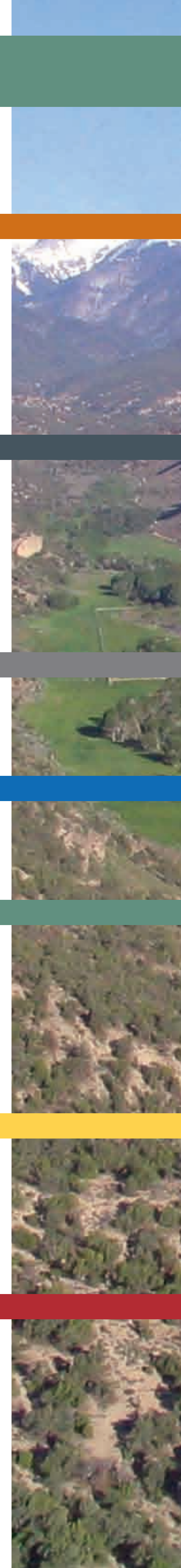
Las Vegas & The Groundwater Development Project

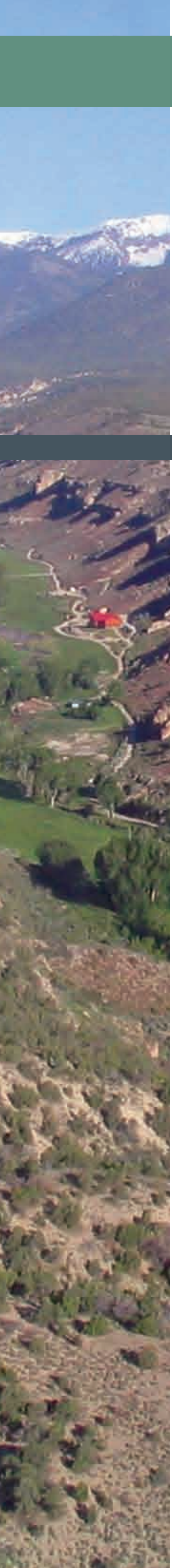
Where does it start?

Where will it end?



Cover: Lake Las Vegas/*photo: Christina Roessler,* Snake Valley, NV/*photo: Gretchen Baker*

Lake Las Vegas/*photo: Christina Roessler*



Las Vegas and the Groundwater Development Project

Where does it start? Where will it end?

A Progressive Leadership Alliance of Nevada (PLAN) Report

By
Christina Roessler

Concepts/design by
Bob Schmitt, laughingwatersstudio.com

PLAN Planevada.org
Progressive Leadership Alliance of Nevada
Reno . Carson City . Las Vegas

Las Vegas Office
732 S. Sixth Street, Suite 200
Las Vegas, NV 89101
(702) 791-1965

Reno Office
821 Riverside Drive
Reno, Nevada 89503
(775) 348-7557

Washoe Valley
6185 Franktown Rd.
Carson City, NV 89704
(775) 882-3440

The Progressive Leadership Alliance of Nevada is a statewide coalition founded in 1994. Our mission is to build collective strategic action among coalition partners in order to deepen democracy and achieve greater social justice in Nevada. PLAN uses research, public education, leadership development, and grassroots organizing to build power and create more humane solutions to Nevada's problems.

For updates on water and Las Vegas and for more information on PLAN and our work please visit: www.planevada.org

Snake Valley, NV/*photo: Gretchen Baker*

The Proposed SNWA Pipeline Project

People can live without just about anything,
but they can't live without water.
The truth that water is an absolute necessity is forgotten by many of us,
however, because it's so easily available.
We simply turn on the tap and it's there—all we need, and more.
Water is arguably our most precious resource,
but those of us with plenty lose sight of that fact.

As a whole, the United States is water rich. Even here, however, rapidly growing urban populations are draining available water resources. This is especially true in arid regions of the Southwest. Cities throughout the region are trying to figure out how to meet the demand for water. This is no easy task, because virtually every drop of water in the Southwest is being used for something.

Increasingly, cities are eyeing the water in rural areas and are contemplating large-scale water transfers. Rural has it, urban wants it, and money and power are largely on the side of the cities. We're at a crossroads, and the life of rural America is in the balance. Without water, rural communities and the farmers and ranchers who grow our food cannot thrive.

Cities have a choice. They can increase supply, often at the expense of rural communities; they can decrease demand; or they can do both. In water-scarce areas, there are no easy answers. It ultimately comes down to who decides, how water is shared, and how to strike the right balance.

Photo: Digital Zoo

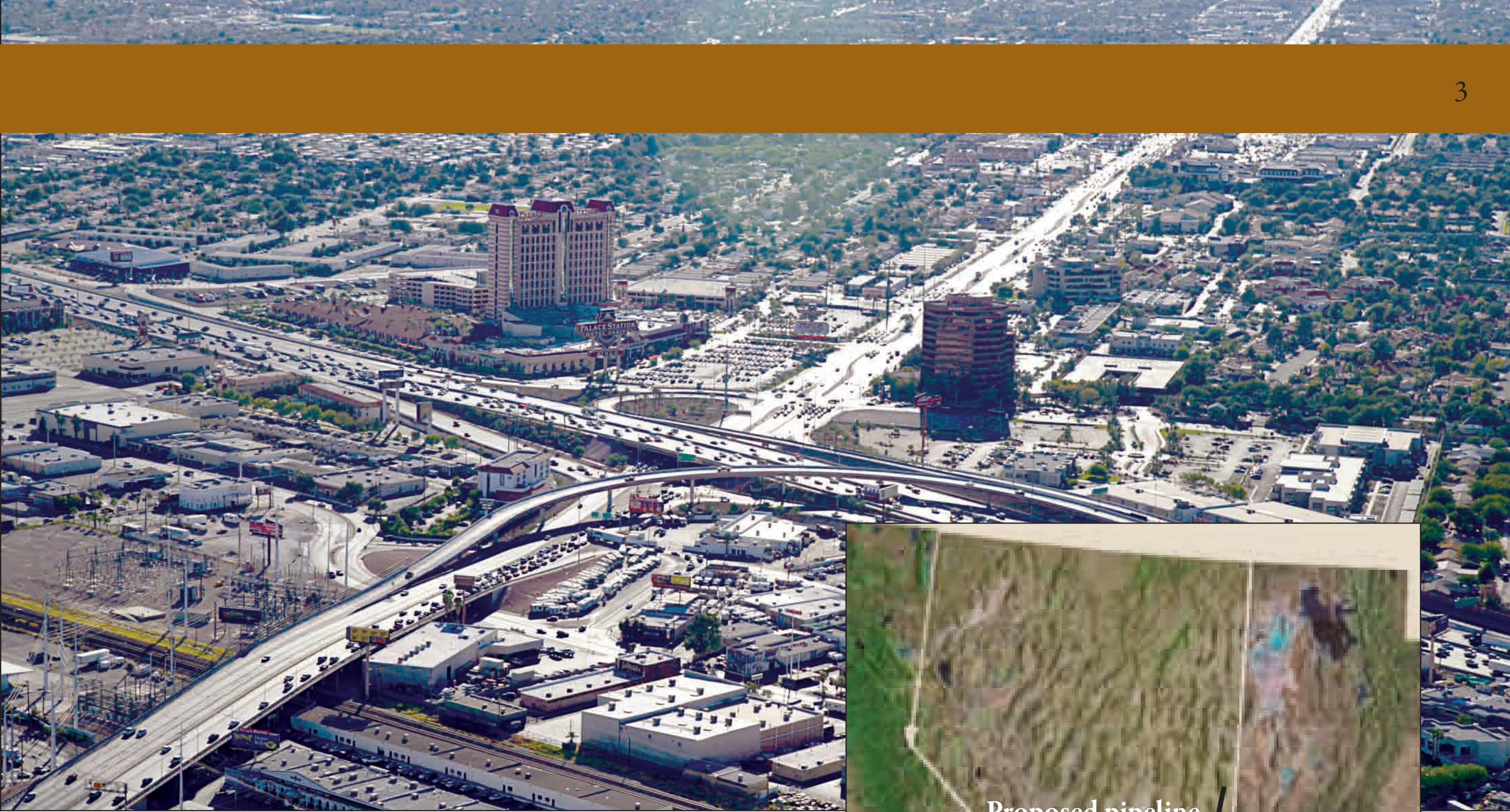
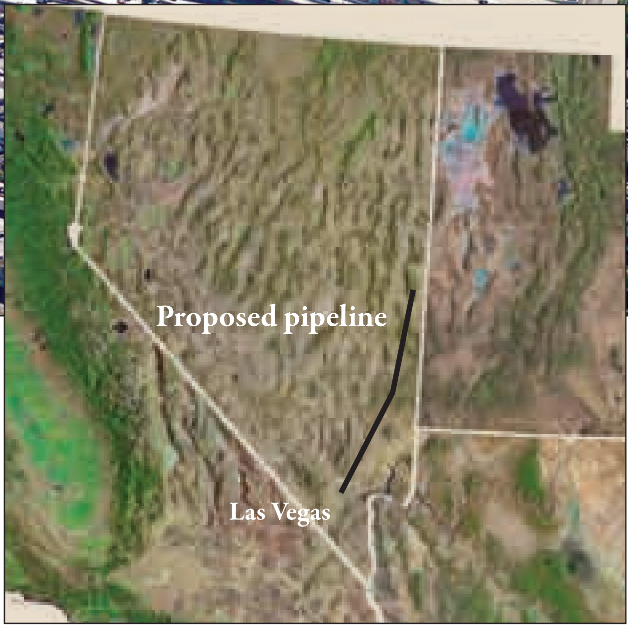


Photo: Frederick Bass



Fastest growing urban area

Collectively, the cities located in the Las Vegas Valley comprise the fastest growing urban area in the country and have for a number of years. The current population in Las Vegas Valley is 1.8 million people and at existing growth rates that number will nearly double by 2030—this means that the valley will grow by more than 70,000 people each year for the next quarter century.

Part of what draws people to Las Vegas is its climate—it's sunny and dry and receives only about four inches of rain a year. It's a desert city, and while there are many advantages to its location, a vast supply of freshwater is not one of them. Rapid growth combined with a desert location has strained existing water supplies, and Las Vegas is looking for more.

Proposed massive pipeline system

The Southern Nevada Water Authority (SNWA), which manages water for the Las Vegas Valley, proposes to build a massive pipeline system that would take underground water from the Great Basin aquifer system and pump it to Las Vegas. The plan calls for transferring up to 180,000 acre-feet per year from rural Nevada to Las Vegas Valley. (An acre-foot is the amount of water needed to cover one acre to a depth of one foot—about 326,000 gallons. Traditionally, water planners have calculated that a family of four uses about one acre-foot per year.)

The Progressive Leadership Alliance of Nevada (PLAN) commissioned this report to give Nevadans a better understanding of the complexity of the pipeline project and its impact on the Great Basin region. It is an expensive project, both to build initially and to maintain, and we believe there are serious questions about the availability of the water the SNWA needs to make this project feasible.

Other cities in the Southwest have dramatically lowered overall demand for water through ambitious conservation programs. The SNWA has excellent conservation programs already underway. We believe that strengthening these programs will go a long way towards meeting the water needs of a growing Las Vegas Valley for many years to come. The pipeline project is costly and risky; conservation is proven and comparatively inexpensive.

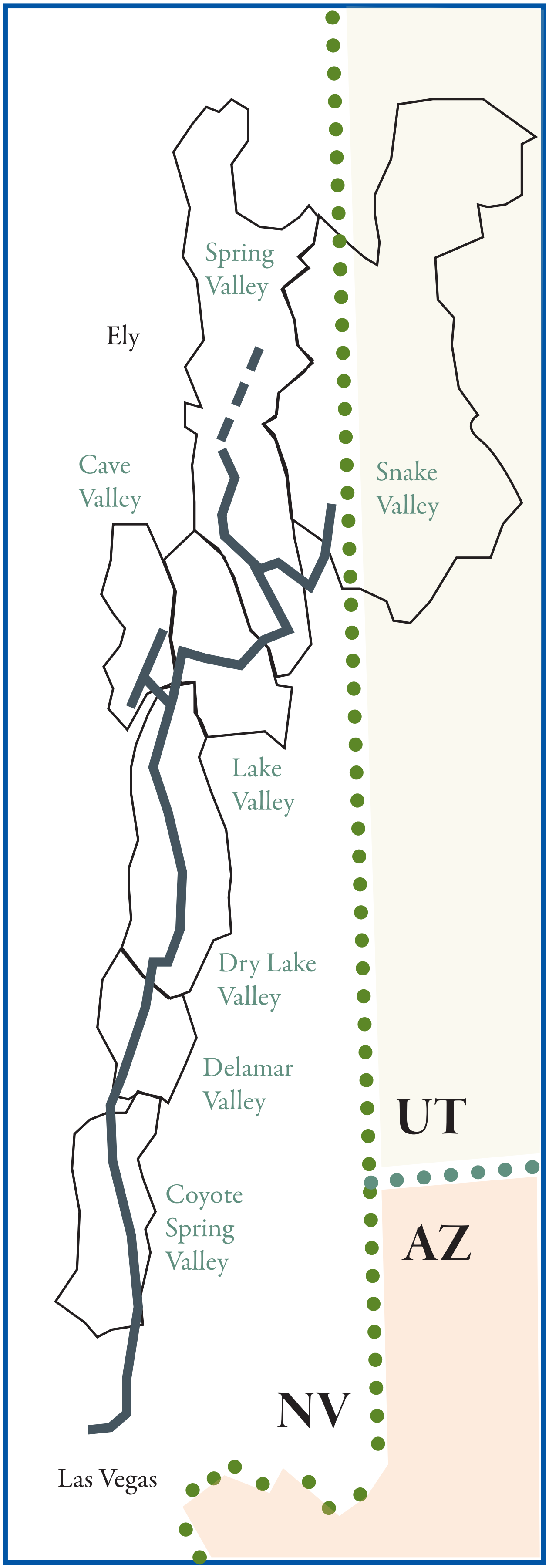
Meet Snake Valley: Pipeline Starting Point?

Snake Valley, NV/*photo: Christina Roessler*

Delicate desert environment

The proposed pipeline would originate in White Pine County in Spring and Snake Valleys. Snake Valley spans the Nevada-Utah border and is the home of the Great Basin National Park. Under the current plan SNWA would extract 25,000 acre-feet a year from the aquifer in this valley. Residents in the valley are concerned that withdrawing water from this delicate desert environment will dry up the springs, ponds, and wetlands and could have devastating effects on the region.

Snake Valley, NV/*photo: Christina Roessler*



70% of the valley is in Utah

Snake Valley is a north-south running valley that at nearly 100 miles is one of the longest valleys in the world. About 70% of the valley is in Utah. On the Utah side in the north end of the valley, the hamlet of Callao was once a stop for the Overland Stage Coach and the Pony Express. Towards the south end the little town of Baker, Nevada, sits right on the border with Utah—the Great Basin National Park is located here.

Snake Valley does not have the most hospitable climate, and the people who live there are a hardy bunch with a deep respect and love for the land. Rainfall averages about six inches a year. The Valley is known for its fierce winds that can blow as much as 70 miles an hour for anywhere from several hours to several days.

The economic mainstay in the Valley for over a century has been ranching. There are somewhere on the order of 40 ranches here now.

Cecil Garland is a rancher in Callao, Utah, in the northern part of the valley.

Dean Baker has a ranch in Baker, Nevada, in the southern part of the valley.

Photos: Christina Roessler

They're friends to each other and foes to the pipeline.

Here's who they are and what they have to say.

Snake Valley, NV/*photo: Gretchen Baker*

Dean Baker, Rancher—Snake Valley, Nevada

Dean's cattle, Snake Valley, NV/*photo: Christina Roessler*

Dean and his dogs, Snake Valley, NV/*photo: Christina Roessler*

It's hard to know what Dean Baker loves more—the land or his cows. In his laconic way he's got an infectious enthusiasm for both. It's difficult to be in his presence for more than a few minutes without sharing his enjoyment. He likes to say he has "an incurable disease called agriculture. I like to watch things grow—plants and animals. I like working on the land."

Dean's ranch is in the Snake Valley in Eastern Nevada within spitting distance of the Utah border. His father started coming to the Snake Valley in the 1920s, and Dean recalls coming to the valley for vacations most summers of his childhood. It wasn't until 1959 that the family bought the current ranch, coincidentally in Baker, although as far as they know the town and family are unrelated.

Modest pretty much sums up the man and the ranch. It's hard to determine his age from his appearance, but he's probably somewhere in his sixties. He looks every bit the rancher with his blue jeans, boots, and work shirts. His heavily calloused hands are a dead give-away of a life spent working outdoors—although his glasses lend just a hint of a Poindexter air. His house, too, is modest. It's a single-story prefab house with a small addition in the form of an enclosed porch looking out on a lovely wetland area. It has a comfortable lived-in look and feel.

A serious ranch on a serious scale

This is not the Hollywood image of a successful western cattle ranch. But that doesn't mean it isn't a serious ranch on a serious scale. The ranch consists

Dean's home, Snake Valley, NV/*photo: Christina Roessler*

Dean at rally, Carson City, NV/*photo: Christina Roessler*

of 12,000 deeded acres, but the 2,000 mother cows and calves also run on 200-300,000 acres of rangeland that the Bakers lease from the Bureau of Land Management.

Unless the water dries up

Dean runs the ranch with his three sons—all of their families live there, too. Together they produce about two million pounds of beef a year along with 4,000 tons of hay as well as alfalfa, corn, and barley. They make a living. Some years are better than others, but it evens out. They intend to continue ranching this land indefinitely.

That is unless the water dries up. Dean is very concerned that the Southern Nevada Water Authority's plans to take underground water from Snake and Spring Valleys and pump it through a pipeline to Las Vegas will devastate the region and will leave ranchers and farmers like him and his neighbors high and dry. "Snake and Spring Valleys are currently in balance, but it's a delicate balance. All of the water is being used to support the life within the region. There is no excess water."

There is no excess water

For the most part all living things in the region, not just humans, are dependent on the Great Basin aquifer and its springs for water. According to Dean Baker, "Virtually any level of irrigation here leaves nearby springs dry, and the vegetation dies. That's just a drop in the bucket by comparison with what will happen when SNWA turns on the spigot and starts pumping 25,000-50,000 acre-feet per year. And once the vegetation goes, the dust will really start blowing around.

"If the pipeline dries this county up, and I'm certain the water just isn't there, then what happens? SNWA has a multi-billion dollar pipeline with no water in it. That would be a fiasco, so they would have to go elsewhere for the water. If the pipeline is built, the beast will have to be fed somehow from somewhere."

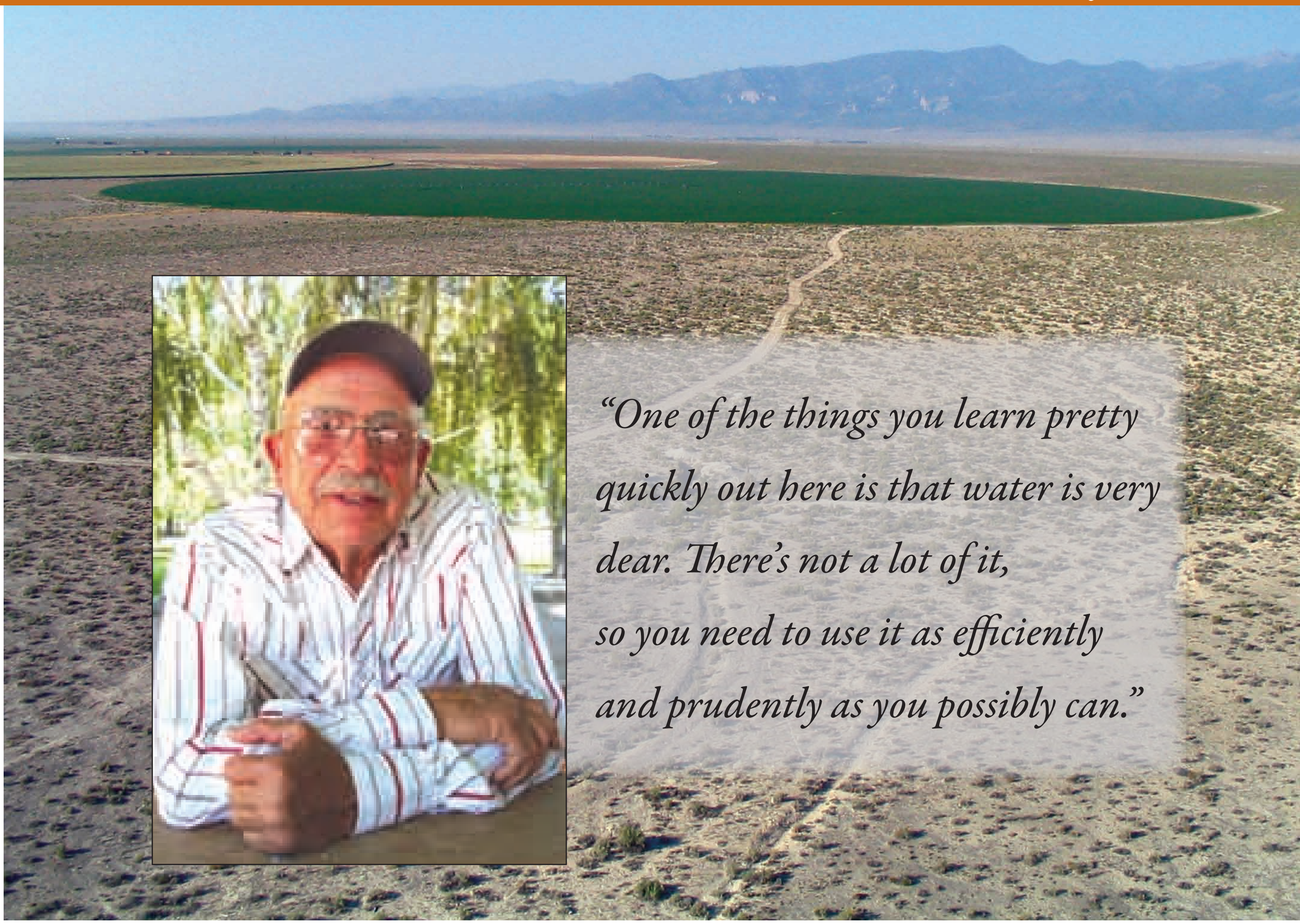
These days, Dean calculates he spends about 30% of his time opposing the pipeline. He's frustrated by this because he'd rather be ranching, producing the meat that's sold in markets all over the country, including most likely Las Vegas. Ultimately, he's optimistic that the pipeline won't get built.

"I just don't believe the people in Las Vegas want to kill everything and take people's communities and livelihoods away. There are better ways for Las Vegas to have the water it needs. Improved conservation would go a long way. Las Vegas could grow quite a bit and not need any more water than it has now."

"Snake and Spring Valleys are currently in balance, but it's a delicate balance. All of the water is being used to support the life within the region. There is no excess water."

Pond on Dean's ranch, Snake Valley, NV/*photo: Christina Roessler*

Cecil Garland, Rancher—Snake Valley, Utah



"One of the things you learn pretty quickly out here is that water is very dear. There's not a lot of it, so you need to use it as efficiently and prudently as you possibly can."

Photo: Christina Roessler

Irrigated section of Snake Valley, NV/*photo: Gretchen Baker*

Cecil Garland always knew he wanted to live out West. When he was a young boy growing up poor in the Smoky Mountains of North Carolina he would read about the West and knew he would move there as soon as he could. In 1946, after a stint in the Army Air Force during World War II, he packed a duffel bag and hitchhiked to Las Vegas.

Las Vegas was a friendly, dusty, desert town when Cecil arrived. He liked it and spent most of the next ten years there, mostly dealing craps, except for three summers when he went up to Lake Tahoe to work. By 1956, though, things had changed. Las Vegas had grown a lot and people were coming from all over the country to make their fortunes at the gaming tables. It had taken on the air of a big city, so Cecil and his wife packed up their belongings and moved with their three girls to Montana.

For nearly two decades Cecil and his family lived in Lincoln, Montana. They started a retail store that sold boots and shoes, and Cecil worked for the Forest Service to supplement the family income. In the early '70s he and his wife decided it was time to go their separate ways. Cecil headed down to Utah where he settled in Callao at the northern end of the Snake Valley and became a rancher.

Cecil and his second wife Annette, a schoolteacher, bought a 200-acre ranch and six cows. They lived on her income and whatever the cows made they'd put back into the ranch. They restored the 100-year-old adobe house that had been owned at one point by a widow lady who took in borders at $1.00 a night (meals were an extra 25 cents). Mark Twain stayed in the house for a couple of nights during his *Roughing It* years.

"There's not much room for error in ranching. You've got to be very careful and frugal to make it work. But I love it; I absolutely think it's the best way of life for me," Cecil says of his life now. He and Annette have grown the ranch over time so that now it's over

"We're at a crossroads in our decision-making— not just in the Great Basin area— about how to share our limited water supplies. It's pitting rural areas against the big cities."

Snake Valley, NV/*photo: Gretchen Baker*

500 acres of deeded land and they have "a couple hundred head of mother cows." They grow just enough hay to feed their calves in their own feedlot until the calves are about a year old, at which point they ship them out to be fed elsewhere.

Water is very dear

"One of the things you learn pretty quickly out here is that water is very dear," Cecil explains. "There's not a lot of it, so you need to use it as efficiently and prudently as you possibly can." He goes on to say, "It's ludicrous to me that the folks down in southern Nevada are willing to bet $15 billion or so—that's probably what the pipeline will ultimately cost —that there's enough water here to fill that pipe. The water just isn't here.

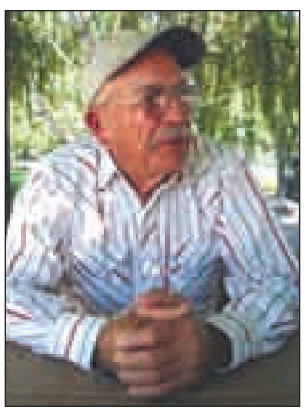


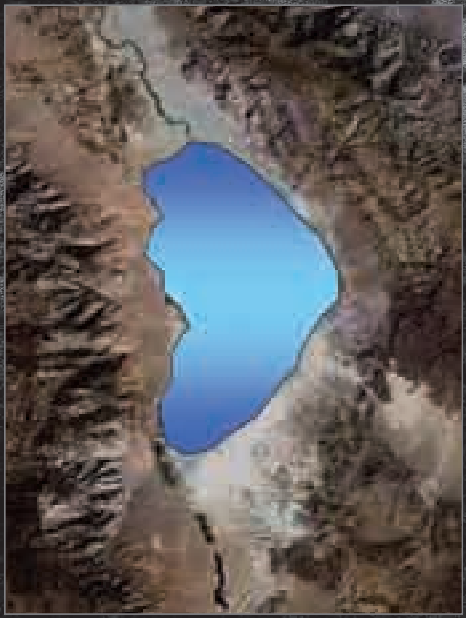
Photo: Christina Roessler

"Look at what happened to Owens Valley. And there's a whole lot more water there than there is here. Owens Valley had a lake, a river, a greater underground water supply, and much more precipitation than we get here. In Snake Valley we have none of that. You can't tell me that sucking all that water out of our aquifer isn't going to devastate the region. We're at a crossroads in our decision-making—not just in the Great Basin area—about how to share our limited water supplies. It's pitting rural areas against the big cities. The question is, do we allow cities to destroy the rural countryside and our communities? If so, let's envision what the Southwest will become—a lot of dead valleys like Owens Valley."

Snake Valley, NV/*photo: Gretchen Baker*

Remember Owens Valley

It's all happened before.
Except a hundred years ago
it was a man named Mulholland.
It was California, not Nevada;
and it was the Owens Valley,
not Snake and Spring Valleys.
It was about water and growth
and destruction, and it still is.



In the late 1800s, Owens Lake , at about 110 square miles, was one of the largest natural lakes in California. It was a saline terminal lake with a salinity about 11⁄2 times that of seawater.

With the lake's main source of water diverted, by the mid-1920s Owens Lake had shrunk to a small hyper-saline remnant brine pool of about 40 square miles, but only a few feet deep.

Photos & diagrams: courtesy Ted Schade

Diagrams and photos courtesy: Ted Schade

Owens River Gorge 1920s or 30s

Historic photograph: Eastern California Museum

This photo, taken in 1891 from the eastern shore of Owens Lake near Keeler, shows the crest of the Sierra in the background.

"Ten years ago, this was a wonderful valley,
with one quarter of a million acres
of fruit and alfalfa.
But Los Angeles had to have more water
for the Chamber of Commerce
to drink more toasts to its growth,
more water to dilute its orange juice
and more water for the geraniums
to delight the tourists,
while the giant cottonwoods here died.
So, now this is a valley of desolation."

—Will Rogers

In 1913, the City of Los Angeles' Department of Water and Power (LADWP) completed construction of the Los Angeles Aqueduct. The Aqueduct diverted Owens River water destined for Owens Lake 223 miles south to Los Angeles.

Owens River Gorge 1991

Historic photograph: Eastern California Museum

Owens Valley: A cautionary tale of pipe dreams

In 1900 Owens Valley was a quietly prospering agricultural region poised to prosper more than quietly. The valley sits between the Sierra Nevada Range on the west and the White-Inyo Range on the east. Although strictly speaking the region is high desert, the soil is fertile, and there has historically been adequate water in the form of the Owens River that runs (or used to) from one end of the valley to the other.

Owens Valley is so well situated for agriculture that it came to the attention of the newly formed U.S. Reclamation Service at the turn of the last century. In 1904 Thomas Means, a Service soils engineer, was sent to study the valley and determine its suitability as one of the first major projects for the Reclamation Service. According to Means,

> *The Owens Valley seems to have many peculiar merits to favor it as an irrigation project. Among these may be mentioned abundance of water power, fertile soil, genial climate, nearby markets for all agricultural projects in Tonopah and Goldfield, and a possible outlet to Los Angeles in the near future* (Kahrl, p. 51).

According to historian William L. Kahrl in his book *Water and Power*, at that time there were over 400 thriving family farms in the valley growing everything from hay, corn, and alfalfa to orchard fruits including apples, peaches, pears, and plums.

> *The Owens Valley with its rich soils and abundant water resources offered a far more likely prospect for agricultural development in 1900 than did the peat bogs of the Sacramento-San Joaquin delta, the barren lands of the west side of the San Joaquin Valley, or the forbidding wastes of the Colorado Desert, all of which rank today among the richest centers of agricultural production in California* (Kahrl, p. 38).

"Excess" water

Then came William Mulholland and his vision for a water-rich Los Angeles. The water had to come from somewhere, since Los Angeles is not naturally endowed with abundant fresh water. So Mulholland decided to take what he saw as "excess" water in Owens Valley and pipe it down to LA. Never mind that the residents of Owens Valley had other plans, and that the water flowing in the Owens River certainly did not seem "excessive" to them. LA's boosters wanted the city to grow, and with a new supply of fresh water, grow it would.

By 1905 the indomitable will of Los Angeles had asserted itself so completely that the U.S. Reclamation Service stepped aside. The *Los Angeles Times* trumpeted the news of more water for the city in a July 29, 1905, headline: *"Titanic Project to Give the City a River."* Mulholland himself summed it up nicely when he said, "Whoever brings the water brings the people" (LADWP website).

Initially, Owens Valley residents were assured that the grab for water would stop with the diversion of the Owens River into a giant aqueduct and pipeline system running 233 miles from just north of the small town of Independence to LA. The *LA Times* promised in a September 7, 1905, article that the Owens River would supply Los Angeles with water "ample for all the needs of the City and its suburbs for all time to come" (Kahrl, p. 90).

This statement proved to be a pipe dream of relatively short duration. With the statement, "There it is. Take it," William Mulholland officially opened the LA Aqueduct in November 1913. Within a few decades Los Angeles was again facing a water shortage. By then Owens Lake, a 110-square-mile perennial lake prior to the diversion of the Owens River, was essentially dried up with only a thin layer of brine left. Gone too, of course, was 63 miles of the Owens River.

"There it is. Take it."

William Mulholland
officially opened the LA Aqueduct in November 1913.

Photo: City of Los Angeles' Department of Water and Power

A thirst not quenched

Undaunted, once again LA turned to the Owens Valley. The city began buying more land and water rights. Surface water was not enough, though, and LA also started eyeing the valley's groundwater. As described on the LA Department of Water and Power website,

> *In order to increase supply, the City began pumping groundwater. Farmers in the Independence area filed injunctions in an attempt to halt falling water table levels. In Bishop and Lone Pine, residents became alarmed by the City's purchases of properties north of Independence for the acquisition of groundwater rights.*

LA's thirst could not be quenched by the Owens Valley groundwater, however, so the Mono Basin Project was initiated in the 1940s, extending the Aqueduct system even farther north and taking water from the creeks that sustain Mono Lake. In the '60s, work began on a Second Los Angeles Aqueduct which was completed in 1970. The second aqueduct was supplied by greater diversions from Mono Basin, huge increases in groundwater pumping from the Owens Valley, and reductions in the remaining irrigated lands.

And so it goes. Today, most years about 70% of LA's water comes from the Eastern Sierra. Owens Valley never attained its promise of an agricultural oasis. Not only did the land dry up, the communities dried up as well.

The City of Los Angeles owns 89% of the privately-owned land in Owens Valley. In towns like Bishop, most business owners have to rent from the City of LA, and they can only get short-term leases that may not be renewed if they raise questions about the reasonableness of LA getting most of the valley's water.

The region is a treasure for people who like to hike and fish, but because of LA's land ownership, one doesn't find the fancy hotels, restaurants, and shops that these days go along with major tourist activity. Although this valley should be a thriving tourist area, there is a lingering feeling that it never has been and never will be. Beautiful, yes. LA couldn't destroy the sheer physical beauty of the region. And, perhaps paradoxically, it feels like a place where real people you'd like to know live and work. Just not that many of them, and not that many who own their land and control their livelihoods.

The true cost unknown

It's pretty simple really when it comes to water—rural has it, urban wants it. It's true the world over. What makes the Owens Valley story so enduring and compelling is the scale. Many of us think about the choices not taken and doubt that the sacrifice was worthwhile. It's a question of balance and time. The bottom line is neither cities nor the living beings in them can thrive if rural areas are destroyed. We need to think more deeply about the consequences of our actions, consider more options, and question how big we want our cities to be—especially those built in water-scarce areas.

Photo: City of Los Angeles' Department of Water and Power

Owens Lake, CA/*photo courtesy: Ted Schade*

Creating dust and costing taxpayers hundreds of millions of dollars

Owens Lake isn't particularly well known as a lake anymore. Instead, the lakebed is infamous for its dust. It's easy to drive right past the remnants of the 'lake' without realizing there's still a form of water there.

Right up until 1900 Owens Lake was one of the largest natural lakes in California—measuring 110 square miles with a depth of 50 feet. It is a terminal lake; the end, as it were, of the Owens River. At one time it was an important migratory stop for birds. Early settler Beveridge R. Spear remembered the lake "alive with wild fowl, from the swift flying Teel to the honker goose....Ducks were by the square mile, millions of them" (Kahrl, p. 35).

After 1913, the Owens River no longer flowed into Owens Lake. That was the year the Aqueduct opened and changed the course of the Owens River to Los Angeles. By 1924, the lake had shrunk to a 40-square-mile hypersaline brine pool a foot or two deep. And that's pretty much what is left today.

Not much grows on the exposed lakebed, and that's where the trouble starts. There's dust, lots of it. Sweeping winds come roaring down the valley and create tremendous dust storms. At times there's so much dust and the visibility is so poor the locals call it the "Keeler fog" after the small remnant of a town on what used to be the lake's eastern shoreline. Recently, a pilot followed a dust plume from the lake-bed all the way into the Grand Canyon.

Unforeseen consequences

All dust isn't equal, and Owens Lake dust is particularly plentiful and particularly nasty. In scientific parlance the dust is PM-10, for particulate matter less than 10 microns in diameter. That means it's very, very small and can cause a lot of problems if you breathe it. The dust is so small your lungs can't get rid of it, and it can literally lead to suffocation. Plus, it's laced with high levels of arsenic, cadmium, and nickel—it's not just dust, it's toxic dust.

# of fugitive dust in the United States

Sweeping winds come roaring across the valley and create tremendous dust storms.

Owens Lake, CA/*photo courtesy: Ted Schade*

In fact, Owens Lake has been identified "as the single largest source of fugitive dust in the United States" (Harrington, pp. 22-23)—emitting at its peak about 76,000 tons of air pollution per year. Something had to be done to get the situation under control, and this meant the polluter needed to be identified and brought into compliance with air quality regulations under the Clean Air Act.

The identified polluter turned out to be the City of Los Angeles. As Ted Schade, air pollution control officer for the Great Basin Unified Air Pollution Control District, puts it, "the Owens Valley is LA's water factory, and Owens Lake is the smokestack."

Early settler Beveridge R. Spear remembered the lake

"alive with wild fowl, from the swift flying Teel to the honker goose.... Ducks were by the square mile, millions of them."

$500 million fix

In 1998 the city of LA and the Great Basin Unified Air Pollution Control District came to an agreement for dust mitigation, calling for it to be completed by the end of 2006. The dust control approaches include a combination of shallow flooding, vegetation management, and applying a gravel overlay. The final bill to Los Angeles is likely to be in the vicinity of $500 million for the treatment of upwards of 19,000 acres.

Ironically, part of the solution for keeping the dust down was the construction of two pipelines. Los Angeles had to build these pipelines from its aqueduct to bring water diverted from the Owens River back to Owens Lake.

Now, a century after the Owens Valley aqueduct was built, another mammoth pipeline project is being considered. The Southern Nevada Water Authority is proposing to extract groundwater from rural areas of Nevada and Utah and send it in a pipeline to Las Vegas.

The Basics

The Southern Nevada Water Authority's pipeline project is confusing.

Concrete facts and figures are elusive, but here's what we know:

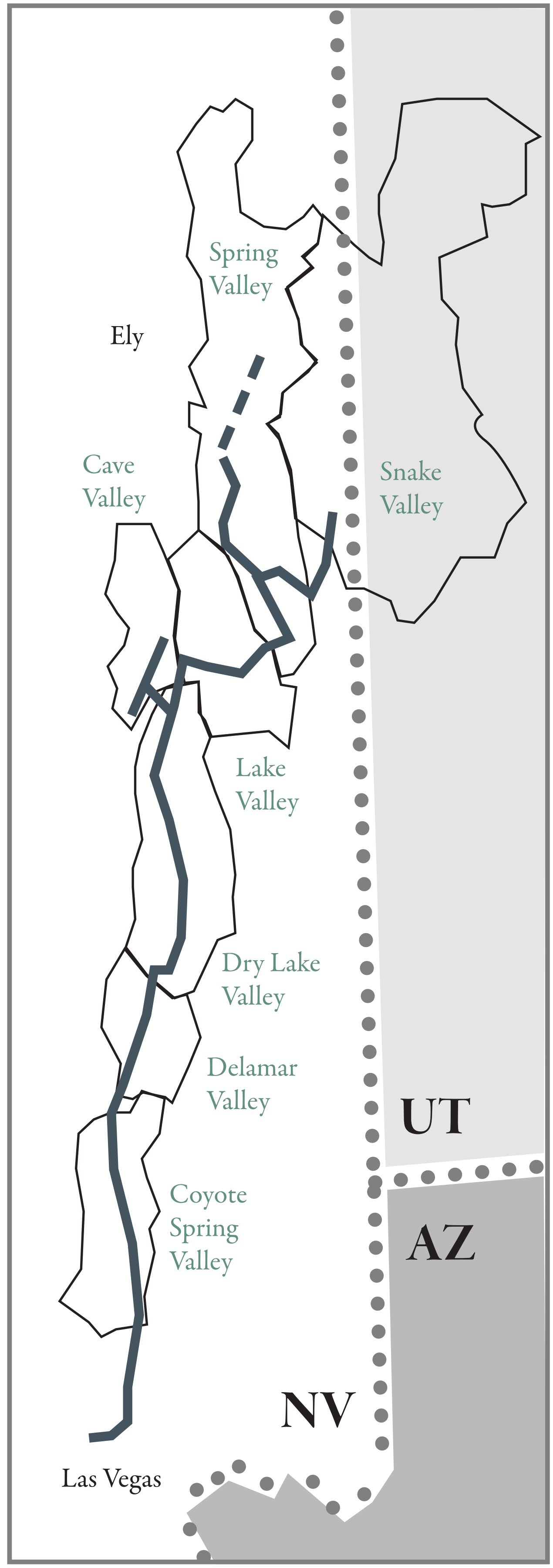
What:
The proposal is to build a pipeline system that would take groundwater from rural parts of Nevada and Utah and ship it to Las Vegas.

Why:
At the current rate of growth, Las Vegas will double in population by 2030. Las Vegas is in a desert and receives only about 4 inches of water annually, and water supplies are limited. The extraction of groundwater from rural Nevada is being promoted as essential to providing more water so that the Las Vegas Valley can continue to be one of the fastest growing urban centers in the nation.

Where:
The pipeline as currently envisioned would go from Las Vegas 256 miles north, northeast and end in White Pine County. There are also plans for a web of additional pipelines.

When:
SNWA's goal is to have the pipeline up and running by 2015, but building it could realistically take longer.

Who:
The Southern Nevada Water Authority is the agency overseeing the project. Patricia Mulroy is the general manager.



The Costs

How much and who foots the bill? It's virtually impossible to determine.

Reading back over newspaper reports of the last few years, figures for the cost of the pipeline range from $1 billion to over $10 billion depending on the year and the speaker.

An independent analysis done in 1992 came to the conclusion that the true cost of the pipeline could be as much as $12.4 billion in 1992 dollars (Mifflin, p. 13).

Even SNWA's own figures started at $1 billion in 2004. Recently they're saying $2 billion, but they've also released estimates as high as $5.6 billion.

No one seems to know what any of those figures refer to and there's no discussion of cost in SNWA's Conceptual Plan of Development dated March 2006, the most substantial information available on the project so far.

It adds up

How big a blank check are you willing to write?

~~$1 billion~~

~~$2 billion~~

~~$5 billion~~

~~$8 billion~~

~~$10 billion~~

$12 billion

$15 billion

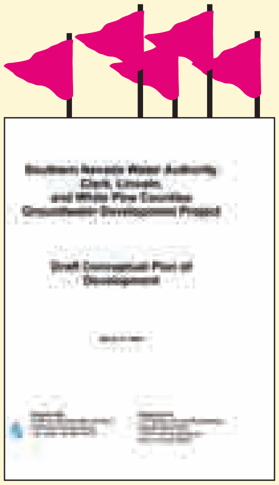
$25 billion

$35 billion

$50 billion

Proposed	Estimated cost
Pipelines 285 miles of buried water pipelines	?$
Wells 34 groundwater production wells	?$
Collector pipelines and associated facilities	?$
Pumping stations 3 pumping station facilities	?$
Regulating tanks 6 regulating tanks	?$
Buried storage reservoir 40-million-gallon buried storage reservoir	?$
Water treatment facility 150-million-gallon-per-day facility	?$
Power facilities 300 miles of overhead power lines, 2 electrical substations, and 2 hydroturbine energy recovery facilities	?$
Power lines for wells and collector facilities	?$
Future right of ways	?$
Future substations	?$
Other	?$
Total	????????????????????????$

What happens when they suc



All quoted statements on this page are taken from the *Conceptual Plan of Development for the Southern Nevada Water Authority Clark, Lincoln, and White Pine Counties Groundwater Development Project*

March 2006
Prepared by the Southern Nevada Water Authority

Check it out for yourself:
www.nvgroundwaterproject.com

Snake ar

Additional exploration needed

Exploratory Areas

“Although SNWA intends to appropriate groundwater from the areas substantially accurately described in its water right applications, additional exploratory work must be accomplished.”

Not included

SNWA Groundwater Production

“Although SNWA intends to divert water from the areas substantially accurately described in its water right applications, there may need to be some adjustments of the exact location of production wells, once the exploration areas are investigated.

“These environmental reviews and the approvals by the Nevada State Engineer may require adjustment of the locations of the groundwater production wells in order to avoid injury to existing water rights and/or adverse effects on the environment. For those reasons, SNWA is not requesting Right of Ways for the groundwater production facilities at this time.”

Extent unknown

Future Secondary Laterals

“SNWA cannot determine if an extension of the Spring Valley primary lateral will be required or if groundwater from this area could be conveyed through future secondary laterals or collector pipelines.”

Associated power lines not identifie

Collector Pipelines and Associated Facilities

“After the groundwater production wells have been approved, collector pipelines and power supply facilities will be determined.

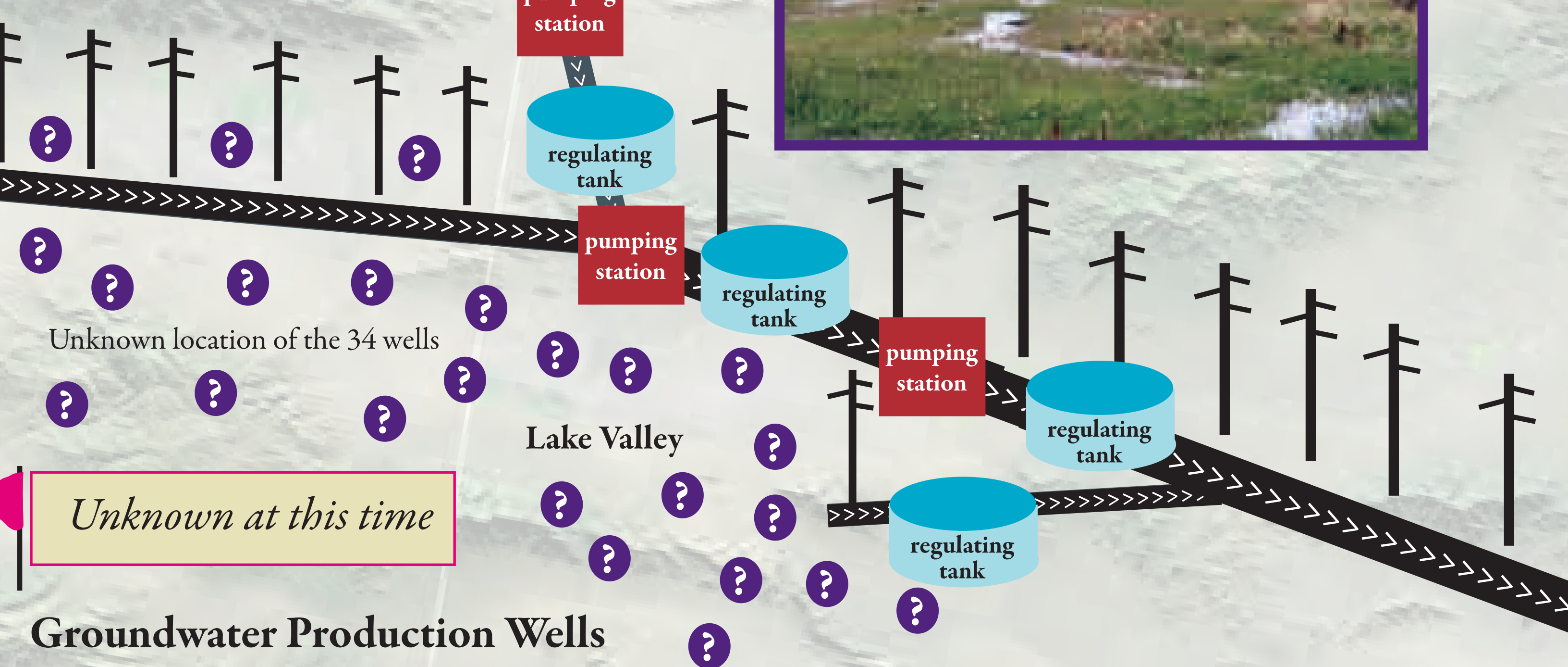
“It is anticipated that collector pipelines from the individual wells will range between 10 and 30 inches in diameter, but may be larger.

“The Right of Ways that will be required for individu groundwater production wells, well fields, and the associated collector pipelines and power lines are not identified in this document.”

SNWA’s pipeline plan is full of red flags

k the water from here...

nd Spring Valleys



Unknown at this time

Groundwater Production Wells

“SNWA has applied for 34 places where production wells will be sited. The exact number of production wells that will be required is not known at this time.”

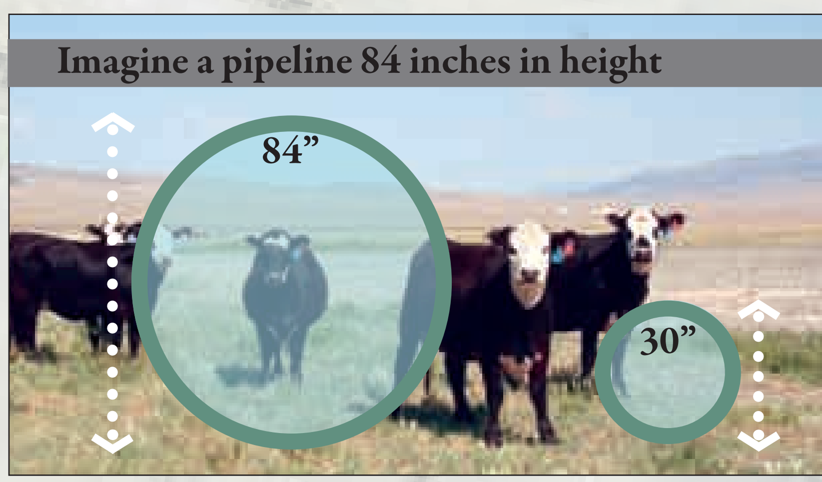
Will be longer

285 Miles of Pipeline

“Approximately 285 miles of pipeline, between 30 and 84 inches in diameter, will be required for the GWD Project. The main pipeline will begin in Spring Valley and extend south to the Las Vegas Valley. Three primary laterals will connect northern Spring, Snake, and Cave Valleys to the main pipeline.

“The pipelines described in this document do not include secondary laterals and collector pipelines from the wells to the main pipeline or primary laterals.”

Imagine a pipeline 84 inches in height



Unsecured

No Permanent Security Fencing

“No permanent security fencing of the pipeline Right of Way or appurtenances is anticipated.”

and unanswered questions.

Isn't it time for real answers an

May also include

Pumping Stations

"The pumping station site may also include water treatment facilities.

"Operation of the pumping stations and the WTF will require the use of chemicals and other consumable supplies that will need to be delivered on a regular basis."

No existing electrical lines

Power Facilities Not Sufficient to Meet

"There is currently no electrical power distribution line in the G area sufficient to meet needs of the GWD Project.

"Installation of each new power pole will disturb approximately area within the power line right of way."

Security = fence

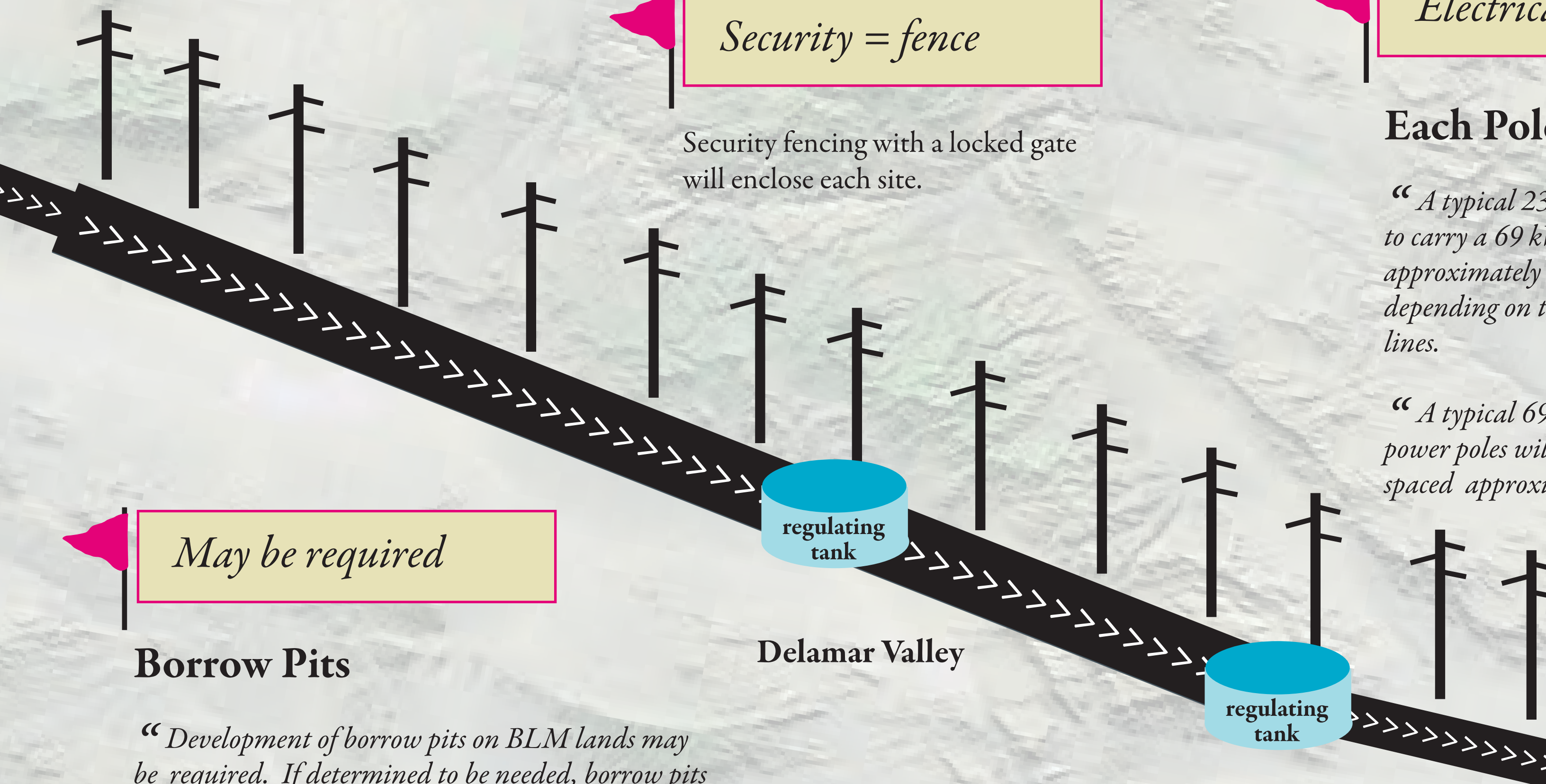
Security fencing with a locked gate will enclose each site.

Electrica

Each Pol

"A typical 23 to carry a 69 k approximately depending on t lines.

"A typical 69 power poles wi spaced approx



Delamar Valley

May be required

Borrow Pits

"Development of borrow pits on BLM lands may be required. If determined to be needed, borrow pits will be the subject of future Right of Way requests and environmental compliance."

Disturbance minimized

"At the initiation of facility construction, Right of Ways will be cleared and grubbed, then graded. Grubbing consists of removal from the ground surface of stumps, roots, and vegetation matter after clearing, and prior to further site modification. Wherever possible, disturbance will be minimized by driving overland and crushing vegetation within the Right of Ways, without clearing and grubbing."

Remotely monitored

Operations and Mainte

"Operation of the GWD Project will b monitored by SNWA with a remote mo

d real budgets?

Needs

WD Project

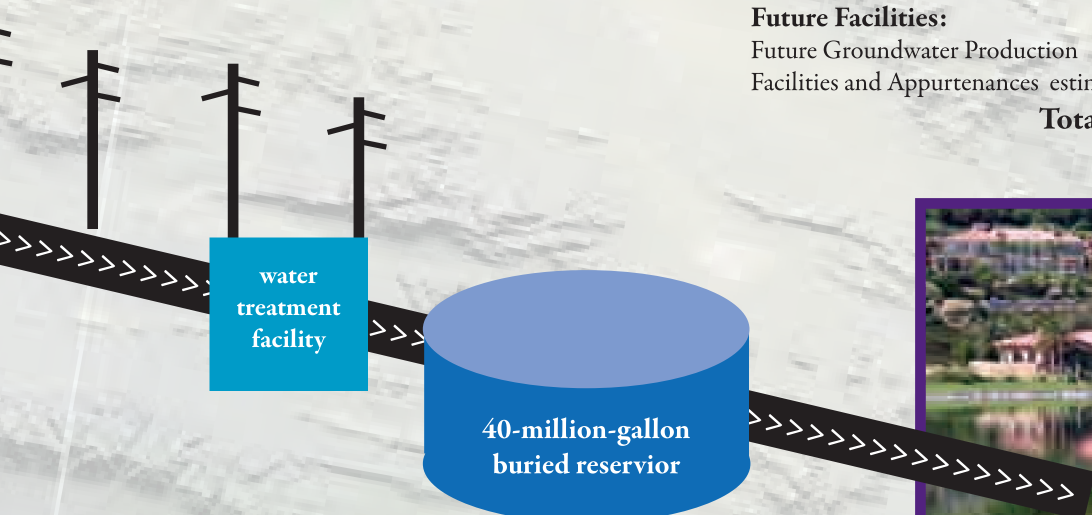
a 1-acre

al poles every 800 feet

e Disturbs One Acre

30 kV power pole with additional insulators (crossbars) V line is shown on Figure 3-16. Single steel power poles, 100 feet tall and spaced approximately 800 feet apart he terrain, will be used for the new 230/69 kV power

9 kV power pole is shown on Figure 3-17. The 69 kV ll be single steel poles, approximately 60 feet in height and imately 600 feet apart depending on the terrain."

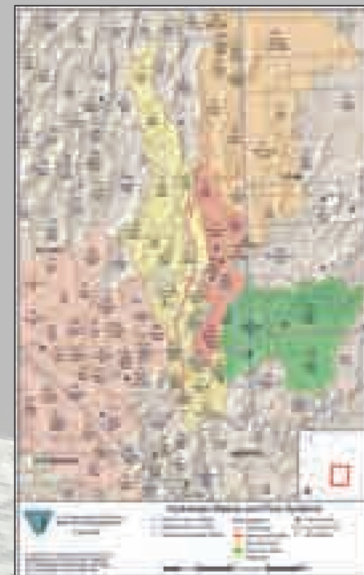


nance

be continuously nitoring system."

Effect on Utah unknown

Snake Valley basin does not end at the Nevada border.



Power needs will double

Table 3-3 Anticipated Power Requirements

GWD Project Facilities	Power (kilowatts)
Proposed Facilities:	
Spring Valley Pumping Station	10,100
Snake Valley Pumping Station	2,500
Lake Pumping Station	8,500
Buried Storage Reservoir	10
Water Treatment Facility	1500
Proposed Total	**22,610**
Future Facilities:	
Future Groundwater Production Facilities and Appurtenances estimated	**19,500**
Total	**42,110**

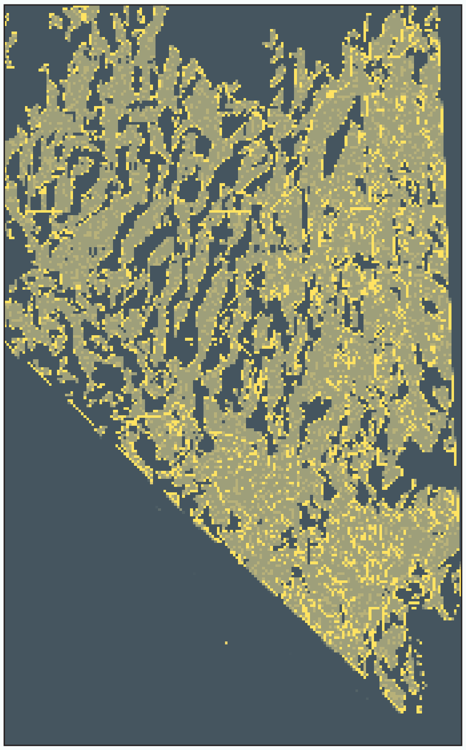
...'til it all comes out here?

The Great Basin Aquifer System

"When the well's dry,

we know the worth of water."

—Benjamin Franklin



The underground aquifer system within Nevada.

Most of us learned in geography class that water in the U. S. eventually flows to the ocean. East of the Continental Divide it flows to the Atlantic or the Gulf of Mexico; west of the Divide it flows to the Pacific or the Gulf of California.

A series of basins

What many of us never knew is that there's a vast area of the country where this isn't true. That area is known as the Great Basin—which is something of a misnomer because it's actually a series of basins—and includes most of Nevada, half of Utah and parts of California, Oregon, Wyoming, and Idaho. In this region surface water stays within the basin system and doesn't wind up in an ocean.

The Great Basin is a series of basins—and includes most of Nevada, half of Utah and parts of California, Oregon, Wyoming, and Idaho. In this region surface water stays within the basin system.

Most of the region is made up of high desert basins separated by ranges of mountains. The basins receive relatively low levels of annual rainfall. Rain and snow in the mountains is the main source of water, but in many areas, the rain and snowmelt in the mountains don't create streams of sufficient force to even reach the valley floors. Or, when the water does reach the valleys, because of the aridity and high rates of evaporation, it often flows into salty, often dry lakes.

A complicated water network

The limited rainfall and creekflow has meant that the people, animals, and plants in the region are highly dependent on water stored in the ground for survival. This groundwater is found in a complicated inter-connected water network known as the Great Basin aquifer system.

Not as simple as an underground lake

It would be nice if aquifers were just like lakes only underground—that way it would be relatively easy to calculate how much water is in them. Unfortunately, aquifers are often more like sponges —or layers of sponges—than they are like lakes. The aquifer system in Nevada and Utah looks like stretched, runny Swiss cheese on a map.

In addition, aquifers and groundwater are often connected in some way to surface water—for example through springs and seeps. That's the reason springs, ponds, and wetlands often dry up when groundwater is pumped from wells.

The Snake and Spring Valley aquifer systems both are comprised of two primary aquifers. The top layer is simply valley fill (sand, gravel, clay, loose rocks) that holds a considerable amount of water. Underneath this is another aquifer made up of carbonate bedrock where the water is in the cracks and spaces within the rock. In addition, there are places where volcanic rock, also found in the regional geology, holds enough water to be considered an aquifer.

As if things weren't complex enough they get even more complicated because both valleys are considered 'closed' basins—meaning the surface water flowing into the basins doesn't flow out of them. But, groundwater does pass from valley to valley (basin to basin) through the aquifer system.

Exactly how and how much water moves among the basins is not well understood — no one can track with any certainty what the flow patterns are, and they probably vary depending on how much water is present.

Connections across state borders

It should be clear from this description that water systems are not bound by the geographic creations of humans, and the Great Basin aquifer system is no different. Hydrologically speaking, people living in the Snake Valley, which spans the Nevada-Utah border, are linked far more directly to each other through their shared groundwater than they are to others in their respective states.

A few helpful water-system terms and definitions

Surface water is water that's on the surface of the land in lakes, ponds, rivers, streams. It's what we see, and for that reason many of us think our drinking water comes largely from surface water. In fact, over 50% of the people in the U.S. rely on groundwater for their drinking supply, and that percentage is much higher in rural areas where most people get their water from wells.

Groundwater is water stored in the ground—below the land surface. Groundwater can come naturally to the surface through springs and seeps, or it can be brought to the surface by pumping from wells.

Aquifer is the geological term for an area underground that holds the groundwater. The water in the aquifer fills the spaces between the underground rocks or other material. Aquifers are varied and can be near the surface or quite deep; the material they're made of can be sand and gravel, limestone, and volcanic rock, or other; and they can be isolated or connected to one another.

Recharge is the water that percolates into the ground from rain and snow or from lakes, rivers, streams, and creeks. Recharge replenishes the groundwater.

Hydrology is the study of water and/or water systems.

Acre-foot is the amount of water that would cover an acre to a depth of one foot—about a football field with a foot of water on it. It's considered enough to supply one to two households for a year—about 326,000 gallons.

"The bottom line is even the most sophisticated hydrologic modeling is nothing more than an educated guess."

—Patricia Mulroy
General Manager, Southern Nevada Water Authority

Quoted in "Squeezing Water from a Stone," Matt Jenkins, *High Country News*, September 19, 2005

Hydrologists attempt to get an idea of what will happen when water is removed from an aquifer by creating mathematical models. This often creates a 'battle of the experts' situation because different experts use different models and different figures and get different results.

Disagreement over adverse affects

Because water is shared across state boundaries, and different states have different laws and plans for water, decisions about water often get tricky or even divisive. The fact that groundwater systems are not thoroughly understood makes it almost a given that there are going to be vigorous disagreements about whether or not and/or how much water can be taken from an aquifer without having adverse affects.

Who to believe?

For non-hydrologists trying to figure out what to trust it's important to remember that the assumptions made in the creation of a model and the questions asked have everything to do with the answers the hydrologists generate.

Therefore, it's important to know:

1) how adverse effects are defined and determined; and

2) what questions were asked and what model was used to reach the conclusions.

There's only one way to know for certain what will happen when water is removed, and that is to actually take it. The problem with that approach, of course, is that if you take the water and problems develop it may be too late to fix things even if the pumping is stopped. The balance of aquifer systems is delicate, the balance of desert areas is often extremely delicate, and it doesn't take much disruption to wreak havoc.

The risk of severe impact

Farmers and ranchers living in Snake and Spring Valleys are certain that pumping water out of the aquifers there will have severe impacts at relatively low levels of extraction. Their certainty comes from watching what's happened when water is taken from the aquifer to irrigate crops and feed livestock. Water extraction for these purposes is nothing compared to the levels of water SNWA is proposing to mine, yet even pumping for irrigation has caused springs and marshy areas to dry up.

SNWA is proposing to take 91,000 acre-feet per year from Spring Valley and 25-50,000 acre-feet per year from Snake Valley. SNWA's experts say this level of water extraction will have no significant impacts on the valleys. Hydrologists working with communities in the region think differently—they think the impacts will be serious indeed.

"We're worried about SNWA's pipeline project because we know what we're doing to ourselves by irrigating. That's just a drop in the bucket compared to what they're talking about."

—Dean Baker, Snake Valley rancher

Snake Valley, NV/*photo: Gretchen Baker*

Perhaps the questions that really need to be asked are:

Is it worth the risk? Are there other options?

It's not simply about using less water;
it's about using just what is needed—no more, no less.

Alternatives that work

A look at the recent water history of two cities — Tucson and Albuquerque — illustrates that there is no single approach to solving water scarcity issues. However, water conservation is more than a drop in the bucket. It works, it's relatively inexpensive, and it really adds up.

"It was the best of times, it was the worst of times,"—an apt description of the current situation in many cities throughout the Southwest.

On the one hand booming populations have translated into robust economic growth—many of the fastest growing and economically sunny urban areas in the U.S. are located in the Southwest. On the other hand the burgeoning population coupled with years of drought have strained the limited water resources of the region, and that has implications for continued growth.

The extent to which cities can and should grow in the fragile desert environments of the Southwest is a question each city has to answer for itself. Water is certainly a factor impacting growth, however many cities in water-scarce areas are learning to do more with less and are finding that their water resources can go much further than they thought. A key is combining water conservation with water-use efficiency. It's not simply about using less water; it's about using just what is needed—no more, no less.

Tucson

Tucson has long been regarded as one of the big success stories in the country for water conservation. Today, Tucson is a city of over 700,000 people located in the Sonoran Desert in southeastern Arizona about 60 miles north of the Mexican border. Rainfall averages about 12 inches per year.

Tucson's emphasis on water conservation began in the 1970s. Interestingly, Tucson faced a water crisis, but it was not linked to supply. It had to do with meeting demand during peak use periods. The city water department responded by creating a "Beat the Peak" campaign to encourage residents to water during off-peak periods.

The image most of us carry around in our heads of Tucson is one of houses landscaped with a strong desert aesthetic—cacti rather than grass. While it is absolutely true that today you can drive around a long time without seeing a traditional lawn, in the '60s and '70s Tucson landscaping had more in common with the Midwest than the desert. There was lots of turf.

Tucson, AZ/*photo: Al Nichols*

Tucson Water's Beat the Peak campaign began in 1977 and was highly visible. It was augmented by a change in the rate structure that did two things:

1) increased the rate for water across the board; and

2) created a block structure with increasing charges for water as water use increased.

The combination of approaches proved to be far more effective than anyone envisioned. Residents changed their habits, and by the early '80s desert landscaping and a conservation ethic were firmly established.

The thing that makes the Tucson story really stand out is that the city has been able to maintain a commitment to conservation and water-use efficiency over decades, not just in times of crisis. Residents now thoroughly embrace the fact that they live in a desert. Keeping up with the Joneses is not about green, manicured lawns and palm trees—they're frowned upon—but about landscaping using native plants and rock.

Outdoors and indoors

Outdoor water conservation spurred a consciousness that led to indoor water conservation as well. Year after year Tucson has some of the lowest per capita water-use figures in the Southwest. According to a 2006 report by the Western Resource Advocates comparing water use in Tucson, Albuquerque, and Las Vegas, the average person in a single family residence in Tucson uses 114 gallons of water per day. In Albuquerque, on average, an individual uses 110 gallons of water a day, as compared to 174 gallons used by a resident of Las Vegas.

A culture of conservation

Today Tucson is a city with a firmly established conservation ethic. The city council provides leadership and funding for approaches advancing water conservation and efficiency. More importantly, there is strong community support for conservation. According to Fernando Molina, Tucson's Water Conservation Program manager, "Residents want more water conservation, and it doesn't seem to matter to them if it costs more. Our approach has been to squeeze aggregate demand down before going for more water elsewhere."

Tucson, AZ/*photo: Al Nichols*

Albuquerque

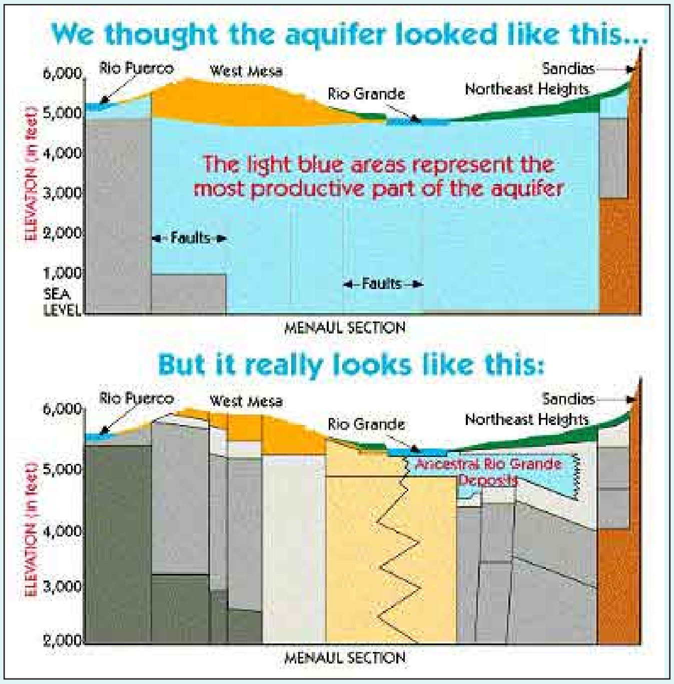
Albuquerque, New Mexico, has an entirely different water history. Until 1993 the common perception among city residents was that Albuquerque sat over a vast underground water source that was continually being replenished, largely by water from the Rio Grande. Most of Albuquerque's water came from this underground aquifer, and city officials thought it was virtually limitless.

The city got a rude awakening in 1993 when the United States Geological Survey (USGS) released a report concluding that there was a lot less water than people thought. In fact, water levels in the aquifer had dropped about 160 feet since the 1960s. The water level was dropping, water was not recharging nearly as quickly has people had thought, and water quality was diminishing as water was taken from deeper wells.

Like Tucson, Albuquerque is located in an arid region receiving limited rainfall—historically about nine inches per year. It is also a city that has grown dramatically in the last few decades. Since 1960, the population of New Mexico has grown by 89%—from 950,000 to 1.8 million people. Much of that growth has been in Albuquerque. The city had approximately 200,000 people in 1960; the water department's service population in 2005 was 525,347 people.

Even the USGS's understanding of aquifers is fluid

Here's the experience of the City of Albuquerque



From the City of Albuquerque, New Mexico's Water Conservation Website: www.cabq.gov/waterconservation/insert.html by permission of the Albuquerque Bernalillo County Water Utility, Water Conservation Department

City Aquifer Geologic Cross-Section

All of our water is pumped from the ground. For decades we believed Albuquerque's aquifer was virtually limitless. We thought it was rapidly replenished by the Rio Grande and other sources.

However, the United States Geological Survey (USGS) released new studies in 1993 that indicate water levels are dropping significantly (up to 160 feet since 1960). The studies show there is much less groundwater than anticipated, that drilling deeper may provide lower quality water, and that the aquifer is not being replenished as quickly as we assumed.

The USGS studies led to the development, with extensive citizen participation, of a comprehensive City water policy in the summer and fall of 1994. The most important component of that policy is a targeted 30% reduction of our per capita water use through conservation.

Prior to 1993 Albuquerque residents were not concerned about conserving water, despite living in a high desert region. Many of the new residents came from areas where water was abundant; furthermore the 1960s and '70s were years of higher-than-average rainfall. Nobody was particularly concerned about water supplies.

A depleted aquifer

When the USGS dropped its bombshell about the depleted aquifer the city was already in a water crisis, it just didn't know it. The Water Utility had to move very rapidly to change people's perceptions from a sense of bountiful water to an understanding of water scarcity.

In 1994, the Utility put into motion a process that included extensive citizen participation in order to develop a comprehensive water policy. One of the primary goals of the plan was a 30% reduction of per capita water use. In the next eight years Albuquerque exceeded its goal and reduced water consumption by 33%, moving it from one of the highest per capita users of water in the Southwest to one of the lowest.

A remarkable cultural shift in water use

Albuquerque was able to achieve a remarkable cultural shift in water use in a relatively short period of time. The understanding that the city faced a serious water crisis drove the change, but residents and the Water Utility also rose to the challenge. Both city officials and the public have demonstrated real will to conserve water, and it's paid off in changed practices and consumption levels.

Katherine Yuhas, water conservation officer for the Albuquerque Bernalillo County Water Utility, ascribes the city's success to a number of factors:

• One of the keys initially was a sizable budget for publicity promoting water conservation—about $1 million per year in the early years of the program.

• Raising the rate structure for water to encourage people to use less—people's bills are also designed to make it easy to compare month-to-month usage through comparative graphs.

• Providing free indoor and outdoor water audits to both residential and commercial customers.

• Offering rebates—the Water Utility offers lots of them to encourage both *indoor and outdoor* water conservation. The Utility offers rebates for everything from switching to desert landscaping to rebates for low-flow toilets, water-efficient washing machines, and hot water recirculating systems.

• Developing educational materials and trainings for both adults and children. The Water Utility has a full-time educator on staff, has developed a water curriculum for grades K-8, and holds a children's water festival each year.

• Enforcing water restrictions during the summer months. The Utility has eight enforcement officers so that people can file reports when they see water being wasted and know that it's likely someone will follow up.

Ms. Yuhas cautions that, "Lots of analysis is necessary to make good water conservation and efficiency decisions. You need to know where water is used, and where it's lost."

Albuquerque remains committed to a long-term water conservation strategy with ambitious goals to further reduce per capita consumption. City officials and residents alike are determined that water conservation is here to stay.

Key lessons

from Tucson and Albuquerque

• **There's no silver bullet**—multiple approaches are necessary.

• **Conservation needs to come first**—it's far less expensive than other options. It's essential to create a *culture* of conservation—it's common sense that in desert regions people need to use water carefully.

• **Involve the public early** in the process and keep involving them in decision-making in meaningful ways.

• **Mixed messages don't work**—people resent and/or resist conservation efforts if they don't have a sense that everyone's in it together.

• **Culture shifts take time**—water conservation efforts need to be *consistent* over time.

• **Cost matters—**implement conservation-oriented rate structures that better convey the true cost of water.

• **Ambitious conservation goals can be met.**

• **Efficient water use**, not just reducing water use, is key.

• **Embracing the notion of living in a desert** is critically important.

• **Changing landscaping aesthetics takes time—** there's often resistance at first, but that can quickly turn to pride.

• **Conservation works.**

It all adds up

Las Vegans Have a Choice

The SNWA proposes to build the pipeline system in order to extract 180,000 acre-feet of water from rural Nevada to send to Las Vegas Valley.

The Southern Nevada Water Authority says its proposed pipeline project is essential to the meet the needs of a growing Las Vegas Valley—the population is expected to double in the next 25 years. The question we need to ask ourselves is: Is it essential or are there other, and better, choices?

Is this pipeline project a good idea?

What we know

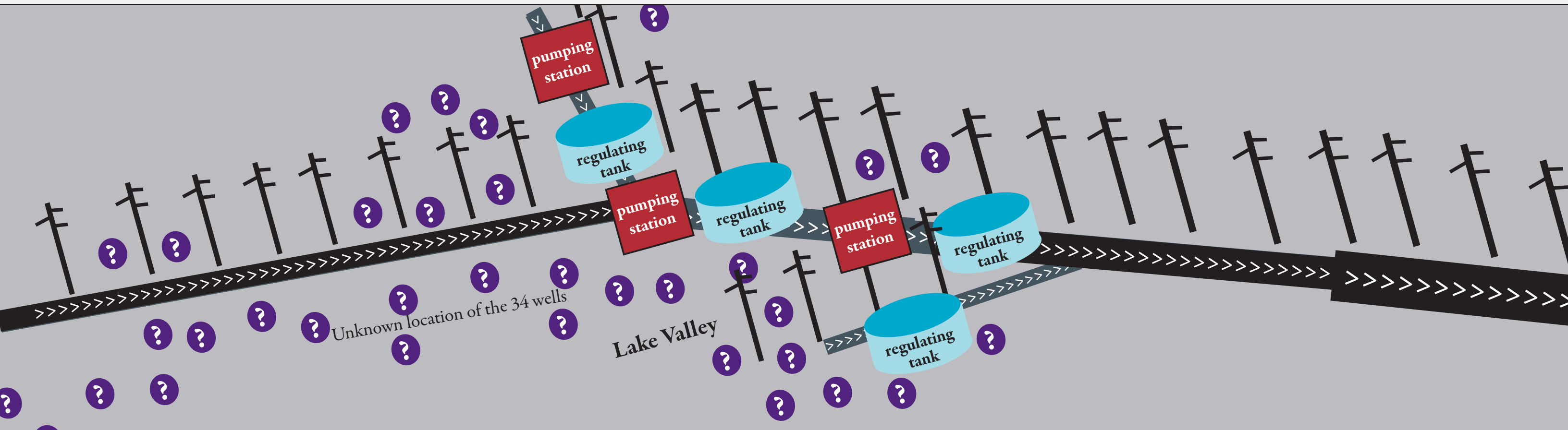
- It's a huge undertaking
- It's expensive to build
- It's expensive to maintain

What we don't know

- How much it's really going to cost
- If there's enough water to support it
- The impacts on the rural areas from which the water is taken

- Who really wants this pipeline?
- Who benefits from the pipeline—those living here now or those yet to come?
- How much will it cost?
- Who pays for the pipeline?
- How many miles of pipe will there finally be —256, 400, 600?
- What are the plans for the security and maintenance of the pipeline once it's built?
- Is the volume of water SNWA needs to fill the pipeline really there?

Is it essential or



We know that other cities in the Southwest have a much better track record for conserving water than Las Vegas currently has. Do we want to create an unquenchable thirst or adopt a culture of conservation?

- What happens if there isn't enough water without turning the region into another Owens Valley?
- Once the tap is turned on, is anyone really going to turn it off?
- Are the risks too great?
- Are there other options?
- Do we want a water pipeline that virtually assures tremendous growth in the Las Vegas Valley?
- Do we want a pipeline if it devastates rural Nevada?

are there better choices?

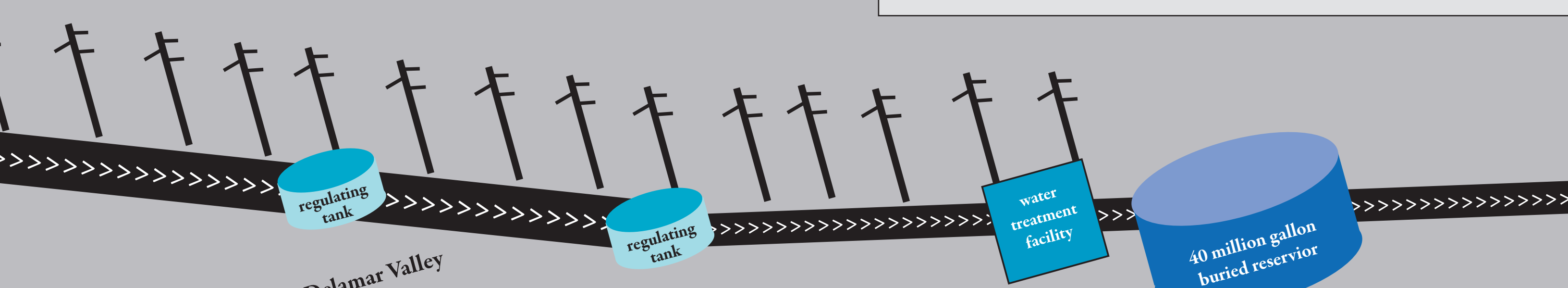
The costs

How big a blank check are you willing to write?

~~$1 billion~~
~~$2 billion~~
~~$5 billion~~
~~$8 billion~~
~~$10 billion~~
$12 billion
$15 billion
$25 billion
$35 billion
$50 billion

Proposed	Estimated cost
Pipelines 285 miles of buried water pipelines	? $
Wells 34 groundwater production wells	? $
Collector pipelines and associated facilities	? $
Pumping Stations 3 pumping station facilities	? $
Regulating Tanks 6 regulating tanks	? $
Buried Storage Reservoir 40-million-gallon buried storage reservoir	? $
Water Treatment Facility 150-million-gallon-per-day facility	? $
Power Facilities 300 miles of overhead power lines, 2 electrical substations, and 2 hydroturbine energy recovery facilities	? $
Power lines for wells and collector facilities	? $
Future Right of Ways	? $
Future Substations	? $
Other	? $
Total	???????????????????? $

It adds up



Look to the Future

The pipeline project potentially affects not only Nevadans, but people living in Utah as well. Before asking—many in the Great Basin Nevada and Utah would say forcing—rural areas to share their precious and limited water, doesn't Las Vegas have a responsibility to at least match the proven water conservation track record of other desert cities?

Improved conservation yields greater savings

What we know

- It works
- It's cost effective
- It's comparatively inexpensive

What we don't know

- How much water we can conserve when we all work together

Daily water usage in single family residences in three desert cities*

Albuquerque

110 gallons/person

Tucson

114 gallons/person

Las Vegas

174 gallons/person

Do more with less

* Based on single family residence per capita figures from Western Resource Advocates 2006 *Water in the Urban Southwest* report.

Lake Mead/*photos: Christina Roessler*

Water is vital to all life, and there are literally life and death implications to water decisions, particularly in desert regions. A good goal for all of us when it comes to sharing water should be "first do no harm."

"First do no harm."

—Hippocrates

The savings

We know:

- SNWA's service population is 1.7 million people
- 38.5 million people visited Las Vegas in 2005

Imagine the annual water savings:

If water is served only when requested*	=	475,000,000 gallons
If sheets in hotels are changed after the third night*	=	318,682,278 gallons
If water consumption was reduced by 35 gallons per person per day	=	21,717,000,000 gallons
Total savings	**=**	**over 23 trillion gallons**

*See basis for calculations, p. 34

System-wide savings

If we were to achieve Albuquerque's level of per capita consumption, we could save 158,052 acre-feet per year.

If we were to mirror Tucson's achievements, Las Vegas could save 190,424 acre-feet per year.

Las Vegas could continue to grow without needing to extract water from the Great Basin.

What does it add up to for you?

Bibliography/Resources

Print Sources

Harrington, Bob. "Owens Lake: To Dust Bowl and Back?" *Southwest Hydrology* July/August 2004: 22-23.

Hundley, Jr., Norris. *The Great Thirst.* Berkeley: University of California Press, 2001.

Hutchins-Cabibi, Taryn, Bart Miller, Anita Schwartz. *Water in the Urban Southwest.* Boulder: Western Resource Advocates, 2006.

Kahrl, William L. *Water and Power.* Berkeley: University of California Press, 1982.

Mifflin, M.D., S.E. Kao, John Keith, C.F. Stringer. *Economic and Engineering Feasibility of Water Development and Importation to Clark County for the Las Vegas Valley Water District Water-Right Applications.* Las Vegas: Mifflin and Associates, Inc., 1992.

Mulholland, Catherine. *William Mulholland and the Rise of Los Angleles.* Berkeley: University of California Press, 2000.

Rake, Launce. "Agency's Water Plans Pegged at $7.6 Billion." *Las Vegas Sun* May 24, 2005.

Reisner, Marc. *Cadillac Desert.* New York: Penguin Books, 1986.

Southern Nevada Water Authority. *Southern Nevada Water Authority Clark, Lincoln, and White Pine Counties Groundwater Development Project Draft Conceptual Plan of Development.* Las Vegas, 2006.

Interviews

Thomas Arnold, senior management analyst, Tucson Water Department, interviewed by author June 19, 2006.

Dean Baker, rancher, Baker, NV, interviewed by author July 27, 2006.

Cecil Garland, rancher, Callao, UT, interviewed by author September 8, 2006.

Greg James, legal counsel and former director of the Water Department for Owens Valley, CA, interviewed by author July 19, 2006.

Fernando Molina, conservation program manager, Tucson Water Department, interviewed by author June 19, 2006.

Al Nichols, water engineer, Tucson, AZ, interviewed by author June 20, 2006.

Ted Schade, air pollution control officer for the Great Basin Unified Air Pollution Control District (in Owens Valley), interviewed by author July 20, 2006.

Katherine Yuhas, water conservation officer, Albuquerque Bernalillo County Water Utility Department, interviewed by author July 14, 2006.

Online Sources

City of Albuquerque Water Conservation Home. www.cabq.gov/waterconservation/

History of the LA Aquaduct. Los Angeles, CA, Department of Water and Power. wsoweb.ladwp.com/Aqueduct/historyoflaa/

Jenkins, Matt. "Squeezing Water from a Stone." *High Country News 37*, No. 17 [Paonia, CO] September 19, 2005, online ed.: www.hcn.org/servlets/hcn.Article?article_id=15778

Southern Nevada Water Authority Nevada Groundwater Project. www.nvgroundwaterproject.com

Water in the Urban Southwest. Western Resource Advocates. www.westernresourceadvocates.org/media/pandp.php

Basis for calculations of annual water savings, p.33
Taryn Hutchins-Cabibi, water policy analyst, Western Resource Advocates

Savings if water is served only when requested
Assumptions
- Visitors average stay is 3 days
- Visitors eat 2 meals out per day
- Only one glass of water is given
- One glass of water uses .5 gallons of water for drink, washing, etc. (from SNWA)

Savings if sheets changed after third night
Assumptions
- Washer capacity of 135 lbs. per wash
- Water consumption of that washer to be 113 gallons per load
- 2 standard-sized towels per room
- 2 standard-sized wash cloths per room
- 2 standard-sized hand towels per room
- 2 sets of queen-sized linens per room including pillow cases

With a 75% occupancy rate, more than 11,500 loads are laundered daily, using 1,459 acre-feet of water annually. Altering the standard so that linens are washed only every three days would result in a savings of 978 acre-feet or 318,682,278 gallons annually.

Acknowledgements

PLAN would like to thank the many people who contributed to this report. We could never have taken on this project had it not been for the support in every possible way of the Panta Rhea Foundation and especially the foundation's Water Program Officer, Jean Caiani. The entire process was truly a team endeavor. PLAN would especially like to thank the author, Christina Roessler, and the designer, Bob Schmitt, for their boundless imagination and creative intelligence which made this report possible. Thanks also to Deanna Lackaff, copy editor par excellence for giving the report its final polish.

Everyone was enormously generous and put in time and effort well beyond the call of duty. The initial research team included Tim Costello (Global Labor Strategies), Robert Ginsburg (Center on Work and Community Development), Taryn Hutchins-Cabibi (Western Resource Advocates), and Brendan Smith (Global Labor Strategies), all of whom helped enormously by providing data and insight throughout the project. Janet Grenzke (Abacus Associates) did a masterful job of conducting the focus groups that informed the approach we took in writing the report.

Greg James (legal counsel and former Water Dept. Director for Owens Valley) and Ted Schade (Air Pollution Control Officer for the Great Basin Unified Air Pollution Control District in Owens Valley) gave hugely of their time to help us understand the impacts the transfer of water from Owens Valley to Los Angeles have on the Valley to this day. We interviewed them extensively, and they also provided invaluable comments on drafts of the report.

We received much of the information in the Tale of Two Cities section through interviews with Thomas Arnold (Senior Management Analyst, Tucson Water Department), Fernando Molina (Conservation Program Manager, Tucson Water Department), and Katherine Yuhas (Water Conservation Officer, Albuquerque Bernalillo County Water Utility Department). Their knowledge and experience with water conservation in major metropolitan areas gives us hope that much more can be done to reduce water use through conservation efforts without jeopardizing quality of life.

The report benefited enormously from the many thoughtful recommendations made by Tim Costello, Jim Deacon, Taryn Hutchins-Cabibi, Burt Lauderdale, Lorraine Lerner, Malcolm Margolin, and Alta Starr, who read early drafts of the report and suggested ways to improve it.

Special appreciation is owed to Dean Baker and Cecil Garland for agreeing to be the faces of Snake Valley in the report, and to Gretchen Baker and Al Nichols for providing marvelous photographs for this report.

The biggest thanks of all go to everyone working with the Great Basin Water Network to make sure that rural communities in Nevada and Utah have the water they need to thrive. It's a massive undertaking, and we have tremendous help from people throughout the West. Everyone is working together with great spirit, tenacity, and good humor to make sure that rural areas in Nevada and Utah don't go the way of Owens Valley, California.

*Illustration courtesy: Jim Day/*Las Vegas Review-Journal

What Can I Do?

Save water indoors

Save water in the kitchen and laundry

Fill your dishwasher
Your dishwasher uses the same amount of water whether it is full or just partially full of dishes, so be sure to fill it. Many dishwashers have a water saver cycle to save even more water.

Keep drinking water in your refrigerator
Don't let the faucet run until the water cools down. Instead, keep a container of drinking water in the refrigerator. Running faucets waste 3 to 7 gallons of water per minute. Before rinsing, put the sink stopper in place instead of running the water. If you need to use the garbage disposal, release the used sink water as the disposal is turned on.

Select proper water level for laundry
Unlike your dishwasher, you can control the amount of water used by your clothes washers. Select the proper water level for each load of laundry.

Buy water-efficient appliances
Replace existing appliances with more water-efficient appliances. For example, a front-load washing machine uses 1/3 less water than a top-loading machine.

Save water in the bathroom

Check all faucets, pipes, and toilets periodically for leaks
A faucet drip or invisible leak in the toilet will add up to 15 gallons of water a day, or 105 gallons a week, which adds up to 5,475 gallons of wasted water a year. Check your flapper periodically to make sure it's a tight fit.

Install water-saving shower heads
Low-flow showerheads deliver 2.5 gallons of water per minute or less and are relatively inexpensive. Older showerheads use 5 to 7 gallons.

Install a 1.6 gallon low-flow toilet
Ultra-low-flow toilets use only 1.6 gallons of water per flush. Using these could cut indoor water use by as much as 20%. Older toilets use 3.5 to 7 gallons per flush.

Install high-efficiency, low-flow faucet aerators
Older faucets use between 3 and 7 gallons per minute. Low-flow faucet aerators use no more than 1.5 gallons of water per minute. The aerators can be attached to most existing faucets.

Fix leaky faucets immediately
A leaky faucet may simply need a new washer. Small faucet leaks can waste 20 gallons of water a day. Large leaks can waste hundreds of gallons.

Turn off the water while shaving, brushing teeth
Don't let the water run when you brush your teeth, wash your face or hands, or shave. This can save 3 to 7 gallons per minute.

Save 13,619 gallons
A low-flow shower head installed in a house built between 1980 and 1994 can save between 850-5,100 gallons of water annually. Replacing a shower head from pre-1980 can save 13,619 gallons annually.

Save 2,375 gallons
Even with a low-flow shower head, showering one minute less each day can save as much as 900 gallons per person or 2,375 per household.

Save 1,300 gallons
A 2.5 gpm rated low-flow faucet installed in a house built between 1980 and 1994 can save roughly 40 gallons per household per day and 1,300 gallons annually.

Saves 11,794 gallons
Switching from a 3.5 or 4.0 gallon per flush toilet to a 1.6 gallon per flush toilet can save 9,337 and 11,794 gallons per year respectively.

Save water outdoors

Plant drought-resistant trees and plants: Xeriscape

Landscape with plants that require less water. These plants can be very attractive and can survive drought better than turf. Rocks, gravel, benches, and deck areas can all be used to creatively decorate the yard.

Choose an automatic irrigation system

An automatic sprinkler system can be set to water the lawn for a specified amount of time. This saves your time and waters the lawn evenly. If you don't have an automatic sprinkling system, set a kitchen timer. A lot of water can be wasted in a short period of time if you forget to turn your sprinklers off. Outdoor faucets can flow at rates as high as 300 gallons per hour.

Use a soil probe to test soil moisture

Water only when a soil probe shows dry soil or a screwdriver is difficult to push into the soil.

Water the lawn only when needed

Step on the grass; if it springs back up when you move your foot, it does not need water.

Don't water the pavement

Position sprinklers so that water lands on the lawn or garden, not in areas where it is not needed. Also avoid watering when it is windy. Wind causes water to evaporate quickly and blows water onto areas where it is not needed. Remember, if it doesn't grow, don't water it!

Water without waste

Interrupt watering when puddles or runoff occur. This allows the water to penetrate into the soil before resuming irrigation.

Consider drip irrigation systems around trees and shrubs

Drip systems permit water to flow slowly to roots, encouraging strong root systems. These systems will also cut down evaporation.

Mow as infrequently as possible

Mowing puts the grass under additional stress that requires more water.

Don't clean driveway and sidewalk with water

Sweeping the driveway and sidewalk will get them clean enough without wasting gallons of water.

Don't let the water run while washing the car

Get the car wet, then turn off the water while you soap the car down using a bucket of soapy water. Turn on the water again for a final rinse. Use the bucket of soapy water on the flower bed or garden.

Check for leaks in pipes, hoses, and faucets

All leaks cause water to be wasted. Repair or replace any equipment leaking water.

Cover your swimming pool

Covering a swimming pool will help reduce evaporation. An average-sized pool can lose about 1,000 gallons of water per month if left uncovered. A pool cover can cut the loss by up to 90%.

Use shut-off nozzles on hoses

Shut-off nozzles completely turn off the water when you are not using it.

Move sprinkler heads away from curbs or sidewalks

A mulch, bark, or rock area at least 8 inches wide adjacent to sidewalks and curbs will help eliminate water waste.

For updates on water and Las Vegas and for more information on PLAN and our work please visit:
www.planevada.org

Snake Valley today

"Virtually any level of pump irrigation here
leaves nearby springs dry,
and the vegetation dies.
And once the vegetation goes,
the dust will really start blowing around.
If the pipeline dries this county up,
and I'm certain the water just isn't there,
then what happens?"

—Dean Baker,
rancher
Snake Valley, Nevada

Dean Baker's ranch, Snake Valley, NV/*photos: Christina Roessler*