Tahoe Valley South Subbasin (6-005.01) Alternative
MEETING NOTES
Wednesday, June 30th, 2021; 2:00 pm - 4:00 pm
Location: On-Line Meeting
https://global.gotomeeting.com/join/501536749
Call-In #: 1 866 899 4679; Access Code: 501-536-749

SAG ATTENDEES:

John Thiel, PE; Ivo Bergsohn, PG, HG (STPUD); Rick Lind (El Dorado Water Agency);Karen Bender, REHS (El Dorado County – EMD); Brian Grey, P.G., Abby Cazier (Lahontan Regional Water Quality Control Board); Jason Burke (City of South Lake Tahoe); Jennifer Lukins (Lukins Brothers Water Co); Harold Singer (Retired)

Participants: 16

BASIN MANAGEMENT OBJECTIVES:

1. Maintain a sustainable long-term groundwater supply.
2. Maintain and protect groundwater quality.
3. Strengthen collaborative relationships with local water purveyors, governmental agencies, businesses, private property owners and the public.
4. Integrate groundwater quality protection into local land use planning activities.
5. Assess the interaction of water supply activities with environmental conditions.
6. Convene an on-going Stakeholders Advisory Group (SAG) as a forum for future groundwater issues.
7. Conduct technical studies to assess future groundwater needs and issues.
8. Identify and obtain funding for groundwater projects.

WORKSHOP OBJECTIVES

1. Consider sustainable management criteria being developed for the TVS Subbasin Alternative.
2. Learn about recent hydrologic work considering surface water depletions within the TVS Subbasin.
3. Discuss the Implementation Plan and potential projects for the TVS Subbasin Alternative.

Roll Call

Roll-Call Sheet

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TVS Basin (6-5.01) - Open Forum (Group)

Current groundwater-related topics outside Agenda

J. Lukins, LBWC

- LBWC #5 GAC Wellhead Treatment Facility – update:
  - LBWC #5 out of service since 2014; Drilled 1983-1985; Largest producing well;
  - Jenn described improvements completed at LBWC #5 Well site; installed new casing liner; constructed 98,000-gallon Welded Steel Storage Tank over former LBWC #2 location (Destroyed); constructed steel building around two x 8,800-gallon GAC Treatment Vessels (Calgon); took 1-week to install and backwash GAC; 4- Booster Pump Station (2 x 15 Hp; 2 x 30 HP); and 250 kW emergency power generator (w/sound attenuation)
  - Operating permit; on-going, submitted in March; awaiting DDW approval.

I. Bergsohn, STPUD

- Groundwater Sustainability Plan Reviews (DWR Press Release)
  - First round of DWR Assessments of GSPs submitted for Critically Over-Drafted (COD) Basins are available; Consultation Letters were issued by DWR outlining the deficiencies identified in the submitted GSPs for four COD Basins.; these reviews are available through the link provided in the press release included in the Meeting Materials.
- TRPA Greenhouse Gas Inventory (Infographic)
  - Inventory includes estimates an emissions inventory and estimates of carbon stored in natural ecosystems (2014-2018); and Projected future emissions Inventory for Lake Tahoe Basin (2018 – 2045)
- 2020 California Groundwater Conditions Report
  - DWR released a report and accompanying maps showing groundwater level changes across California between Spring 2019 and Spring 2020 .
  - Stable conditions are regarded as water level changes on the order of +/- 5 feet
  - Between May 2019 (Normal) and May 2020 (Below Normal) groundwater levels fell an average of -1.82 feet across the TVS Subbasin.
  - Between May 2020 (Below Normal) and May 2021 (Below Normal) groundwater levels fell an average of -2.21 feet across the TVS Subbasin.
- 2021 SAG Workshop 1 Meeting Notes and Presentations are posted on District's Groundwater Page

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TVS SUBBASIN ALTERNATIVE – Sustainable Management Criteria (S. Rybarski, DRI, 30 Minutes);

Handouts: Item 5: Sustainable Management Criteria

Susie Rybarski, DRI (SR) reported on progress in developing Sustainable Management Criteria (SMC) for the TVS Subbasin Alternative. SR explained SMCs as per SGMA and explained the SMCs being developed for Chronic Lowering of GW Levels; Reduction of GW Storage; Degraded Water Quality; and Land Subsidence applicable to the TVS Subbasin.

[**Note:** SMCs for Interconnected Surface Waters (ISWs) to be discussed more fully in next presentation by Mark Hausner.]

Chronic Lowering of GW Levels:
- Sustainability Goal; maintain sustainable supply of groundwater by maintaining pumping levels above top of well screen(s);
- Undesirable Result: Regional Water level decline such that water system demands can no longer be met;
- Sustainability Indicator: Total source capacity of Community Water System (CWS) wells; Total source capacity currently estimated at 19,155 (gpm) or 27.5832 (mgd) - may be modified.
- Minimum Threshold: Total Source Capacity ≥ 110% of Maximum Day Demand (MDD); MDD over past 10-years with 10% buffer = 14.166 mgd; current surplus =13.42 mgd

Minimum Threshold is source capacity > 110% MDD (14.166 mgd); DTW at well (from 2005 WY); Freeboard = expected drawdown when pumping at Specific Capacity (SC); For example Valhalla Well when pumping will have 7 feet of water above top of well screen. If water levels dropped below 7 feet would lose source capacity thereby reducing cumulative total source capacity for the CWS Wells. Based on this analysis groundwater levels can drop a total of 31 feet across basin before total source capacity would be reduced below total MDD for all drinking water users.

Reduction of GW Storage:
- Sustainability Goal; maintain groundwater storage reserves to ensure a sustainable supply of GW;
- Undesirable Result: GW Overdraft Condition – downward trend in groundwater levels;
- Sustainability Indicator: Cumulative changes in groundwater storage relative to WY 2005 (Baseline Normal WY)
- Minimum Threshold: Decrease in Storage of 32,050 AF relative to WY 2005 (equals GW Storage water loss from 7 feet of dd across Subbasin).

Degraded Water Quality:
- Sustainability Goal; maintain groundwater quality to support continued use of CWS wells for water supply;
- Undesirable Result: Degraded water quality impairs CWS reducing total Source Capacity < 110% of MDD;
- Sustainability Indicator: Total Source Capacity of CWS Wells
- Minimum Threshold: Total Source Capacity ≥ 110% of Maximum Day Demand (MDD); MDD over past 10-years with 10% buffer = 14.166 mgd; surplus =13.42 mgd

Land Subsidence:
- Sustainability Goal; maintain GW levels as needed to prevent land subsidence;
- Undesirable Result: GW Overdraft Condition to extent that significant compaction of fine-grained layers occurs;
- Sustainability Indicator: Measured static GW levels at CWS wells;
- Minimum Threshold: Decline in GW levels at each CWS well estimated to result in 1- ft. of land subsidence. Land Subsidence Estimate: 1 foot of Subsidence = ~ 100-ft. GW Level Decline (calculated from modified Terzaghi's equation – for 1-Dimensional compaction of porous media).

Discussion (Group): No questions/comments were received from the group

TVS SUBBASIN ALTERNATIVE – Interconnected Surface Waters (M. Hausner, DRI, 30 Minutes);

Handouts: Item 6: Interconnected Surface Waters

Mark Hausner, DRI (MH) reported on progress in developing quantitative thresholds for ISWs in the TVS Subbasin. Focus on sufficient water supply for ecosystems. MH presented slides discussing Climate Adaptation/Mitigation Strategies, SMCs for ISWs; ISW Archetypes; and establishment of minimum thresholds for groundwater levels within SEZs/GDEs and In-stream flows.

Guidance used for development of thresholds followed SGMA Requirements; California 4th Climate Change Assessment, Sierra Nevada Region, Ca DFW Planning Considerations; and TNC guidance on thresholds and GDEs. Climate Adaptation/Mitigation Strategies include: Resistance – ward off the effects of climate change (applicable to existing infra-structure, not applicable to ISWs); Resilience – increase capacity of systems to resist climate change impacts; Orderly Response – assist transitions to avoid most undesirable outcomes; and Realignment-facilitate transition to most desirable new condition. For ISWS will look at Resilience and Orderly Response as main strategies for ISWs. ISWs are coincident with SEZs; use TRPA SEZ mapping to define boundaries; and follow guidance from TNC on monitoring GW declines. Looked at Quantitative Benchmarks: Historical Variability in GW Levels within GDEs; Baseline Simulations to identify potential undesirable results; and Pumping vs. No-Pumping Model Simulations to determine whether effects are management-driven or climate driven.

ISWs
- Sustainability Goal; maintain shallow water table that supports riparian vegetation where currently exists;
- Undesirable Result: Succession of riparian vegetation by upland vegetation (with loss of Groundwater Dependent Ecosystems (GDEs)) ;
- Sustainability Indicator: Water Table Elevation;
- Minimum Threshold: Maintain average groundwater elevations within the interquartile range of historical variability.

Archetypes;

1. SEZs where simulated heads lie within 25% - 75% interquartile range projected over next 50 years (2021 – 2071): Example: Upper Truckee Marsh – West Side; Does Not Require extensive ongoing monitoring.
2. SEZs where simulated heads fall below 25% - 75% interquartile range due to climate change; Example: Tallac Meadows : Baseline Model simulated head fall below allowable 25% – 75% interquartile range after about 30 years (~ 2050) ; with or with-out pumping; apply Orderly Response mitigation strategy (example- ensure riparian vegetation has seed bank population with deeper root zones (outside scope of GMP).
3. SEZs where simulated heads fall below 25% - 75% interquartile range due to groundwater pumping; Example: Osgood Creek- Baseline Model simulated head fall below allowable 25% – 75% interquartile range after about 30 years (~ 2035) with groundwater pumping; apply Resilience mitigation strategy (example - redistribute pumping allocation between wells).

Identifying most vulnerable GDEs/SEZs: prioritize archetypes where simulated heads fall below 25% - 75% interquartile range due to groundwater pumping by predicted year of exceedance. Focus on SEZ/GDE areas where responses are expected over next 20 years (by 2040) and proximity to active CWS wells – located in north area of Subbasin (South Lake Tahoe, Tahoe Keys Subarea) and outside Groundwater Management Area (south portion of Subbasin (Meyers, Angora, Christmas Valley subareas).

Establishing thresholds: consider using particle tracking and model simulations to identify pumping influence from wells on GDE/SEZs and available remote sensing data to identify representative GDE/SEZs for potential monitoring; also looking at existing monitoring well networks with time series data for comparison to historical simulations; establish a delta between observed and simulated 25% quartiles; and apply deltas to observed hydrographs for establishment of quantitative threshold for area. For areas without existing groundwater monitoring data, new monitoring wells may need to be installed.

SMCs for Instream flows- compare available records from USGS Gage Stations to model simulated base flows at each station.

In-Stream Flows

- Sustainability Goal; maintain spatial and temporal continuity of surface flows to support existing beneficial uses;
- Undesirable Result: reduction of flow that negatively impacts wildlife and/or recreational uses;
- Sustainability Indicator: USGS discharge records;
- Minimum Threshold: 10-year average annual and 10-year average late-season (Aug, Sept, Oct) flows within range of historical variability.

P-values from Kendall's tau evaluation indicate strong correlation between late-season discharge and model simulated baseflow. Apply correlation to average late season flows from projected (2070) model baseflow simulations. Evaluation of records from continuous Gage Stations on Upper Truckee River and Trout Creek suggest that instream flows for these streams are within range of 10-year average annual and 10-year average late season flows.

Discussion (Group)

Was any consideration given to potential changes in groundwater quality over 50-year planning horizon? Not explicitly in GDEs or in-stream flows.

How will future movement of PCE plume affect water quality at seepage face to Lake Tahoe? Would not be fully evaluated as part of this update to the 2014 GMP, but could be added as an item to consider for future work in the implementation plan.

Population numbers for TKWC water system presented in water system demand tables (1,400 vs. 1,520) should be verified; these will be double-checked.

TVS SUBBASIN ALTERNATIVE – Implementation Plan (Section 10) (I. Bergsohn, STPUD, 40 Minutes);

Handouts: Item 7 TVS Subbasin Implementation Plan- 2 page per slide handouts); Item 8 TVS Subbasin Implementation Plan Draft (2021.06.23)

Ivo Bergsohn, STPUD (IB) reported on progress in developing the Implementation Plan for the TVS Subbasin Alternative. IB presented introductory slides to provide a bit of context when considering the draft Implementation Plan. These included a high-level view of the groundwater management work; and the accomplishments achieved since adoption of the current Groundwater Management Plan in 2014; the costs expended for this work; and a description of the funding sources used to support this work. IB also presented several slides describing the Sustainable Groundwater Management (SGM) Grant Program to inform the SAG on the types of projects which may be eligible for future funding.

IB presented a substantial list of accomplishments achieved by the District in collaboration with the EDWA and the SAG with respect to Basin Monitoring, Hydrologic Modeling, Groundwater Investigations, Public Outreach and Reporting. Over the past five years (2015 – 2020), the total costs for this work exceeded $2 million dollars;. The majority of funding support for this works was from the District's water enterprise fund, the EDWA cost share program and State Grants. The base cost of this program is projected to approach $6 million dollars to as high as $16.7 million over 50 years. Over the next 5-year planning cycle, the priorities for this program are expected to include: the management of naturally-occurring and manmade contaminants on groundwater sources; the increased engagement of private well owners in groundwater management; and increased understanding distinguishing between the effects of groundwater pumping and climate change on ISWs. IB believes the draft Implementation Plan recognizes these priorities.

IB provided a brief overview of the draft Implementation Plan. The draft plan is organized into, On-Going; activities needed to continue groundwater management in accordance with current regulations; Short-Term: activities identified for work over the next five years; and Long-Term: activities that are likely to require longer time frames (> 5years) to achieve and is seeking comment from the SAG by the end of July.

Discussion (Group):

SAG recognizes work accomplished through implementation of the 2014 GMP and support seeking of funding opportunities for future projects.

ADJOURN (3:40 PM)

GWMP 5-Year Update
Sustainable Management Criteria

Susie Rybarski
Mark Hausner

DRI
Desert Research Institute

Sustainable Management Criteria: Best Management Practice

- SGMA defines *sustainable groundwater management* as the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results (DWR, 2017).

- Sustainable management criteria include:
  - **Sustainability Goal**
  - **Undesirable Results**
  - **Sustainability Indicators**
  - **Minimum Thresholds**

Sustainable Management Criteria: Best Management Practice

- **Recommend for the entire basin a set of quantitative sustainability indicators, representative monitoring sites, and minimum thresholds designed to prevent the undesirable results:**
  - **Chronic lowering of groundwater levels** indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon
  - Significant and unreasonable **reduction of groundwater storage**
  - Significant and unreasonable **degraded water quality**, including the migration of contaminant plumes that impair water supplies
  - Significant and unreasonable **land subsidence** that substantially interferes with surface land uses
  - **Depletions of interconnected surface water** that have significant and unreasonable adverse impacts on beneficial uses of the surface water (Mark Hausner)

Sustainable Management Criteria: Chronic Lowering of Groundwater Levels

- **Sustainability Goal:** Maintain a sustainable supply of groundwater by keeping groundwater levels a safe distance above well screens
- **Undesirable Result:** Regional water level declines such that water demands cannot be met
- **Sustainability Indicator:** The total source capacity of community water supply wells
- **Minimum Threshold:** Having water levels above the screen intake at enough water supply wells such that the total source capacity meets or exceeds the MDD

Sustainable Management Criteria: Chronic Lowering of Groundwater Levels

- Quantify available water supply as total source capacity of all active public supply wells

		SOURCE CAPACITY		
Well I.D.	**WATER SYSTEM**	**(gpm)**	**(mgd)**	**STATUS**
Al Tahoe Well #2	STPUD	2792	4.0205	Active
Bakersfield Well	STPUD	1450	2.0880	Active
Bayview Well	STPUD	3000	4.3200	Active
Elks Club Well #2	STPUD	508	0.7315	Active
GlenWood Well #5	STPUD	1037	1.4933	Active
Helen Ave. Well #2	STPUD	242	0.3485	Active
Paloma Well	STPUD	1825	2.6280	Active
Sunset Well	STPUD	650	0.9360	Active
SUT No. 3	STPUD	858	1.2355	Active
Valhalla Well	STPUD	597	0.8597	Active
Arrowhead Well #3	STPUD	775	1.1160	Active - Treated
	STPUD SUB-TOTAL	**13,734**	**19.7770**	
TKWC No. 1	TKWC	1000	1.4400	Active
TKWC No. 2	TKWC	400	0.5760	Active-Treated (LP GAC; IX (Temporary), 400 gpm anticipated 7/2021)
TKWC No. 3	TKWC	800	1.1520	Active - Treated (IX (Temporary), 800 gpm anticipated 7/2021)
	TKWC SUB-TOTAL	**2,200**	**3.1680**	
LBWC No. 1	LBWC	900	1.2960	Active
LBWC No. 5	LBWC	620	0.8928	Inactive-Treated (LP GAC; 620 gpm; anticipated start 7/2021)
	LBWC SUB-TOTAL	**1,520**	**2.1888**	
COMMUNITY WATER SYSTEMS TOTAL		**17,454**	**25.1338**	

Sustainable Management Criteria: Chronic Lowering of Groundwater Levels

- Quantify water demands to be met as MDD over the past 10 years with a 10% buffer

Community Water System	Ca Water System No.	Active Wells	Connections[1]	Population Served[1]	Source Capacity (mgd)[3]	Maximum Day Demand (mgd)[2]	(+) Surplus; (-) Deficit (mgd)[4]
South Tahoe Public Utility District	910002	11	14,168	33,124	19.7770	9.862	9.9150
Tahoe Keys Water Company	910015	3	1,566	1,420	3.1680	2.383	0.7853
Lukins Brother Water Company	910007	1	982	3,200	1.2960	0.634	0.6622
TVS SUBBASIN (6-005.01) TOTALS		**15**	**16,716**	**37,744**	**24.241**	**12.879**	**11.3624**
			Lowering of Groundwater Levels Threshold (110% of MDD)			**14.166**	

NOTES

1) Source: SWRCB Drinking Water Branch Drinking Water Watch (https://sdwis.waterboards.ca.gov/PDWW/).
2) 10 Year (WY 2011 - WY 2020) Water System Maximum Day Demand, in million gallons per day (mgd), based on monthly water use as per CA Waterworks Standards (§ 64554).
3) Source capacity of active wells, in mgd (stand-by or offline sources not included).
4) (Source Capacity) - (Maximum Day Demand), in mgd.

Sustainable Management Criteria: Chronic Lowering of Groundwater Levels

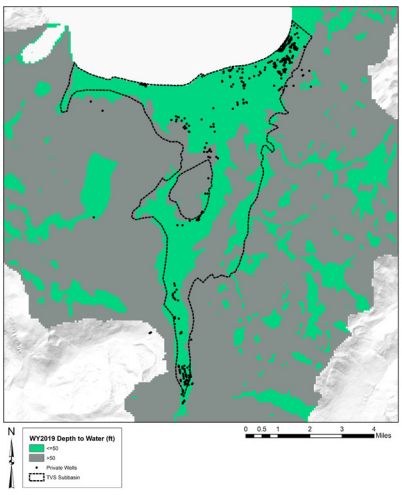
- Minimum threshold is cumulative reduced source capacity greater than 110% MDD (14.166 mgd)

Well I.D.	Water System	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Depth to Water[1] (ft bgs)	Transmissivity (gpd/ft)	Expected Drawdown (ft)	Specific Capacity[2] (gpm/ft)	Water Level Min Target[3] (ft bgs)	Freeboard[4] (ft)	Source Capacity (MGD)	Cum. Red. Source Cap. (MGD)
Valhalla Well	STPUD	110	170	31	14,713	72	9	38	7	0.8597	24.2741
Al Tahoe Well #2	STPUD	110	140	34	67,649	65	39	45	11	4.0205	20.2536
SUT No. 3	STPUD	70	90	18	18,805	37	38	33	15	1.2355	19.0181
LBWC No. 1	LBWC	132	182	20	12,342	97	7	35	15	1.2960	17.7221
Elks Club Well #2	STPUD	110	160	19	3,652	60	5	50	31	0.7315	16.9906
Paloma Well	STPUD	188	248	45	39,996	112	22	76	31	2.6280	14.3626
GlenWood Well #5	STPUD	150	180	39	25,544	75	15	75	36	1.4933	12.8693
Helen Ave. Well #2	STPUD	90	150	18	15,237	29	9	61	43	0.3485	12.5208
TKWC No. 2	TKWC	138	188	20	12,342	74	7	64	44	0.5760	11.9448
Bakersfield Well	STPUD	130	170	29	55,569	52	29	78	49	2.0880	9.8568
TKWC No. 3	TKWC	175	300	20	30,855	100	18	75	55	1.1520	8.7048
TKWC No. 1	TKWC	125	312	20	46,159	39	26	86	66	1.4400	7.2648
Bayview Well	STPUD	180	300	25	65,308	77	47	103	78	4.3200	2.9448
Arrowhead Well #3	STPUD	250	280	49	14,534	92	9	158	109	1.1160	1.8288
Sunset Well	STPUD	275	430	20	31,506	36	18	239	219	0.9360	0.8928
LBWC No. 5	LBWC	141	180	20						0.8928	0.0000

Notes
1. Based on average WY 2005 measurements. Bold values are estimates based on nearby wells.
2. Bold values represent directly measured specific capacity at well capacity. Other values are calculated using Cooper and Jacob (1946) equation.
3. Water level minimum threshold based on top of screen - expected drawdown at full well capacity.
4. Freeboard is defined as Water level target - depth to water.

Sustainable Management Criteria: Reduction of Storage

- **Sustainability Goal:** Maintain groundwater storage reserves to ensure a sustainable supply of groundwater
- **Undesirable Result:** A groundwater overdraft condition causing water levels to trend downward making it more difficult to extract sufficient groundwater for water supply purposes
- **Sustainability Indicator:** Cumulative changes in groundwater storage relative to WY 2005 (baseline normal year)
- **Minimum Threshold:** Decrease in storage of **32,050 AF** relative to WY 2005 (equivalent storage loss from 7 feet of drawdown over subbasin)



Sustainable Management Criteria: Degraded Water Quality

- **Sustainability Goal:** Maintain groundwater quality to support continued extraction for water supply purposes
- **Undesirable Result:** Degraded water quality threatens the ability to produce groundwater of sufficient quality and quantity to meet the demands of the community
- **Sustainability Indicator:** The total source capacity of community water supply wells
- **Minimum Threshold:** Degraded water quality concerns within the TVS Basin should not rise to a level that threatens the ability of groundwater sources to meet 110% MDD (14.166 mgd)

		SOURCE CAPACITY	
Well I.D.	WATER SYSTEM	(gpm)	(mgd)
Al Tahoe Well #2	STPUD	2792	4.0205
Bakersfield Well	STPUD	1450	2.0880
Bayview Well	STPUD	3000	4.3200
Elks Club Well #2	STPUD	508	0.7315
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	LBWC SUB-TOTAL	**1,520**	**2.1888**
COMMUNITY WATER SYSTEMS TOTAL		**17,454**	**25.1338**

Sustainable Management Criteria: Land Subsidence

- **Sustainability Goal:** Maintain water levels as needed to prevent land subsidence that substantially interferes with surface land uses
- **Undesirable Result:** A groundwater overdraft condition causing water levels to trend downward to the extent that significant compaction occurs in fine-grained layers
- **Sustainability Indicator:** Measured water levels at public supply wells
- **Minimum Threshold:** Decline in water levels at each public supply well estimated to result in 1 foot of land subsidence

Sustainable Management Criteria: Land Subsidence

- TVS Basin is largely composed of coarse glacial deposits with limited potential for compaction
- Compaction due to a decrease in pore fluid pressure can be estimated as:

$$-(dz) = -\alpha z p_w g(dh)$$

  - dz = compaction
  - α = sediment compressibility
  - z = saturated thickness
  - $p_w g(dh)$ = reduction in hydrostatic pressure

- To generate 1 foot of subsidence, a sustained static water level drop of ~100 feet would required, far exceeding the minimum thresholds for chronic lowering of groundwater levels.

Questions?

Quantitative Thresholds: Interconnected Surface Waters

Mark Hausner
Susie Rybarski

DRI
Desert Research Institute

Interconnected Surface Waters

- SEZs and GDEs
- Instream Flow Requirements
- Depletions: Quantity and Timing
- Undesirable Results
- SAG Round Robin/Q&A

Interconnected Surface Waters

- General approach
- SEZs and GDEs
  - Undesirable Results
  - Establishing thresholds
- Instream Flow Requirements; Quantity and Timing of Depletions
  - Undesirable Results
  - Establishing thresholds
- SAG Round Robin/Q&A

Guidance followed

- SGMA requirements
- California's 4th Climate Change Assessment, Sierra Nevada Region Report (Dettinger et al. 2018)
- California DFW "Fish & Wildlife Groundwater Planning Considerations"
- TNC guidance on quantitative thresholds and GDEs

Climate Adaptation/Mitigation Strategies

- **Resistance:** trying to ward off the effects of climate change
- **Resilience:** increasing the capacity of systems to resist and bounce back from climate change impacts
- **Orderly response:** assisting transitions to avoid at least the most undesirable outcomes
- **Realignment:** facilitating major transitions to the most desirable new conditions

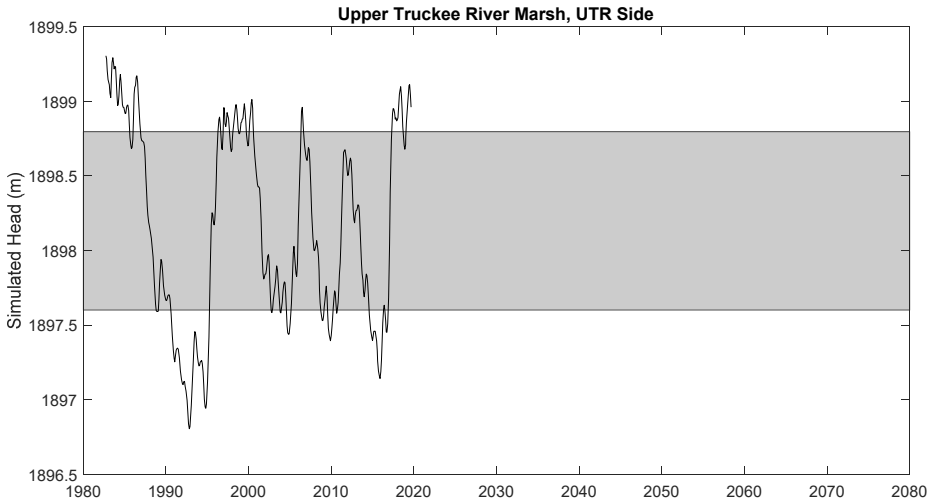
SEZs and GDEs

- Use TRPA's Stream Environment Zones as the geographical boundaries
- Follow guidance from The Nature Conservancy on monitoring declines in water level
- Quantitative benchmarks
  - Historical variability determines acceptable range
  - Baseline simulations used to identify potential undesirable results
  - Pumping vs. no-pumping simulations considered

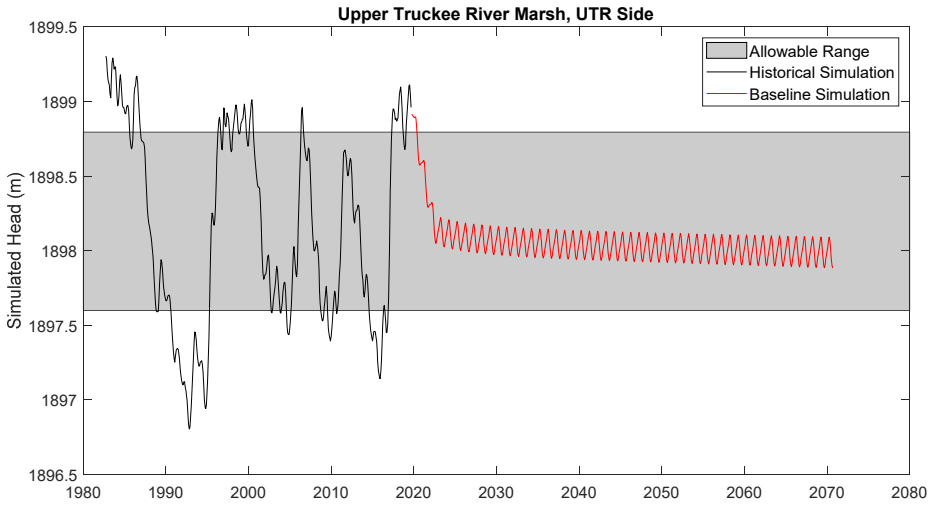
Sustainable Management Criteria: Groundwater-Dependent Ecosystems

- **Sustainability Goal:** Maintain shallow water table that supports riparian vegetation in areas where riparian vegetation currently exists
- **Undesirable Result:** Replacement of riparian vegetation by upland vegetation and loss of associated ecosystem services
- **Sustainability Indicator:** Water table elevation
- **Minimum Threshold:** Having average groundwater elevations within the interquartile range of historical variability

SEZs and GDEs: Examples



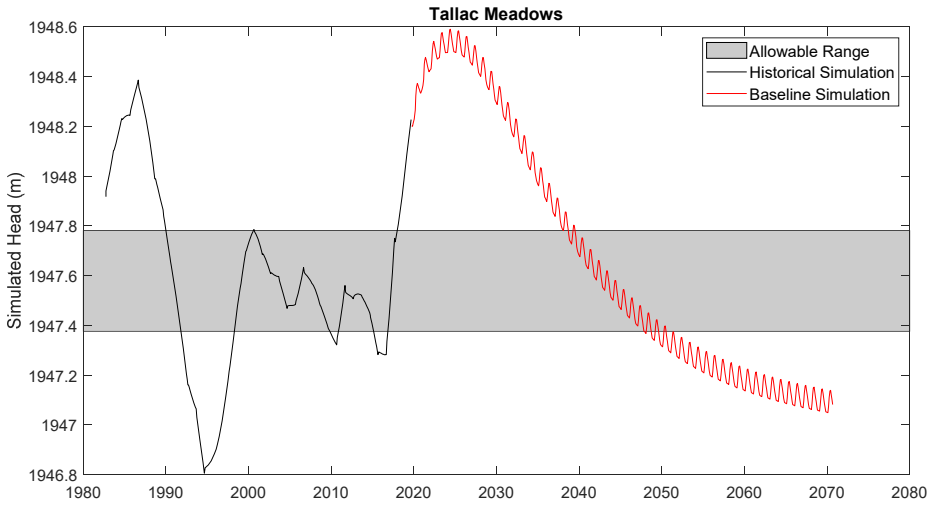
SEZs and GDEs: Examples



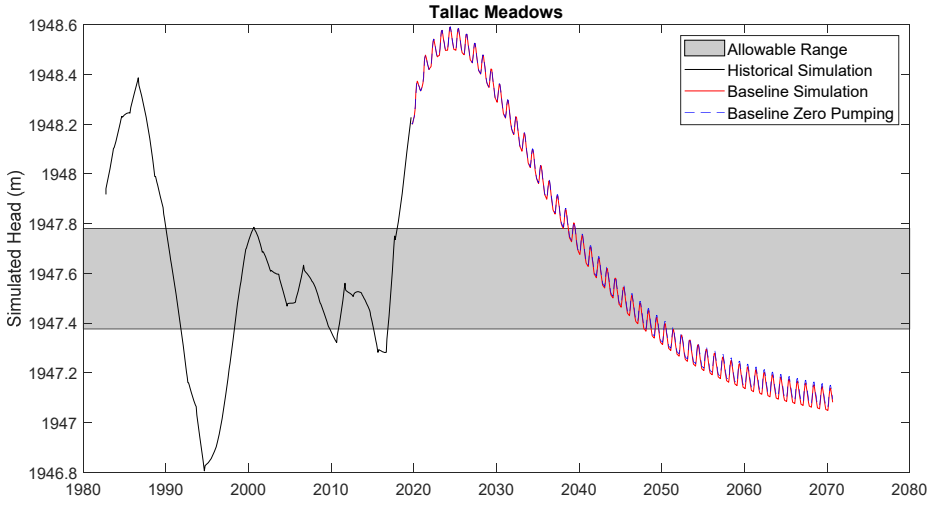
SEZs and GDEs: Examples

- Upper Truckee River Marsh, UTR side
  - Simulated heads fall within historical variability
  - Does not require ongoing monitoring

SEZs and GDEs: Examples



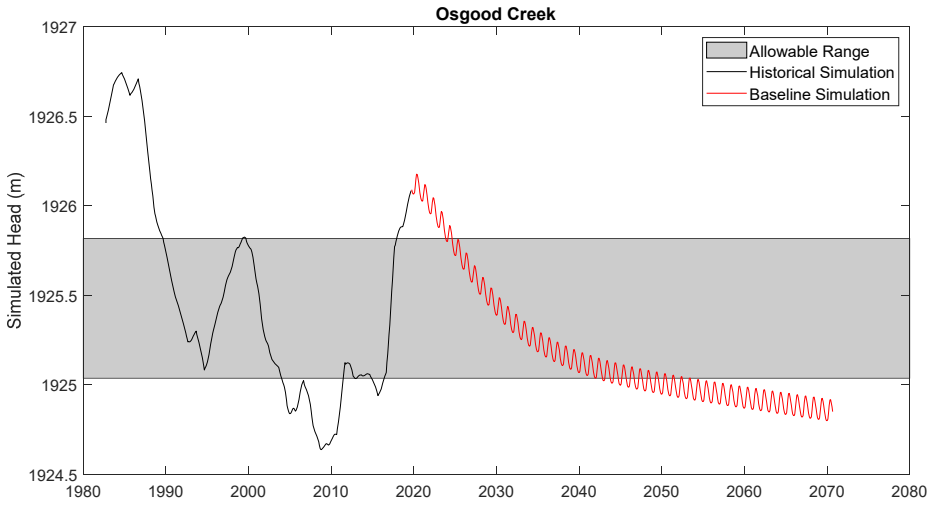
SEZs and GDEs: Examples



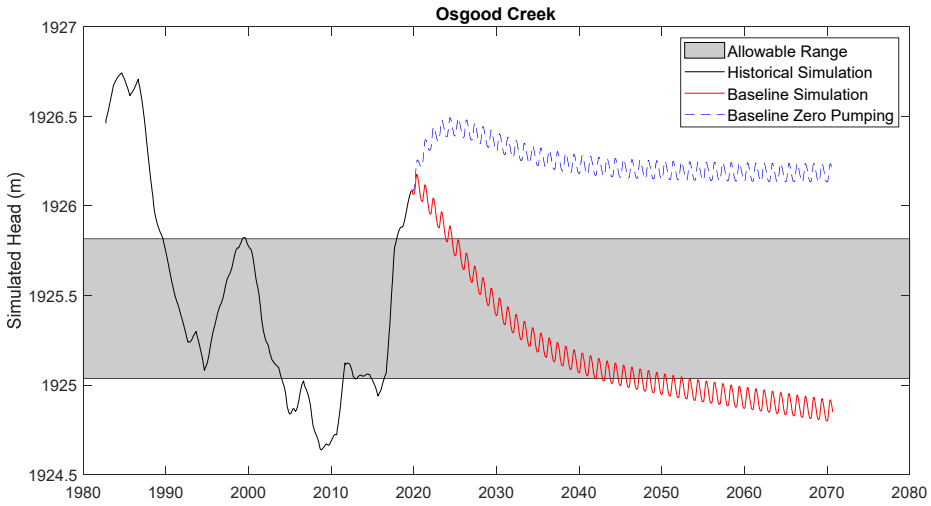
SEZs and GDEs: Examples

- Upper Truckee River Marsh, UTR side
  - Simulated heads fall within historical variability
  - Does not require ongoing monitoring
- Tallac Meadows
  - Simulated heads fall outside of historical variability regardless of pumping
  - Orderly response (assist transitions to avoid the most undesirable effects)

SEZs and GDEs: Examples



SEZs and GDEs: Examples

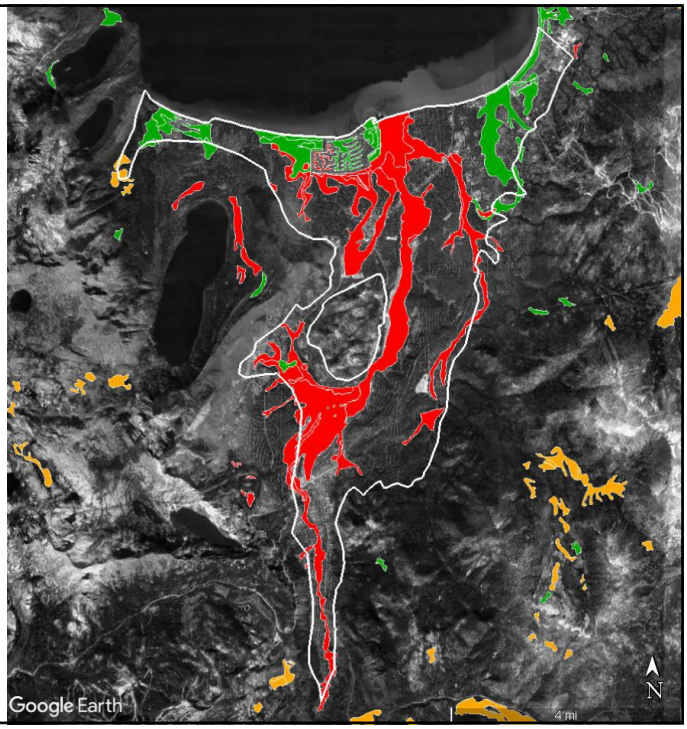


SEZs and GDEs: Examples

- Upper Truckee River Marsh, UTR side
  - Simulated heads fall within historical variability
  - Does not require ongoing monitoring
- Tallac Meadows
  - Simulated heads fall outside of historical variability regardless of pumping
  - Orderly response (assist transitions to avoid the most undesirable effects)
- Osgood Creek
  - Simulated heads fall outside of historical variability with pumping, but are acceptable without pumping
  - Resilience (increase capacity to resist and recover from climate impacts)

SEZs and GDEs

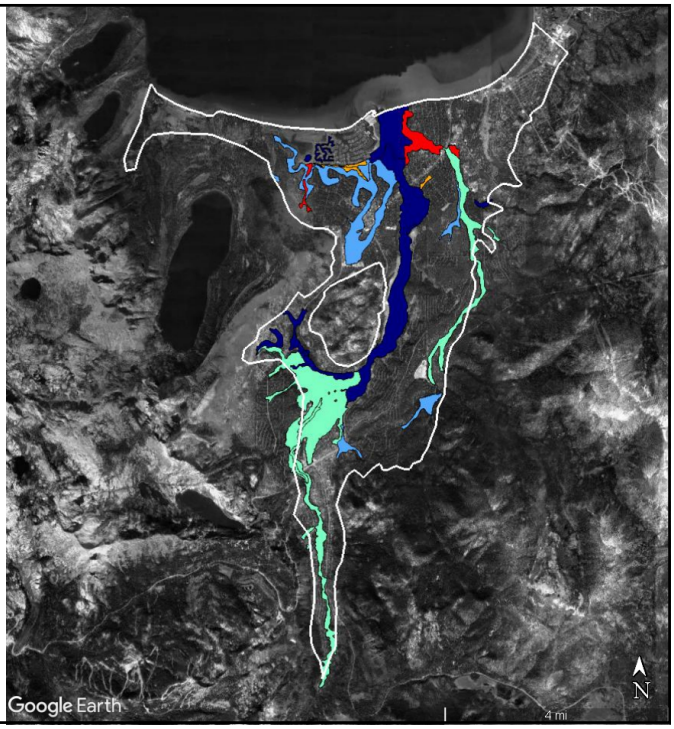
- Green: within historical bounds
- Orange: outside historical, but not affected by pumping (orderly response)
- Red: outside historical and affected by pumping (resilience)

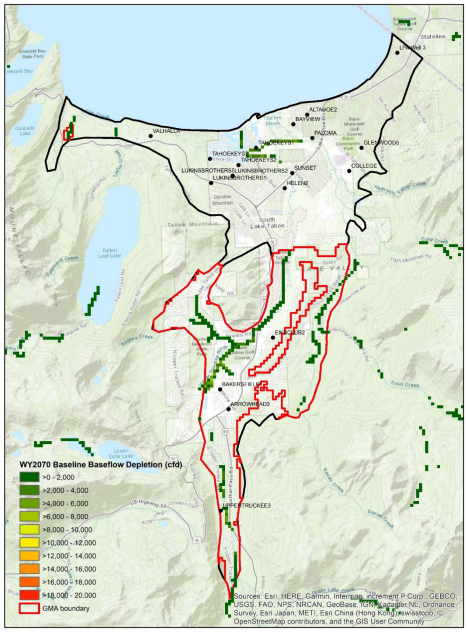


SEZs and GDEs

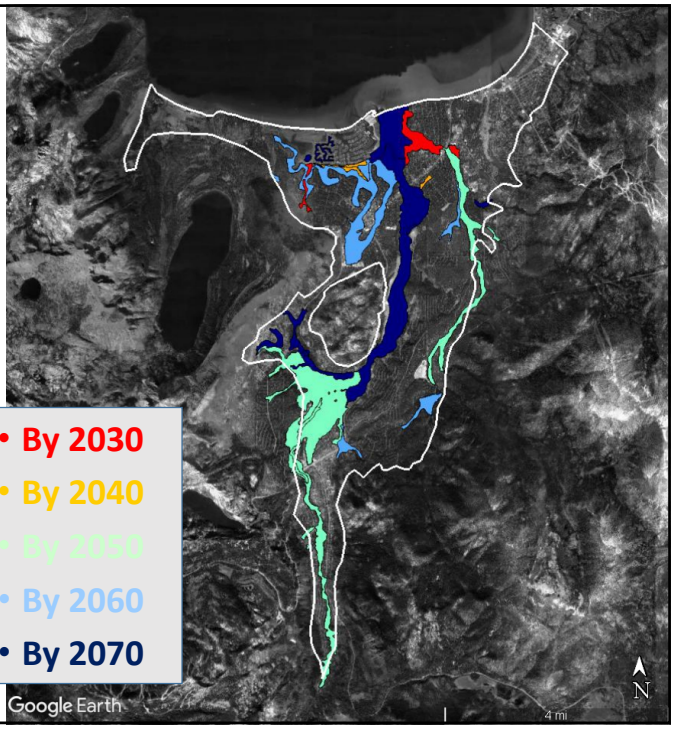
Year of Exceedance

- **By 2030**
- **By 2040**
- **By 2050**
- **By 2060**
- **By 2070**





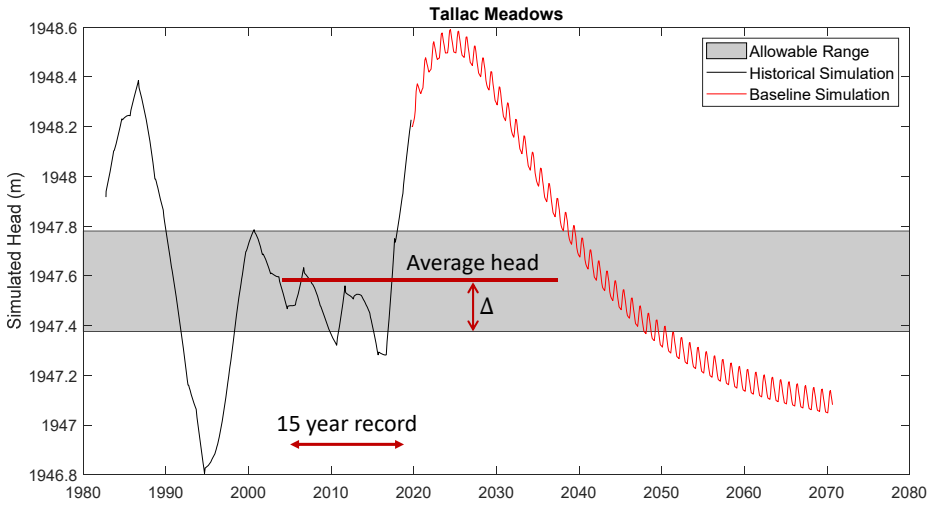
Previously identified Groundwater Management Area



SEZs and GDEs: Establishing Thresholds

- Identify indicator SEZs/GDEs for continuous monitoring
- Are there existing monitoring wells with time series of data?
  - Compare the average water level over the period of record to historical simulations
  - Establish a delta between historical simulations and the 25th percentile of the historical record
  - Apply that delta to the observed water level to obtain the quantitative threshold

SEZs and GDEs: Establishing Thresholds



SEZs and GDEs: Establishing Thresholds

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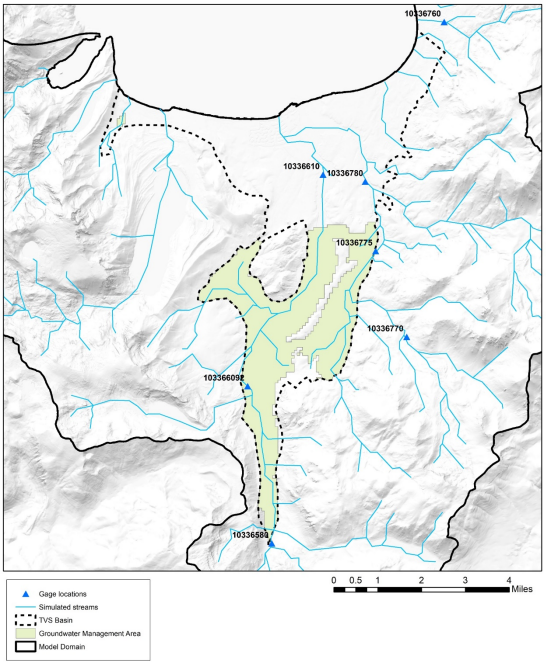
- Are there existing monitoring wells with time series of data?
  - Compare the average water level over the period of record to historical simulations
  - Establish a delta between historical simulations and the 25th percentile of the historical record
  - Apply that delta to the observed water level to obtain the quantitative threshold
- Do we need to drill a new monitoring well?
  - Establish a delta between the current water level and the 25th percentile threshold

Instream Flows

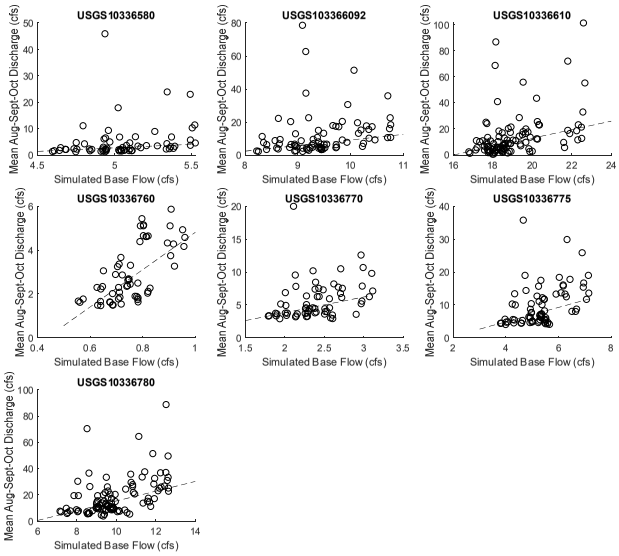
- Seven USGS Gages in the model domain
- Compared simulated baseflows at each USGS gage to historical observations



Sustainable Management Criteria: Instream Flows

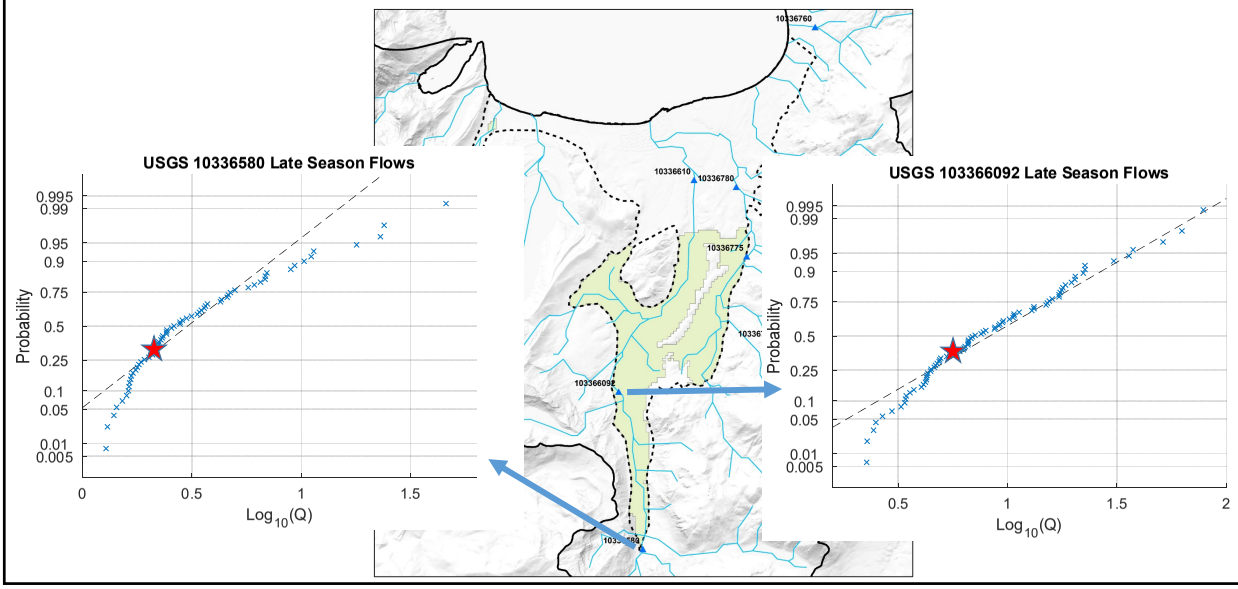
- **Sustainability Goal:** Maintain spatial and temporal continuity of surface flows to support existing beneficial uses
- **Undesirable Result:** reduction of flow sufficient to negatively impact wildlife and/or recreational use of streams
- **Sustainability Indicator:** USGS gaged discharge
- **Minimum Threshold:** Having 10-year average annual discharge and late season (Aug-Sept-Oct) discharge within the range of historical variability

Instream Flows



Aug-Sept-Oct Correlations		
Kendall's tau	p	Sen slope
-0.284	8.4E-04	2.689
-0.277	2.8E-04	3.382
-0.336	5.6E-07	3.263
-0.463	2.4E-07	8.520
-0.304	4.5E-04	2.396
-0.319	5.9E-05	2.200
-0.371	3.4E-08	3.709

Depletions: 2070 Quantity and Timing



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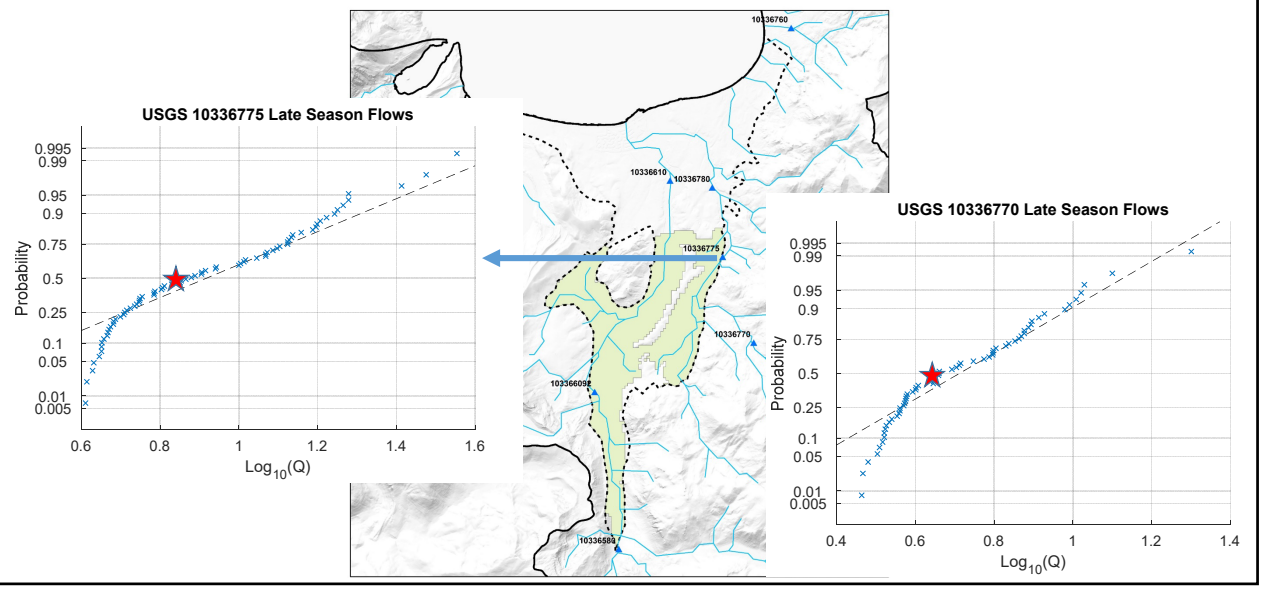

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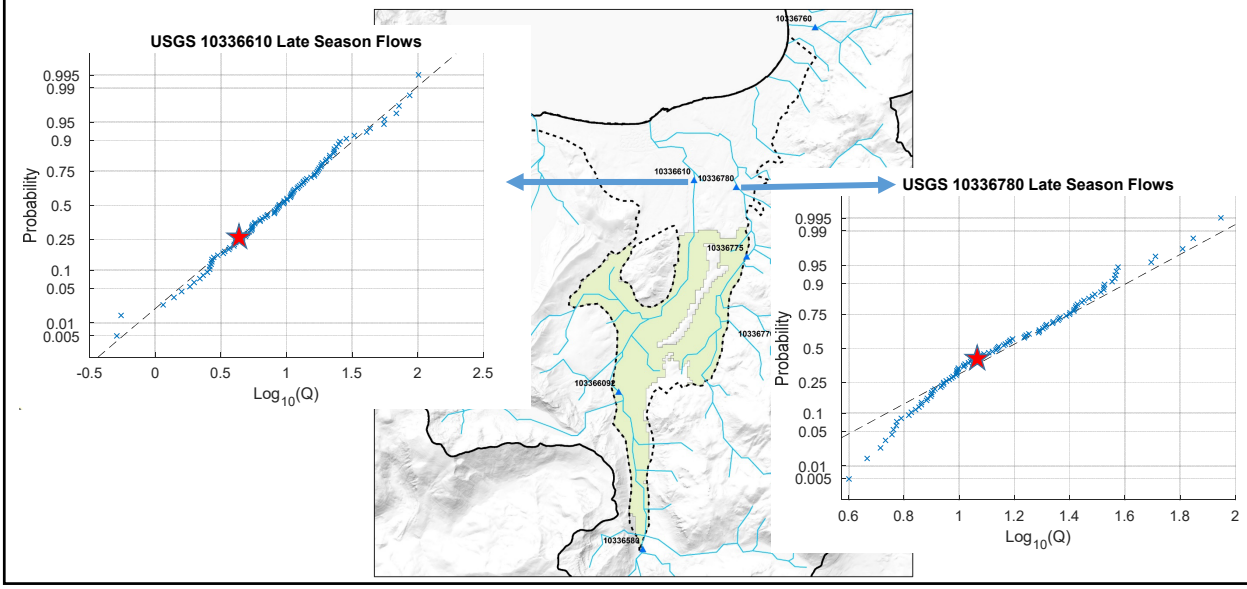

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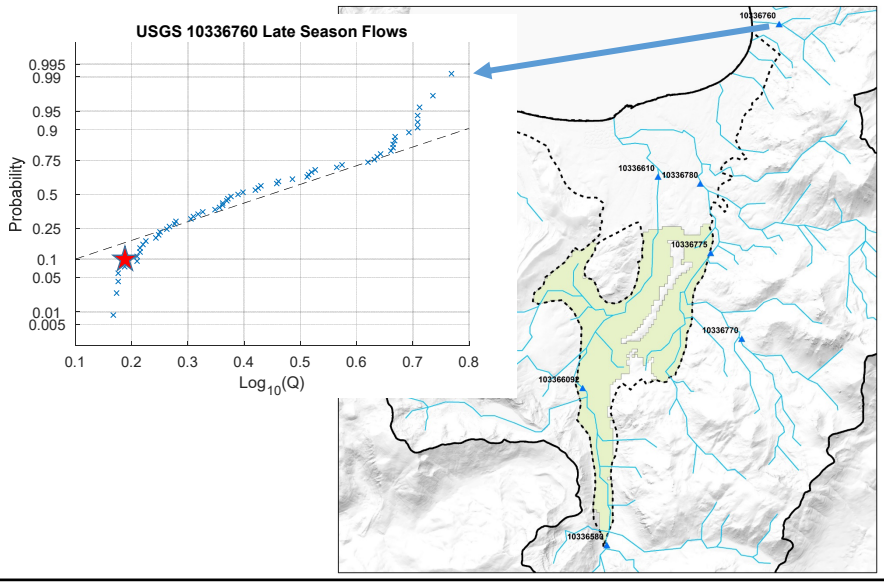
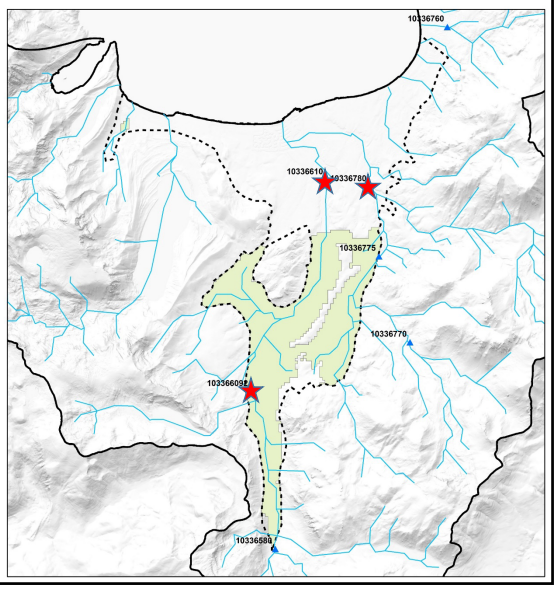


Depletions: Establishing Thresholds

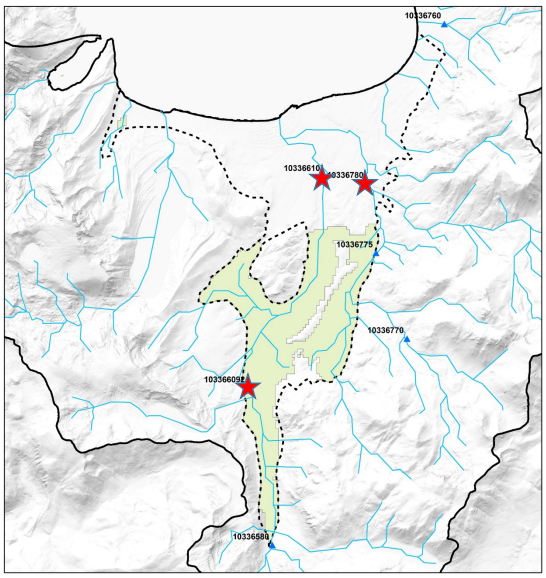
- Continuous monitoring at USGS Gages
  - Upper Truckee River at Hwy 50 above Myers
  - Upper Truckee River at South Lake Tahoe
  - Trout Creek near Tahoe Valley
- Compare recent discharge to historical variability
  - Total annual discharge
  - Late-season discharge (Aug-Sept-Oct)



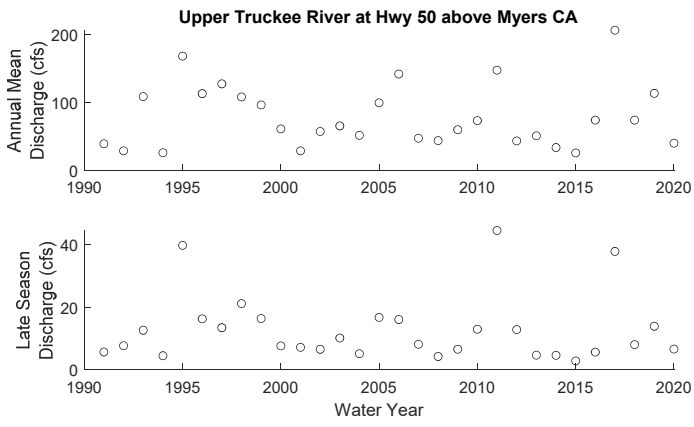
Depletions: Establishing Thresholds

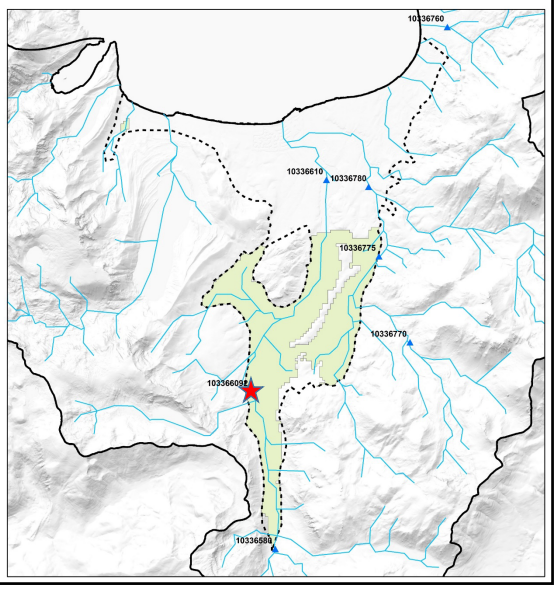
Annual Flows (cfs)				
Gage No.	Location	25th Percentile	10-Year Mean	5-Year Mean
66092	UTR above Myers	43.47	81.1	101.8
6610	UTR at South Lake	45.83	102.7	129.9
6780	Trout Creek	19.92	39.2	50.3

Late Season Flows (cfs)				
Gage No.	Location	25th Percentile	10-Year Mean	5-Year Mean
66092	UTR above Myers	5.71	14.2	14.5
6610	UTR at South Lake	6.08	14.3	13.5
6780	Trout Creek	11.15	19.7	23.1

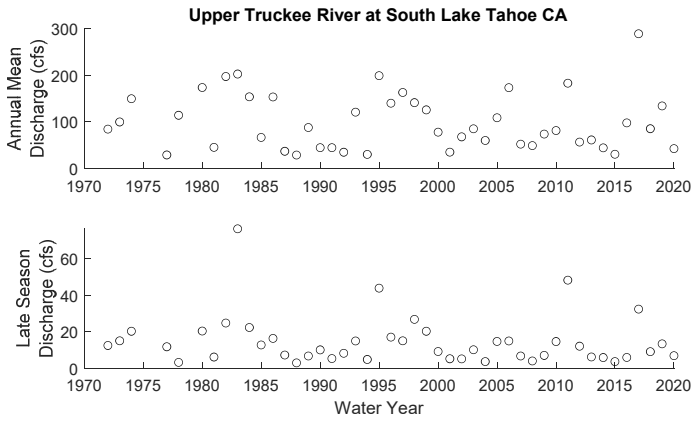


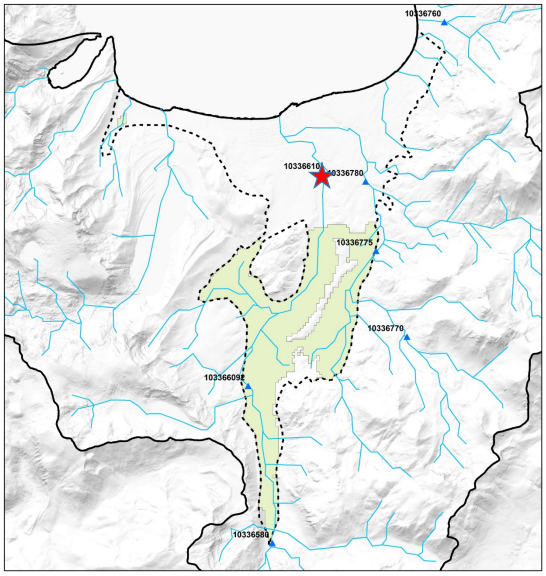
Depletions: Establishing Thresholds



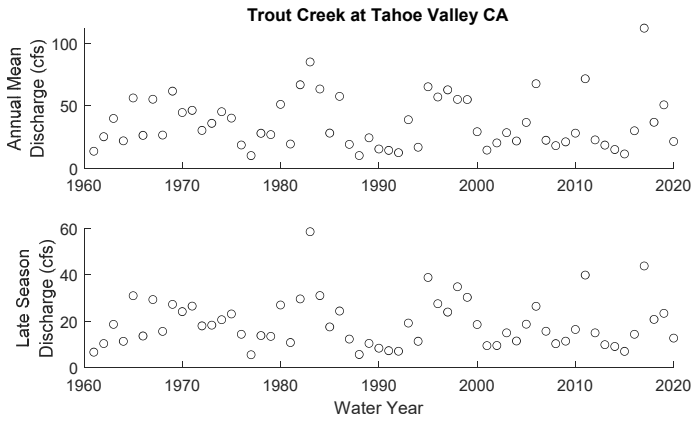


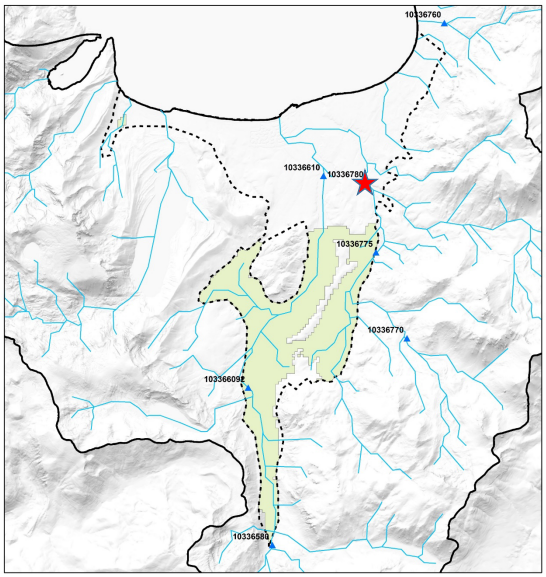
Depletions: Establishing Thresholds





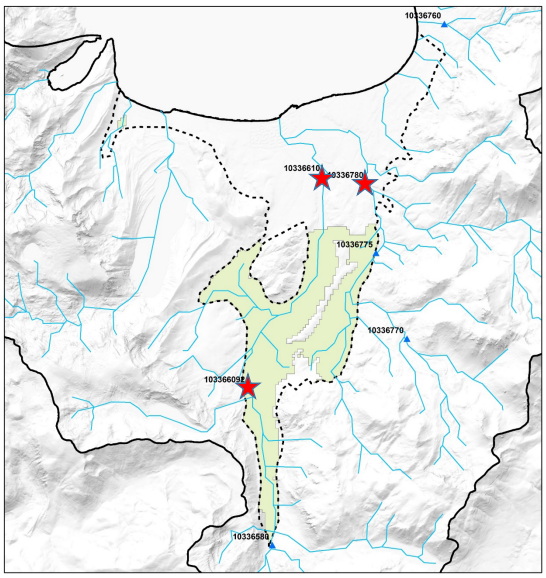
Depletions: Establishing Thresholds





Depletions: Establishing Thresholds

- Warning signs: Trends in discharge
  - Update at end of each water year
  - Look for trends in annual and late-season discharge
- Currently, no long-term (30-year) or short-term (10-year) trends



Questions?

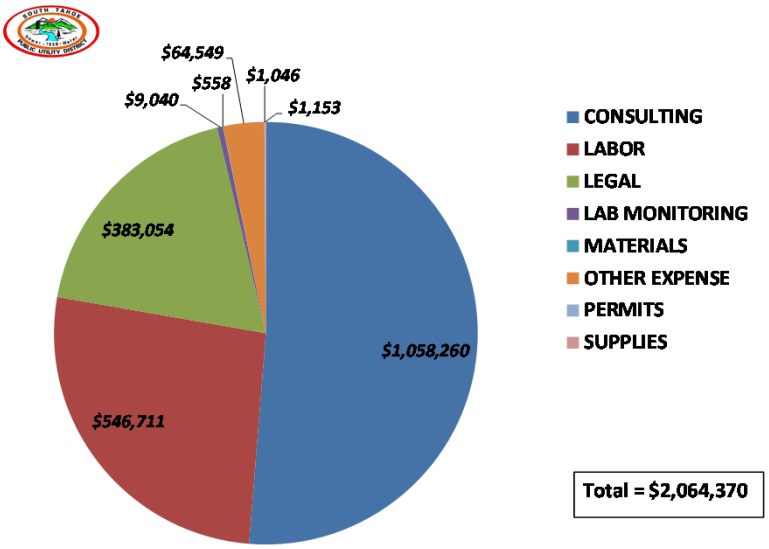
TVS SUBBASIN (6-005.01)
2021 SAG Workshop 2
June 30, 2021

SECTION 10: Implementation Plan

Ivo Bergsohn, PG, HG
ibergsohn@stpud.dst.ca.us

ACCOMPLISHMENTS (2015 – 2020)	
BASIN MONITORING	• Groundwater Monitoring- precipitation, elevations, groundwater pumpage, recharge, storage
HYDROLOGIC MODELING	• Phase 1 Hydrologic Models– Water balance, future conditions • Phase II Hydrologic Models – Recharge areas, capture zones, baseflow depletion analysis and capture maps, climate change impacts, monitoring network evaluation • Updated Phase 1 Groundwater Model • South Y Fate & Transport Model
INVESTIGATIONS	• South Y Extraction Well Suitability Investigation • Basin Management Objectives Analysis • Analysis of Basin Conditions • Survey of Private Well Owners • South Y Feasibility Study – Baseline Health Risk Assessment, Pre-Design Investigation, Feasibility Study, Interim Remedial Action Plan
PUBLIC OUTREACH	• SAG Workshops • South Y FS Workshops • PWOS I – Groundwater Well Survey • PWOS II – Groundwater Well Survey • Groundwater Web Page
REPORTING	• GSA Formation • DISTRICT – EDWA MOU • CASGEM Reporting • SGMA Annual Reporting • GSP Alternative

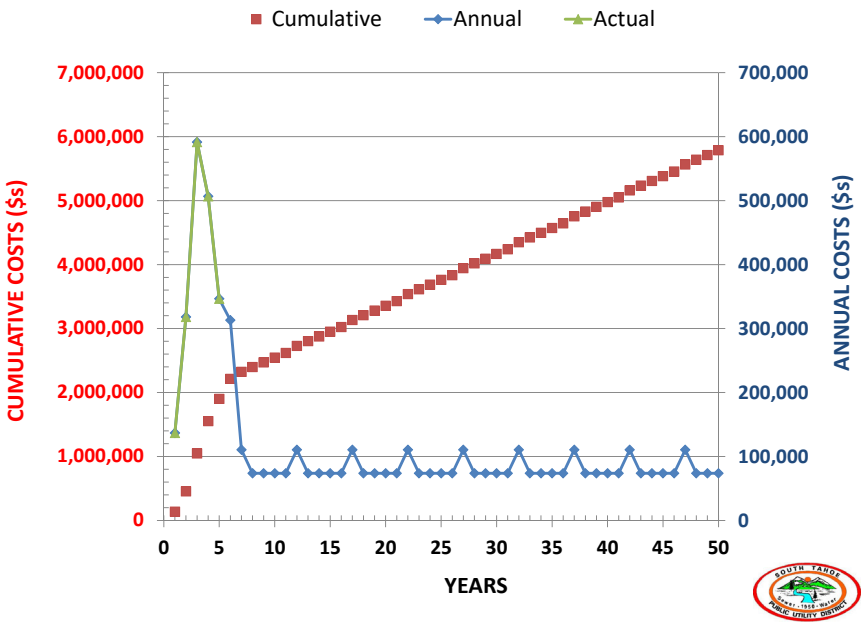
COSTS (2015 – 2020)



FUNDING (2015 – 2020)

SOURCE	AMOUNT
EDWA COST SHARE	$681,000
STATE GRANTS	$430,000
DISTRICT	$953,000
TOTALS	$2,064,000

50-Year PROJECTED



TVS Alternative Priorities (the next 5 years)

- Groundwater Contamination
- Small Water System & Domestic Wells
- Interconnected Surface Waters

FUNDING

- SGM Grant Program
  - SGM Implementation Grants
    - Confirmed: 2nd Round Funding - $77 M for medium and high-priority basins
    - Potential:
      - Governor's Budget (May Revised): $300 M for SGM Implementation including infrastructure, tech. assistance, support for DACs (e.g., DAC Involvement Program)
      - Legislature Budget (June Approved): $60 M for CODs
  - Eligible Project Types
    - Prop 68 Preference
    - Other Eligible
    - Implementation Plan
    - Multiple Benefits
  - Cost Share
    - 25% of local cost share (includes in-kind services)

Proposition 68 Preference

- "….activities and/or tasks that consist of the development of groundwater recharge projects with surface water, stormwater, recycled water, and other conjunctive use projects; and/or projects that prevent or clean up contamination of groundwater that serves as a source of drinking water (Public Resources Code § 80146(a)

Other Eligible

- Projects and programs that support water supply reliability, water conservation, and water use efficiency and water banking, exchange, and reclamation.

Implementation Plan

- Activities associated with the implementation of an adopted GSP or approved Alternative; listed within an adopted GSP or approved Alternative; and consistent with SGMA Guidance and BMPs.

Multiple Benefits (MB)

- Meet benefits of multiple planning documents (e.g., Stormwater Resources Plans (SWRP), Integrated Regional Water management (IRWM) Plans, Draft Water Resiliency Portfolio, etc.)

MB Examples

- Addresses impacts of current and future droughts and other water shortages;
- Community involvement, engagement, and education
- Habitat enhancement and/or creation;
- Stream or riparian enhancement and/or instream flow augmentation
- Upgrade and/or expansion of a wastewater treatment plant(s) to augment local water demand
- Water conservation
- Surface water, or dry weather runoff capture and reuse, treatment, and/or infiltration

Eligible Project Activity Examples

- Groundwater contaminant remediation or prevention projects for groundwater that serves as a source of drinking water
- Stormwater and runoff capture projects that support groundwater recharge
- Groundwater recharge projects that address groundwater dependent ecosystems (GDEs)
- Planning, design, and environmental documentation only as a task of a Project or Component of an overall project (not a standalone task).

SCHEDULE

- Spring 2022 – Solicitation Opens
- Summer 2022 – Public Review of Draft Funding List
- Fall 2022 – Final Awards