

MINUTES

Owens Valley Groundwater Authority

Board Members:

SIERRA HIGHLANDS	John Camphouse	COUNTY OF MONO	Fred Stump
EASTERN SIERRA CSD	Ron Stone	CITY OF BISHOP	Chris Costello
INDIAN CREEK-WESTRIDGE CSD	Luis Elias	COUNTY OF INYO	Dan Totheroh
WHEELER CREST CSD	Glenn Inouye	BIG PINE CSD	BryAnna Vaughan
TRI VALLEY GWMD	Dave Doonan	KEELER CSD	

October 10, 2019

The Owens Valley Groundwater Authority meeting was called to order at 2:04 p.m. at the Bishop City Council Chambers, Bishop, CA.

1. Pledge of allegiance

BryAnna Vaughan led the pledge of allegiance.

2. Public Comment

The Chairperson opened the public comment period and there was no one wishing to address the Board.

3. Introductions

The Board introduced themselves with one alternate, Carol Ann Mitchell – Tri Valley GWMD and one absence, Keeler CSD.

Chris Costello joined the meeting at 2:07 p.m.

4. Approval of minutes from the August 8, 2019 OVGA Board meeting

The Chairperson requested a motion to approve the minutes of the August 8, 2019 meeting. Motion to approve the minutes by Ron Stone, seconded by John Camphouse. Motion passed 8 yes (34.18 votes) 1 abstention (3.82 votes), 1 absent (2 votes).

5. Board Member Reports

BryAnna stated the Big Pine CSD is requesting a state grant through the IRWMP to expand Big Pine CSD's sewer evaporation ponds and requests a letter of support from the OVGA prior to the 10 day deadline. Dan Totheroh stated the Inyo Board would like to have the OVGA Board return to their representative Boards prior to the next meeting and determine future participation in the OVGA. Luis Elias stated the Indian Creek/Westridge CSD Board of Directors held a special meeting regarding their participation in the OVGA. Glenn Inouye stated a new Chairman was elected to replace him when he officially resigns. Carol Ann Mitchell stated the Tri Valley Groundwater Management District is evaluating their options based on the priority status. Fred Stump stated his Board discussed the issue but there was no clear direction.

Moved by Dan Totheroh and seconded by Chris Costello to add an urgency agenda item as follows:

Approve a letter of support for the Big Pine CSD to expand their sewer evaporation ponds and authorize Aaron Steinwand to sign.

Phillip Anaya asked the amount of the grant; Rick Kettleman with IRWMP requested the Board approve the letter of support; Bryanna Vaughan stated the grant is approximately \$100,000.

Motion by Dan Totheroh, seconded by John Camphouse to approve the letter. Motion passed unanimously (38 votes) with 1 absent

(2 votes).

6. OVGA staff reports

- a. Financial Report
- b. Report on Indian Wells Valley Groundwater Authority activities

Laura Piper, Inyo County Water Department, provided the financial report and stated the OVGA cash balance is \$124,572.29. She stated transactions since the last meeting was a fourth quarter interest payment and consultant fees. John Vallejo stated Indian Wells is moving forward in getting their draft GSP completed by their January 2020 deadline. The Board and staff discussed their intent to import water, and a possible agreement with LADWP to purchase water and or a banking agreement. Sally Manning asked if their sustainability criteria were being discussed. Mr. Vallejo stated that draft chapter of the plan has not been released yet. Philip Anaya asked if China Lake Naval Weapons center was discussed for funding possibilities. Mr. Vallejo stated the Navy is a member of the Board.

7. Termination of Keeler CSD participation in the OVGA

Dr. Aaron Steinwand stated there was a letter sent out last July regarding their participation on the OVGA Board. Keeler replied and requested their participation in the OVGA be terminated. Discussion followed on the changes, voting shares, and Brown Act if Keeler is removed. Motion to remove Keeler CSD from the Board pursuant to article 6, section 1.5 of the JPA; motion by Glenn Inouye, seconded by BryAnna Vaughan. Motion passed unanimously. 9 yes (38 votes).

8. Implications of DWR reprioritization of the Owens Valley Groundwater Basin

Dr. Aaron Steinwand provided a staff report regarding the possible reassignment of the basin as low priority. He stated the final status of the basin is still uncertain at this time and discussed drafting a mission statement. Tony Morgan stated the process used to develop a mission statement is the Board develops guiding principles and from that, a mission statement is formed based on the collaborative concerns and interests of all Board members. The Board and staff discussed their options in detail and provided their individual Boards concerns and possible options regarding low and medium priority designation. The Board chose to discuss topics related to items 8, 9, & 10 together. All Members regardless of basin designation wished to move forward with the sustainability plan; requested the consultant move forward; asked for staff to send contribution invoices to each entity; and utilize grant funding. Phillip Anaya questioned if management areas were going to be developed; stated there is an implementation grant process ongoing; and the OVGA needs to move forward with that application. Dr. Steinwand stated the implementation grant proposals will be solicited in the summer of 2020 and if our basin becomes low priority, we may be ineligible. Ted Williams stated he thinks the Board should move forward to develop the plan regardless of DWR's basin prioritization. Sally Manning stated she agrees a mission statement is a good thing, and encouraged the Board to obtain all the facts to assure the basin can be sustainable. Earl Wilson stated CASGEM evaluation made the Owens Valley high priority then it dropped to medium; alternative GSP plans are being denied by DWR; water quality will be a big issue in the future; and requested the Board move forward with the GSP. Daniel Cutshall stated there is no guarantee if designated a low priority basin that it will stay that way and suggested the Board continue forward with the GSP. Lyn Bolton stated if the Board moved forward with the GSP and collected the data, that would show that the basin is a small percentage impact to groundwater. She stated that information could be used as data to prove to legislature how much LADWP is impacting drawdown of the basin.

The Chairperson called a break at 3:45 pm and reconvened the meeting at 3:56 pm.

9. Determination of member interest in future participation in the OVGA

Glenn Inouye, Wheeler Crest CSD, expressed his agency's wish to terminate participation in the OVGA should the basin priority be rated low. Mr. Vallejo stated the future Board item would need to agree to release those parties from the financial agreement in place. He stated an agenda item could be that Wheeler Crest be relieved from its responsibilities under the financial contribution agreement and removed from the Board. Mr. Inouye stated they would request that there be no financial penalty for terminating their participation on the Board. Aaron Steinwand stated if we are designated low, he would send a notice requesting the member write a formal letter requesting termination so it could be agendized at the next meeting which would be a majority vote by the Board, and then the following meetings have the revised funding agreements for those wishing to remain on the Board. Earl Wilson asked if there was any data on diminimus users, Aaron stated as far as use, no.

10. Members' annual financial contribution and continued progress on the GSP

The Chairperson stated we are well into the second year; all entities contributed the first year; the only entity to contribute so far in the second year is the City of Bishop, and invoices were sent out last May 2019. Aaron Steinwand stated Chairman Stump is correct, the OVGA has been subsisting entirely on 2018/2019 member contributions; a grant advance was received in June 2019 but staff was advised by DWR to not utilize the grant funding until the OVGA was positive it would continue to exist and proceed with the plan.

He stated the consultants work was slowed and payments of contributions were withheld pending the outcome of the basin priority rating. He stated invoices will need to be reissued to account for the year end credit adjustment and although we have the grant funding that covers the consultants costs, the budget was created was for two staff members (Inyo) and now there are three agencies with staff, which has a benefit but has increased the original developmental budget. John Vallejo stated with regard to the JPA and Bylaws, any outside funding source shall be a credit (grant funding) to the member contributions. He stated dependent on the future composition of the Board, the members funding requirements will change and can be answered in a future agenda item. He stated the GSP budget vs the annual budget differs and you wouldn't want to take a credit midstream and create a shortfall. Chris Costello stated it seems the entire Board wishes to move forward with the plan; the entire Board in good faith has entered into the funding agreements; and made that commitment to contribute. The entire Board confirmed they wished to move forward with the GSP. Jarod Phillips asked if we are reprioritized to low, can we still utilize the grant funding. Staff stated yes. Phillip Anaya stated he is in support of the OVGA moving forward with the GSP and said he hopes the basin remains as a medium priority basin.

11. Discussion regarding future agenda items

The Board requested that if available, have staff bring the final determination from DWR; a formal request to Aaron Steinwand from members that wish to withdraw if a low priority rating releasing them from their financial contributions; and a staff presentation on basic hydrology concepts.

12. Set next meeting

The next OVGA meeting was scheduled for November 14, 2019 in the Bishop City Council Chambers.

13. Adjourn

The Chairperson adjourned the meeting at 4:41 pm.

Lg BUDGET UNIT	Primary Ref	Transaction Description	SS Ref Date	Job No	Debit	Credit	NET
GL 621601-1000	YEAREND	3. Balance Forward 2018/2019	JE 07/01/19	02561976	136,576.20	0.00	136,576.20
GL 621601-1000	TTLOH	AutoID:WD18628A Job:2483097	OH 07/18/19	02483097	0.00	450.00	136,126.20
GL 621601-1000	TTLOH	AutoID:WD19715A Job:2484520	OH 07/19/19	02484520	0.00	4,450.97	131,675.23
GL 621601-1000	TTLOH	AutoID:OW19723C Job:2487316	OH 07/24/19	02487316	0.00	23,467.45	108,207.78
GL 621601-1000	INTRCBL	AutoID: JAI19802E Job: 2496015	JE 08/02/19	02496015	1,196.59	0.00	109,404.37
GL 621601-1000	JE35066	AutoID: JHI19C07J Job: 2540790	JE 10/07/19	02540790	0.00	13,714.77	95,689.60
GL 621601-1000	JE35095	AutoID: JHI19C11C Job: 2544343	JE 10/11/19	02544343	0.00	4,500.00	91,189.60
GL 621601-1000	TTLOH	AutoID:OW19C14B Job:2545637	OH 10/15/19	02545637	0.00	844.50	90,345.10
GL 621601-1000	JE35239	AutoID: JHI19C31G Job: 2556858	JE 10/31/19	02556858	0.00	9,767.85	80,577.25
GL 621601-1000	INTEREST	AutoID: JAI19B04G Job: 2558989	JE 11/04/19	02558989	1,853.04	0.00	82,430.29
GL 621601-1000	TTLOH	AutoID:OW19N04A Job:2559123	OH 11/05/19	02559123	0.00	29,180.45	53,249.84
GL 621601-1000	JE35319	AutoID: JAI19B08A Job: 2562429	JE 11/08/19	02562429	52,859.66	0.00	106,109.50
*****Total *OBJT 1000		CLAIM ON CASH		DR	192,485.49	86,375.99	106,109.50
GL 621601-1160	YEAREND	3. Balance Forward 2018/2019	JE 07/01/19	02561976	1,196.59	0.00	1,196.59
GL 621601-1160	INTRCBL	4th QTR INTEREST RVRS	JE 08/02/19	02496015	0.00	1,196.59	0.00
*****Total *OBJT 1160		INTEREST RECEIVABLE		DR	1,196.59		0.00
GL 621601-1200	YEAREND	3. Balance Forward 2018/2019	JE 07/01/19	02561976	2,500.00	0.00	2,500.00
GL 621601-1200	JE34537	UA386949:GOLDEN STATE RISK MAN	JE 07/09/19	02475759	0.00	2,500.00	0.00
*****Total *OBJT 1200		PREPAID EXPENSES		DR	2,500.00		0.00
GL 621601-2000	YEAREND	4. Balance forward 2018/2019	JE 07/01/19	02561976	0.00	27,918.42	27,918.42
GL 621601-2000	TTLOH	AutoID:WD18628A Job:2481900	OH 07/16/19	02481900	0.00	450.00	28,368.42
GL 621601-2000	TTLOH	AutoID:WD18628A Job:2483097	OH 07/18/19	02483097	450.00	0.00	27,918.42
GL 621601-2000	TTLOH	AutoID:WD19715A Job:2484520	OH 07/19/19	02484520	4,450.97	0.00	23,467.45
GL 621601-2000	TTLOH	AutoID:OW19723C Job:2487316	OH 07/24/19	02487316	23,467.45	0.00	0.00
GL 621601-2000	TTLOH	AutoID:OW19C14B Job:2544634	OH 10/14/19	02544634	0.00	844.50	844.50
GL 621601-2000	TTLOH	AutoID:OW19C14B Job:2545637	OH 10/15/19	02545637	844.50	0.00	0.00
GL 621601-2000	TTLOH	AutoID:OW19N04A Job:2558022	OH 11/04/19	02558022	0.00	29,180.45	29,180.45
GL 621601-2000	TTLOH	AutoID:OW19N04A Job:2559123	OH 11/05/19	02559123	29,180.45	0.00	0.00
*****Total *OBJT 2000		ACCOUNTS PAYABLE		CR	58,393.37		0.00
GL 621601-2200	YEAREND	4. Balance forward 2018/2019	JE 07/01/19	02561976	0.00	52,859.66	52,859.66
GL 621601-2200	JE34553	CR113320:CITY OF BISHOP	JE 07/09/19	02475759	52,859.66	0.00	0.00
*****Total *OBJT 2200		DEFERRED REVENUE		CR	52,859.66		0.00
GL 621601-3000	YEAREND	1. Balance Forward 2018/2019	JE 07/01/19	02561976	0.00	235,193.56	235,193.56
GL 621601-3000	YEAREND	2. Balance Forward 2018/2019	JE 07/01/19	02561976	175,698.85	0.00	59,494.71
*****Total *OBJT 3000		FUND BALANCE AVAILABLE		CR	175,698.85	235,193.56	59,494.71
GL 621601-4301	INTEREST	3RD QRT 18/19 INTEREST	JE 11/04/19	02558989	0.00	1,853.04	1,853.04
*****Total *OBJT 4301		INTEREST FROM TREASURY		CR	0.00	1,853.04	1,853.04
GL 621601-4599	JE34553	CR113320:CITY OF BISHOP	JE 07/09/19	02475759	0.00	52,859.66	52,859.66
GL 621601-4599	JE35319	19-20 INYO OVGA CONTRIBUTION	JE 11/08/19	02562429	0.00	52,859.66	105,719.32
*****Total *OBJT 4599		OTHER AGENCIES		CR	0.00	105,719.32	105,719.32
GL 621601-5155	JE34537	UA386949:GOLDEN STATE RISK MAN	JE 07/09/19	02475759	2,500.00	0.00	2,500.00
*****Total *OBJT 5155		PUBLIC LIABILITY INSURANCE		DR	2,500.00	0.00	2,500.00

SELECT BUDGET UNIT: 621601

Ig BUDGET UNIT	Primary Ref	Transaction Description	SS Ref Date	Job No	Debit	Credit	NET
GL 621601-5265	JE35066	UA390613:DANIEL B. STEPHENS	JE 10/07/19	02540790	13,714.77	0.00	13,714.77
GL 621601-5265	237187	DANIEL B STEPHE PROJECT#DB18.1	OH 10/14/19	02544634	844.50	0.00	14,559.27
GL 621601-5265	238057	DANIEL B STEPHE PROJECT#DB18.1	OH 11/04/19	02558022	29,180.45	0.00	43,739.72
*****Total *OBJT 5265		PROFESSIONAL & SPECIAL SERVICE	DR		43,739.72	0.00	43,739.72
GL 621601-5291	10117	WHISKEY CREEK R 7/11/19 OVGA M	OH 07/16/19	02481900	450.00	0.00	450.00
*****Total *OBJT 5291		OFFICE, SPACE & SITE RENTAL	DR		450.00	0.00	450.00
GL 621601-5539	JE35095	JUL-SEPT19 COUNTY COUNSEL	JE 10/11/19	02544343	4,500.00	0.00	4,500.00
GL 621601-5539	JE35239	JUL-SEPT19 OVGA STAFF SERVICES	JE 10/31/19	02556858	9,767.85	0.00	14,267.85
*****Total *OBJT 5539		OTHER AGENCY CONTRIBUTIONS	DR		14,267.85	0.00	14,267.85
*****Total *BUDG 621601		OVGA-OWENS VALLEY GROUNDWATER	DR-CR		544,091.53	544,091.53	0.00
** GRAND TOTAL **					544,091.53	544,091.53	0.00

COUNTY OF INYO
Budget to Actuals with Encumbrances by Key/Obj
As Of 11/8/2019

Ledger: GL

Object	Description	Budget	Actual	Encumbrance	Balance	%
Key: 621601 - OVGA-OWENS VALLEY GROUNDWATER						
Revenue						
4301	INTEREST FROM TREASURY	4,000.00	1,853.04	0.00	2,146.96	46.32
4498	STATE GRANTS	261,551.00	0.00	0.00	261,551.00	0.00
4599	OTHER AGENCIES	249,195.00	105,719.32	0.00	143,475.68	42.42
Revenue Total:		<u>514,746.00</u>	<u>107,572.36</u>	<u>0.00</u>	<u>407,173.64</u>	<u>20.89</u>
Expenditure						
5129	INTERNAL COPY CHARGES (NON-IS)	1,500.00	0.00	0.00	1,500.00	0.00
5155	PUBLIC LIABILITY INSURANCE	2,500.00	2,500.00	0.00	0.00	100.00
5263	ADVERTISING	2,000.00	0.00	0.00	2,000.00	0.00
5265	PROFESSIONAL & SPECIAL SERVICE	309,771.00	43,739.72	18,414.77	247,616.51	20.06
5291	OFFICE, SPACE & SITE RENTAL	1,500.00	450.00	0.00	1,050.00	30.00
5311	GENERAL OPERATING EXPENSE	500.00	0.00	0.00	500.00	0.00
5539	OTHER AGENCY CONTRIBUTIONS	97,500.00	14,267.85	0.00	83,232.15	14.63
5901	CONTINGENCIES	13,290.00	0.00	0.00	13,290.00	0.00
Expenditure Total:		<u>428,561.00</u>	<u>60,957.57</u>	<u>18,414.77</u>	<u>349,188.66</u>	<u>18.52</u>
621601	Key Total:	<u>86,185.00</u>	<u>46,614.79</u>	<u>(18,414.77)</u>	<u>57,984.98</u>	

**COUNTY OF INYO
UNDESIGNATED FUND BALANCES**

AS OF 06/30/2020

		Claim on	Accounts	Loans	Prepaid	Accounts	Loans	Deferred	Computed	Fund	
		Cash	Receivable	Receivable	Expenses	Payable	Payable	Revenue	Fund	Encumbrances	Balance
		1000	1100,1105,1160	1140	1200	2000	2140	2200	Balance		Undesignated
WDIR - WATER											
6272	OVGA-OWENS VALLEY GRO	106,110							106,110	18,415	87,695
WDIR	Totals	106,110							106,110	18,415	87,695
Grand Totals		106,110							106,110	18,415	87,695

SGMA Implications for the Owens Lake Groundwater Development Project

Owens Lake Groundwater Working Group

October 24, 2019

Aaron Steinwand
Inyo County Water Department



photo: C. Howard

Introduction



SGMA: State Groundwater Management Act

LTWA: Inyo/Los Angeles Long Term Water Agreement

GSA and GSP: Groundwater Sustainability Agency and Plan

OVGA: Owens Valley Groundwater Authority

DWR: Department of Water Resources

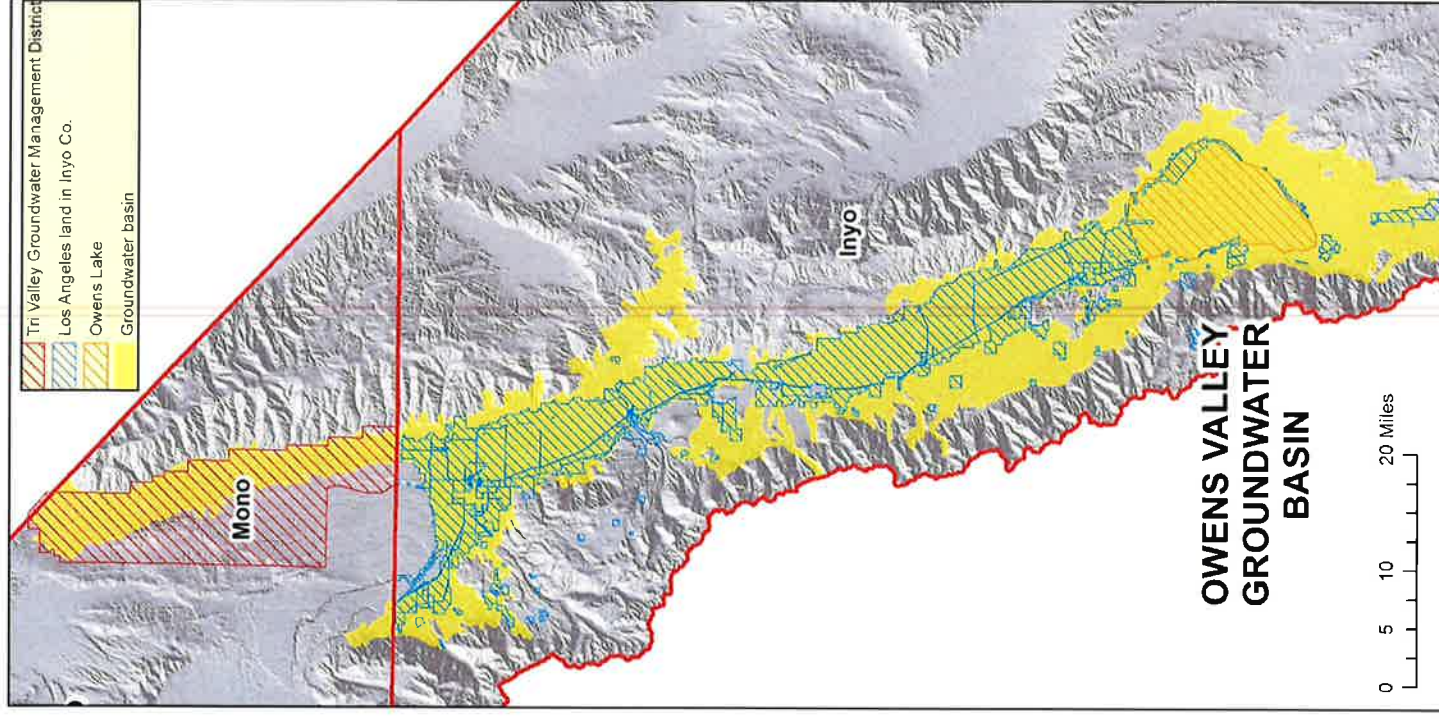
GDE: Groundwater Dependent Ecosystem

SGMA and LTWA

“ (a) ...this part (SGMA) does not apply to the following adjudicated areas...

“ (c) Any groundwater basin or portion of a groundwater basin in Inyo County managed pursuant to the terms of(Inyo County Case no. 12908) shall be treated as an adjudicated area...”
(CWC §10720.8)

Water Agreement and Owens Lake pumping subject of Inyo/LA dispute resolution set aside in February 2012





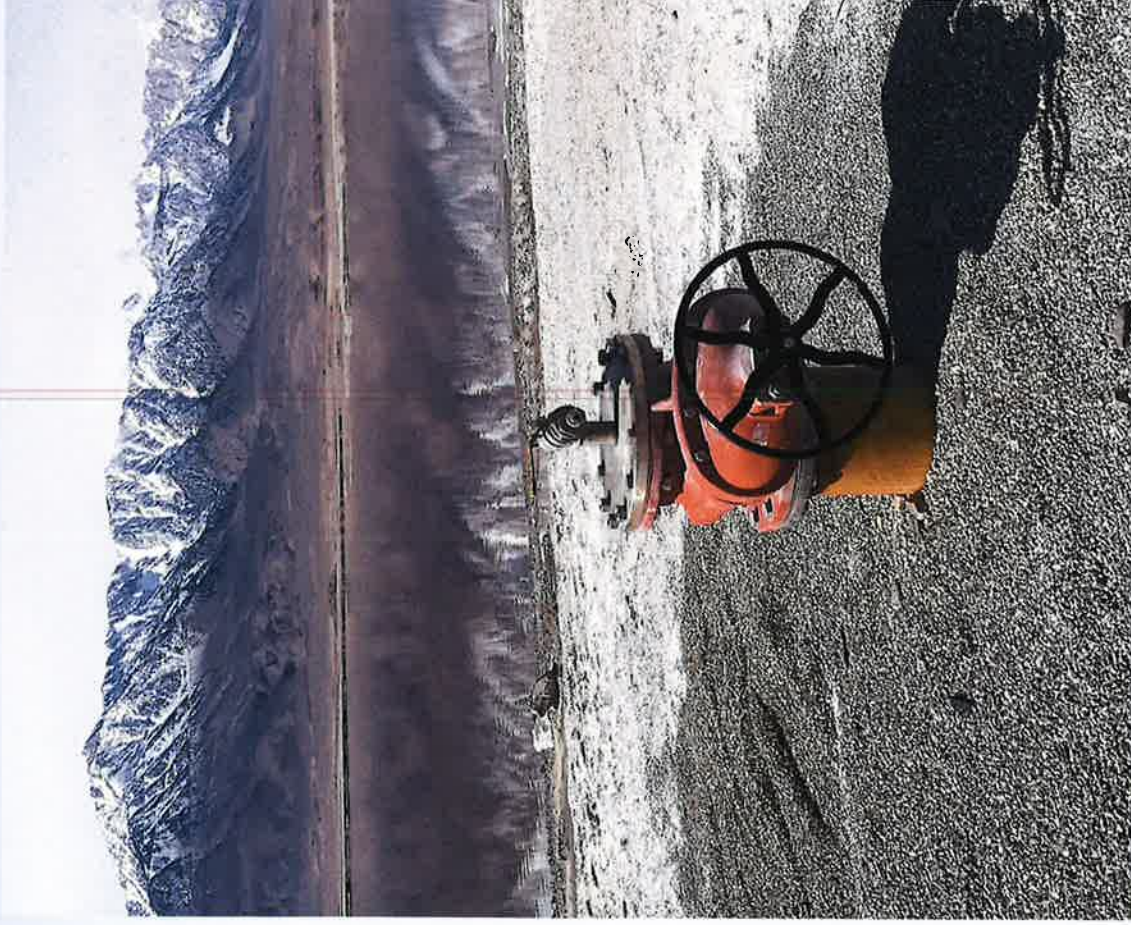
SGMA and Owens Lake Groundwater

State agencies are required to “..consider the policies of [SGMA], and any groundwater sustainability plans adopted pursuant to [SGMA], when revising or adopting policies, regulations, or criteria, or when issuing orders or determinations, where pertinent” (CWC §10720.9)

“..a state or local agency that extracts groundwater shall be subject to a fee imposed under [SGMA] to the same extent as any nongovernmental entity” (CWC §10726.8(d))

SGMA “...does not authorize a local agency to impose any requirement on the state or any agency, department, or officer of the state. State agencies and departments shall work cooperatively with a local agency on a voluntary basis” (CWC §10726.8(d))

SGMA and Owens Lake Groundwater



Unless managed pursuant to LTWA, Owens Lake pumping PROBABLY is subject to regulation by a GSP, and

the California State Lands Commission could make compliance with an adopted GSP part of their lease requirements

OVGA Powers



- Conduct investigations, prepare rules and regulations, propose or update fees, monitor compliance and enforcement.
- Require registration of groundwater extraction facilities.
- Require installation of meters at well owners expense and annual reporting.
- Require reporting of surface water diverted to underground storage.
- Acquire property, water, or water rights; provide a program for fallowing agricultural land; recycle water.
- Impose spacing requirements on new wells.
- Regulate, limit, or suspend groundwater extraction; authorize transfers of extraction allocations; establish rules for carry over of unused allocations.
- Impose fees to fund preparation, adoption, and amendment of a GSP; administration and operations; acquisitions; supply, treatment, production, or distribution of water.



GSP and Owens Lake Groundwater

GSP prepared by OVGA must avoid certain undesirable results

Sustainability Indicator	Needed for Owens Valley GSP?
Lowering of Groundwater Levels	Yes
Reduction of Groundwater Storage	Yes
Seawater Intrusion	No
Degraded Water Quality	Yes
Land Subsidence	Yes
Depletion of Interconnected Surface Water (GDE)	Yes

OVGA JPA Provisions



Management Areas

"...the GSP may provide for discrete areas with the GSA boundary in which the GSP is implemented and managed by at least one Member...."

- Designation based on hydrological conditions
- A management area can have requirements specific to the area
- Costs borne by Members responsible for the management area

Advisory Committees

"The Board of Directors may from time to time establish advisory committees for the purpose of making recommendations"

- Duties and term specified by OVGA Board
- Subject to Brown Act

OVGA Current Status



Basin Prioritization

DWR has proposed to classify Owens Valley Basin as Low Priority

Low priority basins are not required to establish a GSA or implement a GSP

Several Members, including Inyo Co., desire to remain in the OVGA regardless of basin status and directed staff to proceed with GSP

OVGA's JPA and GSA status remains valid with a smaller Board, but the GSP only enforced within the Members' jurisdiction

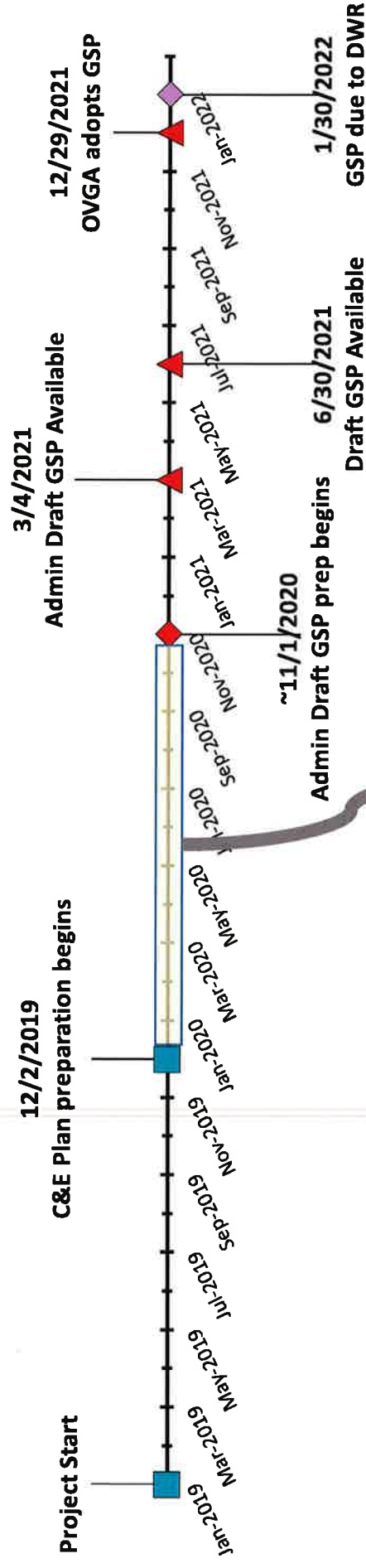
GSP Update

- Tentative project schedule
- Communication & Engagement Plan (CEP) (aka “stakeholder communication plan”)
- Dr. Douglas Tolley - working on GSP
- Database Management System (DBMS)



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Tentative Project Timeline



- | | |
|--|--|
| ✓ C&E Plan finalization & implementation | ✓ GW model reviews / assessments |
| ✓ Data gap analysis | ✓ Sustainable management criteria |
| ✓ Sampling and Analysis Plan (SAP) | ✓ Identify projects & management actions |
| ✓ Monitoring plan | ✓ Implementation schedule and budget |
| ✓ Water budgets | ✓ Cost and rate study |
| ✓ Hydrogeologic conceptual models | ✓ Annual reporting system |

Communication & Engagement Plan (CEP)

- “Guiding principles” - facilitator assistance?
- GPs can lead to “mission statement”

Example GPs:

- ✓ *OVGA is committed to conduct sustainable groundwater practices that balance the needs of and protect the groundwater resources for all Beneficial Users in the Basins.*
- ✓ *The OVGA will have an open, transparent process for GSP development and SGMA implementation.*
- ✓ *SGMA implementation is new to water users throughout the State, thus there are many unknowns. Willingness by all GSA members and Beneficial Users to adapt and adjust during GSP development (based on science and facts) and SGMA implementation is crucial to the Basins’ success.*



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Dr. Douglas (Gus) Tolley



- PhD, Hydrology - UC Davis
- MS, Hydrology - NM Tech
- BS, Geological Science - UC Santa Barbara

Dissertation Title: *Assessment of Groundwater-Surface-Water Interactions in an Irrigated Agricultural Basin with Groundwater Dependent Ecosystem Using an Integrated Hydrologic Model*

Groundwater Resources Association of CA Webcast (Nov 20th) - *"Integrated Hydrologic Model Development and Evaluation (for Non-Modelers)"*



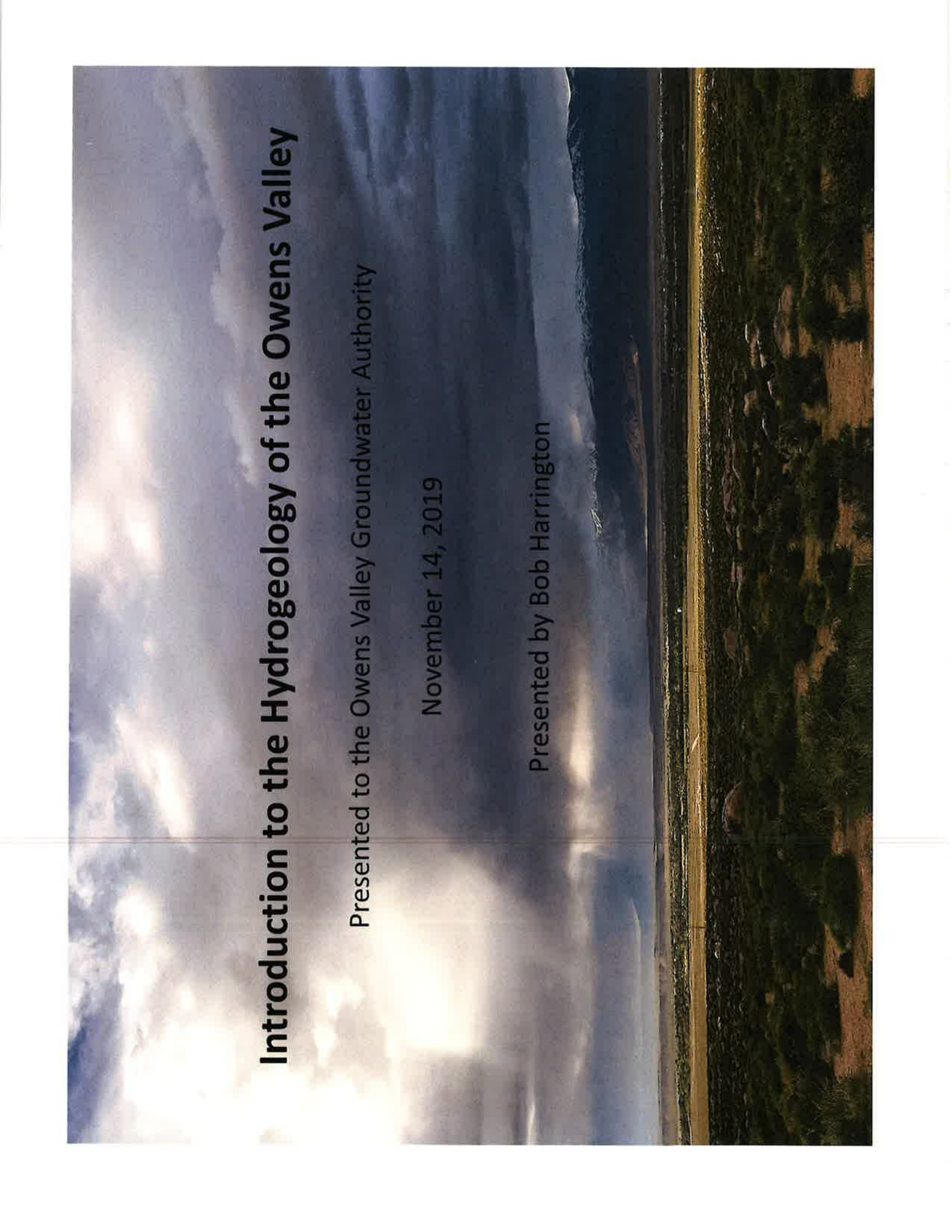
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Database Management System

- Why do we need / want a DBMS?
 - Organize data
 - Archive data
 - Ease of use by stakeholders & OVGA staff
 - Support DWR data inquiries
 - Annual reports to DWR or others
- Can be simple or complex
 - DWR Water Data Library
 - Cuyama Basin
 - County of San Bernardino Landfills



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The background of the slide is a landscape photograph. The top half shows a sky with large, white, fluffy clouds against a blue background. Below the sky, a wide river or valley stretches across the frame. The river is light-colored, possibly due to sand or silt, and is flanked by green vegetation and trees. In the distance, a range of mountains is visible under the same sky. The overall scene is a wide, open landscape.

Introduction to the Hydrogeology of the Owens Valley

Presented to the Owens Valley Groundwater Authority

November 14, 2019

Presented by Bob Harrington

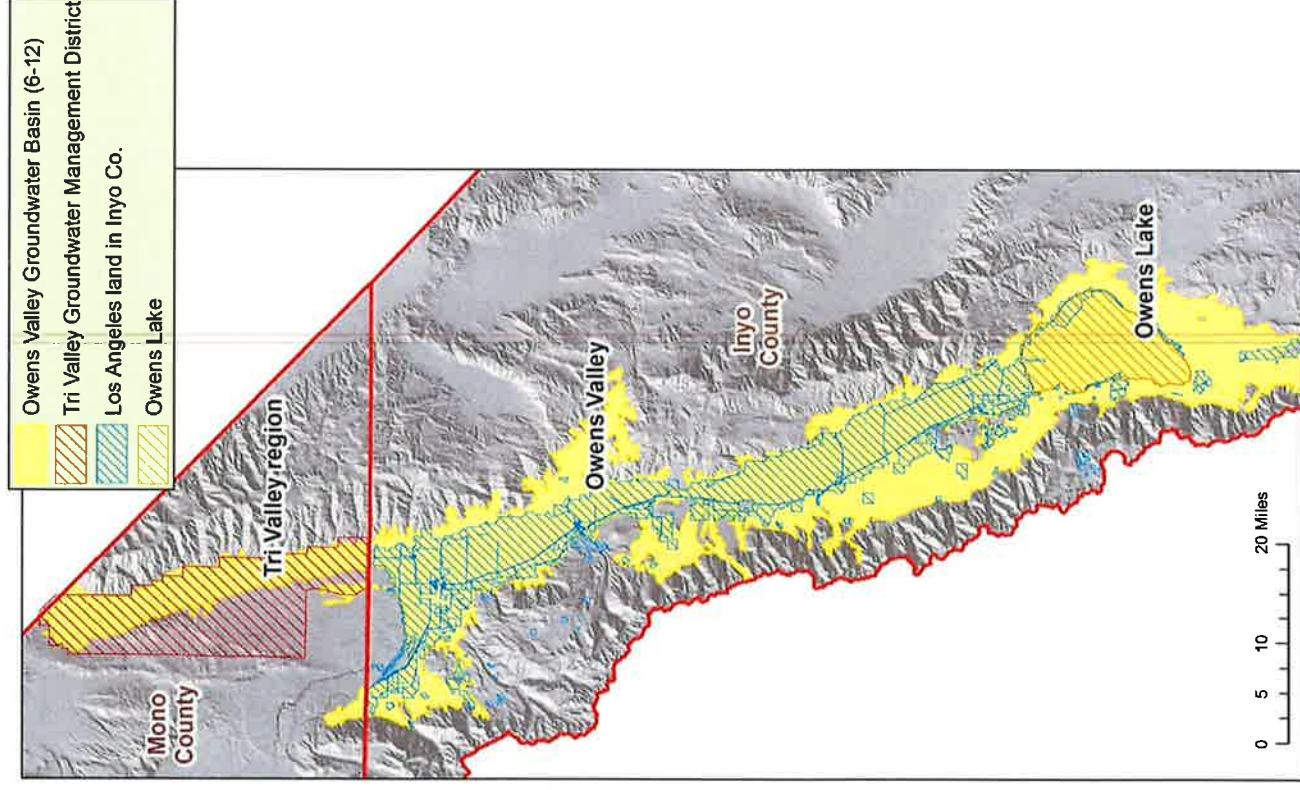
Sustainable Groundwater Management and Hydrologic Processes

Two subbasins: Owens Valley (6-12.01) and Fish Slough (6-12.02).

Sustainable Groundwater Management: the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon [50 years] without causing an **undesirable result**, defined as significant and unreasonable:

- Chronic lowering of groundwater levels
- Reduction in groundwater storage
- Seawater intrusion
- Degraded water quality
- Land subsidence
- Surface water depletion

Predicting, avoiding, or mitigating undesirable results requires an understanding of how a groundwater basin works.



How does a groundwater basin work?

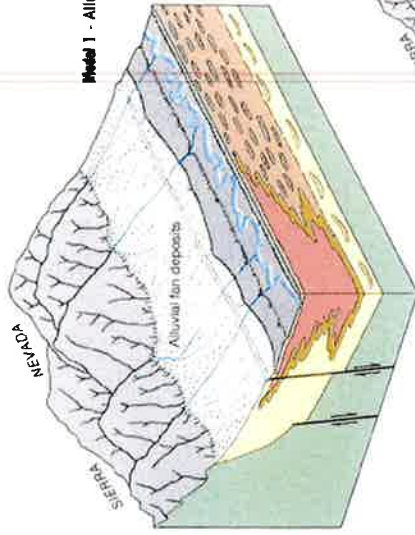
The two main components of a groundwater basin are a hydrogeologic system (geologic materials) and a water budget (water inputs and outputs).

The hydrogeologic system, a function of geology, determines how water moves through the system. It is described in the “hydrogeologic conceptual model” for the basin.

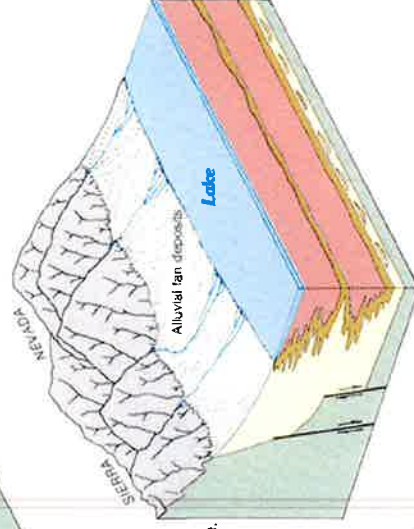
The water budget, a function of climate, biological processes, and societal water use and management, determines the amount of water moving through a groundwater basin.

The conceptual model and water budget are required components of a Groundwater Sustainability Plan.

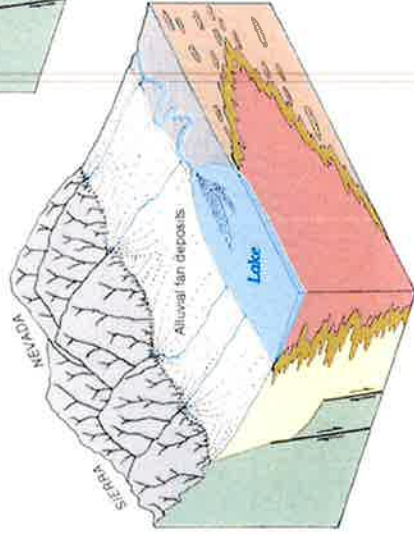
Hydrogeologic Systems



Model 1 - Alluvial fan to fluvial and lacustrine plain to trunk river.



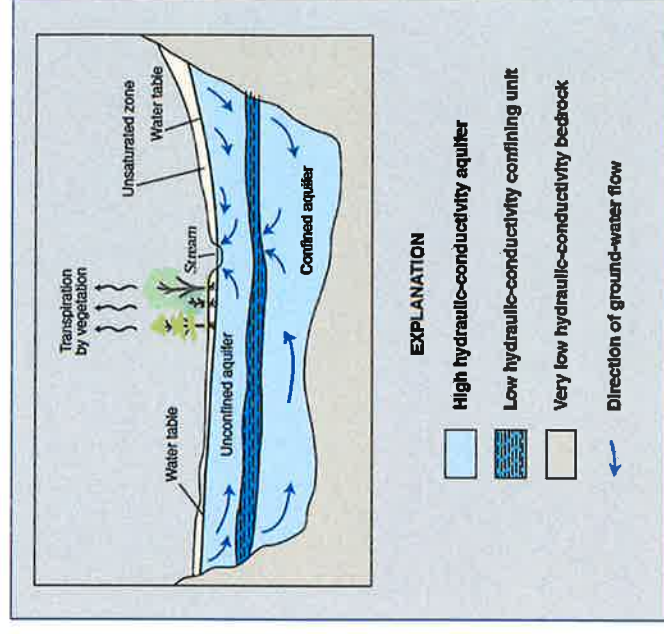
Model 2 - Alluvial fan to lake.



Model 3 - Alluvial fan to trunk river to lake margin with localized river-dominated delta.

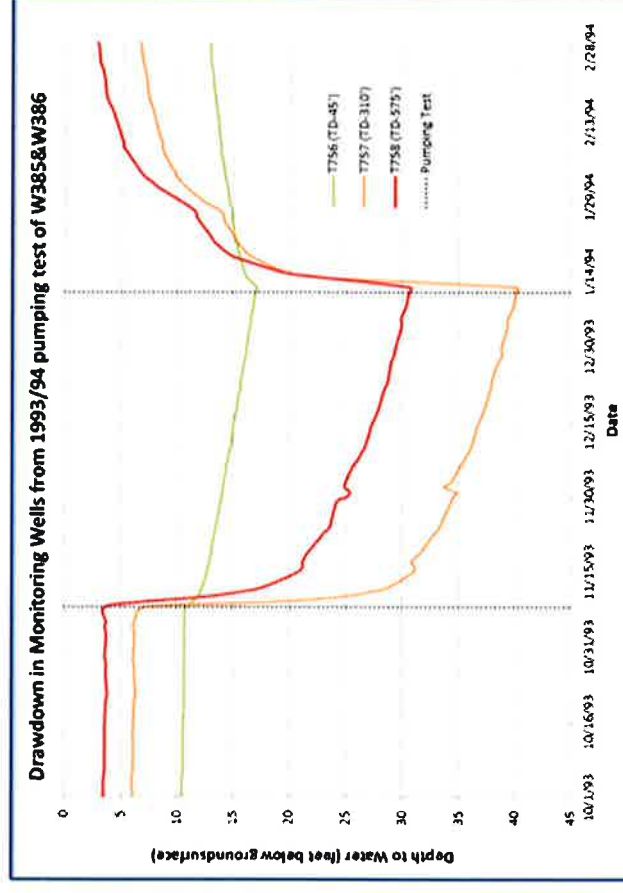
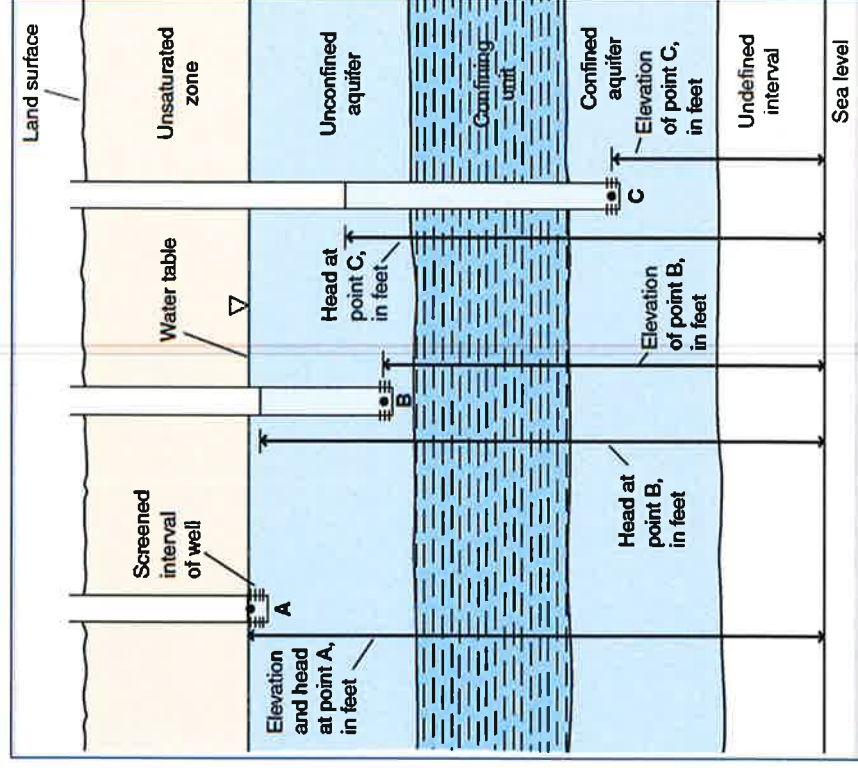
Aquifers – Water bearing geologic formations (e.g., sands, gravels, fractured rock). Confined aquifers are bounded by impermeable or low permeability materials. An unconfined aquifer is generally shallow and open to atmospheric pressure.

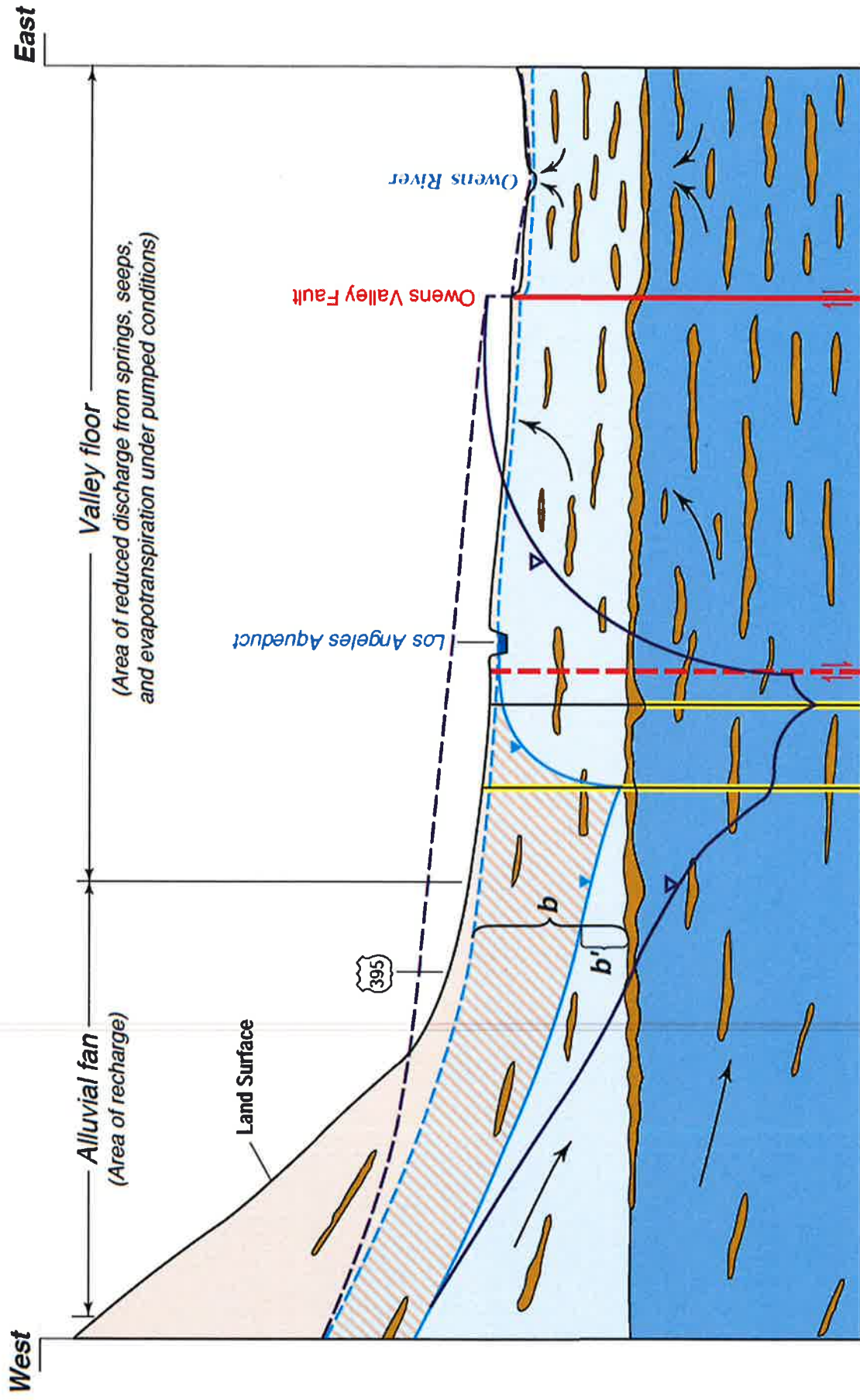
Aquitards – Low permeability zones that impede the flow of groundwater (e.g., clay layers, unfractured hard rock, other non-porous rock).



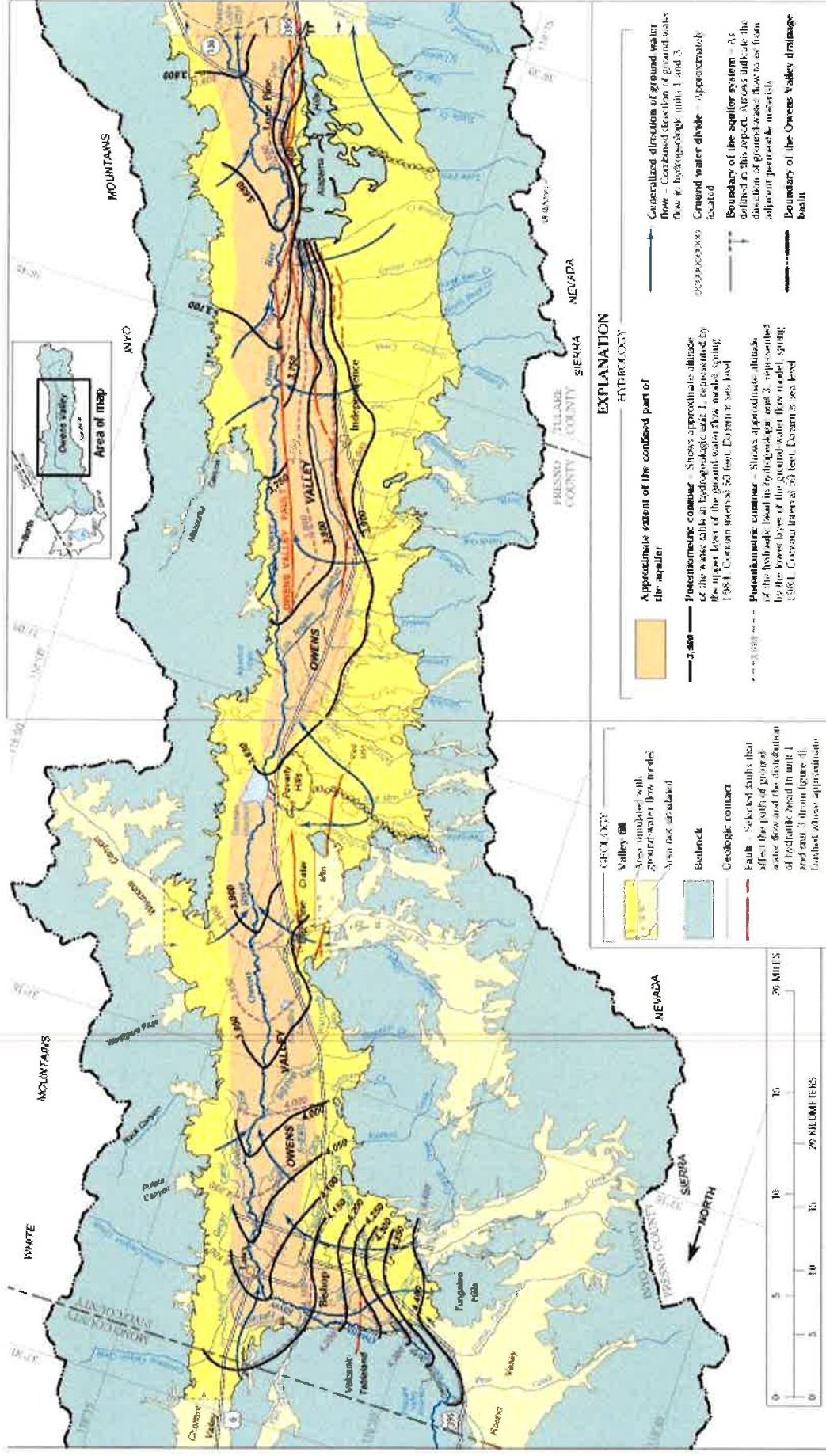
Groundwater Levels

What is a “groundwater level?” At any point in the saturated zone, groundwater is at a specific elevation and pressure. The combination of elevation and pressure is “hydraulic head.” Hydraulic head is the driver of groundwater flow, with groundwater moving in the direction of lower hydraulic head. In an open well, the hydraulic head at the well screen is the level to which water rises in the well casing.





Owens Valley groundwater hydraulic head and groundwater flow paths



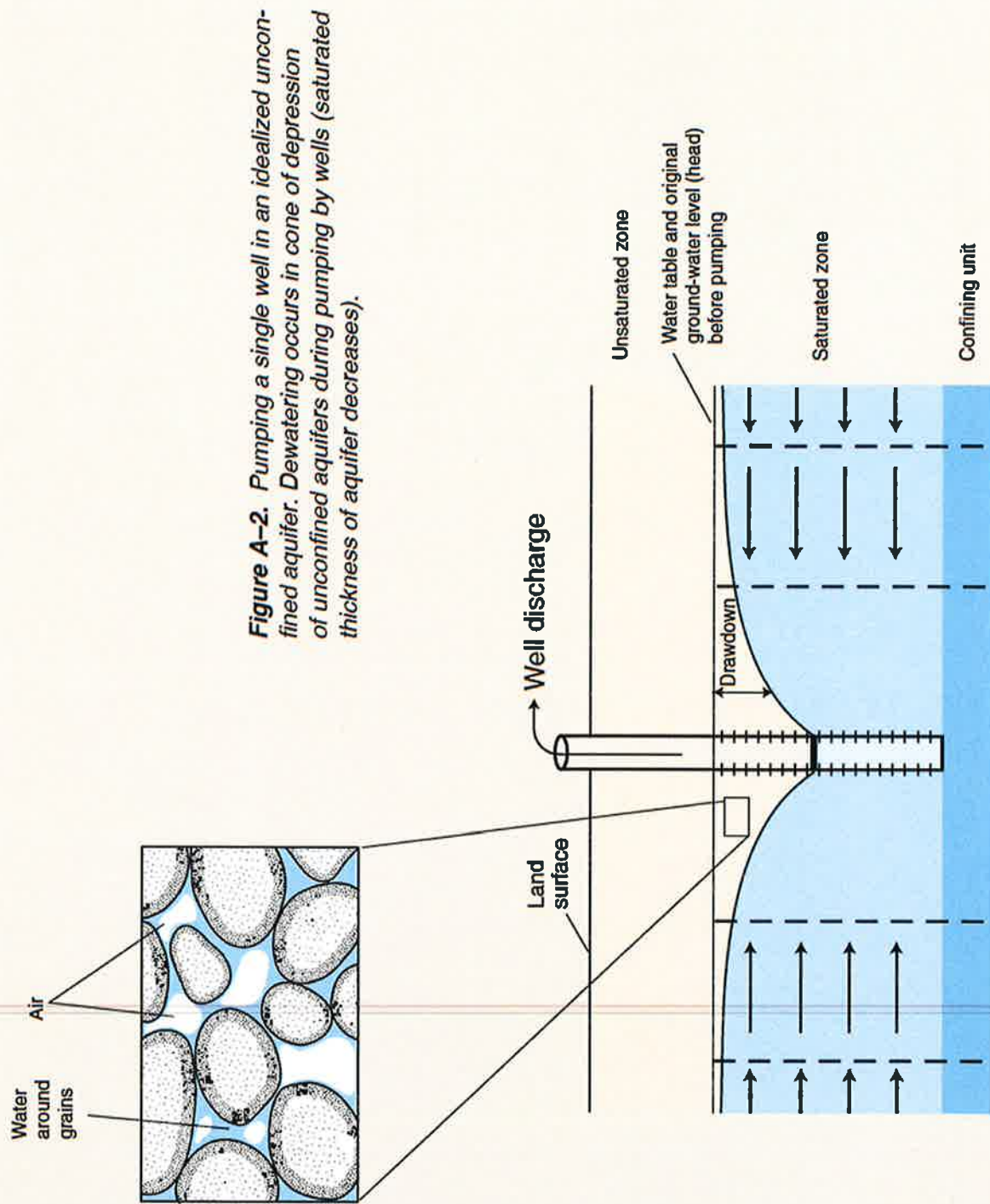


Figure A-2. Pumping a single well in an idealized unconfined aquifer. Dewatering occurs in cone of depression of unconfined aquifers during pumping by wells (saturated thickness of aquifer decreases).

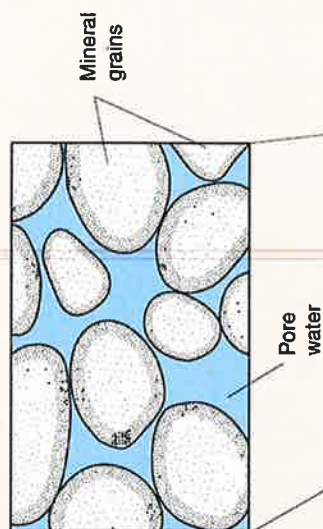
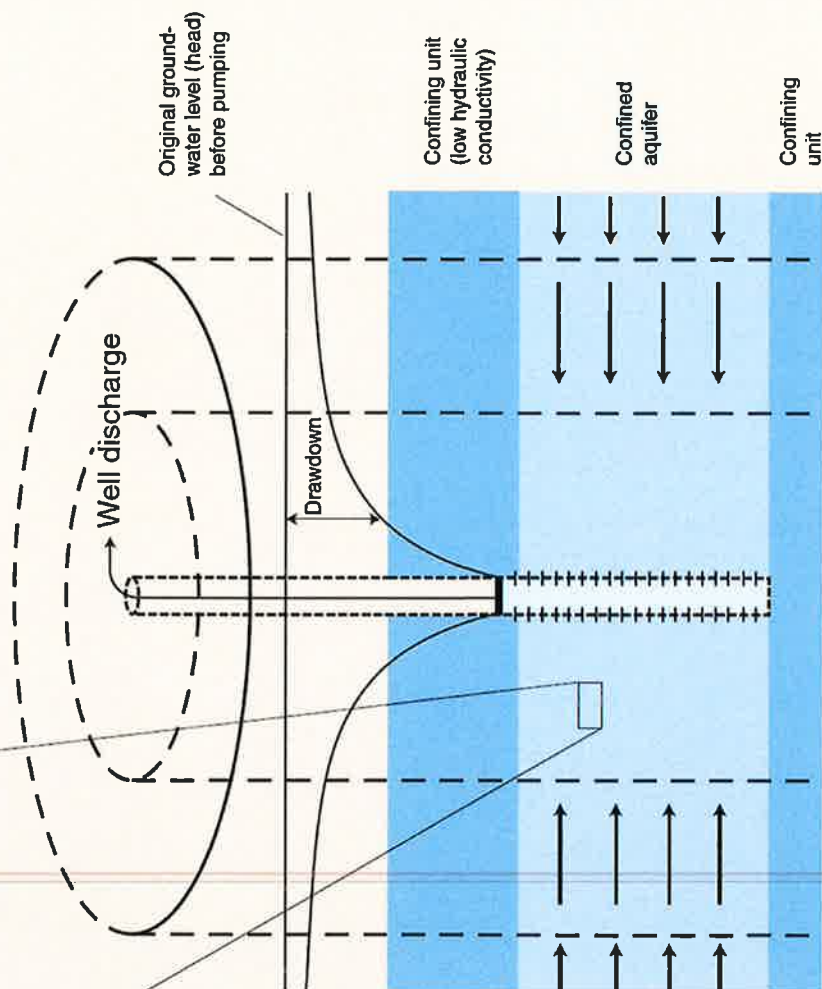


Figure A-1. Pumping a single well in an idealized confined aquifer. Confined aquifers remain completely saturated during pumping by wells (saturated thickness of aquifer remains unchanged).



Groundwater Capture

As cone of depression grows, pumping wells capture recharge or discharge:

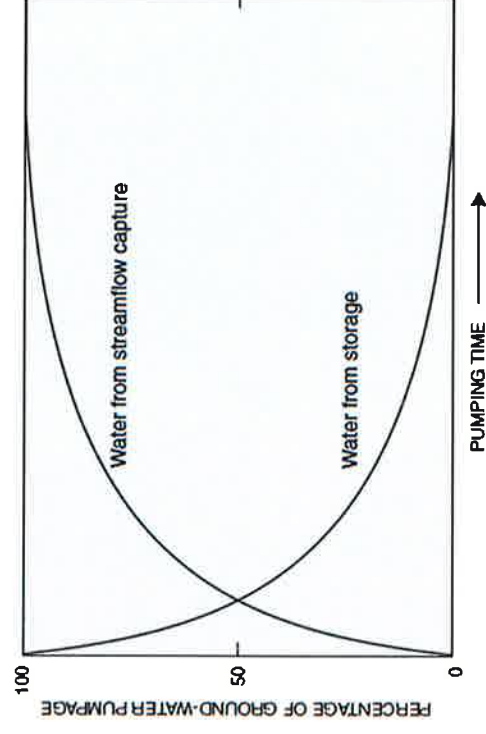
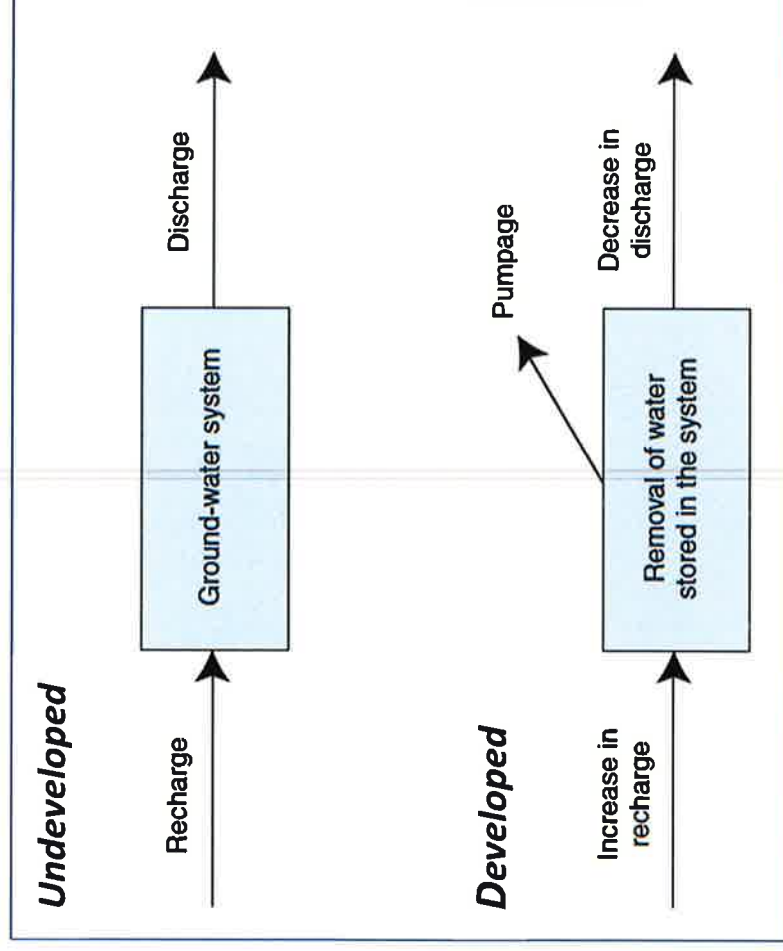
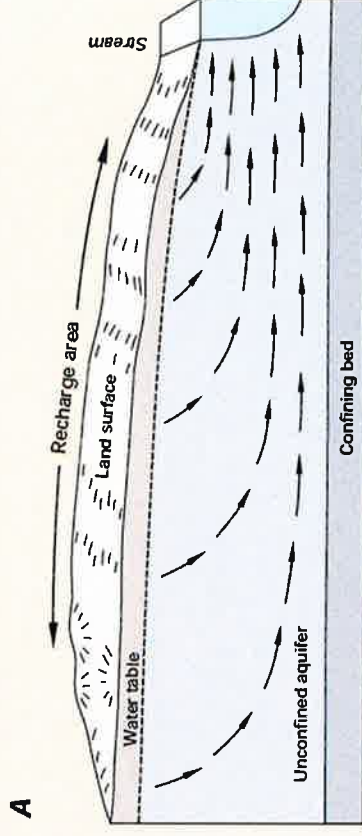


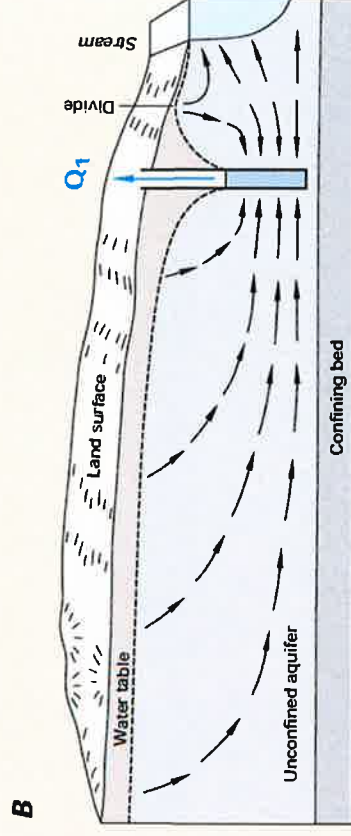
Figure 14. The principal source of water to a well can change with time from ground-water storage to capture of streamflow.

Groundwater capture example:

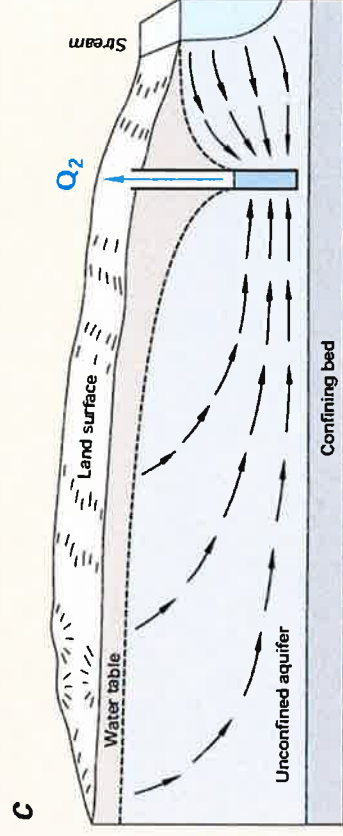
A – System prior to pumping with shallow water table and groundwater discharge to river



B – Pumping begins, deepening water table near well, withdrawing water from storage, and reducing discharge to river. Undesirable result: lowered gw levels, reduced storage, and reduced baseflow to stream.



C – Water table stabilizes at deeper level, storage stabilizes, all pumped water is withdrawn from stream. Undesirable result: depletion of surface water.



Water Budgets

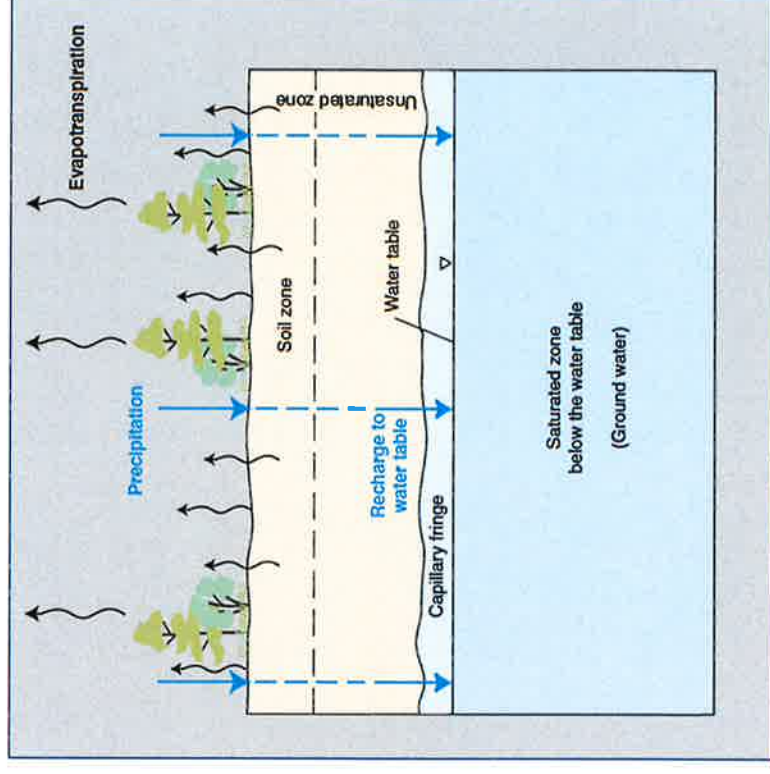


Recharge:

Precipitation,
Streams and rivers,
Lakes, ponds, wetlands
Canals, ditches,
Irrigation return flow,
Artificial recharge,
Subsurface inflow
Mountain front recharge

Discharge:

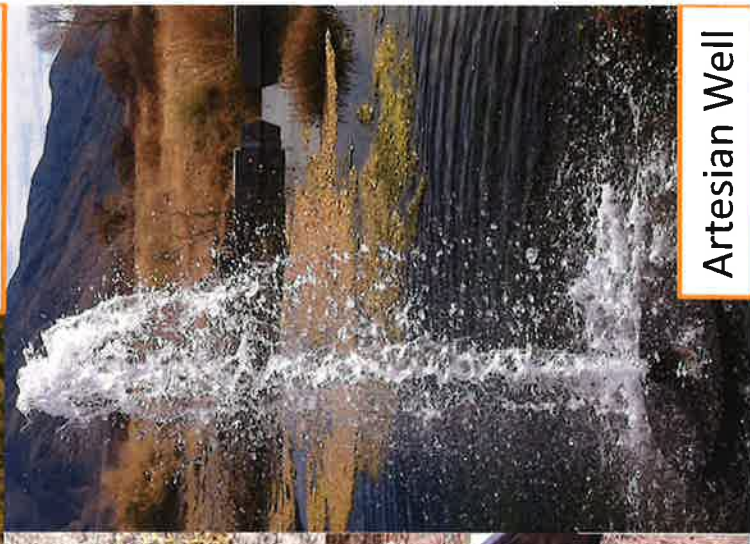
Streams and rivers,
Lakes, ponds, wetlands,
Springs and seeps,
Evapotranspiration,
Pumping wells,
Flowing wells
Subsurface outflow



Common hydrologic monitoring devices



Cipolletti Weir



Artesian Well



Pump-Equipped Well and Totalizer



Monitoring Wells



Parshall Flume

Owens Valley average annual water budget (acre-feet/year)

Owens Valley data from USGS studies; Tri Valley data from US Filter and other studies; Owens Lake data from MWH/LADWP Owens Lake studies. Compiled by ICWD for 2016 basin boundary modification request.

	Recharge	Pumping	Discharge
Tri Valley region	17,000 - 43,000	16,200 - 19,600	ET, springs and seeps, baseflow to water courses 5,000 ¹
Owens Valley	183,800	98,000 ²	84,000
Owens Lake	29,500 - 55,000	2300 ³	51,400
Subtotal	230,800 - 281,900	116,500 – 119,900	141,400
Total	220,200 - 271,300⁴	251,900 - 260,300	

¹ 4,400 AFY groundwater discharge at Fish Slough plus 600 AFY discharge in Chalfant Valley.

² 78,000 AFY pumping by LADWP plus 10,000 AFY by non-LADWP pumps, plus 10,000 AFY from flowing wells.

³ Includes 2,000 AFY for irrigation and 300 AFY for water bottling plant.

⁴ 10,600 AFY was subtracted to account for overlap Owens Valley (Danskin, 1998) and Owens Lake (MWH, 2011) study areas.

Summary

The hydrogeologic conceptual model describes the geologic framework of a groundwater basin. It may be simple or complex, as appropriate for the problem at hand. One conceptual model for Owens Valley is that the aquifer system consists of a shallow unconfined aquifer, a confining zone, and a deeper confined aquifer, with less confinement along the margins of the valley. Regional and localized hydrogeologic characteristics can complicate groundwater flow.

The source of water to a pumping well may be depletion of aquifer storage, capture of increased recharge, or capture of discharge. The proportion of each source changes over time.

The water budget describes the inflows and outflows of water to the groundwater system. Conceptually simple, complicated in practice, and subject to considerable uncertainty.

Sources for figures:

Alley et al., Sustainability of Groundwater Resources, USGS Circ. 1186, 1999.

Danskin, Evaluation of the Hydrologic System and Selected Water Management Alternatives in the Owens Valley, California, USGS WSP 2370-H, 1998.

Inyo County Water Department.