

**CONSERVATION DISTRICT OF SOUTHERN NEVADA
2018-2020 RESOURCE NEEDS ASSESSMENT
CONSERVATION REPORT 1.0**



Photo collage courtesy of Southern Nevada Water Authority, Basin and Range Resources, and Moapa Valley Water District.

Developed in cooperation with the Conservation District of Southern Nevada and partnering local governing entities and non-governmental organizations and individuals supporting sustained multiple-use resource management initiatives on private and public lands.

October 17, 2019, Basin and Range Resources

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Introduction

Conservation Districts:

When Congress, and subsequently the states, created and empowered Conservation Districts (CDs), they believed that conservation decisions should be made at the local level and that CDs should have positive influence and involvement on natural resource and associated agricultural issues. Conservation Districts are structured to play the lead role in the Locally Led Conservation process. The process, which is resource driven rather than program driven, can be used to direct and coordinate all federal, state and local conservation efforts. As illustrated (Figure 1), there are 28 Conservation Districts in the state of Nevada. The Conservation District of Southern Nevada comprises the southernmost tip of the state, and includes all of Clark County, Nevada.

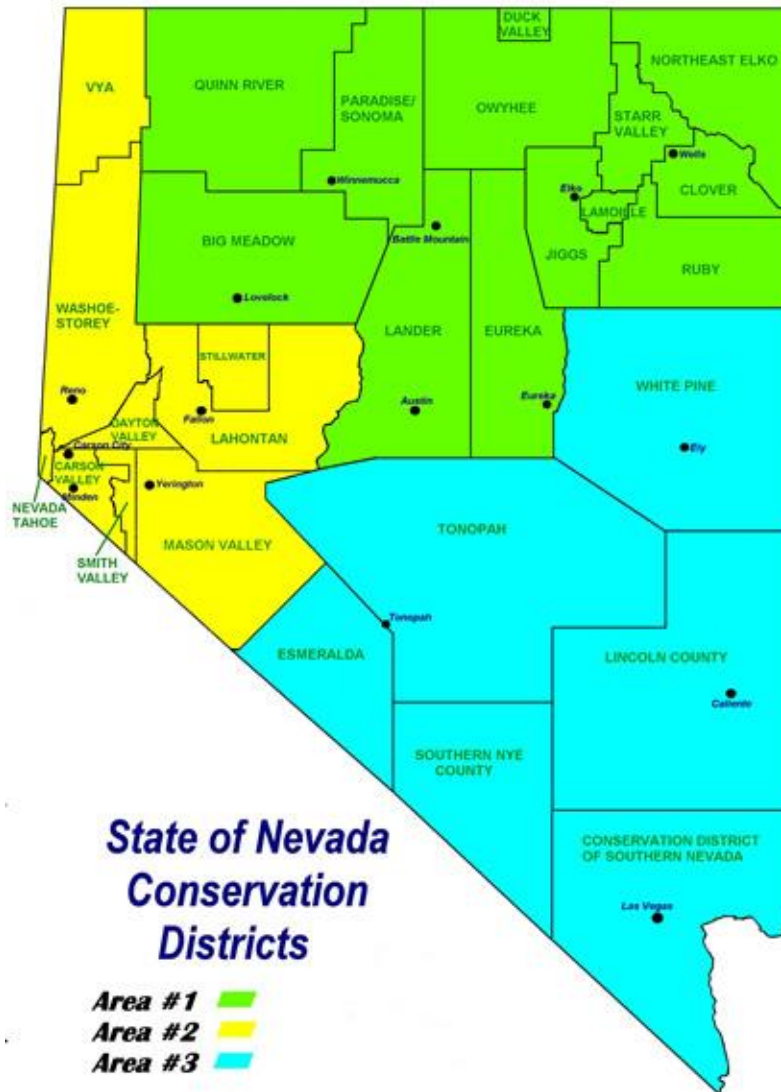


Figure 1: State of Nevada Conservation Districts Areas

Resource Needs Assessment:

The fundamental requirement to initiate Locally Led Resource-Based conservation is contingent upon the development of a Resource Needs Assessment and analysis. The protocol utilized in development of the Conservation District of Southern Nevada (CDSN) Resource Needs Assessment is the NRCS Resource Concerns Checklist analytical tool. This planning tool systematically assesses primary resource concern categories relative to soil, water, air, plant and animal environmental concerns. The protocol requires first the identification of primary natural resource concerns followed by energy related implications and thirdly by human related impacts and effects. This is also known as SWAPA+E+H.

(Figure 2) illustrates that Southern Nevada is the only unmapped region in Nevada per NRCS natural resources, emphasizing a great need for a resource assessment.

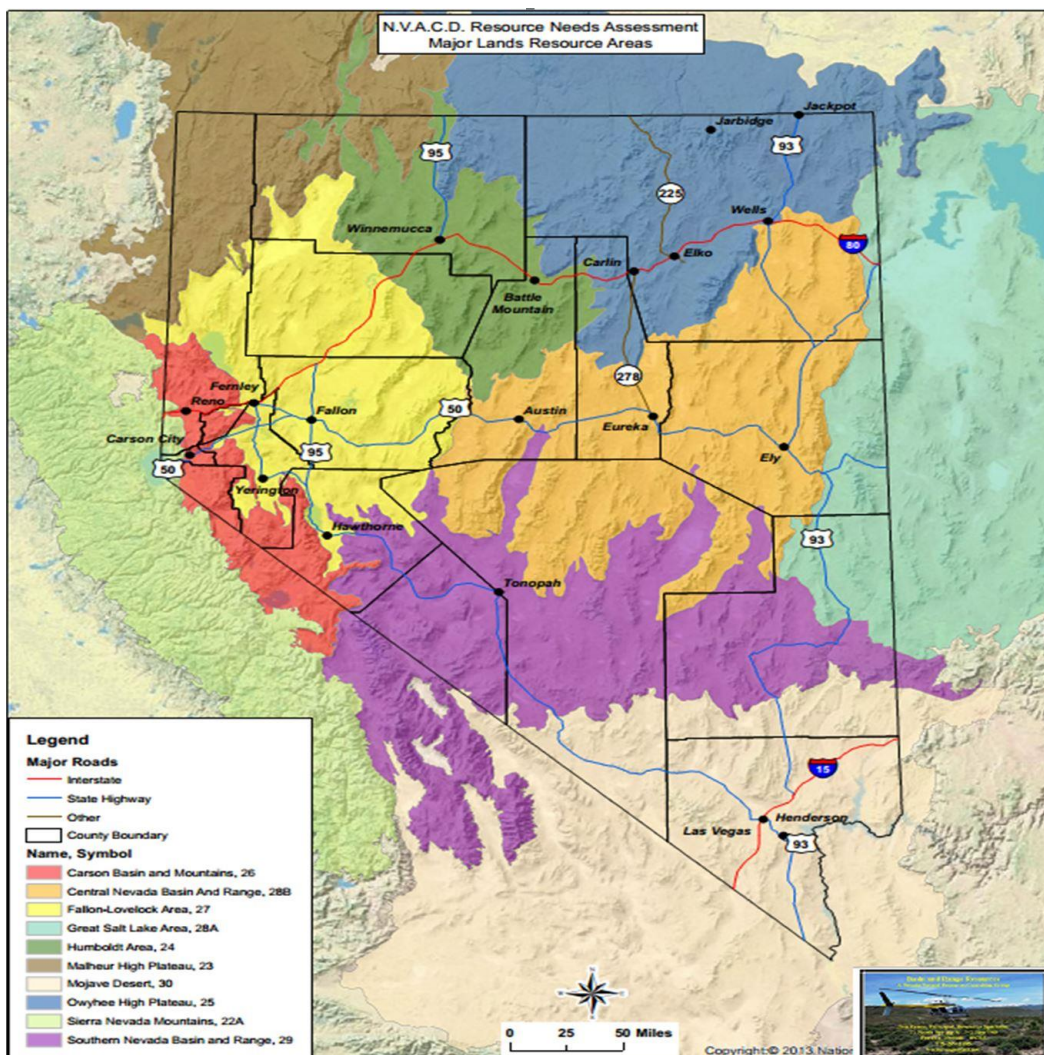


Figure 2: NVACD Resource Needs Assessment Major Lands Resource Areas

Executive Summary

Within this Conservation Report, you will find a discussion of the current resource needs and issues that need to be addressed within Clark County, the southernmost area of Nevada. The Conservation District of Southern Nevada is responsible for this area and has worked with many partners on this resource needs assessment. Many of the participants, other than agency resource professionals, were not familiar with the NRCS Resource Concerns Checklist protocol which compartmentalizes environmental considerations into seven primary categories; soil, water, animals, plants, air, energy and the human factor, which is also known as SWAPA+E+H. Using this template, resource concerns have been identified and summarized. Water Quantity and Quality and Loss of Agricultural Lands and weeds primary resource concerns and are addressed individually within this report.

The Conservation District of Southern Nevada is one of the few Conservation Districts in the state of Nevada that has both urban and rural populations. Resource Needs Assessment meetings were held in conjunction with the CDSN and partnering entities from August 2018 through August 2019. The group facilitation process was utilized to explain the Resource Needs Assessment process, goal, objectives and reporting protocols. The CDSN focused their Local Work Group in the rural area of Logandale/Overton, and will continue to address the metropolitan urban needs within the Southern Nevada Strong regional planning initiative.

This Conservation report is a working document and will continue to be modified as needed to include relevant details that were missing at the time of initial release. One major item to be considered in further detail would be urban resource needs in addition to the water concerns that were addressed herein. Furthermore, understanding the resource concerns and problems presented in this document are only one step of this process. For this report to be relevant and useful, the next step is to continue dialogue and discussions on creating action plans to address what was reported here. We can understand the resource concerns, but without action, this report is irrelevant. We hope this is not the case as the Conservation District of Southern Nevada continues to work with current and new partners to address these concerns regarding the issues presented within.

The primary goal with a collaborative effort moving forward will be to provide the targeted land user and manager groups the tools needed to strategize resource planning initiatives on both private and public lands employing a locally led strategy to address local concerns. We intend that the information provided in this report will also be useful for filling the gap in areas of Conservation not being addressed by our partners. The local work groups and the Southern Nevada Strong initiative play this role.

I: Resource Discussion Initiative and Protocols

The group facilitation process was an integral tool in providing the discussion leaders an orderly and effective presentation mechanism to explain the Resource Needs Assessment process, goals and objectives and reporting protocols. Many of the participants, other than agency resource professionals, were not familiar with the NRCS Resource Concerns Checklist protocol which compartmentalizes environmental considerations into seven primary categories; soil, water, animals, plants, air, energy and the human factor, which is also known as SWAPA+E+H.

As the varied discussions relative to local issues progressed, the groups became more comfortable with pinpointing and identifying specific impacts/effects relative to the categorical delimiters, SWAPA+E+H (NHCP, 2019). The groups readily recognized the similarity of localized resource concerns throughout Clark County and the climatological and physiographic effects associated with the Mojave Desert (Major Land Resource Area 30). A brief summary of the climatic and physiographic characteristics for these zones, major land resource areas, is described in 'Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean and the Pacific Basin.' (Ag Handbook 296, 2006)
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_050898.pdf.

Municipal Conservation Planning:

The Conservation District of Southern Nevada is one of the few Conservation Districts in the state of Nevada that has both urban and rural populations. Resource Needs Assessment meetings were held in conjunction with the CDSN and partnering entities from August 2018 through August 2019. The group facilitation process was utilized to explain the resource needs assessment process, goal, objectives and reporting protocols. The CDSN first focused their Local Work Group in the rural area of Logandale/Overton, and will continue to address the metropolitan urban needs within the Southern Nevada Strong regional planning initiative.

The primary goal with a collaborative effort moving forward will be to provide the targeted land user and manager groups the tools needed to strategize resource planning initiatives on both private and public lands employing a locally led strategy to address local concerns. We intend that the information provided in this report will also be useful for filling the gap in areas of Conservation not being addressed by our partners. The local work groups and the Southern Nevada Strong initiative play this role.

II: Local Partners, Focus Groups, Meetings, Resource Areas of Concern

Conservation District of Southern Nevada RNA Meeting Overview/Highlights – 2018/2019
RNA meetings were held in conjunction with the Conservation District of Southern Nevada and partnering entities on August 1, 2018, April 15, 2019, and June 11-13 of 2019.

- 8/1/2018 Gary McCuin (Extension) and Jim Evans met with CD partners from UNR, CD Supervisors, and US Fish and Wildlife (partnering on private lands initiative). The RNA initiative was reviewed to determine what inputs/products may be available from Extension and USFWS to support the planning process and assist in evaluating prioritized concerns throughout the southern Nevada region. A very productive meeting with both entities relative to identifying the information that is currently available to analyze resource concerns and prioritize needs.
- 4/15/2019; Gary McCuin (Extension) and Jim Evans met with Southern Nevada Conservation District Coordinator Jarrett DeCorte and NRCS District Conservationist Teri Knight with District Supervisor Mark Damron. The ‘Southern Nevada Strong’ regional plan was reviewed to determine how municipal and urban planning initiatives can be addressed in the RNA. We discussed NRCS planning initiatives and technical assistance provisions within the urban setting and outlying agricultural districts in Moapa Valley. Much discussion focused on how programs and planning objectives can be described in the assessment and how USDA programs and assistance may need policy modification in order to address local municipal/urban needs. The group felt that the next phase in the RNA process should focus on agricultural districts. Tentative meeting dates were targeted in June to meet with representatives from the Moapa agricultural districts.
- 6/11/2019; CDSN Board members met with representatives from the Regional Transportation Commission, RTC, who oversee the Southern Nevada Strong Initiative. Chris Magee, CDSN Chair, Shane Ammerman, CDSN Vice Chair, and Jarrett DeCorte, CDSN Conservation Coordinator, met with Paul Gully, and Rae Lathrop from RTC, discussing and outlining overlapping goals between both organizations in which they could move forward with implementation of items for the 2020 year. This meeting dialogue was important as it reestablished the connection with this focus group for the SNS. Dialogue has continued since this meeting.
- 6/13/2019; CDSN held a meeting and met with the Logandale FOCUS group and provided a presentation on the RNA process. Jim Evans was the presentation facilitator, while Jarrett DeCorte, CDSN Conservation Coordinator, and Rachel Lewison, CDSN Treasurer, assisted with the management of the group while Jim covered the SWAPA topics summarized in the presentation. The group identified issues pertaining to growth and sprawl that has changed both the residential and agricultural neighborhood setting over the last three decades. Other issues pertaining to property maintenance, weed control and xeriscape best management practices within residential zones were addressed. The commentary and feedback from this localized group was significant for all members who actively participated. A discussion summary with a listing of participants and contributors from the Logandale group were compiled.

The following (Table 1) lists the CDSN Resource Needs Assessment focus group participants that were actively involved in the planning process that led to the formation of a Local Work Group for Clark County, and Southern Nevada Strong initiative.

CDSN Affiliation	Contact	Entity
NRCS	Teri Knight	District Conservationist
NDOW	Jasmine C. Kleiber	NDOW-NRCS Partner
Overton/ LWG	Brad Hardenbrook	NDOW, Nevada Division of Wildlife
USFWS	Christiana Manville	Partners for Fish/Wildlife
SNS	Paul Gully	RTC, Southern Nevada Strong
SNS	Rae Lathrop	RTC, Southern Nevada Strong
SNCWMA	Johnny Jones	Weed Cooperative
Overton/ LWG	Caryn Wright	Clark County Desert Conservation Program
Overton/ LWG	Kiley Bradshaw	MVWD, Moapa Valley Water District
Overton/ LWG	Joan Day	Partners in Liberation Logandale Trails
Overton/ LWG	Lola Egan	Moapa Valley Resident
Overton/ LWG	Marjorie Holland	Moapa Valley Revitalization Project
Overton/ LWG	Brenda Slocumb	Friends of Gold Butte
Overton/ LWG	Jonathan “JJ” Smith	BLM, Bureau of Land management
Overton/ LWG	Amelia Smith	Clark County Commissioners Office
Overton/ LWG	MaryKaye Washburn	Moapa Valley Revitalization Project
Overton/ LWG	Caryn Wright	Desert Conservation Program
Admin. Support		
CDSN Chair	Chris Magee	Schneider Electric
CDSN Vice Chair	Shane Ammerman	Clark County Assistant Planning Manager
CDSN Supervisor	Mark Damron	Supervisor for CDSN
CDSN Treasurer	Rachel Lewison	NDEP Nevada Division of Environmental Protection
CDSN Secretary	Bryan Cabble	Garden Farms
CDSN Liaison	Jarrett DeCorte	Extension, CDSN Conservation Coordinator
Extension	Eric Killian	Extension, Southern Nevada Regional Director

Table 1: Conservation District of Southern Nevada, RNA FOCUS Groups.

The adoption of a holistic framework devised to allow all key partners to participate in localized conservation planning impetus will be integral to successful collaboration. Jurisdictional and regulatory boundaries must be recognized as a component of the ecological process relative to system health but not a barrier to the deployment of sound resource planning and management initiatives. The window of opportunity to work with our primary constituents, the Nevada’s Association of Conservation Districts, the University of Nevada Cooperative Extension, the Southern Nevada Water Authority, Moapa Valley Irrigation District, local municipalities and USDA’s Natural Resource Conservation Service has been widened through outreach and commitment by all to deploy prioritized conservation efforts for our localized community now and into the future.

Water and weeds are primary concerns and are addressed individually. The following (Table 2) summarizes the primary resource concerns inventory, evaluations and discussion commentary developed by the localized focus group, Moapa Valley-Logandale/Overton.

Moapa Valley – Logandale/Overton Resource Concerns

RESOURCE CONCERN	RESOURCE CONSERVATION and MANAGEMENT CONSIDERATIONS
WATER:	
<u>Water Quantity:</u> -Insufficient Water – Moisture Management -Inefficient Use of Domestic, Commercial/ Industrial/Agricultural Water Supply <u>Water Quality:</u> -Degradation – Excessive Salts in Ground -Water and Potential Heavy Metals	-Adopt water conservation measures as prescribed by SNWA incentives programs, CDSN/SNS and UNLV Center for Water Conservation. -Propose land development restrictions within environmentally sensitive areas and new site development where water supply is not secured. -Improve irrigation efficiency and soil health in order to sustain/stabilize ground water basin aquifer and producer economic viability. -Unregulated wells may sustain water quality impedance with salinity and or metals.
AIR:	
<u>Air Quality:</u>	-Implement dust abatement ordinances on lands undergoing development construction and or demolition. -Address silica loading and control alternatives for the Silica Sand Prospect industrial site southwest of Overton.

SOILS:	
<p><u>Soil Quantity and Quality:</u></p> <ul style="list-style-type: none"> -Soil Erosion – Sheet, Rill and Wind. -Degradation – Urban/Commercial and Agricultural/Industrial Lands 	<ul style="list-style-type: none"> -Explore conservation cover and critical area treatment alternatives to stabilize soil. -Water availability on converted and abandoned residential/commercial and industrial/agricultural lands. -Evaluate opportunities to produce native plant seed on abandoned Ag lands that have water rights.
WEEDS, PLANTS AND ANIMALS:	
<p><u>Plants and Animals:</u></p> <ul style="list-style-type: none"> -Degraded Plant Condition – Plant Pests -Weeds on degraded lands -Inadequate Habitat for Fish and Wildlife 	<ul style="list-style-type: none"> - Increase efforts and efficiency in combating noxious/invasive species resulting from land abandonment or non-use (urban/commercial/industrial) and fallowed land (Ag Lands). -Control weed invasion on environmentally sensitive areas (critical habitats/riparian) and federal/state recreational areas, parks and wildlife refuges.
HUMANS:	
<p>Human – Capacity</p>	<ul style="list-style-type: none"> -Educate and empower entities to actively participate in and fund conservation programs -Ensure capacity to implement and follow through with action plans. -Promote holistic planning and management across jurisdictional boundaries – municipal/county/federal and state lands. -Support local societies and NGO’s to promote community awareness of resource management issues. In example the Historical Society, the State Museum and the Friends of Gold Butte Visitor Center.

Table 2: CDSN Moapa Valley – Logandale/Overton Resource Concerns and Management Considerations Summary.

Purpose of Southern Nevada Strong Initiative:

The purpose of Southern Nevada Strong is to unite the municipal regions of Southern Nevada in order to uniformly plan with more cohesion among the many municipalities and planning entities within Clark County area. The SNS develops regional support for long-term economic success and stronger communities by integrating reliable transportation, quality housing for all income levels, and job opportunities throughout Southern Nevada. The primary organizations responsible to maintain momentum and implement strategies outlined in the SNS Regional Plan include: all local governments, including Clark County, City of Henderson, City of Las Vegas, City of North Las Vegas, Boulder City, and City of Mesquite, the Regional Transportation Commission, UNLV, the Southern Nevada Regional Housing Authority, the Southern Nevada Water Authority, the Clark County School District, the Southern Nevada Health District and the Conservation District of Southern Nevada, and the dozens of people and organizations who participated on group tasks.

Southern Nevada is among the fastest growing regions in the nation. This rapid rate of development brought prosperity and opportunity to many, but it also created challenges. As our communities grew, our local governments did not collaborate at the regional level to strategically guide growth and development. The rapid and extended population growth over the past 20 years has put pressure on natural resources and public sector funding for infrastructure, social service, and schools. If development continues as it has in the past, our current challenges will only continue to get worse. (Strong, 2015)

Region's Top Priorities with Southern Nevada Strong

The SNS Plan presents goals, objectives and strategies to address our region's top 3 priorities:

1. Improve Economic Competitiveness and Education
2. Invest in Complete Communities
3. Increase Transportation Choice

Environmental Resource Use Goals with Southern Nevada Strong

- Reduced emissions and resource usage (Industrial Development)
- 11% decrease in energy use
- 11% decrease in carbon emissions
- 21% decrease in water use

For more detailed information on the Southern Nevada Strong Initiative, and to download the regional plan, you can go to the RTC website at <http://sns.rtcsnv.com/>.

The following (Figure 4) is a map of the key urban areas that have been addressed by the Southern Nevada Strong regional plan. The red dots mark the 4 downtown areas that encompass the immediate Las Vegas area. They are the City of North Las Vegas, the City of Las Vegas, the City of Henderson, and Boulder City. Clark County is also an independent jurisdiction.

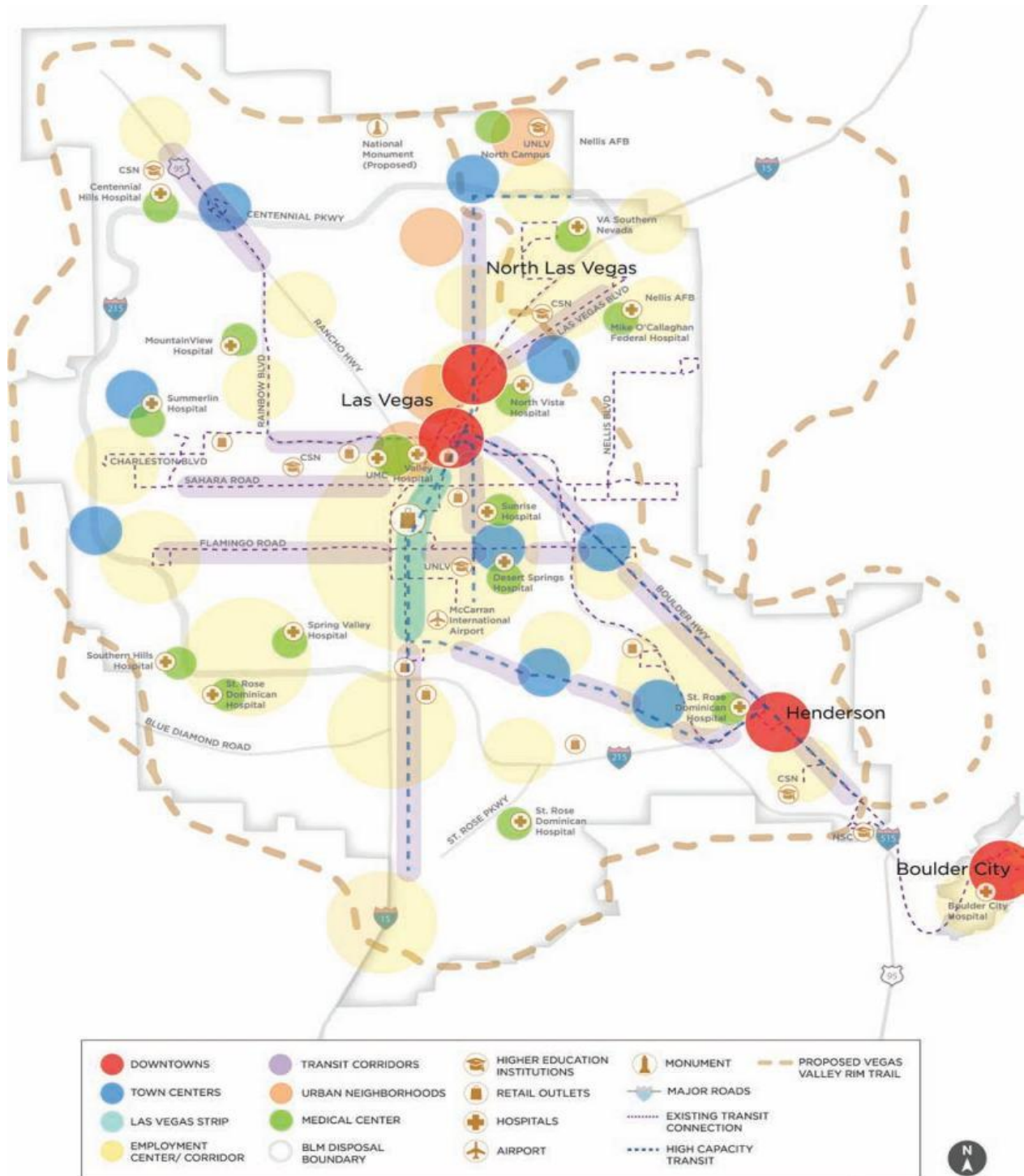


Figure 4: Southern Nevada Strong Regional Map
Regional Plan Map Source: Southern Nevada Strong Regional Plan 2015

CDSN and Southern Nevada Strong:

The Conservation District of Southern Nevada and Southern Nevada Strong came together and developed a component that was crucial within the comprehensive regional plan. A list of themes regarding Water Conservation Strategies are itemized and detailed in the following (Table 3). These conservation priorities remain the focus for both CDSN and Southern Nevada Strong.

THEME #	STRATEGY
ICC 5.3.1	Support a variety of regulations by local governments to promote efficient use of water resources (e.g., turf restrictions, plumbing code requirement for high efficiency fixtures, etc.).
ICC 5.3.2	Continue to encourage the use of incentives to manage and reduce overall water use (e.g., providing rebates on water efficient technologies program).
ICC 5.3.3	Continue and expand education and outreach programs to improve water efficiency (e.g., school programs) and reduce water consumption during peak usage times of day and year.
ICC 5.3.4	Consider local government adoption of ordinance or other code restricting water usage during peak usage times of day and year to enhance enforcement efforts.
ICC 5.3.5	Continue SNWA, Las Vegas Valley Water District and local government adoption of progressive/tiered water pricing structure based on quantity and use.
ICC 5.3.6	Encourage all new golf courses to use recycled water and submit drought-tolerant landscape and irrigation plans.
ICC 5.3.7	Encourage existing golf courses to submit turf conversion/irrigation management plans. Support the Clark County Flood Control District’s Stormwater Quality Management.
ICC 5.4.1	Committee’s adopted Stormwater Management Plan to promote site design standards in large parking lots, such as depressed medians, buffer strips, porous paving and minimized parking standards.
ICC 5.4.2	Encourage adoption of ordinance or other code for new and existing commercial businesses with water intensive uses that regulate/restrict water usage and provide other minimum standards. (For example, consider requiring commercial car washes to recycle water on-site or send it to a wastewater treatment facility, where it can be cleaned and returned to the water.)
ICC 5.4.3	Promote sustainable water practices among businesses, such as dry cleaners, gas stations, hotels and other similar uses.
ICC 5.4.4	Work toward meeting or surpassing federal, state and local water quality requirements.
ICC 5.6.1	Encourage solar PV and solar thermal hot water for new homes.
ICC 5.7.1	Coordinate conservation and development of natural resources by establishing a regional entity that represents the views of the federal, state, and local agencies involved in these efforts, including private and non-profit agencies

Table 3: Southern Nevada Strong and the CDSN Needs Assessment Summary – Water Conservation Strategies

III: #1 Resource Concern in Clark County is Water Quantity

The consensus from the Resource Needs Assessment indicates that water conservation initiatives throughout all basins in Clark County remains a top priority. Although many conservation districts in Nevada have concerns with water quality, the area within Clark County has treated well water and lake water that is delivered by the local water authority. The exception of quality includes unregulated private wells throughout the area, among which were identified in the Logandale/Overton area. Without adequate quality control methods, potable water will remain questionable from these unlicensed wells. Untreated well water is also the main source of agricultural irrigation for the Logandale area.

The current ground water management plan in Southern Nevada focuses on stabilizing the ground-water draw-down and balancing the basin water budget. This initiative will require adoption of state-of-the art irrigation system technology to minimize water loss and maximize application efficiencies. Cropping system alternatives that significantly reduce the annual gross water application requirement will play a vital role in achieving an optimal balance.

Of primary consideration during this process and into the future is the abandonment of agricultural lands. This is an important issue as many previously irrigated agricultural lands are being converted and are no longer irrigated. Water rights are often separated out from the land they were initially tied to. Much of the agricultural land in parts of Clark County and central Nevada Counties are being purchased by Southern Nevada Water Authority to meet the needs of the growing population in the Las Vegas metropolitan area. The re-allocation of water rights to a governing water authority is indeed quite an issue and is only briefly addressed in this report.

With the loss of well water rights from irrigated agricultural lands, the potential for invasive species, weeds and soil erosion are significant. This will present a measurable problem relative to resource degradation as water rights are adjudicated and large tracts of agricultural lands are dried up and or water rights are transferred from agriculture to other uses. Within the urban-residential environment a modeling initiative may be required to analyze water resource consumptive use and management alternatives.

Current conservation initiatives focus on the urban environment, and the urban metro footprint. Urban-residential zones include ranchettes where food and garden farming with limited livestock production has become a significant land use. In these urban-residential settings production opportunities can be limited by restraints associated with utilization of non-ag water resources. Water allocation can limit opportunities on these small parcels, other than the permitted right for residential development. A modeling study may more accurately quantify consumptive uses and the effects of water conservation practices (improved irrigation system technology and irrigation water management monitoring).

EQIP and AMA programs are currently utilized to implement NRCS programs on the or within the urban-residential lands. Water allocation and permitted uses, again, should be clearly defined in order to insure compliance with state water law. Self-certification is currently recognized as a legal tool to insure certificated right of use. Collaboration with NDWR may enhance planning initiatives for both urban-residential uses and on agricultural lands to ensure compliance and more effectively promote water conservation.

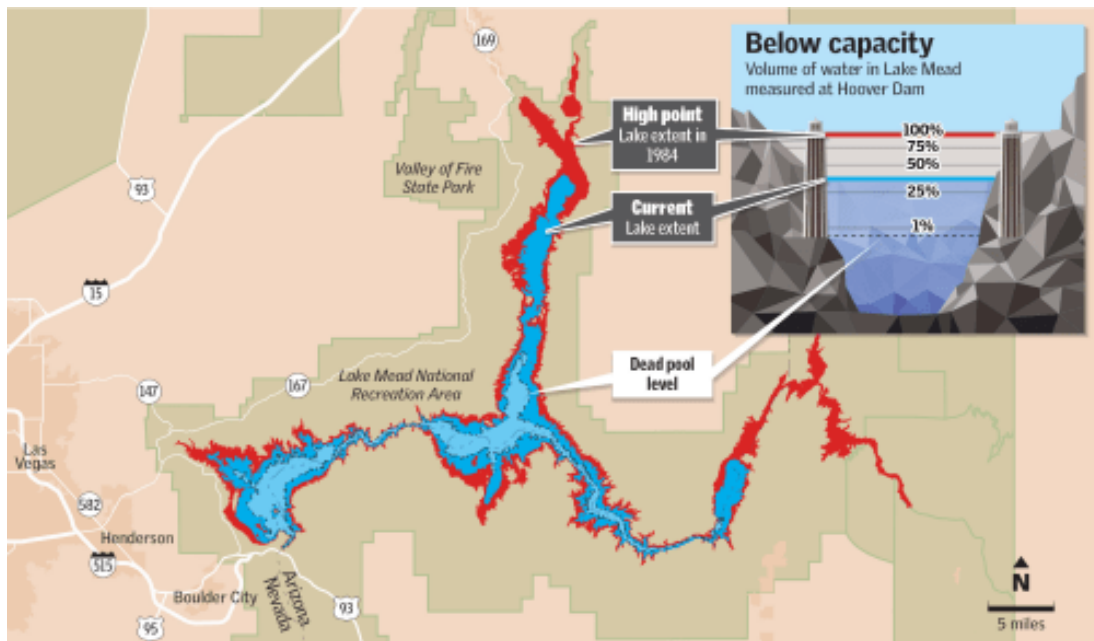
Lake Mead and Hoover Dam:

The Colorado tributary system begins in Wyoming and continues south towards the California and Mexican border. Lake Mead was formed in 1936 with the building of the Hoover or Boulder Dam and supplies water and power to more than 40 million people in seven Western states and in Mexico. The surface of Lake Mead is considered full at 1229 feet. As of the writing of this paper in September 2019, the lake level was at a surprising 1084 feet, which reflects an increase in lake level, higher than from similar periods of time during 2015-2018. Even with peaks of surplus, the lake level is still expected to fall another 15 feet by January 2021.

According to some estimates, the Las Vegas Valley outgrew its local groundwater supply in the late 1940s, but the community kept drilling wells and powering pumps for decades after that. By the time the community sank its first straw into Lake Mead in 1971, the free-flowing springs that attracted Las Vegas' first settlers had been drained dry, and the ground above the valley's depleted aquifer had begun to crack and sink in places. The formation of the Southern Nevada Water Authority in 1991, with Mulroy at the helm, gave the community a strong, unified voice to negotiate with other river users and collectively take on major infrastructure challenges that the individual utilities would have struggled to address. (Brean, 2019). Southern Nevada Water Authority is spending almost \$1.5 billion on a new straw #3 in 2015, and pumping station for 2020, at Lake Mead that can draw water from the bottom of the large reservoir.

The following (Figure 5) illustrates the high and low points of Lake Mead. Straw #3 will be at the base of the lake and can be used long after Hoover Dam is no longer able to generate electricity.

Lake Mead Water Levels:



Sources: National Park Service; Missouri University of Science and Technology

Las Vegas Review-Journal

Figure 5: Lake Mead Map and Water Levels

Despite the inevitable shrinking lake level, very effective conservation strategies have been implemented within Clark County over the past decade. With urban population growth continuing to increase at an alarming rate, the usage of water in percentage to population has consistently decreased. The conservation strategies implemented by the Southern Nevada Water Authority have been commended to be one of the best in the nation. Even with the best conservation strategies, the main water conservation issues remain: irrigation management for urban landscapes and agricultural lands, and potable drinking water from ground wells and Lake Mead.

Lake Mead Water Allocation:

The single largest water user on the Colorado is California’s Imperial Irrigation District, which takes more from the river than Nevada, New Mexico and Wyoming combined. The Silver State has a legal entitlement to less than 2 percent of the Colorado River. California gets the biggest share at 27 percent, followed by Colorado at 23 percent and Arizona at 17 percent. Roughly three-quarters of river diversions go to agriculture, while cities consume less than 20 percent of the flow.

Clark County Water Allocation:

The Las Vegas Valley holds the pulsing heart of the state’s largest industry, tourism. Nearly three-quarters of Nevadans live there. None of that is possible without Lake Mead and the Colorado River, the source for 90 percent of the community’s water supply. About 60 percent of the water piped to the valley from Lake Mead goes to irrigate landscaping and supply evaporative cooling towers, a type of air conditioning system. These are one-time “consumptive” uses that do not allow for recycling. Clark County’s population more than doubled between 1940 and 1950, then tripled between 1950 and 1960 to just over 127,000. It would double or nearly double every decade after that.

Water management strategies need to be developed not only for conventional agriculture but also for urban water utilization. The Las Vegas Valley Water District estimates, in southern Nevada, residential water use as high as 65% of the total water use (Figure 6). 35% of total water use is used to irrigate turfgrass and landscape. Thus, if urban communities such as those in southern Nevada were to become better stewards of their water resources, they must develop best management practices (BMPs) for all aspects of water utilization. Research and educational programs will need to be developed that focus on all areas of water usage, including programs aimed at improving irrigation efficiency in urban agriculture. (UNLV, 2019)

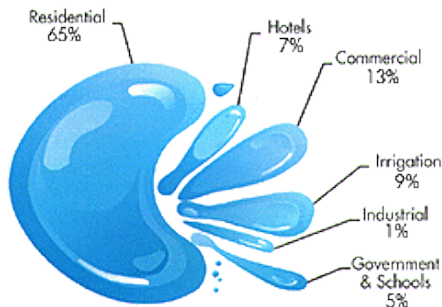


Figure 6: Water Allocation

Clark County Ground Water Quantity:

Water is one of the most precious natural resources in the arid and semi-arid regions of the southwestern United States. Growth and development in this region will continue to be dictated to a large extent by the availability of adequate water supplies. As such, increasing pressure is being placed on water users, both small and large, to become more efficient in all aspects of water utilization. Local and state water agencies will therefore need to investigate all possible water management strategies that will enable the wise and efficient usage of the available water resources.

Throughout this extremely dry region (Appendix 2: Clark County Land Status Map), the annual average precipitation ranges from 2 to 8 inches. It exceeds 37 inches in some scattered areas at the higher elevations in Nevada and southwestern Utah. Most of the rainfall occurs in the winter months as low-intensity precipitation from Pacific storms that are frontal in nature. High-intensity, convective thunderstorms can occur during the summer, but they contribute little to soil moisture. These storms occur more frequently in the eastern part of the area, where they contribute more to soil moisture.

(Table 4) shows major groundwater hydrographic basins in Clark County including the committed duty groundwater rights and perennial yield of each basin.

Basin	Perennial Yield (Acre Ft/Year)	Committed Acre Feet Annually (AFA)₁
Black Mountain Area - 215	7000 ₂	5797
California Wash - 218	40000 ₂	9610
Colorado Valley - 213	200	823
Coyote Spring Valley - 210	1900-18000	16903
Eldorado Valley - 167	500	2856
Frenchman Flat - 160	100	0
Garnet Valley - 216	400	4758
Gold Butte Area - 223	500	1
Greasewood Basin - 224	300	4
Hidden Valley S - 166	rev data	67
Hidden Valley N - 167	200	2275
Indian Springs Valley - 161	500	1390
Ivanpah-North - 164A	700	2493
Ivanpah-South - 164B	250	781
Jean Lake Valley - 165	50	200
Las Vegas Valley - 212	25000	91163
Lower Meadow Valley Wash - 205	25000	25207
Lower Moapa Valley - 220	50	5800
Mesquite Valley - 163	2200	436
Muddy River Springs - 219	100 – 36000	16544
Parump Valley - 162	20000	59141
Piute Valley - 214	300	5033

Three Lakes Valley N - 168	3700	3700
Three Lakes Valley S - 211	4500	4200
Tikapoo Valleys N - 169A	2600	2599
Tikapoo Valleys S - 169B	1700	1700
Virgin River Valley - 222	100000	12548

Table 4: Clark County Ground Water Rights (In Acre-Feet).

Source: Nevada Division of Water Resources

Groundwater Committed is the sum of all permitted, certificated, decreed, reserved, relinquished, revocable and unadjudicated vested claims to groundwater rights. Domestic Well Use is estimated as the number of active domestic wells multiplied by the estimated average use of 1 AFA per well. Domestic commitments may be represented under Groundwater Committed for wells with an appropriative right for domestic use, or for wells that were drilled under a relinquishment of an existing groundwater right

Groundwater Available for Appropriation is estimated as the difference between perennial yield and groundwater committed plus domestic well use. If groundwater committed exceeds perennial yield, available groundwater is zero. This simplified estimate does not take into account several variables that may affect groundwater availability, such as the supplemental nature of groundwater to surface water sources, rights that were issued with an expiration date, rights that are temporary in nature (i.e. mining and milling), the consumptive use of individual rights, hydrogeologic setting, hydraulic connectivity to surface water, adjudication status, and geothermal appropriations.

2 System Yield

The hi-lighted basins indicate committed allocations that exceed the estimated perennial yield. This accounts for a significant basin area re-charge zone throughout Clark County. The basin status relative to current decisions, orders, rulings and management implications can be found at the Nevada Division of Water Resources website at;

<http://water.nv.gov/UndergroundActive.aspx>

Ground water management conservation initiatives for the Las Vegas Valley zone: Big Bend Water District, City of Boulder City, City of Henderson, City of Las Vegas, City of North Las Vegas, Clark County Water Reclamation District, Las Vegas Valley Water District, and Moapa Valley Water District (Logandale and Overton Area) can be found at the following:

<https://www.snwa.com/assets/pdf/water-resource-plan-printable.pdf>,

https://www.moapawater.com/att/44/store/u35_MVWD-2016-Water-Conservation-Plan-Pt-1.pdf

IV: #2 Resource Concern is Loss of Agricultural Lands and Weeds

The loss of Agricultural lands due to urban development and transfer of water rights consequently leads to an increase in undesired plant growth, weeds. The weeds that are considered noxious and invasive are the targeted species for reduction. In addition to weed reduction strategies for re-cultivating fallow agricultural fields with the introduction of native seed is important.

The management of *noxious and invasive weeds* is necessary to conserve and improve natural resources such as cropland, soil, forage, and wildlife habitat. Primary goals and objectives are to manage land resources for multiple use values and enhance economic stability throughout southern Nevada. Plans have been constructed by the Southern Nevada Cooperative Weed Management Area to compliment the Nevada Noxious Weed Laws put in place by the Nevada Department of Agriculture. The targeted noxious weeds to be controlled are designated by the Nevada Department of Agriculture. Control is aimed at eradicating, reducing, suppressing or containing populations of non-native, invasive noxious weeds which pose a threat to the environment and economies within the southern Nevada area

Southern Nevada Cooperative Weed Management Area and Partners:

The Southern Nevada Cooperative Weed Management Area planning initiatives and control strategies are administered and implemented on public lands by the partnering regulatory agencies, primarily the Bureau of Land Management Southern Nevada District Office, the Humboldt-Toiyabe National Forest Las Vegas District, the Nevada Department of Wildlife, the US Fish and Wildlife Service, the Nevada Department of Agriculture and the Bureau of Reclamation.

The Conservation District of Southern Nevada has partnered with the SNCWMA group to identify and address Resource Concerns within Clark County. More information about the Southern Nevada CWMA can be found at <https://www.facebook.com/pages/category/Nonprofit-Organization/Southern-Nevada-CWMA-1620091064874432/>

The private lands administrative and planning team, in concert with the regulatory agencies, includes the Conservation District of Southern Nevada, the Natural Resource Conservation Service, the University of Nevada Cooperative Extension, municipal partners in Las Vegas, Overton/Logandale/Moapa Valley, Boulder City, Henderson, and Clark County, the municipal water districts/authorities and several non-governmental organization (NGO) interest groups.

The partnering public and private lands planning teams work jointly in the effort to identify the areas of infestation, classify categorically the noxious species index, develop treatment and reclamation/rehab plans and monitor both treatment sites and new areas of infestation. The following (Table 5) lists alphabetically by common name the Nevada Noxious weed list.

African Rue	Giant Salvina	Hydrilla
Austrian fieldcress	Goats rue	Johnson grass
Austrian peaweed	Green fountain grass	Klamath weed
Black Henbane	Hemlock, poison	Knapweed, Diffuse
Camelthorn	Hemlock, water	Knapweed, Russian
Common crupina	Horse-nettle, Carolina	Knapweed, Spotted
Dyer's woad	Horse-nettle, White	Knapweed, Squarrose
Eurasian water-milfoil	Houndstongue	Leafy Spurge
Mayweed chamomile	Rush skeletonweed	Thistle, Sow
Mediterranean sage	Saltcedar (tamarisk)	Thistle, Iberian star
Medusahead	Sorghum alum	Thistle, Purple star
Perennial pepperweed	Sulfur cinquefoil	Thistle, Yellow star
<i>(tall white top)</i>	Syrian bean caper	Thistle, Malta star
Perennial sweet sudan	Thistle, Canadian	Toadflax, Dalmatian
Puncturevine	Thistle, Musk	Toadflax, yellow
Purple loosestrife	Thistle, Scotch	Whitetop or Hoary cress

Table 5: Nevada Noxious Weed List and Species

The following (Figure 7) identifies key target areas for the list of noxious/invasive plants that are considered priority target species in Clark County. In addition, the target areas demonstrate higher concentration zones for these weed species.

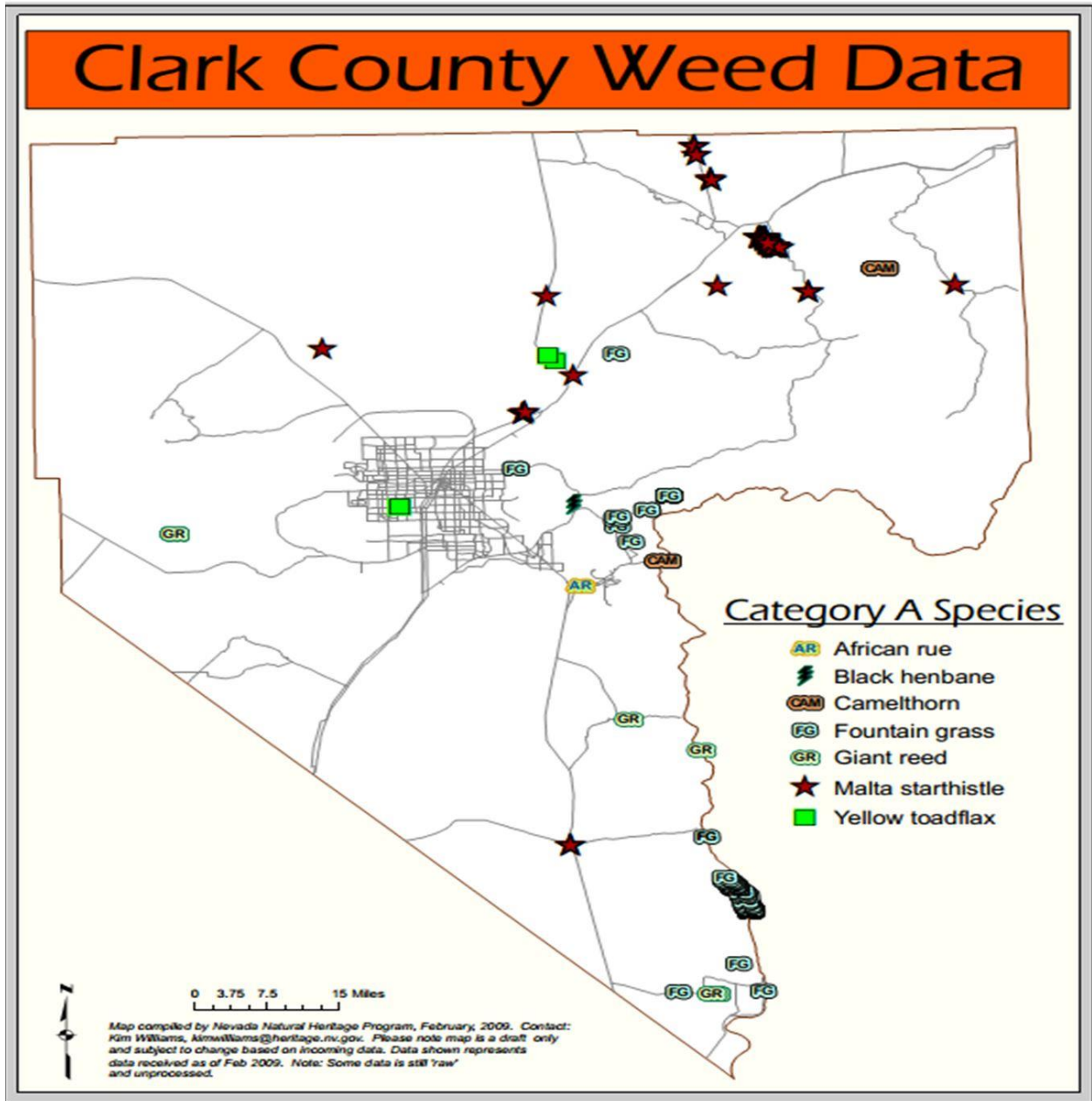


Figure 7: Clark County Category A Noxious/Invasive Species Source: Nevada Natural Heritage Program

V: Resource Concern Modeling Tool – NRCS Conservation Practice Physical Effects Matrix

The Natural Resources Conservation Service currently utilizes a modeling tool matrix, the conservation practice physical effects analysis, to evaluate long term effects relative to implementing a host of conservation management and or structural conservation practices to address resource concerns associated with a variety of land uses (NHCP, 2019). As an example to address soil health and water quantity problems for irrigated cropland in the Moapa Valley Water District the standard conservation practices considered may include irrigation system improvements, conversion (i.e. surface flood to sprinkler) or replacement, a modification of the cropping system rotational sequence, and implementing integrated pest management strategies to curtail or minimize invasive weed impacts.

The urban-rural interface within the Logandale/ Overton communities would focus more so on practices designed to conserve water for large garden and produce infrastructure, horticulture/floriculture and ornamental production, xeriscape plantings (landscape), and integrated pest management (noxious/invasive). The agricultural census in 2017 identified some 179 farm operations producing irrigated crops and haylage on 3,728 acres in Clark County (usda-nass, 2017). Irrigated crop production includes vegetable, melon, potatoes, fruits, nuts, beans, nursery, greenhouse, floriculture and sod.

The primary irrigated uses within Clark county comprise cropland served by sprinkler systems and surface flood systems, hayland/pasture and sod served by sprinkler systems and surface flood systems, and nursery/greenhouse/ornamental/floriculture production served by sprinkler, sprinkler/trickle and micro-irrigation systems. Many of the garden/nursery/greenhouse/floriculture properties are associated with the urban-rural interface with larger parcels. Clark county leads the state of Nevada in the production and marketing of the nursery/greenhouse and floriculture products. Water for agricultural use is drawn from ground water wells in the Logandale/ Overton area.

The identification of primary natural resource concerns can be summarized using the following: SWAPA+E+H, demonstrating the 7 components within the NRCS Resource Concerns Checklist. Soil, water, air, plant and animal environmental concerns, followed by energy related implications and lastly by human related impacts and effects. In the following figures, the NRCS Conservation Practice Physical Effects Matrix tool summarizes integral conservation practice and management applications to address primary resources concerns associated with these land use and crop production issues.

For a complete listing of NRCS conservation practice standards and specifications reference the NRCS National Handbook of Conservation Practices (NHCP, 2019)
https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849

(Table 6) Irrigated Crop Lands Resource Concerns, Conservation Practice Physical Effects:

Conservation Practice Selection Tool - Irrigated Cropland Major Land Resource Areas 30 - Mojave Desert - Clark County		Land uses sprinkler irrigated cropland and haylage/pasture production. Potential enhancements/conservation & management practice applications include well rehab or new construction, sprinkler system re-hab or new installation, pipeline, pumping plant re-hab or replacement, conservation cover, and management practices irrigation water mgt., nutrient mgt., conservation crop rotation/forage harvest mgt., residue/tillage management-reduced till, and integrated pest mgt. Primary resource concerns address soil wind erosion, soil quality degradation-organic matter depletion, soil quality degradation-compaction, insufficient water-inefficient use of irrigation water, insufficient water-inefficient moisture management, degraded plant condition-undesirable plant productivity & health, and degraded plant condition-excessive plant pressure.				
Use the CPPE to recommend practices that address the resource concerns: Enter the CPPE minimum acceptable "effect" value (1-5). Select the "Run" button to view recommended practices for each resource concern (equal to or greater than the minimum acceptable value). Place an "x" to the left of the practice that may be included in the conservation plan. Select the "Sort" button to list selected practices at top of column, and "Results" for final report.						
Soil Erosion - Wind Erosion	Soil Quality Degradation - Organic Matter Depletion	Soil Quality Degradation - Compaction	Insufficient Water - Inefficient Irrigation Water	Insufficient Water - Inefficient Moisture Management	Degraded Plant Condition - Undesirable Plant Productivity and Health	Degraded Plant Condition - Excessive Plant Pest Pressure
x Windbreak/Shelterbelt Establishment	x Tillage Management, Reduced Till	x Residue and Tillage Management, Reduced Till	x Water Well	x Tillage Management, Reduced Till	x Nutrient Management	x Sprinkler System
x Sprinkler System	x Nutrient Management	x Forage Harvest Management	x Sprinkler System	x Forage Harvest Management	x Irrigation Water Management	x Irrigation Water Management
x Irrigation Water Management	x Irrigation Water Management	x Conservation Crop Rotation	x Irrigation Water Management	x Conservation Crop Rotation	x Irrigation System, Surface & Subsurface	x Irrigation System, Surface & Subsurface
x Irrigation System, Surface & Subsurface	x Forage Harvest Management		x Irrigation System, Surface & Subsurface	x Irrigation Water Management	x Forage Harvest Management	x Conservation Crop Rotation
x Integrated Pest Management	x Conservation Crop Rotation		x Forage Harvest Management		x Conservation Crop Rotation	x Integrated Pest Management
x Forage Harvest Management			x Conservation Crop Rotation			
x Conservation Crop Rotation			x Irrigation Pipeline			
x Conservation Cover						

Table 6: Irrigated Crop Lands Resource Concerns and Conservation Practice Physical Effects

(Table 7) Flood Irrigated Crop Lands/Haylands/Pasture Lands Resource Concerns and Conservation Practice Physical Effects.

Conservation Practice Selection Tool - Surface Flood Irrigated Crop & Hayland/Pastureland MLRA's 30 - Mojave Desert - Clark County		Land use irrigated cropland and hayland/pasture lands utilizing surface flood irrigation system. These irrigated lands are fed primarily by irrigation canals and require water control structural practices and field ditch conveyance systems or pipelines to adequately distribute irrigation water. Additional conservation practices required to facilitate cropland/ hayland/pasture land production and stabilization may include, pumping plant re-hab or replacement, irrigation land leveling, perennial cover re-establishment, livestock watering systems, and fencing. Integral management practices include conservation cropping systems, forage harvest management, irrigation water management, prescribed grazing, integrated pest management and nutrient management. Primary resource concerns typically associated with irrigated cropland/hayland/pastureland include, excess water-runoff, flooding or ponding, insufficient water-efficient use of irrigation water, water quality degradation-pesticides in surface waters, water quality degradation-nutrients in surface waters, degraded plant condition-undesirable plant productivity and health, degraded plant condition-inadequate structure and composition, fish and wildlife habitat-inadequate habitat-cover/shelter, livestock production limitation-inadequate feed & forage and livestock production limitation-inadequate water.										
Use the CPPE to recommend practices that address the resource concerns: Enter the CPPE acceptable "effect" value (1-5):		1										
Select the "Run" button to view recommended practices for each resource concern (equal to or greater than the "effect" value). Place an "x" to the left of the practice that may be included in the conservation plan. Select the "Sort" button to list selected practices at top of column, and "Results" for final report.												
Soil Erosion Sheet and Runoff	Excess Water - Runoff, Flooding, or Ponding	Insufficient Water - Inefficient Use of Irrigation Water				Water Quality Degradation - Pesticides in Surface Water	Water Quality Degradation - Nutrients in Surface Water	Degraded Plant Condition - Undesirable Plant Productivity and Health	Degraded Plant Condition - Inadequate Structure and Composition	Fish and Wildlife Habitat - Inadequate Cover/Shelter	Livestock Production Limitation - Inadequate Feed and Forage	Livestock Production Limitation - Inadequate Watering Facility
x Prescribed Grazing	x Waterspreading	x	x	x	x	x	x	x	x	x	x	
x Fence	x Water and Sediment Control Basin	x	x	x	x	x	x	x	x	x	x	
x Conservation Cover	x Drainage, Field Ditch	x	x	x	x	x	x	x	x	x	x	
x Conservation Crop Rotation	x Structure for Water Control	x	x	x	x	x	x	x	x	x	x	
	x Land Smoothing	x	x	x	x	x	x	x	x	x	x	
	x Irrigation Water Management	x	x	x	x	x	x	x	x	x	x	
	x Irrigation System, Surface & Subsurface	x	x	x	x	x	x	x	x	x	x	
	x Irrigation Land Leveling	x	x	x	x	x	x	x	x	x	x	
	x Irrigation Ditch Lining	x	x	x	x	x	x	x	x	x	x	
	x Irrigation Pipeline	x	x	x	x	x	x	x	x	x	x	

Table 7: Flood Irrigated Crop Lands/Haylands/Pasture Lands Resource Concerns and Conservation Practice Physical Effects.

(Table 8) Garden/Nursery/Greenhouse/Ornamental/Floriculture/Horticultural Production Resource Concerns and Conservation Practice Physical Effects.

Conservation Practice Selection Tool - Garden/Nursery/Greenhouse/Horticultural Crops Major Land Resource Areas 30 - Mojave Desert - Clark County		Land uses: garden, nursery, greenhouse, & horticultural crops for fruit, vegetable/herb, ornamental, floriculture and horticulture production. Potential enhancements/conservation & management practice applications include well rehab or new construction, sprinkler system re-hab or new installation, pipeline, and pumping plant re-hab or replacement. Management practices include irrigation water mgmt., nutrient mgmt., conservation crop rotation, residue/tillage management-reduced till, and integrated pest mgmt. Primary resource concerns address soil wind erosion, soil quality degradation-organic matter depletion, soil quality degradation-compaction, insufficient water-inefficient use of irrigation water, insufficient water-inefficient moisture management, degraded plant condition-undesirable plant productivity & health, and degraded plant condition-excessive plant pressure.				
Use the CPPE to recommend practices that address the resource concerns: Enter the CPPE minimum acceptable "effect" value (1-5): <input type="text" value="1"/>						
Select the "Run" button to view recommended practices for each resource concern. The number of recommended practices will appear in the "Results" column.						
Place an "x" to the left of the practice that may be included in the conservation plan.						
Select the "Sort" button to list selected practices at top of column, and "Results" for final report.						
Soil Erosion - Wind Erosion	Soil Quality Degradation - Organic Matter Depletion	Soil Quality Degradation - Compaction	Insufficient Water - Inefficient Use of Irrigation Water	Insufficient Water - Inefficient Moisture Management	Degraded Plant Condition - Undesirable Plant Productivity and Health	Degraded Plant Condition - Excessive Plant Pest Pressure
<input checked="" type="checkbox"/> Windbreak/Shellerbelt Establishment	<input checked="" type="checkbox"/> Residue and Tillage Management, Reduced Till	<input checked="" type="checkbox"/> Residue and Tillage Management, Reduced Till	<input checked="" type="checkbox"/> Water Well	<input checked="" type="checkbox"/> Tillage Management, Reduced Till	<input checked="" type="checkbox"/> Nutrient Management	<input checked="" type="checkbox"/> Sprinkler System
<input checked="" type="checkbox"/> Sprinkler System	<input checked="" type="checkbox"/> Nutrient Management	<input checked="" type="checkbox"/> Forage Harvest Management	<input checked="" type="checkbox"/> Sprinkler System	<input checked="" type="checkbox"/> Forage Harvest Management	<input checked="" type="checkbox"/> Irrigation Water Management	<input checked="" type="checkbox"/> Irrigation Water Management
<input checked="" type="checkbox"/> Irrigation Water Management	<input checked="" type="checkbox"/> Irrigation Water Management	<input checked="" type="checkbox"/> Conservation Crop Rotation	<input checked="" type="checkbox"/> Irrigation Water Management	<input checked="" type="checkbox"/> Conservation Crop Rotation	<input checked="" type="checkbox"/> Irrigation System, Surface & Subsurface	<input checked="" type="checkbox"/> Irrigation System, Surface & Subsurface
<input checked="" type="checkbox"/> Irrigation System, Surface & Subsurface	<input checked="" type="checkbox"/> Conservation Crop Rotation		<input checked="" type="checkbox"/> Irrigation System, Surface & Subsurface	<input checked="" type="checkbox"/> Irrigation Water Management	<input checked="" type="checkbox"/> Conservation Crop Rotation	<input checked="" type="checkbox"/> Conservation Crop Rotation
<input checked="" type="checkbox"/> Integrated Pest Management	<input checked="" type="checkbox"/> Conservation Crop Rotation		<input checked="" type="checkbox"/> Conservation Crop Rotation		<input checked="" type="checkbox"/> Conservation Crop Rotation	<input checked="" type="checkbox"/> Integrated Pest Management
<input checked="" type="checkbox"/> Conservation Crop Rotation			<input checked="" type="checkbox"/> Irrigation Pipeline			
<input checked="" type="checkbox"/> Conservation Cover						

Table 8: Garden/Nursery/Greenhouse/Ornamental/Floriculture/Horticultural Production Resource Concerns and Conservation Practice Physical Effects.

VI: Future, Survey and Action Plans

Resource Needs Assessment Survey:

In addition to the Resource Needs Assessment local work groups, The University of Nevada Cooperative Extension provided funding for a Conservation survey to be distributed within several conservation district areas throughout the State of Nevada. The UNR Department of Economics and University of Nevada Cooperative Extension are collaborating and the survey has been distributed by mail in the northern Nevada conservation districts and will be released electronically Fall of 2019 in Southern Nevada. Although the results of this Survey are not included in this version of the Resource Needs Assessment Conservation Report, updates will be made in the future to this working document.

The purpose of the survey instrument is to gather public input from a broad range of agencies, organizations, businesses, and individuals within conservation districts who have an interest in natural resource conditions. This information will inform and assist CD supervisors when working through the CPPE process and completing the Conservation Action Plans. It will help supervisors assess natural resource conservation needs and set community conservation goals in context of community conservation goals and priorities. Completed surveys in each participating District will help ensure that projects, research, and educational priorities meet the conservation needs in each District and across the state (NVACD, 2017)

Future of this Resource Needs Assessment Initiative

This Conservation report is a working document and will continue to be modified as needed to include relevant details that were missing at the time of initial release. One major item to be considered in further detail would be urban resource needs in addition to the water concerns that were addressed herein. Furthermore, understanding the resources concerns and problems presented in this document are only one step of this process. For this report to be relevant and useful, the next step is to continue dialogue and discussions on creating action plans to address what was reported here. We can understand the resource concerns, but without action, this report is irrelevant. We hope this is not the case as the Conservation District of Southern Nevada continues to work with current and new partners to address these concerns regarding the issues presented within.

Acknowledgements:

A special thanks to Eric Killian (Extension Area Director) and the University of Nevada Cooperative Extension for funding this Resource Needs Assessment and Survey. Thank you to the major contributors: Gary McCuin (Extension Educator), Jake Tibbitts (Eureka County Natural Resource Manager), Maggie Orr (Past President, Nevada Association of Conservation Districts), Jarrett DeCorte (Conservation Coordinator for CDSN and Extension), and Mark Damron, (CDSN Advisor) for their due diligence in establishing the primary partners network and providing technical and administrative assistance throughout the RNA development process, in addition to editing and reviewing this RNA Conservation Report. Without a group effort, this RNA initiative would not have been able to come to where it is today.

VII: Resource Needs Assessment Bibliography

Ag Handbook 296, N.-U. 2. (2006). *Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean and the Pacific Basin*. Retrieved from https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051845.pdf

Brean, H. (2019, March). The Water Question. *Las Vegas Review Journal* .
District, M. V. (2016, January). *Water Conservation Plan*. Retrieved from https://www.moapawater.com/att/44/store/u35_MVWD-2016-Water-Conservation-Plan-Pt-1.pdf

Nevada, W. R. (2019). *State of Nevada Division of Water Resources*. Retrieved from <http://water.nv.gov/>

NHCP. (2019). *National Handbook of Conservation Practices*. Retrieved from https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849,
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/econ/tools/?cid=nrcs143_009740

NVACD. (2017). *Locally Led Conservation*. Eureka, Nevada: UNRCES.

NVSHPO. (1979). *Nevada State Register of Historic Places*. Retrieved from <http://shpo.nv.gov/services/srhp>

Region, U. N. (2016 Crop Year). *Nevada Ag Statistics Annual Bulletin*. Retrieved from <http://www.nass.usda.gov/nv/>

SNCWMA. (2019). *Southern Nevada CWMA*. Retrieved from https://www.facebook.com/pg/Southern-Nevada-CWMA-1620091064874432/about/?ref=page_internal

SNWA. (2018). *2018 SNWA Water Resource Plan*. Retrieved from <https://www.snwa.com/assets/pdf/water-resource-plan-printable.pdf>

Strong, S. N. (2015). *Southern Nevada Strong Regional Plan*. Las Vegas, Nevada: Southern Nevada Strong.

UNLV. (2019). *Center for Urban Water Conservation*. Retrieved from <http://urbanwater.sites.unlv.edu/>

usda-nass. (2017). *2017 Census of Agriculture Clark County Nevada*. Retrieved from https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Nevada/cp32003.pdf

VIII: Appendix - CDSN Climate and Resource Maps

Appendix 1: Mojave Desert Region and Climate

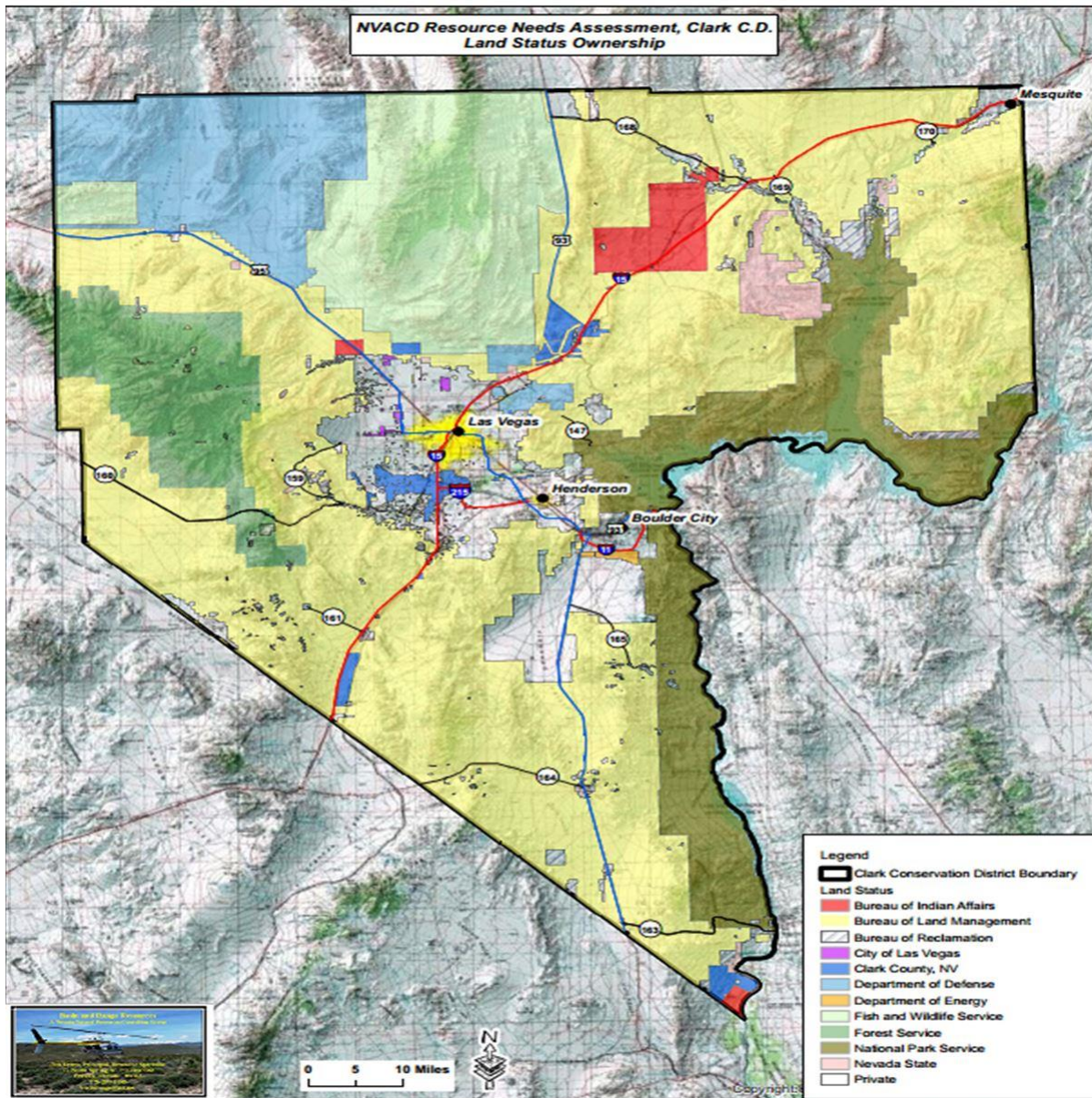
Mojave Desert

The Mojave Desert encompasses all of Clark County, Nevada, in addition to several states including California (59 percent), Nevada (28 percent), Arizona (12 percent), and Utah (1 percent). It makes up about 43,750 square miles (113,370 square kilometers). Lancaster, Palmdale, Victorville, Apple Valley, and Barstow, California, Bullhead City and Kingman, Arizona, and Las Vegas, Nevada, are in this MLRA. Interstate 15 connects Las Vegas and Barstow in this area. Interstate 40 connects Kingman and Barstow. Interstate 40 terminates in Barstow, where it intersects with Interstate 15. The Lake Mead National Recreation Area is along the Colorado River, which forms the border between Nevada and Arizona in this MLRA. The Mojave National Preserve, Joshua Tree and Death Valley National Parks, and numerous wilderness study areas and recreational areas occur in this sparsely populated MLRA. Numerous military reservations are in the area, including Edwards Air Force Base, Fort Irwin, China Lake Naval Weapons Center, Goldstone Communications Complex, and Twenty-Nine Palms Marine Corps Base in California and Nellis Air Force Range and Nellis and Indian Springs Air Force Bases in Nevada.

Climate

The average annual precipitation is 2 to 8 inches (50 to 205 millimeters) in most of this extremely dry MLRA. It exceeds 37 inches (940 millimeters) in some scattered areas at the higher elevations in Nevada and southwestern Utah. Most of the rainfall occurs in the winter months as low-intensity precipitation from Pacific storms that are frontal in nature. High-intensity, convective thunderstorms can occur during the summer, but they contribute little to soil moisture. These storms occur more frequently in the eastern part of the area, where they contribute more to soil moisture. Snow is not very common and usually is on the ground for very short periods at the lower elevations, but the highest elevations may have snow for several weeks at a time in the winter. The average annual snowfall ranges from nearly 0 inches in the lowest deserts to more than 30 inches (760 millimeters) at the highest elevations of the Spring Mountains directly west of Las Vegas. The average annual temperature ranges from 43 degrees F (6 degrees C) in the highest mountains to 76 degrees F (25 degrees C) in areas along the Colorado River in California, Nevada, and Arizona. Most of the lowest deserts have a growing season of nearly 365 days per year, especially along the Colorado River, whereas other desert areas have a freeze-free period of 200 to 330 days per year. In the higher mountains and the higher valleys in Nevada and extreme southwestern Utah, the freeze-free period typically is about 150 to 180 days per year. In the highest mountains, it is as short as 160 days per year. Death Valley National Park is considered one of the hottest and driest areas in the Western Hemisphere. The average annual precipitation in the park is 1.96 inches (49.8 millimeters), and the summer air temperatures can be as high as 134 degrees F (56.7 degrees C).

Appendix 2: Clark County Land Status Map



Appendix 3: Clark County Hydro Basin Map

