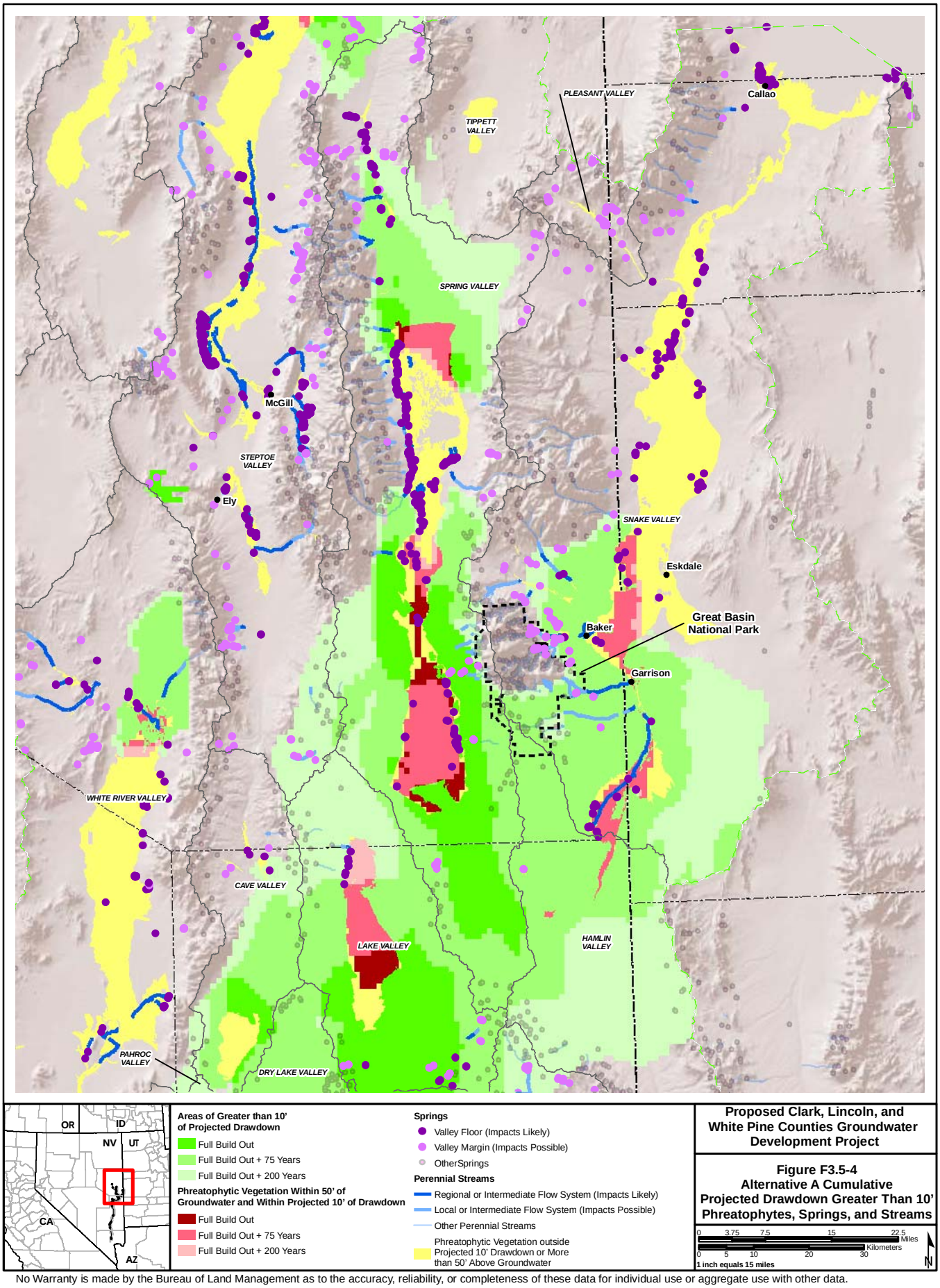


Figure F3.5-4

Alternative A – Cumulative Projected Drawdown Greater Than 10’ Phreatophytes, Springs, and Streams

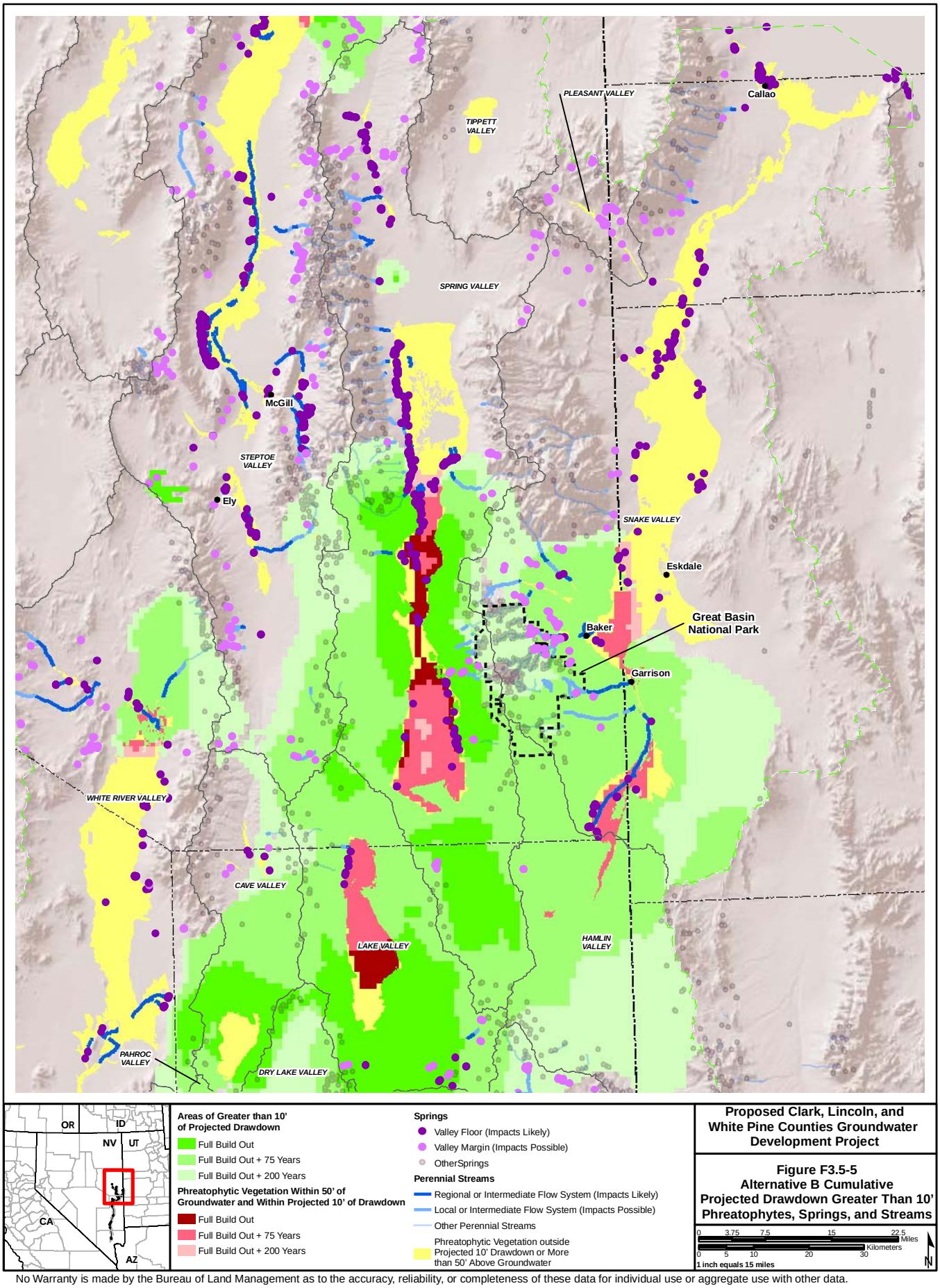


Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure F3.5-4
Alternative A Cumulative Projected Drawdown Greater Than 10' Phreatophytes, Springs, and Streams

Figure F3.5-5

Alternative B – Cumulative Projected Drawdown Greater Than 10’ Phreatophytes, Springs, and Streams



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

Figure F3.5-6

Alternative C – Cumulative Projected Drawdown Greater Than 10’ Phreatophytes, Springs, and Streams

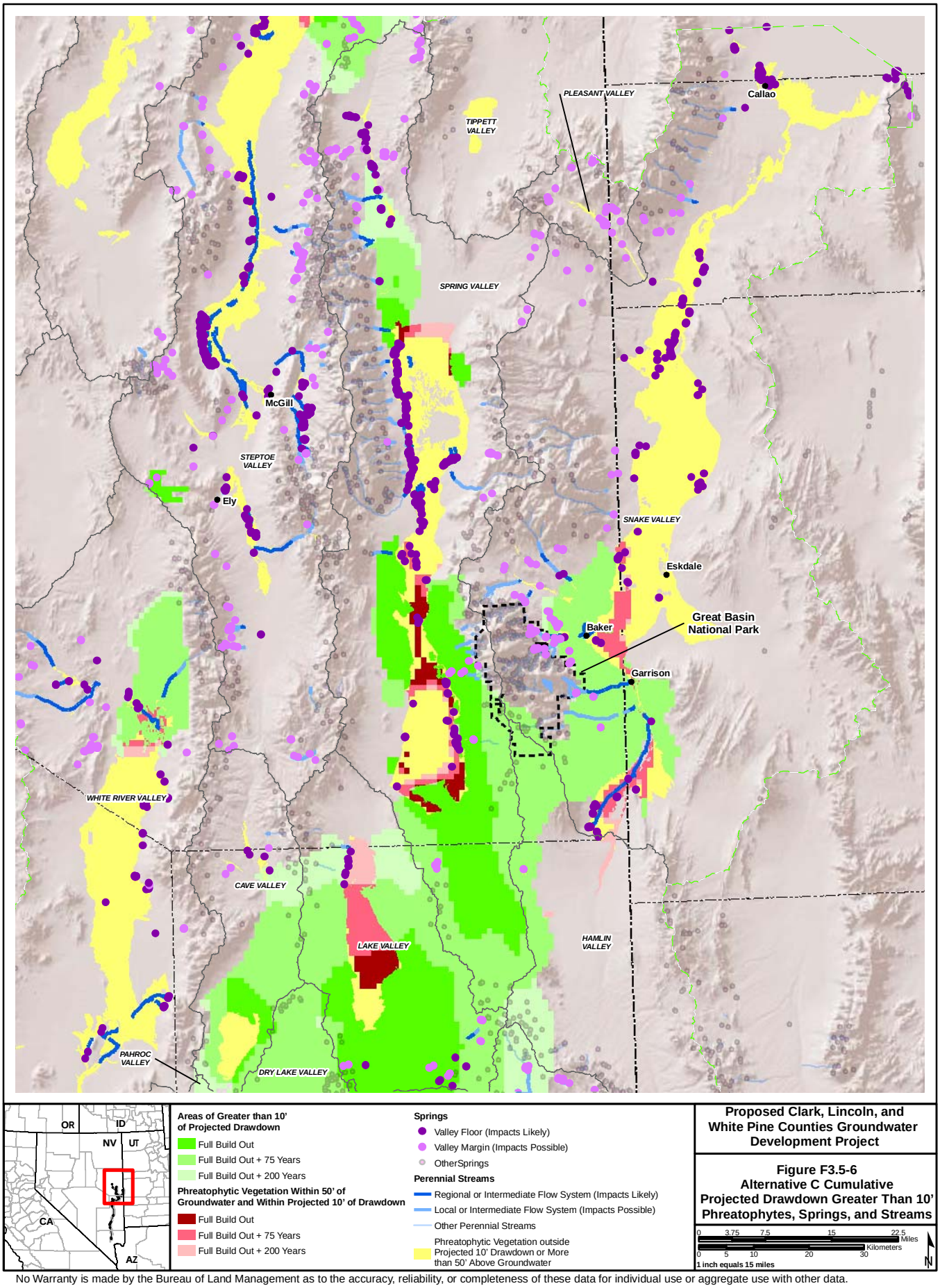


Figure F3.5-7

Alternative D – Cumulative Projected Drawdown Greater Than 10’ Phreatophytes, Springs, and Streams

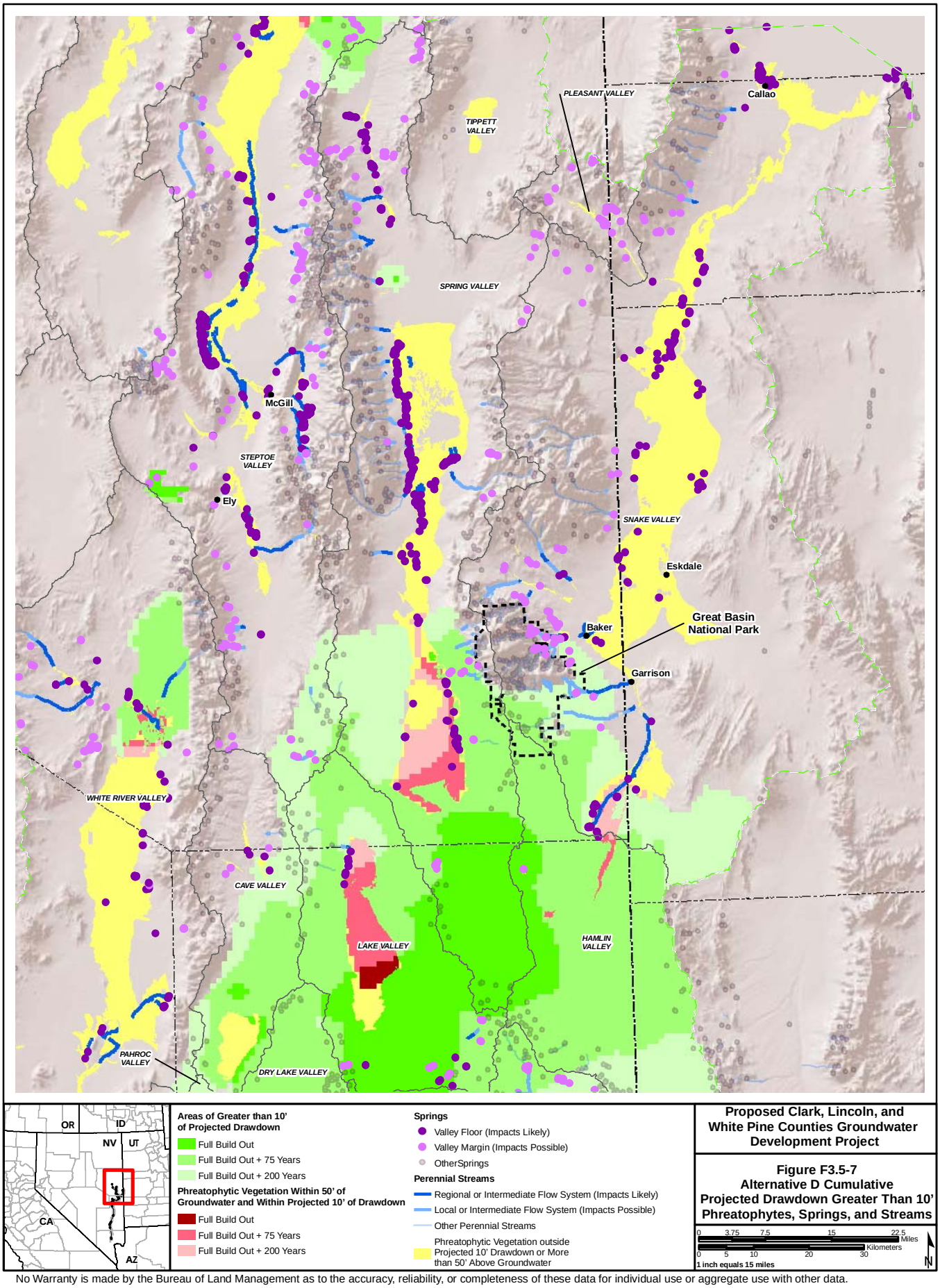
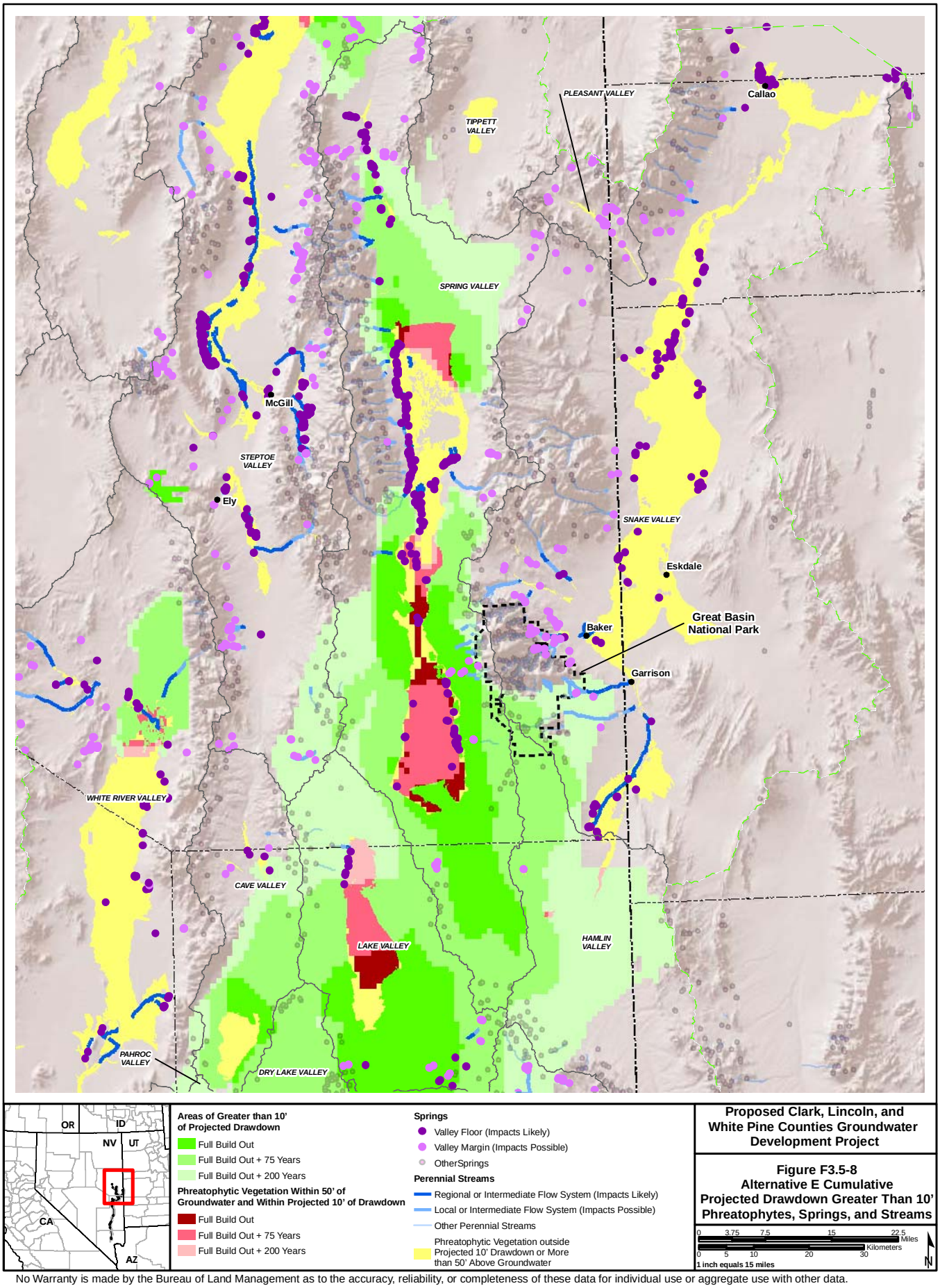


Figure F3.5-8

Alternative E – Cumulative Projected Drawdown Greater Than 10’ Phreatophytes, Springs, and Streams



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