EXPLORATION, DEVELOPMENT, AND GREED: A CHRONOLOGICAL STUDY IN COLORADO RIVER PUBLIC POLICY

Abstract

Overdrawing water in arid Southern Nevada to support aggressive development requires a substantive re-balance of hydrological efforts with economic desires. Other environmental benefits will follow.

Michael McGreer
manfordmcgreer@gmail.com

Today I wish to discuss the use of public funds to enrich a handful of individuals using their inheritance of publicly owned but appropriated polluted river water, no longer used for its original purposes.

This discussion is a three-part series.The information presented is from a draft of a public policy book I am writing, which addresses the exploration, development, and management of the Colorado River within the context of public policy. More specifically, the information addresses water policy issues affecting the communities of Mesquite and Bunkerville.

1. Series one. Supply and demand presented today on July 9, 2025

2. Series two: Intentionally Created Surplus (ICS) and profiteering is scheduled or July 23, 2025,

3 Series Three: Paradise Canyon vs. Virgin Valley Water District is scheduled for August 6th, 2025

Other sessions could be scheduled if demanded.

"Desert, semidesert, call it what you will. The point is that despite heroic efforts and many billions of dollars, all we have managed to do in the arid West is turn a Missouri-size section green—and that conversion has been wrought mainly with nonrenewable groundwater." ***Marc Reisner,*** *Cadillac Desert (p. 15). Penguin Publishing Group. Kindle Edition.*

"The water of all sources of water supply within the boundaries of the State, whether above or beneath the surface of the ground, belongs to the public." ***Nevada Revised Statutes (NRS) 533.025***

The legal term for a publicly owned water right is codified in Nevada's Public Trust Doctrine, where both the State and Federal governments, as trustees, must manage these resources for the benefit of both current and future generations.

Just a reminder that this area is a desert and that you, the pubic, own all sources of water ostensibly, as a public trust issued, delivered for beneficial use.

It’s a simple issue: does the supply of water meet the demand?

While it’s a simple question, representatives of the Virgin Valley Water District inform the Mesquite City Council that they have sufficient water supplies that will last until 2040 or beyond.

However, the United States Geological Survey and representatives of the Nevada Water Engineer tell and publish data showing an overappropriation that is short of demand.

I am not a hydrologist or geologist. I retired from the Department of the Interior, U.S. Geological Survey, as a supervisory computer scientist, in Washington, D.C, and from that position, I learned a lot about the quality of work that the USGS scientists perform, which has been reinforced as I researched, the work of USGS scientists on the Virgin River a tributary to the Main Colorado River.

It is the work of USGS scientists that frames the positions taken by the Nevada Water Engineer.

Notable Growth (demand) activities 1841-1894

Year	Notable Growth (Demand) activities
1841	Preemption Act. 160 acres of federal land. Prevent sale to others
1862	Homestead Act: reduce cost of homesteading under the Preemption Act.
1864	Nevada ratified its constitution and recognized the public trust doctrine, which includes all waters of the state, not just those that were navigable at statehood
1873	Timber Culture Act granted up to 160 acres of land to a homesteader who would plant at least 40 acres (revised to 10) of trees over a period of several years.
1877	The Desert Land Act amended the Homestead Act and enlarged the maximum allowable purchase for settlers from 160 to 640 acres, with additional acres potentially available through the Timber Culture Act.
	Bunkerville
	Bunkerville Establised by Edward Bunker
1879	United State Geological Survey Established
1882	Leavittville-Mesquite by Dudley Leavitt
1891	Growth in Mesquite and Bunkerville
1894	Cary Act: allowed private companies in the U.S. to erect irrigation systems in the western semi-arid states, and profit from the sales of water.

Figure 1 Mesquite-Bunkerville

Figure 2 Virgin River

Before settling the area as Mesquite and Bunkerville, the government issued the 1841 Preemption Act, offering 160 acres for settlement while preventing the sale to others.

This was followed by the 1862 Homestead Act, the Timber Culture Act of 1873, and the Desert Land Act of 1877, which expanded the settlement areas offered under the Preemption, Homestead, and Timber Culture Acts.

Given the offer of fee land, and by default water, Edward Bunker and his followers established Bunkerville in 1879, on the south side of the Virgin River in the north easter edge of the immense Mojave Desert (outlined in pink) and following a dispute with Bunker, Dudly Leavitt, and his followers established Leavittville near Mesquite in Arizona. He and his followers later settled with others in Mesquite Flats on the North side of the Virgin River.

When Nevada established its constitution, it recognized the public trust doctrine, which encompasses all waters of the state, not just those that were navigable at the time of statehood.

State Engineer, beneficial use, and reclamation (1903-1917).

1903	Office of State Engineer
1905	Water Act: Application filing for Beneficial use
1917	Arthur Powell Davis, Heads Reclamation Service, within the Department of Interior told Congress that owners of uncultivated private lands in reclamation projects or their tenants may receive water for irrigation until December 31, 1920 and pay for it not less than the annual operation and maintenance charge fixed by public notice, plus 2% of the construction charge, which is approximately $55.

As pioneers settled the area, the Nevada legislature established the Office of State Water Engineer and established that all water is appropriated for beneficial use.

The legal term for a publicly owned water right is often associated with the Public Trust Doctrine. The government, as the trustee, has an obligation to manage these resources for the benefit of both current and future generations.

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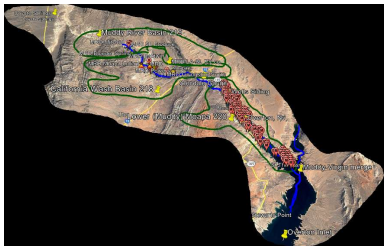
Muddy River Decree and Davis-Fall Report (1920-1923)

1920	The Tenth (now Eighth) Judicial Court of Nevada issued the Muddy River Decree in 1920 covering Basins 219,218, 220 with historical "rights"
1922	Davis-Fall Report, which reports to Congress under the Kinkaid Act of 1920, proposes the construction of the All-American Canal and a Dam on the Colorado River near Boulder Canyon to control floods and recover costs by selling electricity primarily to California.
1923	Reclamation services bcomes Burau of Reclamation, Davis reigns replaced by Idaho Governor and Banker Arthur Powell Davis, no relation,



Muddy River Decree area

For residents of this area, two legislated decrees, one on the Muddy River and the second on the Virgin River, both of which confirmed the rights of settlers who had been using Muddy and Virgin River water for irrigation to continue doing so as they had been.

I want to mention the work of Arthur Powell Davis, nephew of John Wesley Powell, who explored the Colorado River in 1869, and later served as Director of the USGS from 1881 to 1894.

Two issues from Arthur Davis deserve mention. In one briefing to Congress, as head of the Reclamation Service, he stated that the price of public water should be 2% above the cost of construction.

In the second instance, Davis along with Albert Bacon Fall, a New Mexico Senator authored he Davis-Fall Report, which reports to Congress under the Kinkaid Act of 1920, proposes the construction of the All-American Canal and a Dam (Hoover Dam) on the Colorado River near Boulder Canyon to (control floods and recover costs by selling electricity primarily to California.

1920 Muddy River allocations

Muddy River Decree summary Basin 219						
Ditches	Claimant	Sections	Acreage	(ft3/s)	acre feet a year (ft3/s*ac-ft/y	acre feet year/acreage
Morris and Jones Ditches	Jacob Bloedel	1	2.000	0.0486	35.185	17.5923
Big Springs, Jones Spring, High Springs, and Rock Cabin Spring Ditches	Moapa & Salt Lake Produce Co.	8	155.000	2.2150	1,603.580	10.3457
Cox ditch and Cox Spring Ditch	Isaiah Cox abd Wife	1	10.000	0.1430	103.527	10.3527
Mowry and Mitchell or Cox Ditch	Isaiah Cox and Wife as grantees of J.H. Mitchell	1	3.000	0.0430	31.130	10.3768
Totals as listed in decree		11.000	170.000	2.450	1,773.422	
Total acre feet year/acreage						10.4319

Table 1 Upper Muddy (Upper Moapa) River Decree Basin 219.

Muddy River Decree summary Basin 218						
Ditches	Claimant	Sections	Acreage	(ft3/s)	(ft3/s*ac-ft/y	(ft3/s*ac-ft/y/acreage
George A. Davis and Dry Ditch	George Baldwin	3	16.000	0.2286	165.498	10.3436
Indian Ditch	Sadie George	1	2.100	0.0300	21.719	10.3423
St. Thomas Ditch	John F. Perkins	2	2.000	0.0486	35.185	17.5923
White, Livingston and Crosby Ditches	Livingston and Smith	13	160.000	2.2860	1,654.982	10.3436
Cook Ditch	W.J. Powers	6	29.000	0.7043	509.888	17.5823
Bams and Harris Ditch and Brafute Ditch	Joseph Perkins	5	30.000	0.4280	309.857	10.3286
Lodian Ditches	Moapa Indian Reservation	5	87.000	2.1120	1,529.012	17.5749
Irrigation totals as listed in decree		35	326.100	5.838	4,226.140	
Total acre feet year/acreage						12.960
Los Angeles and Salt Lake Ry Pipe Line				0.0929	67.271	
Total with pipeline				5.9201	4,293.4109	

Table 2 Muddy River Decree California Wash Basin 218.

Muddy River Decree summary Basin 220						
Ditches	Claimant	Sections	Acreage	(ft3/s)	(ft3/s*ac-ft/y	(ft3/s*ac-ft/y/acreage
Weiser Ditch	Holmes and Knox	8	95.000	1.3570	982.419	10.3413
St. Joe Ditch, Sprole-Averitt Ditch,Kapalapa Ditch, Stringtown Ditch,Sparks Canal, Overton Canal, Kaolin Ditch, St. Thomas Ditch, East St. Thomas Ditch,	Muddy Valley Irr Co	163	2,244.800	45.2910	32,789.056	14.6067
Overton Canal	Muddy Valley Irr. Co (Cert 58)	14	398.110	3.9800	2,881.377	7.2376
Kaolin Ditch	Muddy Valley Irr. Co. (Cert. 59)	14	425.200	4.2520	3,078.295	7.2396
St. Jo or Logan Ditch	Muddy Valley Irr. Co. (Cert. 60)	3	80.000	0.8000	579.171	7.2396
Totals as listed in the Decree		202.000	3,243.110	55.680	40,310.318	
Total Acre Feet year/acreage						12.430

Table 3 Lower Muddy River Decree Basin 220.

* 1920 Muddy River Decree irrigation summary					
Statistics	Sections	Acreage	Decreed (ft3/s)	Acre Feet Decreed	Decreed ac-ft/y
Total	248.00	3,739.21	63.97	46,309.88	
Total Acre Feet year/acreage					12.38
Average	15.500	233.701	3.998	2,894.368	11.840
Median	5.000	55.000	0.752	544.530	10.345
Average-Median	10.500	178.701	3.246	2,349.838	1.495
Mode	1.000	2.000	0.049	35.185	10.344
Max	163.000	2,244.800	45.291	32,789.056	17.592
Min	1.000	2.000	0.030	21.719	7.238
Max-Min	164.000	2,246.800	45.321	32,810.775	24.830
* Excludes Los Angeles and Salt Lake Ry non-irrigation Pipeline 0.0929 ft3/s = 67.2707 Ac-ft/yr.					

Table 4 1920 Muddy River Decree irrigiato summary

I will not spend time on the details of the Muddy River Decree, except to note that it covers three basins and its allocations will play a role in future discussions of the Intentionally Created Surplus profiteering issue. However,

Virgin River (1925-1927)

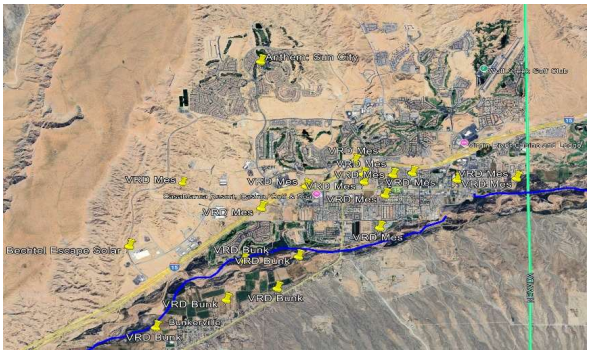
1925	Mesquite and Bunkerville Irrigation Company was Established primarily to deliver river water stored in tanks for domestic and irrigation.
1927	In 1927, Republican Nevada Governor Fred B. Balzer (1880-1934) told the legislature that ranching, livestock, and farming industries were struggling against adverse economic conditions. Balzar said their dry seasons exacerbated their needs by reducing the availability of spring, fall, summer, or winter ranges.
	On May 14, 1927, the Tenth (now Eighth) Judicial District Court, Clark County, Nevada, affirmed the rights of area pioneers sharing Virgin River water as appropriators in the Mesquite Irrigation Company (MIC) and the Bunkerville Irrigation Company (BIC). The affirmation required an appropriation date before March 1, 1905, and a declaration that the stock-share holder was in good standing.

In 1925, residents of Mesquite and Bunkerville each established Irrigation Companies, followed in 1927 by warnings from Nevada Governor Fred Balzer of ranching, farming, and industry-wide water concerns from dry seasons.

Also in 1927, the Tenth Judicial Court established the Virgin River Decree.

Virgin River Decree (1927)

Virgin River flowing between Mesquite and Bunkerville Decreed water.

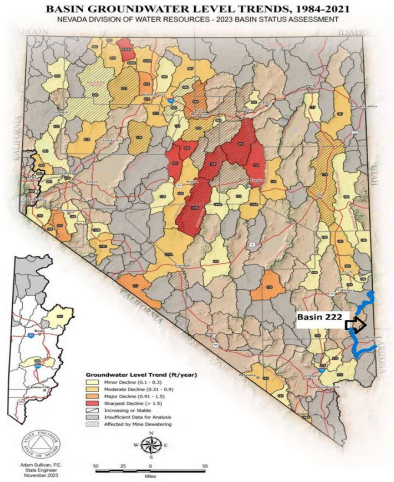


1927 Virgin River Decree Statistical Summary				
Statistics	Harvest Acres	(ft3/s)	Acre Feet	AcreFeet Yearly
Sum	1,963.14	48.66	14,213.22	
Average	16.92	0.42	122.53	7.239463
Median	14.45	0.35	104.63	7.240042
Mode	13.11	0.32	65.81	7.239544
Leavitt holdings	495.52		3587.6	
	25.24%		25.24%	
Hafen Holdings	43.84		317.41	
	2.23%		2.23%	
Mary Hafen interrelation holdings	663.72		4805.31	
	33.81%		33.81%	

The Virgin River Decree allocated shares equal to 14,213.22 acre feet to stockholders of the Mesquite Irrigation Company (MIC) and the Bunkerville Irrigation Company (BIC) to irrigate 1,963.14 harvest acres or 7.239 acre-feet yearly.

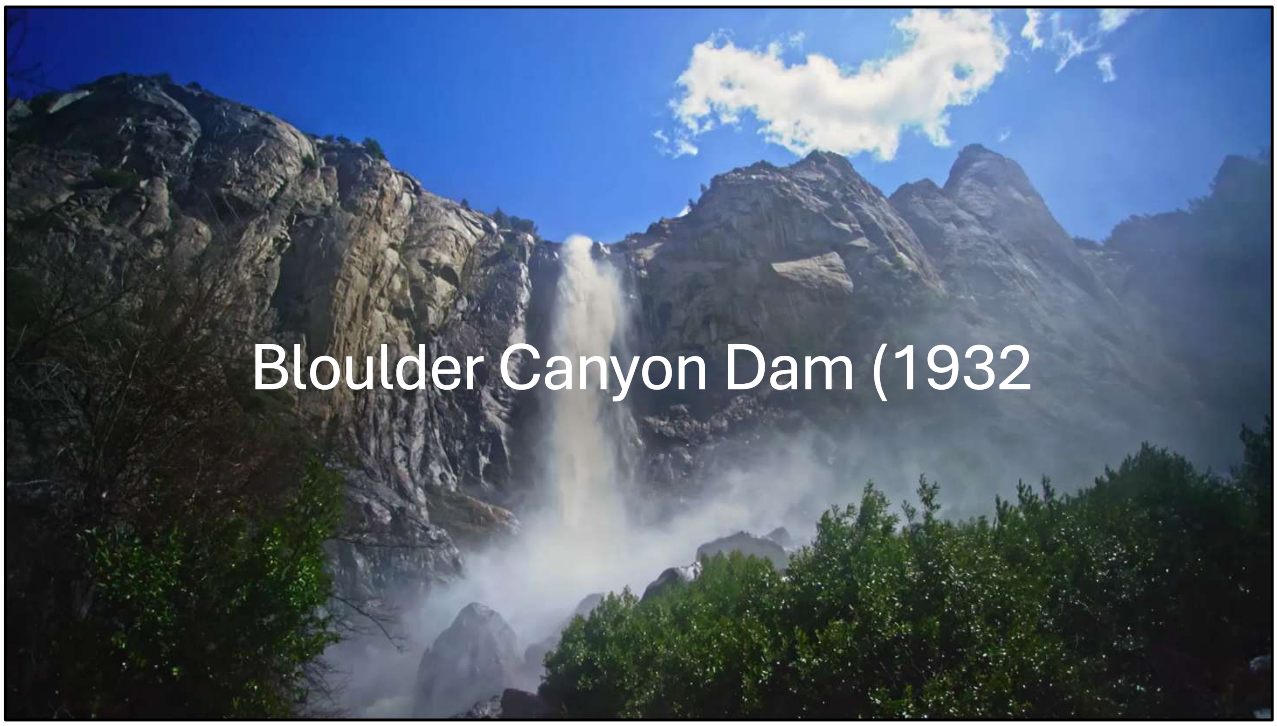
An acre-foot is a standard unit of measurement in the U.S. for water volume and usage. It is the amount of water it takes to cover an acre of land one foot deep. An acre is about the size of a football field. An acre-foot of water equals 325,851 gallons, and historically that was enough to serve the needs of two families for a year.

River Basins (1928)



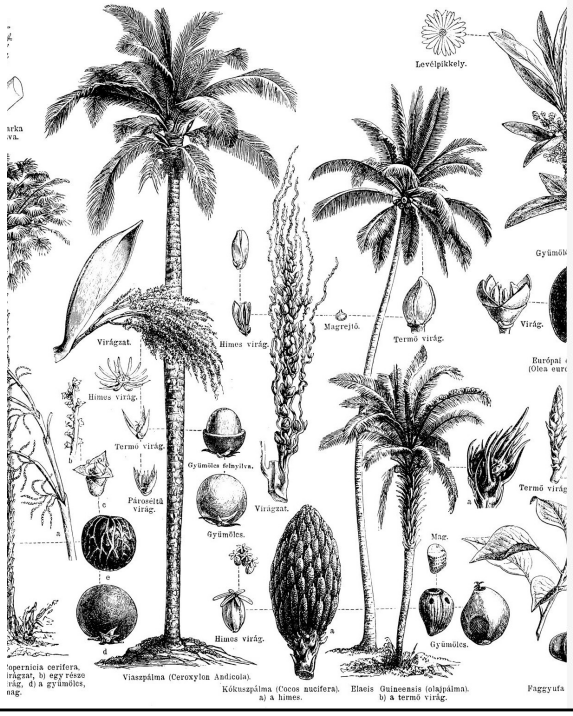
Nevada divided its water into basins in 1928. The state has 256 hydrographic basins, some of which are over-appropriated.

Each appropriation requires a declaration of Beneficial use, including the basis, measure, and limit of the right to use. Beneficial use shall be the basis, the measure, and the limit of the right to the use of water.



In March 1932, Republican President Herbert Hoover ordered the construction of the Boulder Canyon Dam at Black Canyon. The Government contracted with Six Companies, Inc., a joint venture formed to build the Dam within seven year

Groundwater Act (1939)



In 1939, the Nevada Legislature passed the Groundwater Act, which defined the vested rights of underground water drawn from wells before March 22, 1913. However, under the Groundwater Act, the Nevada Engineer was not authorized to grant permits to appropriate water in excess of the average annual replenishment.

Mesquite Dairy Operations (1940)

A significant portion of the Mesquite-Bunkerville economy derived from the work of Maxwell Hafen, who in the 1940s, along with ten others, began the Company Dairy operation in Mesquite. they utilized a single facility to milk their cows, featuring separate corrals and feeding facilities. Eventually, they split off into their facilities. During nuclear testing, the Hafen milking operation grew from more than 100 cows to 700 cows by the early 60s.

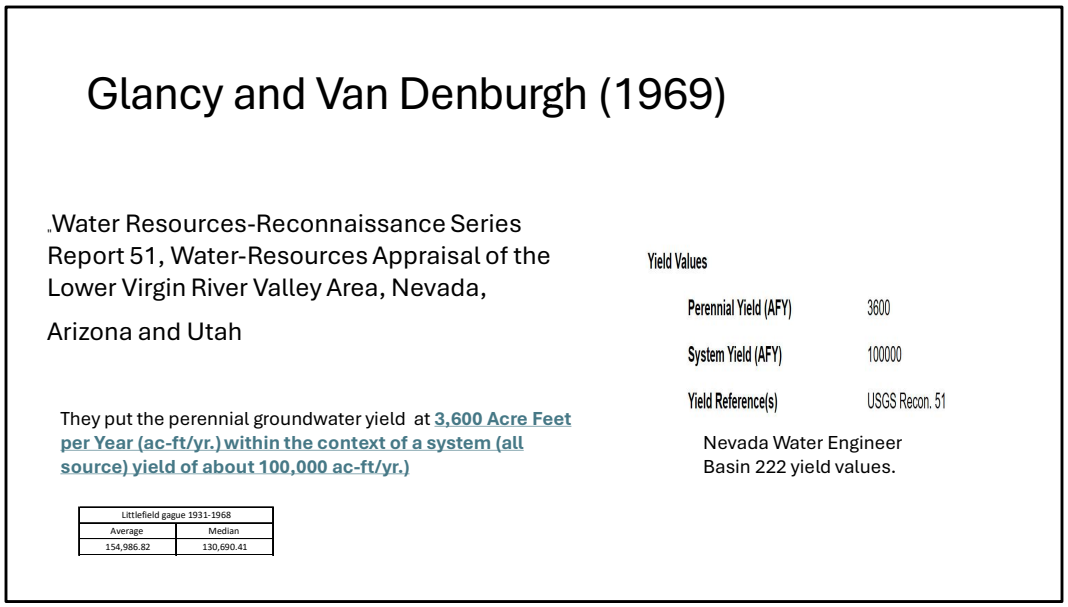
Subsistence farmers in Clark County sold and consumed locally produced milk within the fallout areas of Moapa Valley, north of Glendale, and the Virgin River communities of Mesquite and Bunkerville.

Cows consume contaminated fallout from hay, pastures, and grasslands. The farmers and dairy operators milk the cows, and the contaminated product appears in the tainted milk within one to two days.

Exactly how the fall-out from contaminated milk impacted the local communities remains undocumented.

On July 15, 1946, Nevada Water Engineer Alfred Merritt Smith sent his “Biennial Report of the State Engineer, from July 1, 1944, to June 30, 1946, inclusive,” to Nevada Governor Vail Pittman saying tha the water for Mesquite and Bunkerville totaled 164 users with water coming from the Cabin-Mica Notch Springs area, approximately 10 miles from the use points.

He said the development and expansion of market milk production in both communities increased domestic and culinary water demand. Consequently, he pointed out that the Bunkerville Community sold all their water rights to their portion of the joint supply and installation to the Mesquite Community.



In 1969, USGS scientists Patrick Glancy and A.S. Van Doesburg, under the supervision of Nevada Water Engineer Roland D. Westergard, conducted a floodplain surface water study of the lower Virgin River (Recon Report 51.

Their study included the amount of groundwater recharged and discharged due to changes in storage for different levels of water consumption.

The USGS scientists recognize that in 1969, groundwater reservoirs in the area were largely untapped. They also noted that the Virgin River partly hydraulically controls the reservoirs. Thus, they concluded that any intensive groundwater development adjacent to the Virgin River floodplain could affect the River. Conversely, they argued that any substantial depletion in river flow would affect adjacent groundwater reservoirs.

However, put the perennial groundwater yield at **3,600 Acre Feet per Year (ac-ft/yr) within the context of a system (all source-groundwater-surface water-spring water) yield of about 100,000 ac-ft/yr.)**

In January 1971, Westergard issued an estimated water use report in Nevada. At the time of his study, Westergard estimated the population of the Virgin Valley to be 1,100, with Mesquite at 700 and Bunkerville at 300. Westergard acknowledged Mesquite as a potential tourist attraction that would also serve as a commuter community for Las Vegas.

By 2020, he estimated the population at 10,000. However, that number turned out to be less than half of the 24,971 customers served by the VVWD in 2020.

Westergard estimated the water requirements for the Virgins River area as 13,800 acre-feet per year, with 13,250 acre-feet allocated to agriculture (the original Decree allocated 14,213.22 acre-feet for irrigation) and 550 acre-feet consumed for domestic needs.

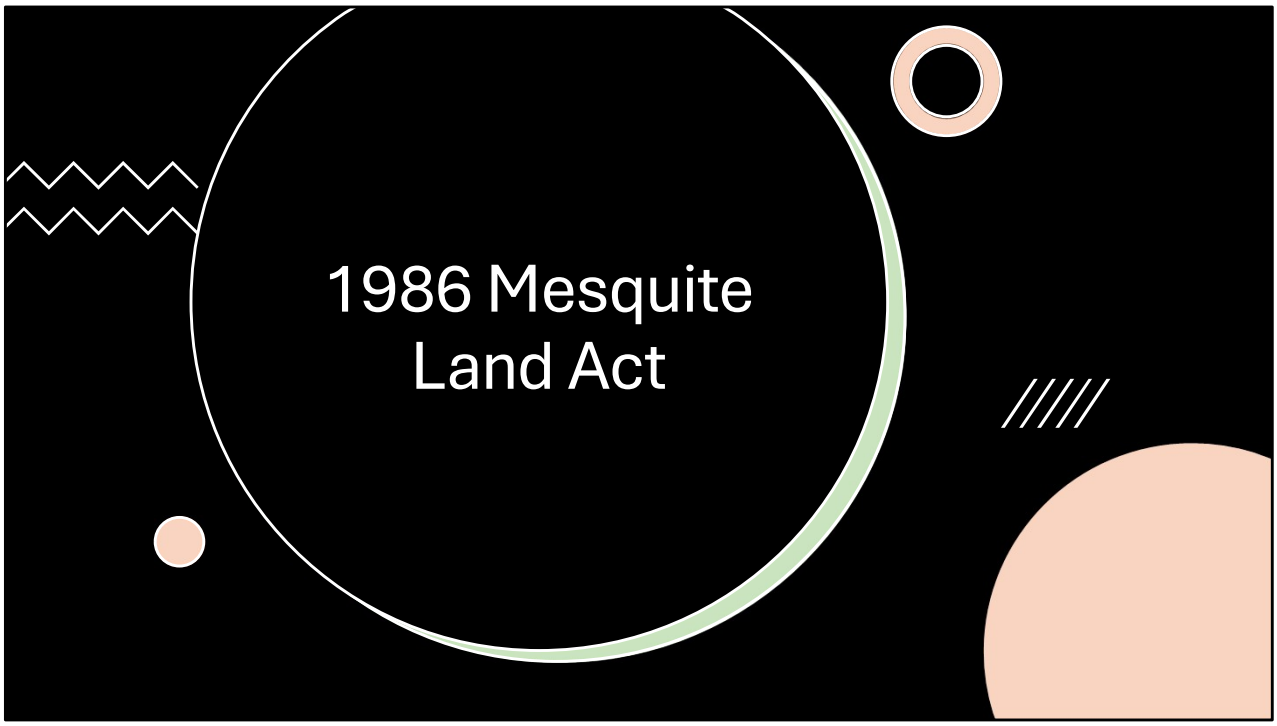
Westergard recognized the need for extensive treatment of highly polluted Virgin River Water (3.6 times the concentration of sulfates, 1.4 times the concentration of chlorides, and 4.3 times the concentration of total dissolved solids as recommended by the Public Health Service in 1962) but felt that mixing with Colorado River Water and Lake Mead would mitigate the issue.

Those sworn in as leaders in 1984 of the new city of Mesquite were Jimmie Hughes, Bill Lee, Craig Pulsipher, Dan Spencer, and district court judge Roy Guy. After Mesquite achieved its incorporation, the Nevada Legislature changed laws, and no town in the state has been able to become independent from a county commission since Mesquite.

City of Mesquite 1984

Mesquite residents established Mesquite, NV, as a city in 1984 with a population of approximately 1,100, with Jimmie Hughes, Bill Lee, Craig Pulsipher, Dan Spencer, and Roy Guy serving as the first city council.

Initially, city founders created a ward structure closely aligned with their religious wards to elect officials for the mayoral and council positions.

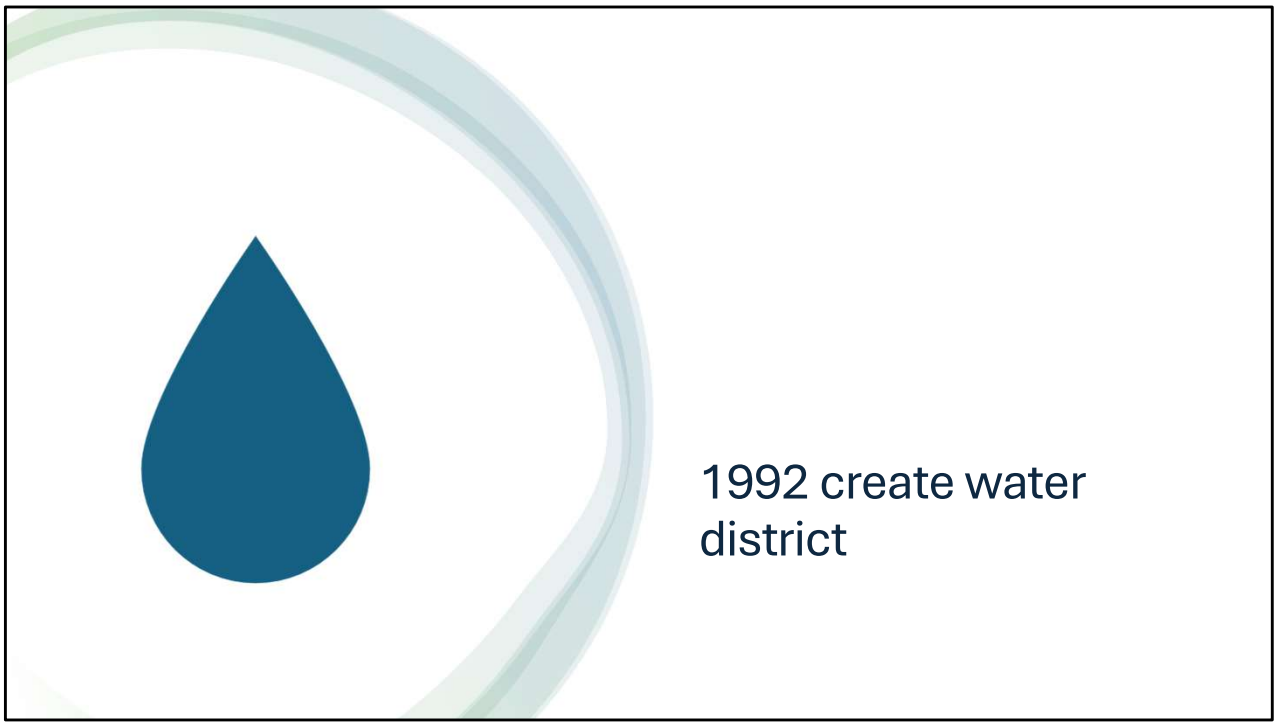


U.S. Representative Harry Reid (1939-2021), pushed for the passage of the Mesquite Lands Act of 1986 (P.L. 99-548), signed into law on October 26, 1986, by President Ronald Reagan.
T
The Mesquite Land Act (commonly known as the “Mesquite Lands Act of 1988”) gave City Officials exclusive rights to identify and purchase 12,200 acres of BLM lands near the City at fair market value and subject to all appropriate environmental reviews.

If City officials fail to comply with the limitation, the Secretary of the Interior could put the land up for public auction as proscribed in the 1976 Federal Land Policy and Management Act.

On February 22, 1989, Jensen, Reber, Duke, Lee, and Val Woods for the Mesquite Farmsead Water Association filed an application (**52952**) asking Morros to approve drilling for one Second feet (724.45 ac fe/yr) of groundwater on section 30 of Township 13 S, Range 71 E (NE NE) to serve both the township of Mesquite and portions of Arizona.

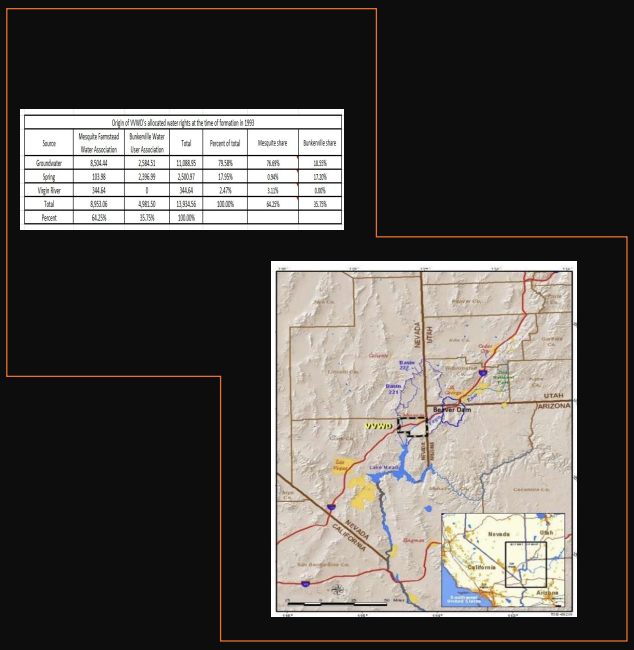
Thompson Drilling, Col, Las Vegas, had drilled quarters NE and SE of section 30 owned by Bruce Jensen to 153 feet in March 1988 with no yield reported.



The Farmstead Association sponsored a bill to create the Virgin Valley Water District, which would purchase, sell, and deliver water, as well as issue bonds and collect taxes.

The Farmstead Association sponsored a bill to create the Virgin Valley Water District, which would purchase, sell, and deliver water, as well as issue bonds and collect taxes. According to Leavitt, the council learned about the bill sponsorship during meetings with legislators in Carson City on non-water issues. He informed the Farmstead board members that the council had several concerns with the bill but agreed to vote in favor if the Board included specific amendments.

1993 Virgin Valley Water District



In 1993, Nevada state senator R. Hal Smith (R, Clark 2) introduced Bill Daft Request (BDR-S.B. 50) (amended in 1995) to create "a single government entity succeeding the limited groundwater providers, i.e., the Bunkerville Water Users' Association and the Mesquite Farmstead Water Association" to combine them into theVirgin Valley Water District (VVWD) as a political subdivision of this State.

At that time, those forming the VVWD reported a total water share division of 64% Mesquite and 36% Bunkerville.

The legislation passed with an overwhelming majority in both the House and Senate. U.S. House Representative Dina Titus (D, NV.1), then a member of the State Senate (Clark 7), also voted in favor of establishing the District. However, Ann O'Connell, R Clark District 5, voted against forming the District. The District became a political subdivision on May 10, 1993.

The legislators mandated that the elected Board of the VVWD "adequately and efficiently provide water service for the economy and well-being of the residents of the Virgin Valley area,“ meaning developing groundwater, whereas the surface water remained too polluted to be effectively and economically cleaned for domestic use.

Basin 222 over appropriated

Nevada Division of Water Resources data base as of June 23, 2025								
Source	EFFLUENT (EFF)	OTHER GROUND WATER (OGW)	OTHER SURFACE WATER (OSW)	RESERVOIR (RES)	SPRING (SPR)	STREAM (STR)	UNDERGROUND (UG)	Total
* Duty in Acre Feet	9,374.02	0.00	5.06	0.00	456.90	200,775.88	22,506.00	233,117.86
1927 Virgin River Decree						14,213.22		
Total with decree	9,374.02	0.00	5.06	0.00	456.90	214,989.10	22,506.00	247,331.08
** System perennial yield								100,000.00
Over system perennial yield								147,331.08
***Groundwater perennial yield							3,600.00	
Acre Feet over groundwater Duty							18,906.00	
****groundwater Manner of use							12,947.95	
Groundwater Manner of use over perennial yield							9,347.95	
Permits, certificates and Vested. Does not included Virgin River 1927 Decree, nor unresolved protests								
*The Duty of water is the relationship between the water volume and the land area it matures.								
** System perennial yield (all source) that can be withdrawn annually over the long term without depleting the aquifer.								
*** Ground water Perennial yield, refers to the maximum amount of groundwater that can be withdrawn annually over the long term without depleting the aquifer.								
**** Manner of use: How underground source is allocated for use: municipal, quasi-municipal in this case.								
Permits, certificates and Vested. Does not included Virgin River 1927 Decree								
Source NDWR Database. Source of perennial yields: 1968 USGS recon report 51 (Basin shared in common with Arizona and Utah								

When discussing Basin water, it's essential to understand that the Nevada Water Engineer has the authority to permit and certify water source applications and approve applications to confirm vested rights, which are claims of use for water that predate the State's initiation of water rights appropriation. The Water Engineer can also hold applications as ready to use, or hear appeals.

All applications for beneficial use are categorized.

In terms of Basin 222, as of June 23, 2025, the Oasis Golf Course, the Paradise Canyon (Wolf Creek) golf course, and the city of Mesquite hold a duty of 9,374.02 acre-feet of effluent (wastewater). The golf courses clean the wastewater provided by the City for watering their courses.

The Bureau of Land Management holds a duty of 5.06 acre-feet on Juanetta Springs for stock watering.

Continued

The state of Nevada, the Virgin Valley Water District, the Bunkerville Irrigation Company, and individuals hold a duty of 456.90 acre-feet on numerous springs for stock watering, quasi-municipal use, irrigation, recreation, and wildlife support.

The Virgin Valley Water District, Bunkerville Irrigation Company, the State of Nevada, C& L Cattle, LLC, Mesquite Irrigation Company, the Southern Nevada Water Authority, and individuals have 200,775.88 acre feet in River, Cabin Springs Creek, Beaver Dam Creek, Fort Creek, and the Beaver Dam Creek.

However, the Decree adds 14,213.22 acre-feet to the stream flow of the Virgin River, bringing the total stream flow to 214,989.10 acre-feet.

Groundwater duty appropriations held by the Virgin Valley Water District, Nevada Parks Division, and various individuals amount to 22,506.00 acre feet or 18,906.00 acre feet over the 3,600 acre feet established in the 1968 Recon Study.

In total, Basin permits, certifications, vested approvals, and the decree amount to 247,331.08 acre-feet, or 147,331.08 acre-feet over the 100,000 acre-feet reported in the 1968 Recon Study.

In May 1994, in Mesquite, Bryan Hafen sold alfalfa land needed to support Hafen Dairy Inc. to **Players International**, with the construction of "**Players Island"** to began in the third quarter of 1994, becoming the third casino after the Oasis and the Virgin River to operate in the Mesquite and Bunkerville area of Clark County.

On January 25, 1995, Kraig D. Hafen and his brother, Maxwell D. Hafen, sons of Bryan Hafen, ended their historic Hafen Dairy Inc. and formed River View LLC to market MIC and BIC river water shares, which the family formerly used to grow alfalfa and provide water to their family's dairy operation.

In November 1995, construction began on the Cal Olson-designed Casa Blanca golf course, situated on an alfalfa field formerly owned by Brian Hafen. , The course opened in October 1996 as part of Players Island.

Also, in 1995, Arnold Palmer designed the Palmer & Canyons 36-hole Golf Courses (Oasis) operation for Si Redd as part of Redd's Mesquite Vistas Land Development Co. and the Oasis Golf Course operation.

In two phases, Mesquite residents Kelby Hughes and Crescent Hardy designed the Mesquite Falcon Ridge golf course, with Phase One opening in June of 1998

2011 Supreme Court Public Trust Doctrine

The Nevada Supreme Court formally recognized the Public Trust Doctrine in 2011 in Lawrence v. Clark County. However, the Court in Lawrence only recognized the doctrine in the context of navigable waters. In Mineral County, the Court later clarified that the doctrine applies to all waters within the state, whether navigable or non-navigable. The Court also adopted the position that the Public Trust Doctrine has been in place in Nevada since statehood, despite the doctrine not being formally acknowledged until Lawrence.

2012 Study proposed

Geological Survey proposes study

On September 18, 2012, Mike Moran from the U.S. Geological Survey (USGS), Henderson, NV suggested a water budget which would account for all the surface and ground water within basin 222 or flowing through the basin and how the water moves.

According to Moran, the study would enhance understanding of the groundwater flow system discharging into the Virgin River and the hydraulic connection between the aquifer systems and the river, thereby providing a "water budget." He set a five-year price of $972,544 with a cost split between the USGS and the VVWDB, beginning in 2014.

King, who attended the meeting, told the Virgin Valley Water Board that Nevada had permitted 12,000 AFY (2,271 AFY) (exceeding the 3,600 acre feet of perennial yield) for underground use by the Water District.

The study remains unfunded.

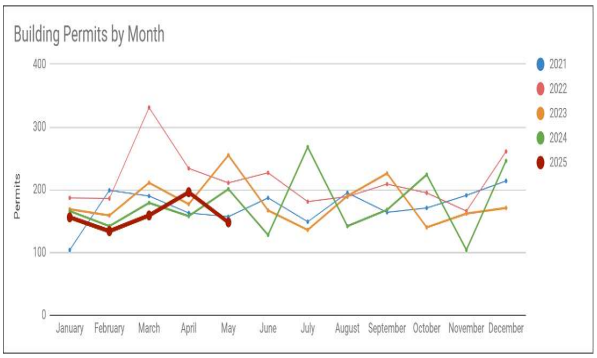
On January 30, 2018, during a Nevada Water Law Summit, then-Nevada Water Engineer Jason King referred to over-appropriations. He said, “Most (Basins) was already over-appropriated before establishing the perennial yield.” He noted, “Popular thinking suggested that not all rights would be put to their maximum beneficial use, so it was acceptable to over-appropriate.”

In the meantime, on June 29, 2018, Nevada Water Engineer Jason King told the Legislative Committee on Public Lands that: "The goal is not to allow the consumptive use of Groundwater rights and domestic wells; to exceed the basin's perennial yield."

On Tuesday, September 28, 2021, Micheline Fairbank, Deputy Director in Nevada's Division of Water Resources, appeared before the Mesquite City Council.Ms. Fairbank, a lawyer, pointed to the Glancy and Van Denburgh (1969) the perennial groundwater yield set at 3,600 Acre Feet per Year.Ms. Fairbank also informed the Council that 2019 legislation, SB150, requires county or city governments to develop an all-source water resource plan. She also addressed the issue of conjunctive (all source) studies.

She said that historically, the Division of Water Resources managed surface and underground Water separately. Nonetheless, she confirmed that the Water Engineer was required to prepare a "water budget" and manage water resources conjunctively. She acknowledged that the Water Engineer did have a conjunctive water model but lacked the financial resources to implement it locally. (AFY).

Supply and demand



The relationship between supply and demand evolved from the late 19th century's agricultural and dairy operations, where the primary source of water was the highly polluted Virgin River, to the late 20th century's gaming, golfing, and retirement communities, where water demand shifted to groundwater for domestic use.

In the dairy and agricultural years, the water supply was met by residents forming the Bunkerville Water Users' Association and the Mesquite Farmstead Water Association, which delivered water from a tank.

With the formation of Mesquite as a City in 1984 and the establishment of the Water District in 1993, a relationship shifted, whereby elected individuals of the City of Mesquite created demand to be met by elected officials on the Virgin Valley Water District Board, also a government organization.

In 1993, the VVWDB delivered 1,288 acre feet of groundwater to a population of 3,270. By 1999, the Water District had delivered 4,156 acre-feet of groundwater to a population of 14,070, exceeding the basin's perennial yield of 3,600 acre-feet by 1,456 acre-feet. In 2020, the VWDB reached its highest level of groundwater delivery, at 7,137 acre-feet, to a population of 24,971.

City pushes demand

Supply and Demand vs. irrigation diversions				
Virgin Valley Warer District domestic underground water pumping in Acre Feet Annually (AFA) (Supply)				City of Mesquite Permit valuations (Demand)
Year	AFA **	percent of perennial yield	Population	Permit valuations
1990	811		1,960	No record on file with city of Mesquite
1991	964	27%	2,070	
1992	1,052	29%	2,370	
1993	1,288	36%	3,270	
1994	1,813	50%	3,850	
1995	2,637	73%	5,120	
1996	3,036	84%	7,460	
1997	3,416	95%	9,270	
1998 *	3,521	98%	12,070	
1999 *	4,156	115%	14,070	
2000	4,458	124%	15,605	
2001	4,526	126%	11,940	
2002	4,563	127%	13,216	
2003	5,253	146%	13,895	
2004	5,478	152%	15,881	
2005	5,616	156%	16,423	
2006	6,366	177%	17,656	$95,350,630.50
2007	7,462	207%	18,787	$117,115,672.00
2008	6,759	188%	19,754	$102,527,883.04
2009	6,729	187%	20,677	$27,029,053.23
2010	6,430	179%	20,440	$36,811,200.22
2011	6,345	176%	17,038	$26,761,655.44
2012	6,601	183%	16,778	$28,789,392.00
2013	6,204	172%	17,477	$38,879,662.00
2014	6,232	173%	18,262	$38,059,247.00
2015	6,305	175%	19,061	$45,813,632.00
2016	6,535	182%	19,991	$66,907,917.00
2017	6,864	191%	20,838	$86,004,825.00
2018	6,529	181%	22,557	$94,038,594.00
2019	7,009	195%	23,827	$85,638,524.00
2020	7,137	198%	24,971	$96,684,234.00
2021	7,017	195%	25,672	$122,405,426.00
2022	6632	184%	26,372	$140,822,790.43
total value of permit statistics				$1,249,640,337.86
Average	3,468		15,110	$73,508,255
Medium	3,521		16,778	$85,638,524
*Nevada Water Engineer established Perennial yield is 3,600 AFA			Nevada Demographic Historical record	https://www.mesquitenv.gov/building-permit-statistics
** virgin valley water district conservation plan, 2023				

In 2022, the delivery dropped to 6,632 acre-feet for a population of 26,372. That year, the City Council had issued $140,822,790.43 in building permit valuations.

Between 2007 and 2022, the City of Mesquite issued permit valuations totaling $1,249,640,337.86, averaging $73,508,255.00, with a median value of $85,638,524.00.

It’s the elected officials on the City council creating a demand for elected officials on the water board to meet, with neither group concerned about the over appropriations of the Basin.

Marketing Virgin River surface water

Virgin Valley Water District Board Members 1993-2010

Board Members	1993	1996-1997	1998	1999	2000	2002-2004	2005	2006-2009	2010
* John Lee	x								
* J.L. Bowler	x								
* Sam Reber	x	x	x	x					
* Cresent Hardy	x	x							
* Todd Leavitt	x								
* Cecil Leavitt		x	x	x	x	x	x	x	
* Vinnie Leavitt		x							
* Kathryn Leavitt				x	x				
* Kenyon Leavitt						x	x	x	x
* Paul Jensen		x							
* Harold Wittwer			x	x	x				
Bill Tanner			x						
* Michael Waite			x						
* Charlene Hughes				x	x	x			
* Kraig Hafen					x	x	x		
Dave Bennett						x	x		
* Theron Jensen									
John Paul								x	x
Ted Miller							x	x	x
Robert (Bubba) Smith								x	
Karl Gustaveson									x
Mark McEwen									x

* family has Virgin River Shares under the 1927 Virgin River Decree

Virgin Valley Water District Board Virgin River Decree purchases to 2010

Statistics	Shares	Purchase price	Price per share
Totals	549	$12,159,670.86	$22,148.76
Average	7.32	$164,319.88	$17,895.41
Median	1	$12,000.00	$12,000.00
Mode	1	$8,287.30	$6,000.00

The marketing of the publicly owned but appropriated Virgin River Basin water by the Virgin Valley Water Board (primarily dominated by Virgin River stockholders in Mesquite Irrigation Company (MIC) and the Bunkerville Irrigation Company (BIC)) comes in two forms.

Those elected officials, over time, used public funds to pay for the delivery of over-appropriated groundwater for domestic use.

However, the shift to groundwater for domestic needs has virtually eliminated the need for polluted Virgin River water, which was appropriated for the beneficial irrigation use of their ancestors 98 years ago.

However, instead of using public funds to potentially increase the availability of domestic water, between 1993 and 2010, they "gifted" $12,159,670.86 in public funds to stockholders of MIC and BIC.

On July 21, 2005, the Southern Nevada Water Authority (SNWA) awarded the Dixie and Ann Leavitt Foundation $11,686,500 for 350 BIC shares (2,736 acre-feet), or $4,270.97 per acre-foot.

SNWA ICS summary totals 1997-2023 (Return on Investment)							
Transactions	Paid	Acre Feet	$Per ac-ft	Term in average years	Years	ICS credits (ac-feet)	per credit (total/credit)
Muddy River total	$86,007,207.55	81,144.66	$1,059.92	5.20	1997-2023	269,314.00	$319.36
Coyote Springs purchase total	$29,500,000.00	9,000.00	$3,277.78	NA	1998 and 2002	10,075.00	$2,928.04
Virgin River totals	$58,973,985.66	34,372.22	$1,969.05	3.6	2005-2023	226,748.00	$297.09
Summary totals	$174,481,193.21	124,516.88	$1,401.27	4.40	1997-2023	506,137.00	$344.73
Average						6,460.36	$27,007.96
Meadian						6,445.00	$27,072.33

$12,159,670.86 + $ 58,973,905.66 = 71,133,576.52

Thus began a trend where SNWA would either purchase or lease the Virgin River Decreed (and Muddy River Decreed and appropriated water), eventually as part of the federal sanctioned Intentionally Created Surplus program, under which portions of those purchases or leases would be counted as credits to the increase in declining Lake Mead water levels.

Through 2023, SNWA has distributed $ 58,973,905.66 in public funds to MIC and BIC stockholders, bringing the total to those stockholders to $71,133,576.52.

I will address the use of public funds to acquire publicly owned and appropriated water in more detail in the following two sections.

Bio

Michael Manford McGreer retired from government service in 2006. He moved from his home in Northern Virginia to Mesquite, NV., to pursue his writing and lecturing career.

Mike taught graduate and undergraduate programs at the University of South Dakota, George Washington University, and Western Governors University.

He is the Past President of the Stuttgart, Germany, Chapter of the Armed Forces Communications and Electronics Association (AFCEA). He has Fifty-five awards and commendations, including an award for Exceptional Civilian Service from The Defense Threat Reduction Agency (DTRA) for his contributions to reducing Weapons of Mass Destruction (WMD).

Mike has worked extensively with members of the international intelligence community in activities associated with the strategic and tactical deployment of Command, Control Communications, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems. He also served as Chief Information Officer for the Defense Threat Reduction Agency (DTRA). The agency provides combat support, operations, and research and development activities concerning chemical, biological, and nuclear weapons of Mass Destruction (WMD).

He is the Past President of the Stuttgart chapter of the Armed Forces Communications and Electronics Association (AFCEA).

He has numerous articles published in online magazines and newspapers on federal policy and alternative energy strategies."

He stays current on public policy issues through collaboration in professional online discussions. He is the founder and managing editor of mesquatewteralliance.com

He is the author of "No Harm, No Foul," a fictional account of biological warfare in the 21st Century, and has authored historical and genealogy books. He is currently working on a public policy case study of water management along Colorado River Basin 34 Hydrographic Region No. 13, Basin 222, a tributary of the Southern portion of the Colorado River.

Mike holds a Bachelor's Degree in Criminal Justice Administration, a Master's Degree in Public Administration (emphasis on Public Policy analysis) from Boise State University, Boise, Idaho, and a Doctorate in Public Administration (emphasis on (Operations Research and Systems Analysis)from Nova Southeastern University, Davie, Fla.

He is married to Bonnie Jean LaJeunesse McGreer. They are the parents of one son, one daughter, four grandchildren, and four great-grandchildren. His recreation interests include motorcycle touring, classic cars, golf, genealogy, and travel.

Mike can be reached at manfordmcgreer@gmail.com.