Overview of Water Resource Issues in Inyo County, California

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Presented to:

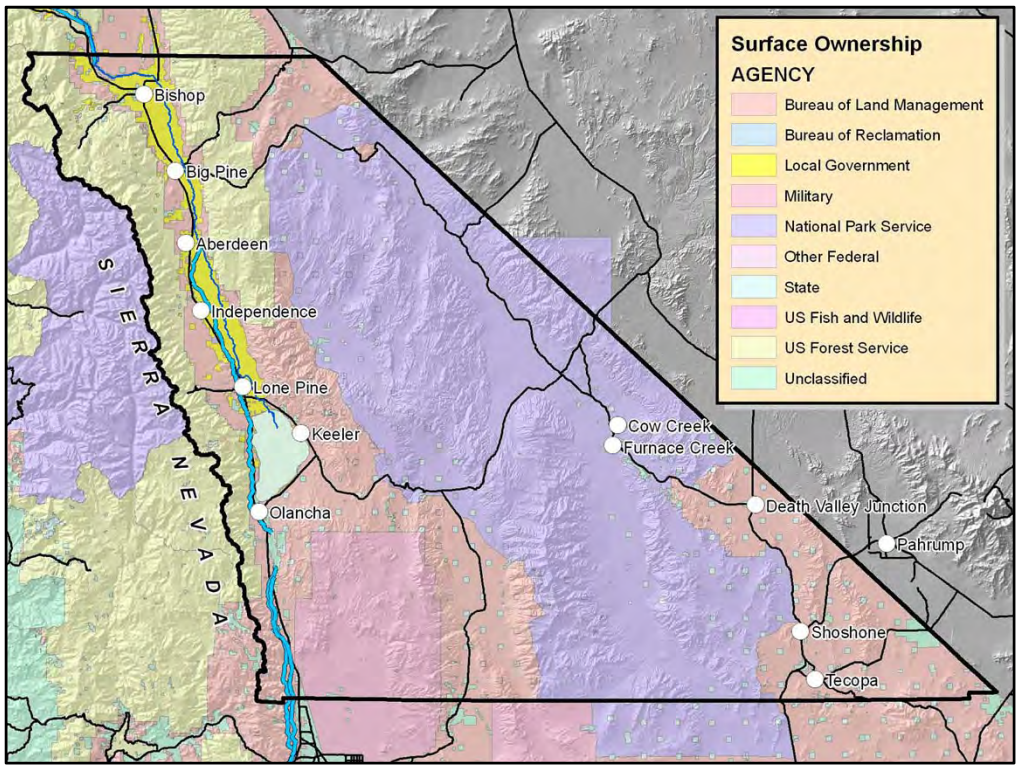
Meeting of the Nevada Legislative Commission's Subcommittee to Study Water
Pahrump, Nevada
July 11, 2016

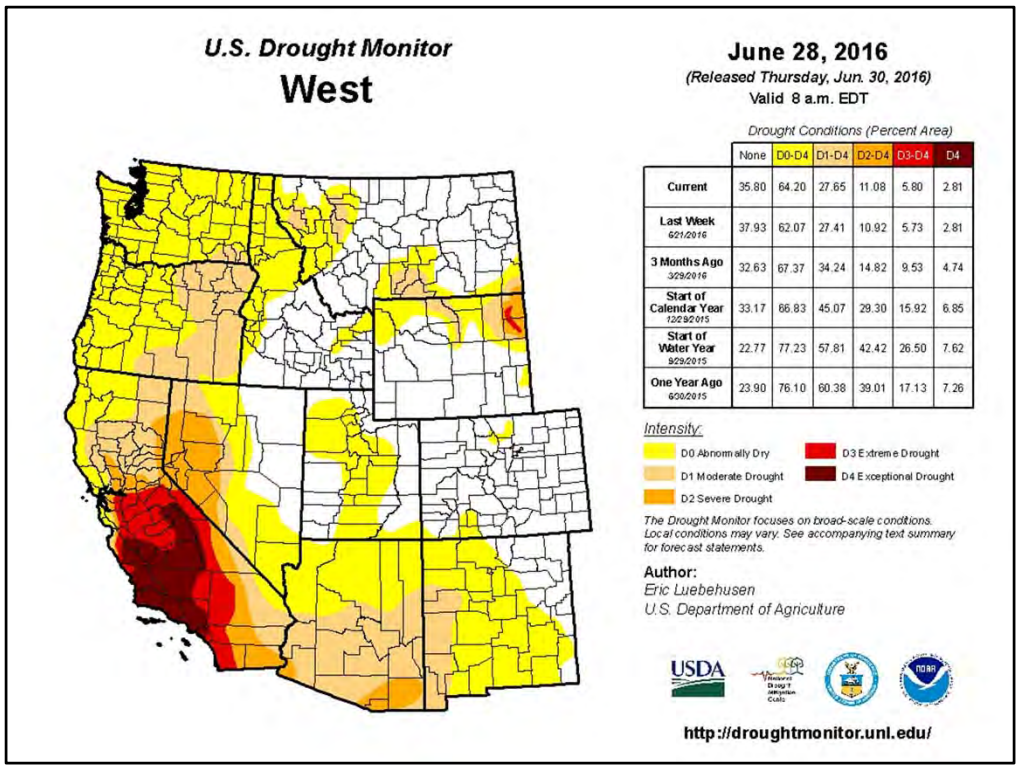
Topics:

Inyo County overview
Issues:
- Drought
- Water transfers to Los Angeles
- California Sustainable Groundwater Management Act
- California/Nevada transboundary groundwater basins

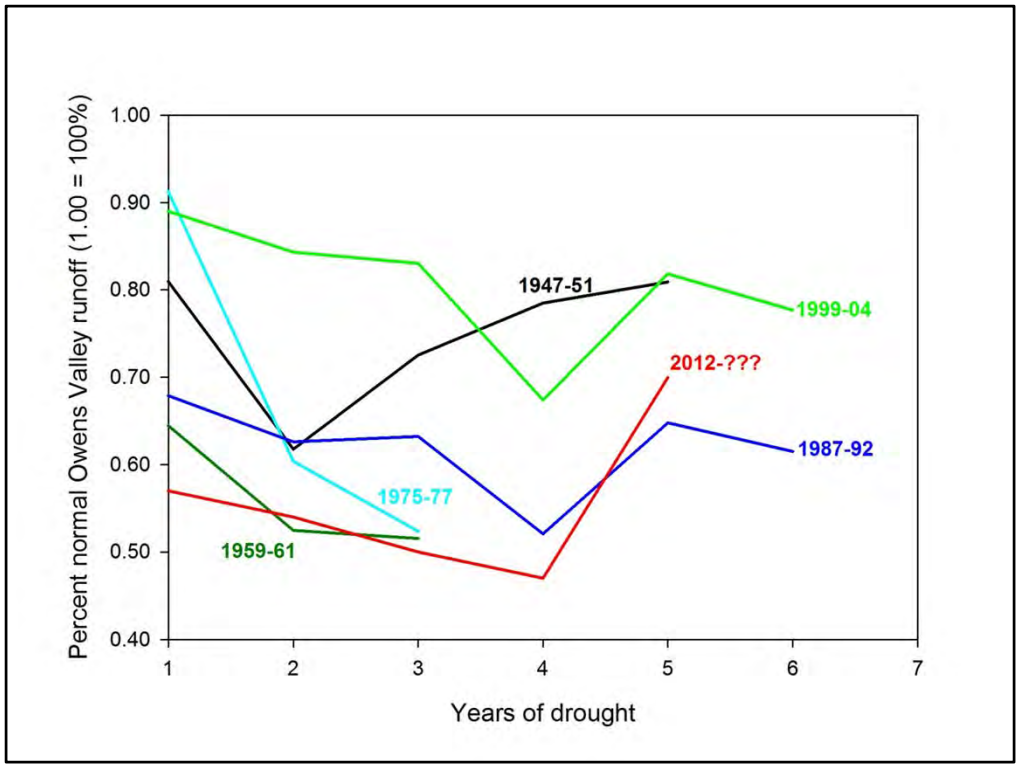
After a short introduction to Inyo County, I'll address four water resource issues in Inyo County: drought, water transfers to Los Angeles, new legislation – the Sustainable Groundwater Management Act, and California/Nevada transboundary groundwater basins.

Agenda Item IX (WATER)
Meeting Date: 07-11-16


Surface Ownership
AGENCY
Bureau of Land Management
Bureau of Reclamation
Local Government
Military
National Park Service
Other Federal
State
US Fish and Wildlife
US Forest Service
Unclassified
Bishop
Big Pine
Aberdeen
Independence
Lone Pine
Keeler
Olancha
SIERRA NEVADA
Cow Creek
Furnace Creek
Death Valley Junction
Pahrump
Shoshone
Tecopa

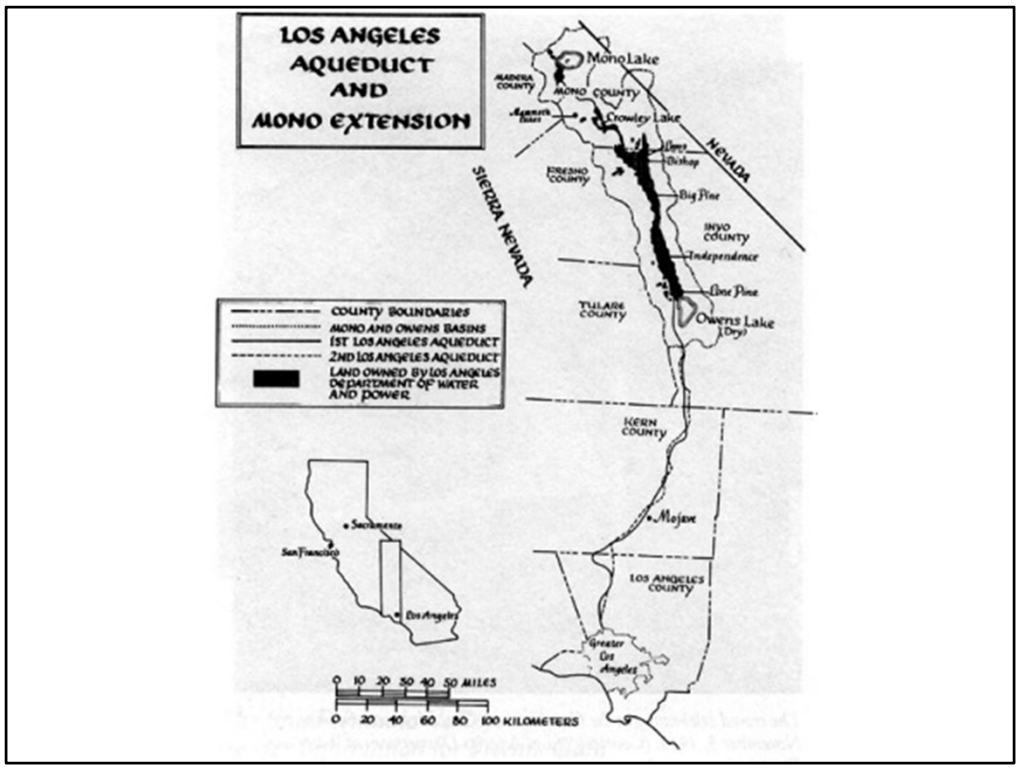


I'd like to touch briefly on drought conditions. South-central California, including Inyo County, remains in the throes of drought. Here is the most recent federal drought monitor map for the western US, showing the western part of Inyo County, including the east slope of the Sierra Nevada, remaining in 'exceptional drought', which is the most dire classification. Last winter provided some relief to northern California, but it did not extend to the central coast and southern Sierra Nevada.

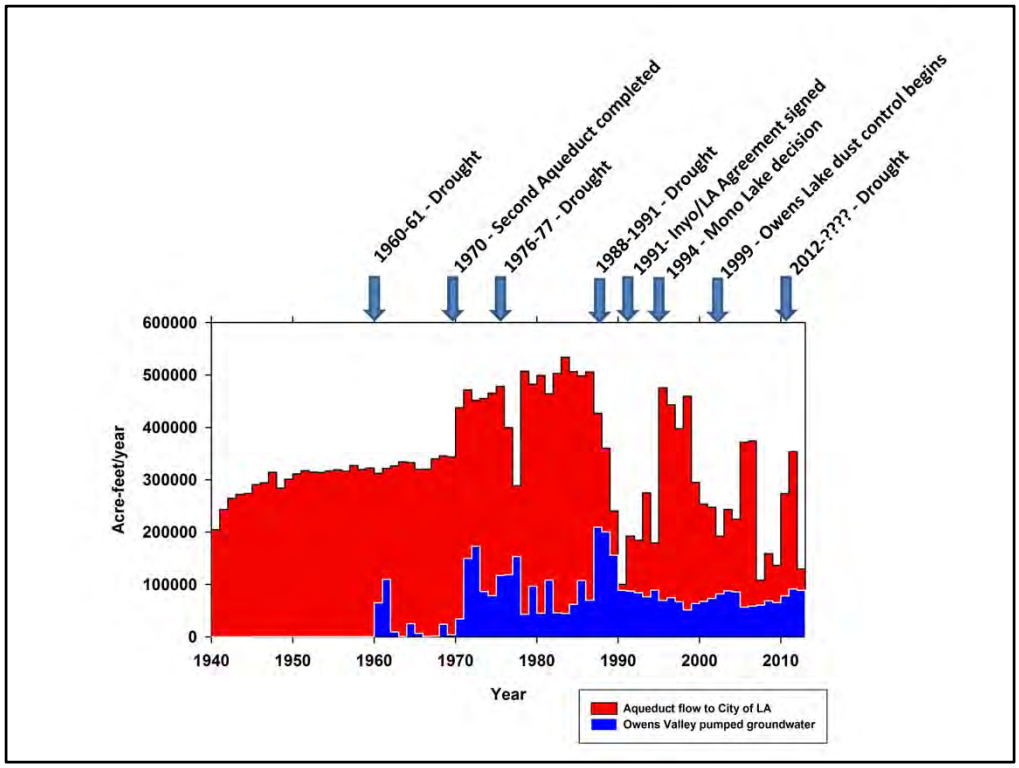


This slide compares the present ongoing drought that began in 2012 with historic droughts since the mid-20th century. The measure of drought shown here is percent of normal runoff for Owens Valley, where 'normal' is defined as the average runoff for 1961-2010. During the present drought, we've seen the driest year (2015) in our record going back to the 1930s, and lasting five years so far, this drought has nearly equaled the six-year duration of the longest droughts of the twentieth century. Since 2000, five years have been normal or above and twelve have been below normal, including, as noted, the driest year on record.

The next topic is water transfers to Los Angeles. The Los Angeles Aqueduct was the inspiration of this man, William Mulholland. It was a brilliant concept – build an aqueduct across 233 miles of the nations driest desert to deliver high-quality snowmelt runoff to Los Angeles, driven by gravity, and generating hydropower in the process. The initial problem he confronted was to obtain the rights to the water in Owens Valley, as the valley was already settled and under irrigation for agriculture. By misrepresenting the City's intentions and playing individual property owners against each other, the City was able to buy up almost all of the water rights and private property in the Valley by 1930. This was a storied and colorful conflict, with Los Angeles's representatives at times posing as agents of the federal reclamation service, Owens Valley farmers seizing and dynamiting aqueduct spill gates to divert water from the aqueduct, and Los Angeles protecting their facilities with Pinkerton guards. The

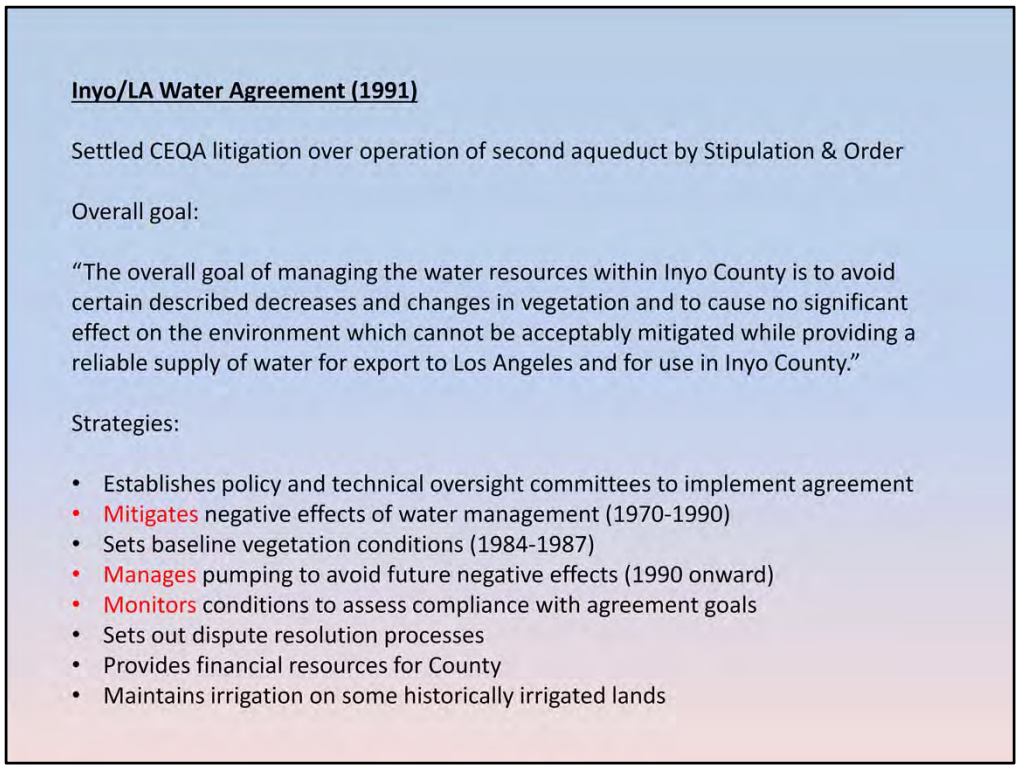


Here is the Los Angeles Aqueduct system. Its north most extent is actually outside the Owens River watershed in Mono Basin, where there's an eleven mile tunnel to transfer runoff from creeks in Mono Basin to the headwaters of the Owens. In Owens Valley, the river is diverted into the Los Angeles Aqueduct and south to Los Angeles. In 1971, Los Angeles completed a second aqueduct from Owens Valley to the City, shown here in the dark line. This second aqueduct increased Los Angeles's export capacity from 480 to 780 cfs. The intended supply for this increased capacity was increased groundwater pumping in the Owens Valley, reduced irrigation on Los Angeles's land in Owens Valley, and increased transfers from the Mono Basin.

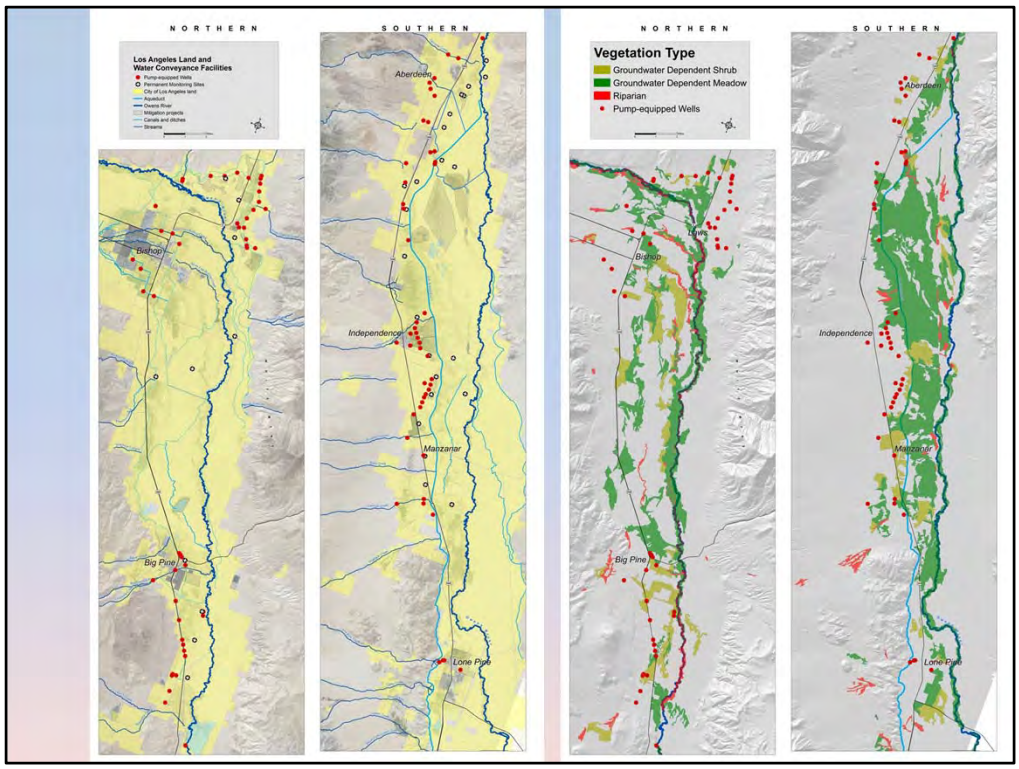


These are hydrographs of water export to Los Angeles from Owens Valley, in red, and groundwater pumping by Los Angeles in Owens Valley, in blue. In the early-1960s, LA pumping groundwater to supplement the aqueduct during a two-year drought, the first significant groundwater pumping they had done since the early-1930s. In 1963, LA started construction of the 2nd aqueduct, and completed it in 1970. You see here where when the 2nd aqueduct was completed groundwater pumping and water exports immediately increased. In 1971, Inyo County, the county where Owens Valley is located, sued Los Angeles over compliance with the California Environmental Quality Act. The California Environmental Quality Act, or CEQA, is California's law requiring environmental analysis be done on all projects requiring government approvals and mitigation for any negative environmental impacts caused by the project. CEQA was brand new law in 1971, having been signed by Governor Reagan in 1970. The County alleged that LA had to analyze the environmental impacts of operating the 2nd aqueduct. From 1971 to 1990 was a period of grueling litigation, and high groundwater pumping, interspersed with droughts in the late-70s and late-80s. In 1991, Inyo County and Los Angeles resolved the litigation by with an agreement for joint management of groundwater, mitigation of impacts from groundwater pumping, and monitoring of conditions in Owens Valley that may be affected by water table declines. This led to reduced, but relatively sustained constant level of pumping, with exports fluctuating with surface water availability. A couple of other situations that affected Los Angeles's water exports were the Mono Lake court decision restricting their transfers from Mono Basin and orders from state air quality regulators to control dust emissions from the dry lakebed of Owens Lake.

Two themes are evident in this history since 1970: recurring drought and litigation between Los Angeles and various other parties – Inyo County, Audubon Society, and State air quality regulators – over negative environmental effects of Los Angeles's water management and export activities.



The agreement that Los Angeles and Inyo County came to -- The overall goal of managing the water resources within Inyo County is to avoid negative effects on vegetation, avoid significant effects on the environment which can't be acceptably mitigated, while providing a reliable supply of water for export to Los Angeles and for use in Inyo County. This agreement sets out a number of activities: policy and technical committees; mitigation for the effects of pumping during from 1970 to 1990; a quantitative baseline for vegetation from mapping done in the mid-1980s; hydrologic and habitat monitoring; processes for dispute resolution; financial resources for the County; and maintaining irrigation on some historically irrigated land.



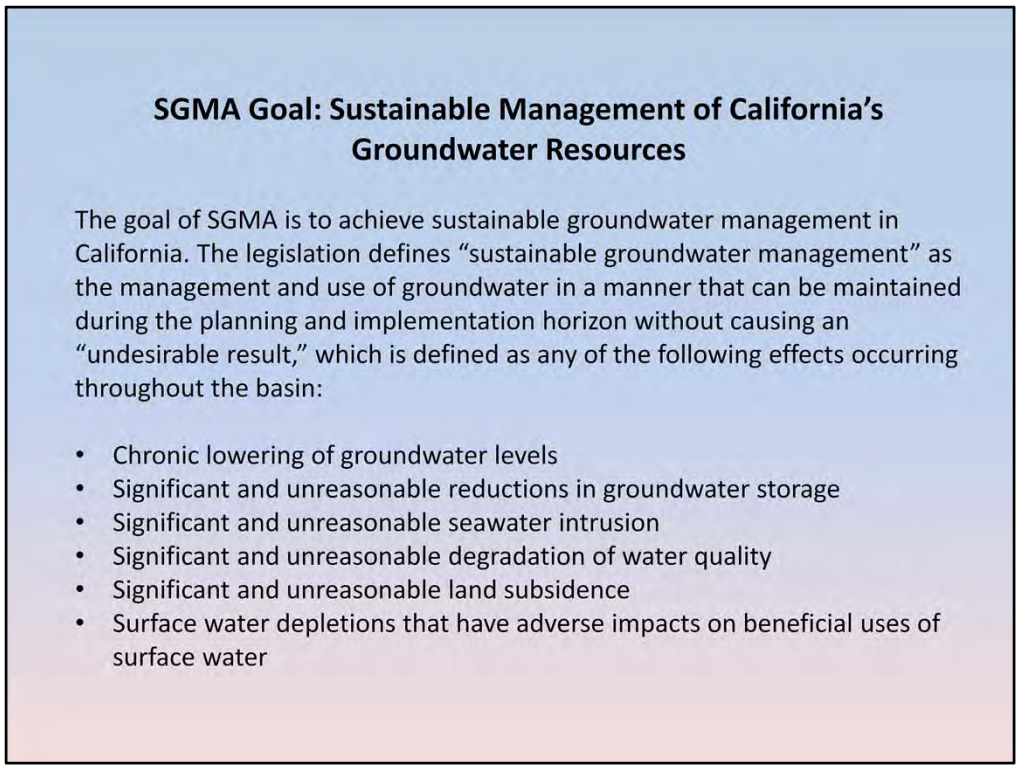
Here's a map of Owens Valley, north and south halves, showing Los Angeles's land ownership in yellow and locations of production wells, the red points. Here, about mid-way down the valley is where the river is diverted into the aqueduct. On the right here are shown the groundwater dependent vegetation communities, color-coded for grass and shrub dominance, extending from the toes of the alluvial fans on the west side of the valley out onto the valley floor. Los Angeles's groundwater pumping is managed to maintain sufficient soil water in the root zone to maintain the groundwater dependent vegetation. The Inyo/Los Angeles Agreement also has provisions for protecting non-Los Angeles-owned wells, springs, and other potentially affected receptors.

Owens Valley Water Availability and Uses

	Export to Los Angeles (AF)	Groundwater pumping (AF)
Pre-second aqueduct (1935-1969)	295,000	7,100
Second aqueduct pre-agreement (1970-1990)	432,000	104,000
Post-agreement (1990-2011)	278,000	73,000

Owens Valley runoff (1935-1969)	Mean: 421,000 AF Maximum: 886,000 AF (1969) Minimum: 197,896 AF (2015)
Owens Valley Recharge estimate	175,000 – 225,000 AF (USGS WSP 2370-H)
In-Valley uses (2012)	Total: 178,000 AF Irrigation: 49,000 AF Stockwater: 11,000 AF Mitigation projects: 41,000 AF Tribal lands: 3,000 AF Owens Lake dust control: 75,000 AF

Export to Los Angeles was just shy of 300 kAF before the second aqueduct, increased to over 400 kAF after the second aqueduct, and went back below 300 kAF after 1990. This last decrease is the combined effects of the Inyo/LA water agreement, LA's dust control obligations on Owens Lake, LA's loss in court to the Audubon Society over exports from Mono Basin, and a general decline in snowmelt runoff since the 1980s. Groundwater pumping was small before the second aqueduct, then increased, and with the settlement of the litigation over the second aqueduct, it declined but is still fairly substantial, about 30-40% of estimated recharge. Uses of Los Angeles's water rights in Owens Valley are significant, about 178 kAF, with the bulk of that going to dust control on Owens Lake and for irrigation. Under the Inyo/LA agreement groundwater, on average, pumping has been about one-third of recharge.



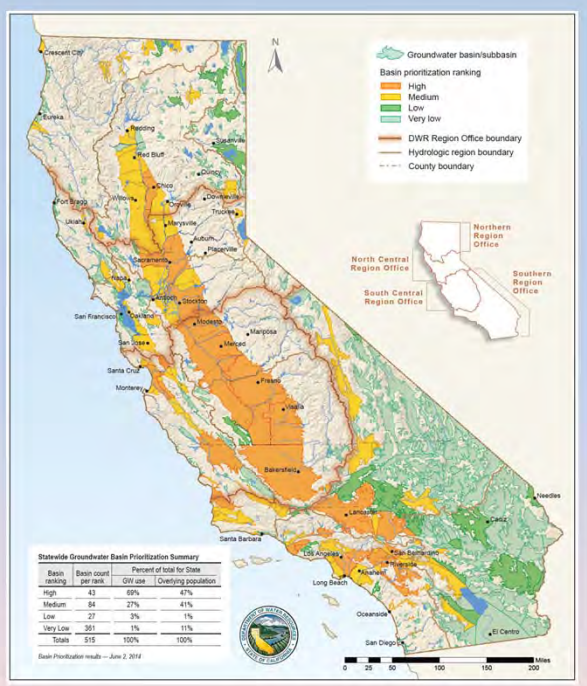
The next topic is California's new groundwater management legislation, the Sustainable Groundwater Management Act. California has historically has the weakest statewide framework for groundwater management of any western state, where in general, land owners have rights to pump groundwater beneath their land, and disputes between groundwater users were resolved through adjudication by the courts – an expensive and time-consuming process. With the advent of the Sustainable Groundwater Management Act (or SGMA), there is now a framework for statewide groundwater management. The overall goal of SGMA is to achieve "sustainable groundwater management" by not causing "undesirable results" from groundwater pumping. These undesirable are defined in SGMA as chronic lowering of groundwater levels, significant and unreasonable reductions in groundwater storage, significant and unreasonable seawater intrusion, significant and unreasonable degradation of water quality, significant and unreasonable land subsidence, and depletion of surface water that affects beneficial use of surface water rights.

SGMA Strategy:

- Groundwater basins are the geographic management unit.

In medium and high priority basins:

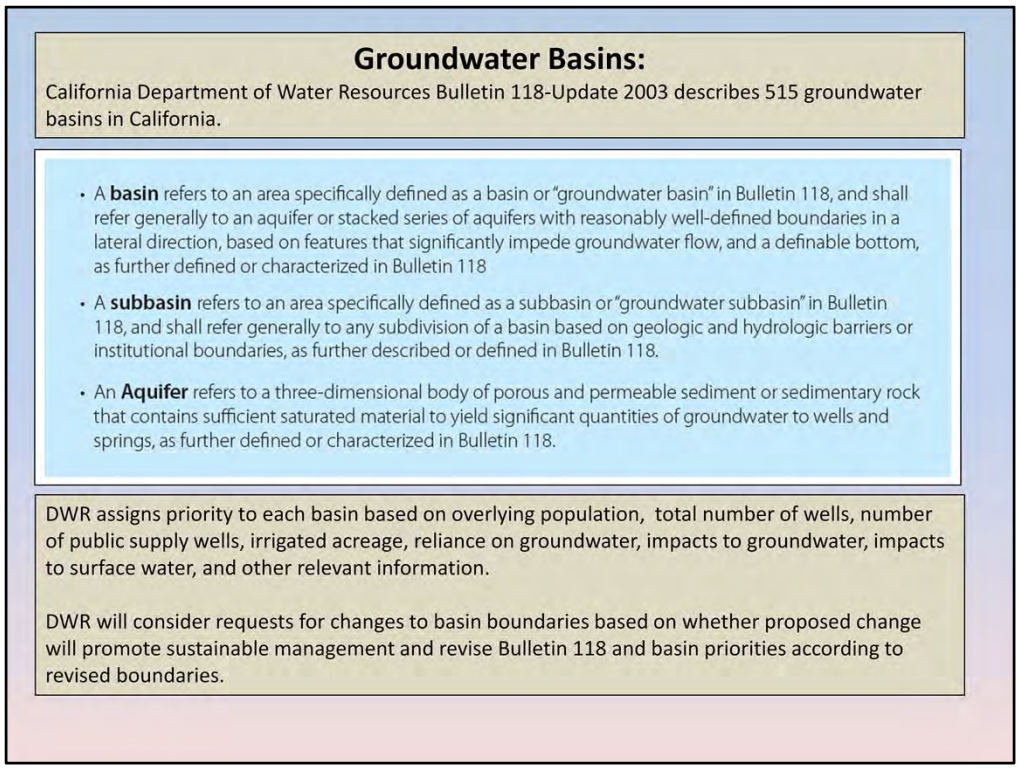
- Local agencies form groundwater sustainability agencies, develop groundwater sustainability plans, and implement plans to manage groundwater
- If local agencies fail to form groundwater sustainability agencies, or develop and implement groundwater sustainability plans, State Water Resources Control Board implements interim plan



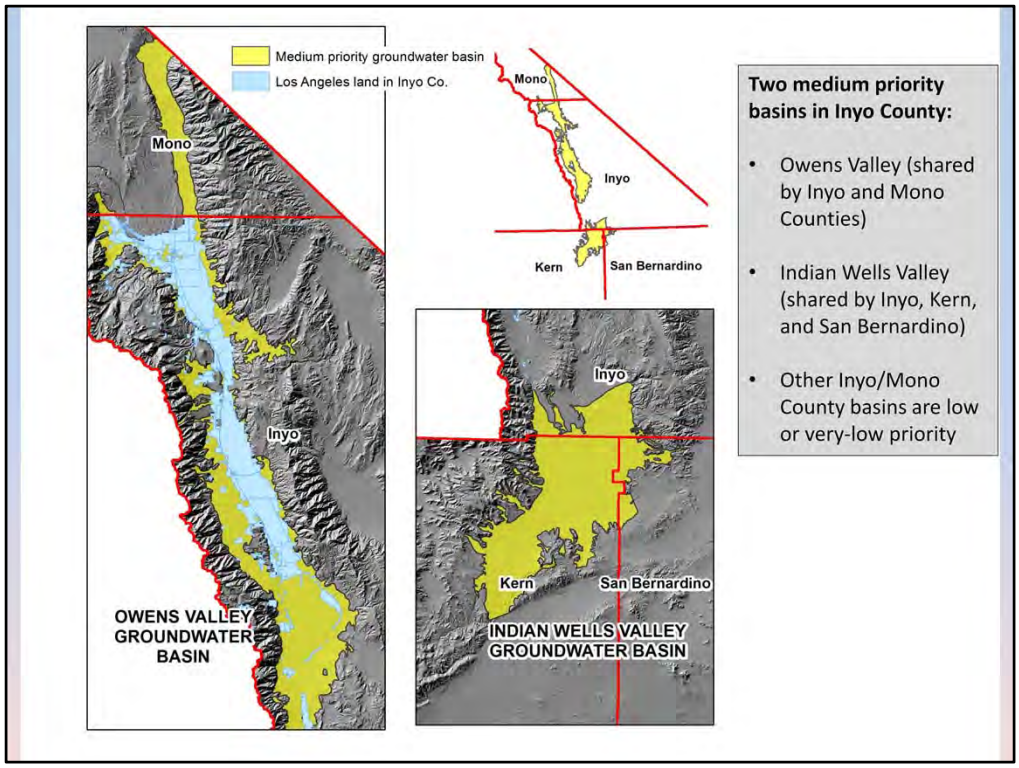
The management unit identified in SGMA is a groundwater basin. California has 515 groundwater basins that are identified in DWR Bulletin 118, and of these, 127 have been designated medium or high priority. This map shows low and very low priority basins in green, medium priority basins in yellow, and high priority basins in orange. Each medium and high priority basin in the state must have a groundwater sustainability plan implemented by a groundwater sustainability agency. Groundwater sustainability agencies can local agencies such as cities, counties, water districts, groundwater management districts, or groupings of such agencies associated through a joint powers agreement or memorandum of agreement. For each of the yellow and orange basins on this map, a groundwater sustainability agency has to be in place by mid-2017, and a groundwater sustainability plan has to be in place by 2022 (or by 2020 if a basin is in conditions of critical overdraft).

If the local agencies fail at any of these steps, the State Water Resources Control Board will step in and impose an interim plan on a basin that will be in place until the local agencies can assume responsibility.

So, local agencies have the authority and responsibility to determine their own fate with respect to groundwater management, but there is a big threat out there that the state will come and impose a plan on a basin if the local agencies fail to exercise SGMA's authorities and meet its responsibilities.



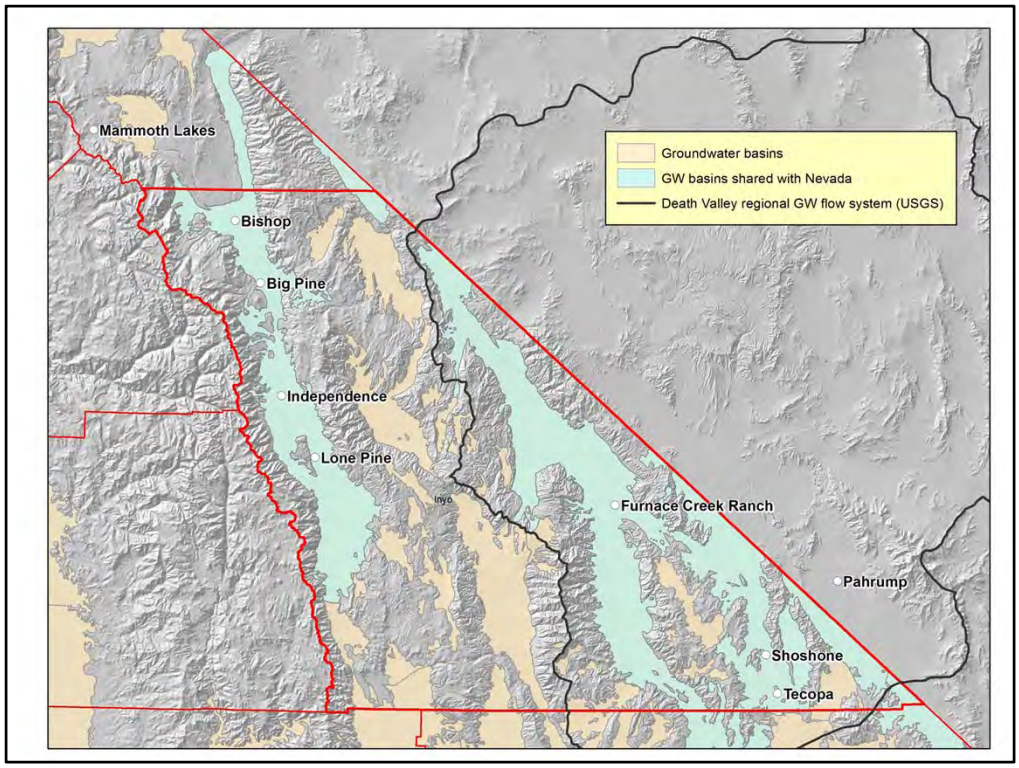
California's groundwater basins are defined in DWR Bulletin 118. A groundwater basin is generally a geologic depression filled with alluvial material – that's material carried by water – and basins may be divided up into subbasins on both hydrogeologic or jurisdictional criteria. Hydrogeologic criteria would be things such as barriers to groundwater flow – faults or other features that impede percolating water; jurisdictional boundaries would be things like city limits or county lines. DWR prioritizes each basin based on population, number of wells, public supply wells, irrigated acreage, reliance on groundwater, impacts to surface water, and other information.



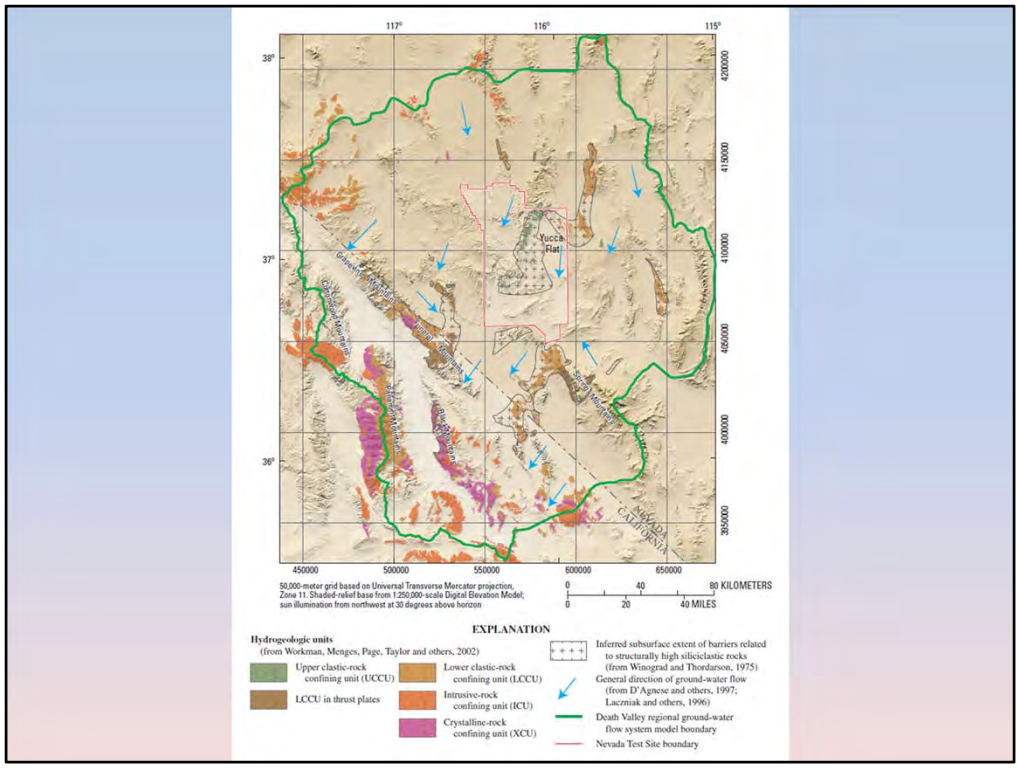
Here are more detailed maps of those two medium priority basins.

Owens spans the county line into Mono County because, according to DWR's mapping of groundwater basins, Chalfant, Hamill, and Benton Valleys are included in the Owens Valley groundwater basin. Los Angeles's land, shown in blue, is recognized in the legislation as being managed under the Long-Term Water Agreement, so no additional sustainability plan is required for the LA land. Note however that much of the basin is not LA land, and compliance with SGMA is still required there.

To manage basins that lie within multiple counties, the legislation allows for multiple plans in a single basin managed through a "coordination agreement", or multiple agencies can for a joint powers authority or enter into a MOA and develop a single plan. That sort of arrangement probably makes sense in Indian Wells, where the majority of activity is in Kern County, but portions of the basin lie in Inyo and San Bernardino. Most of the Inyo portion of the basin lie in the China Lake Naval Air Weapons Station or on BLM land, so Inyo's interests and authority in the basin are relatively small, and we anticipate participating in an MOU-type agreement with other agencies.



The final topic I would like to touch on is groundwater basins shared between Inyo County and Nevada. Inyo County has 36 groundwater basins wholly or partly within its boundaries, and six of these are shared with Nevada - going from north to south, Fish Lake Valley, Death Valley, Middle Amargosa Valley, Pahrump Valley, and Mesquite Valley (aka Sandy Valley). The shared basins are shown in blue and the other basins are shown in beige. Owens Valley Groundwater Basin extends up into Mono County where it borders Nevada and the part of the basin in Nevada is relatively small, undeveloped, and does not presently appear to present significant transboundary water issues. The area outlined in black is the boundary of the Death Valley regional groundwater flow system as defined by the USGS, and it spans the California/Nevada border in the area of Death Valley, Middle Amargosa, and Pahrump Valley.



This is a generalized map of the DV regional flow system, and the blue arrows indicate directions of groundwater flow. A well-recognized hydrogeologic condition that occurs in eastern and southern Nevada and southeastern California is the existence of interbasin groundwater flow through mountain blocks where permeable carbonate rocks – limestone and dolomite – allow groundwater to flow through the bedrock of the mountain ranges. The flow from the springs at Furnace Creek originates to the east on the Nevada Test Site or Spring Mountains. Even though the Death Valley groundwater basin has a relatively small mapped interface with Nevada, the groundwater connectivity between Death Valley and Nevada is considerably greater because of the potential for interbasin flow through carbonate aquifers.

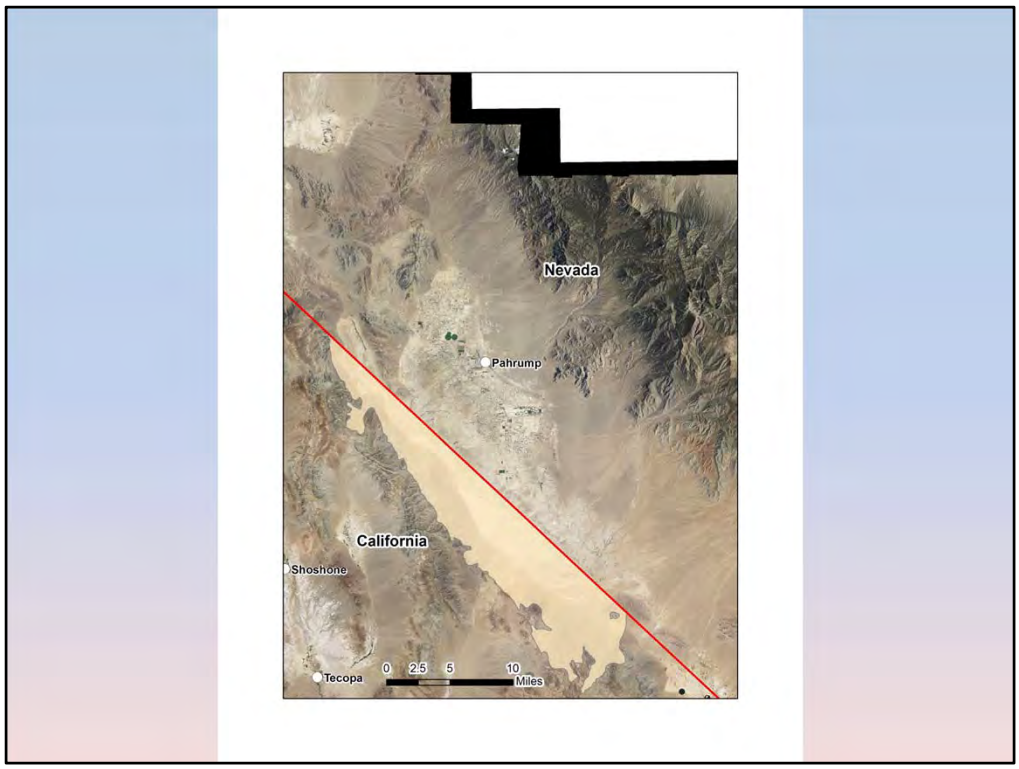
Fish Lake Valley

Irrigation (supplied by pumped water)

	Acre-feet/year
Esmerelda	33,600
Mono	13,800
Inyo	1,800
Total	**49,200**

Estimated recharge: 33,000 AFY (Rush and Katzer, 1973

Fish Lake Valley presents some problems. It's shared by Inyo and Mono counties in California and Esmerelda in Nevada. In this 2014-2015 composite air photo, an estimated 9,840 acres in under irrigation, at five acre-feet per acre, this equates to 49,200 acre-feet of applied water. Recharge in the basin is estimated to be 33,000 acre-feet per year with no groundwater entering from neighboring basins. In other words, this basin is in overdraft.



Pahrump Valley is also shared betweent the two states. Even more so than Fish Lake Valley, the majority of the activity is on the Nevada side, but there is a large private parcel in the California part of the basin that has been proposed for residential/ commercial development and solar development in the past. Because so much of Inyo County is in governmental ownership, the private property in Pahrump Valley actually represents a significant portion of the private property in the County – about 5%.

Summary

Drought – Ongoing

Water transfers to Los Angeles – Ongoing, managed sustainably through Inyo/LA Agreement

Sustainable Groundwater Management Act – Many new and uncertain challenges and requirements

Transboundary groundwater basins – Entirely new territory for Inyo County

In summary…