San Mateo Plain Groundwater Basin Assessment

Stakeholder Workshop #8

17 APRIL 2018

COUNTY OF SAN MATEO
HEALTH SYSTEM

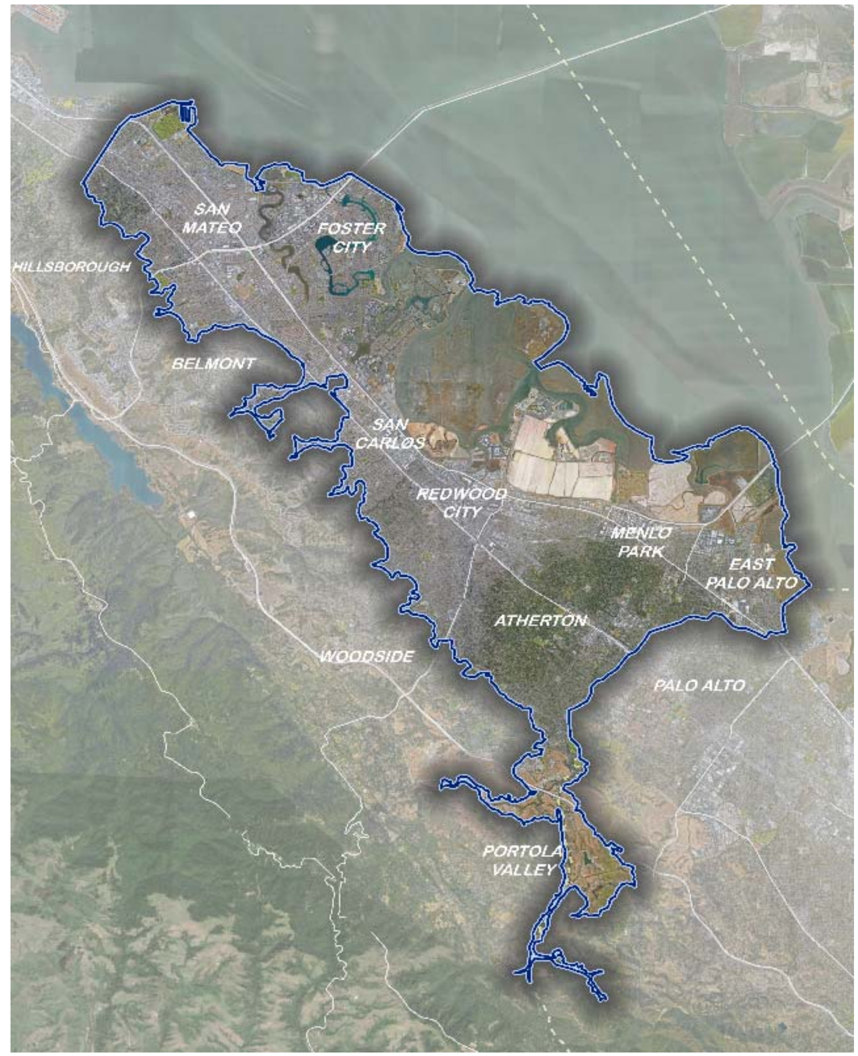
TODD GROUNDWATER

eki environment & water

HYDROFOCUS INC.
Solutions for Land and Water Resources

PRESENTATION OVERVIEW

- Introductions
- Project Overview
- Summary of Analysis Supporting Model Development
- Model Development Activities – Phase 1 and 2
- Phase 3 Scenario Modeling Methods and Results



SAN MATEO PLAIN GROUNDWATER BASIN ASSESSMENT

- Funded through Measure K and Office of Sustainability
- Project Objectives:
  - Increase Public Knowledge
  - Evaluate Hydrogeologic and Groundwater Conditions
  - Evaluate Risk of Undesirable Results
  - Potential Groundwater Management Strategies

SUPPORTED BY MEASURE K
LOCALFUNDS LOCALNEEDS
WWW.SMCGOV.ORG

OFFICE OF SUSTAINABILITY
COUNTY OF SAN MATEO

http://www.smcsustainability.org/smplain

THE PROJECT IS BEING EXECUTED IN THREE PHASES

Phase 1

- Stakeholder Coordination and Public Outreach
- Data Compilation, Unification, and Sharing
- Develop Initial Basin Conceptual Model
- Develop Basin Groundwater Numerical Model
- Evaluate Potential Basin Management Strategies
- Prepare Phase I Report

Apr 2016 – Jan 2017

Phase 2

- Public Outreach
- Fill Selected Data Gaps
- Update Database
- Update and Refine Conceptual and Numerical Models

Feb 2017– Dec 2017

Phase 3

- Public Outreach
- Conduct Scenario Evaluations
- Prepare Final Report

Aug 2017 – Jun 2018

ON-GOING STAKEHOLDER OUTREACH

- Small group and one-on-one meetings
- Presentations to organizations and governing bodies
- Stakeholder workshops
- New website address: http://www.smcsustainability.org/smplain
- Open Data Portal: http://data-smcmaps.opendata.arcgis.com/datasets?q=Groundwater&sort_by=relevance
- Preliminary Report: http://www.smcsustainability.org/download/energy-water/groundwater/Final-Phase-1-Report.pdf

Workshop #1 – 5/17/2016
Project Introduction and Overview

Workshop #2 – 9/7/2016
Basin Conceptual Model

Workshop #3 – 11/21/2016
Groundwater Flow Model

Workshop #4 – 12/6/2016
Basin Management Options

Workshop #5 – 1/31/2017
Phase 1 Results and Report

Workshop #6 – 8/17/2017
Phase 2 Progress and Phase 3 Planning

Workshop #7 – 11/9/2017
Modeling Activities and SGMA Updates

PHASE 3 SCENARIO MODELING: FOUR SCENARIOS

Baseline

Baseline + Climate Change

Baseline + Climate Change + Urban Demand Pumping Increase

Baseline + Climate Change + Urban Demand Pumping Increase + Implementation of Recharge Projects

- Stepwise approach allows for measurement of incremental effects
- Reflects accumulation of effects and potential local changes to mitigate those effects

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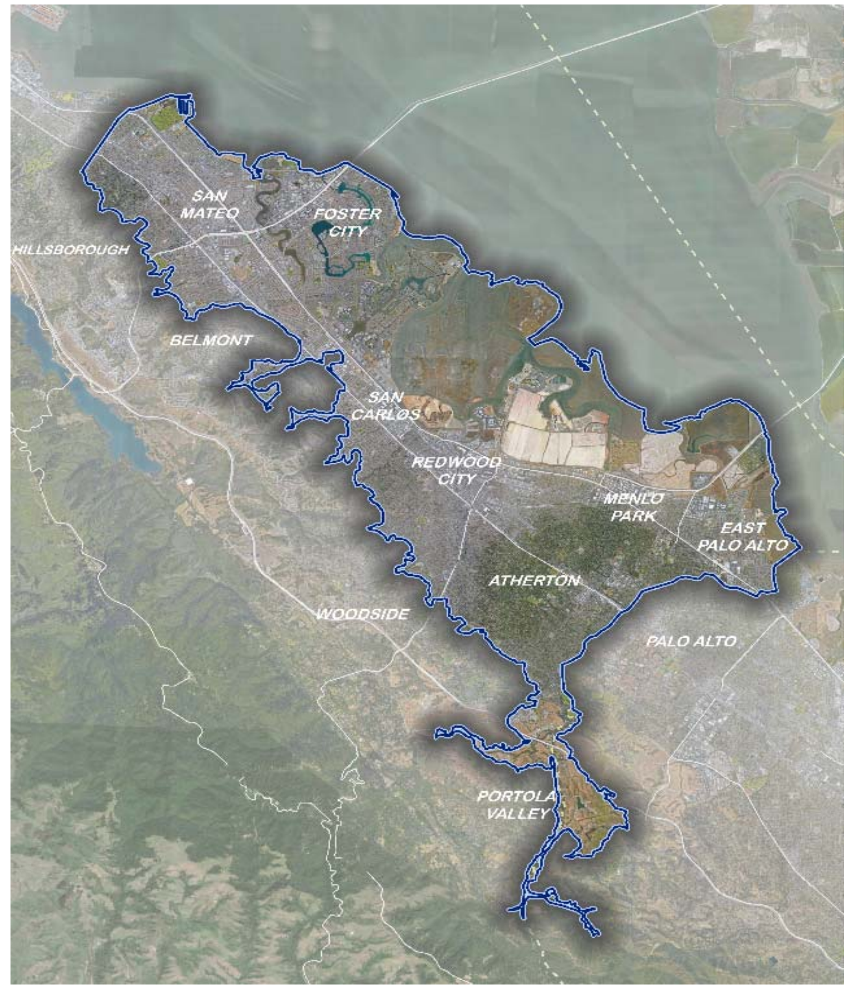
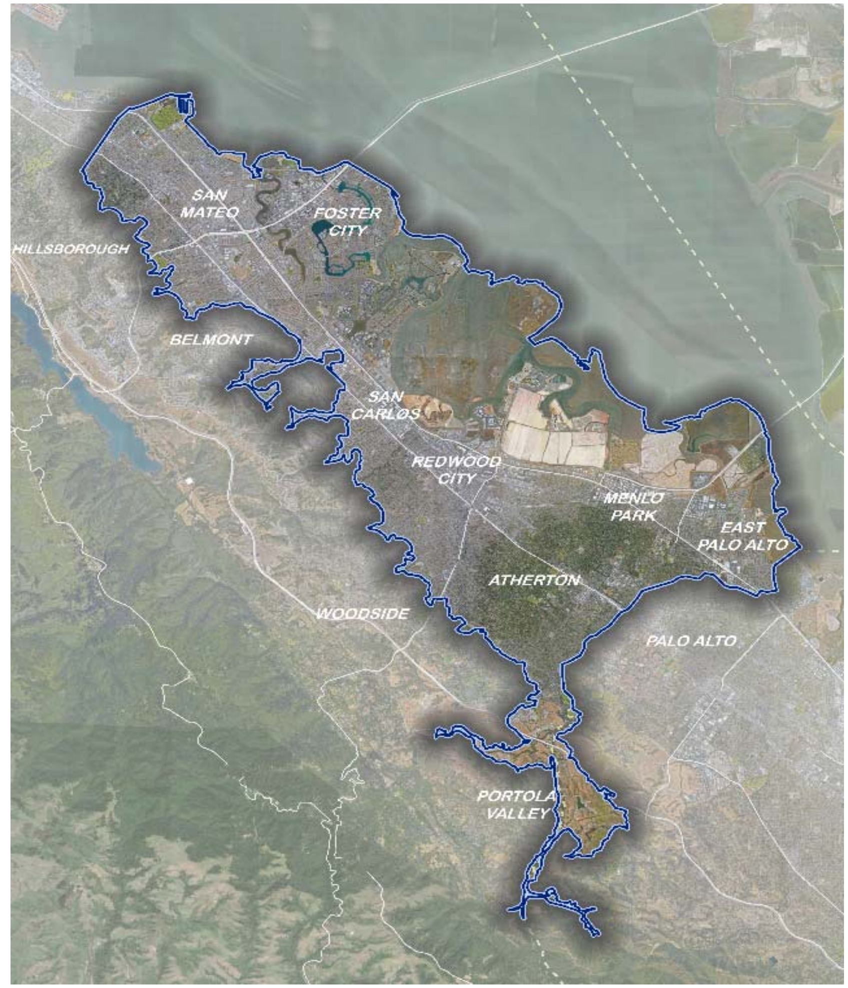
MODEL DEVELOPMENT AND ANALYSIS



MODEL DEVELOPMENT ACTIVITIES

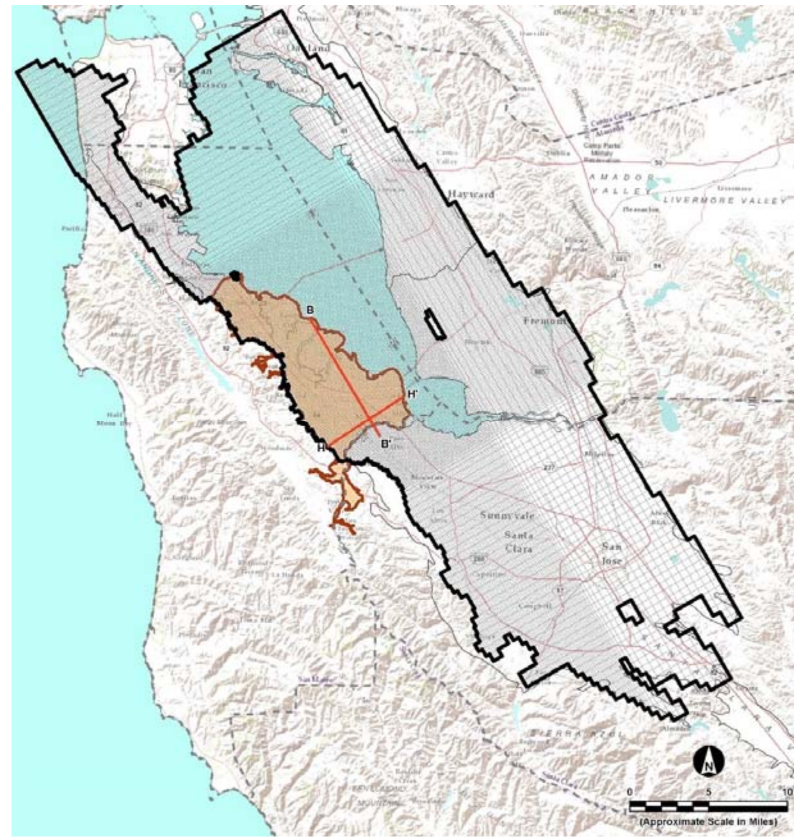
Phase 1	• Development and initial calibration of steady-state model • Development of Basin water balance
Phase 2	• Refinement of Basin water balance • Update of steady-state model to include dewatering pumping • Re-calibration of steady-state model to reflect updated Bay Mud conductivity data (reduced streamflow percolation and dispersed recharge, and increased inflow from bedrock) • Upgrade of model from steady-state to transient, including calibration of storage coefficients • Development of Basin scenarios
Phase 3	• Constraints analysis to inform use scenarios • Calibration of transient model • Application of calibrated transient model to simulate hypothetical future Basin scenarios

MODEL DEVELOPMENT ACTIVITIES – PHASE 1 AND 2



QUANTITATIVE ASSESSMENT OF BASIN CONCEPTUAL MODEL – ACTIVE MODEL GRID (LAYER 1)

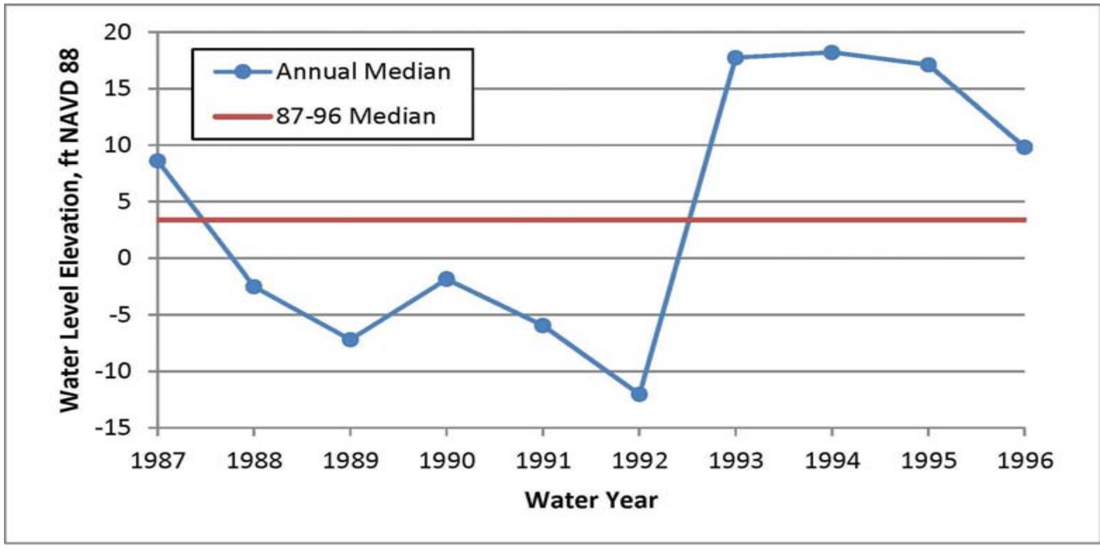
- Physical Boundaries
- 10 – 160 Acre Cell Size
- Water-Levels (Bay/Ocean)
- Specified Inflow (Recharge)
- Specified Outflow (Pumping)



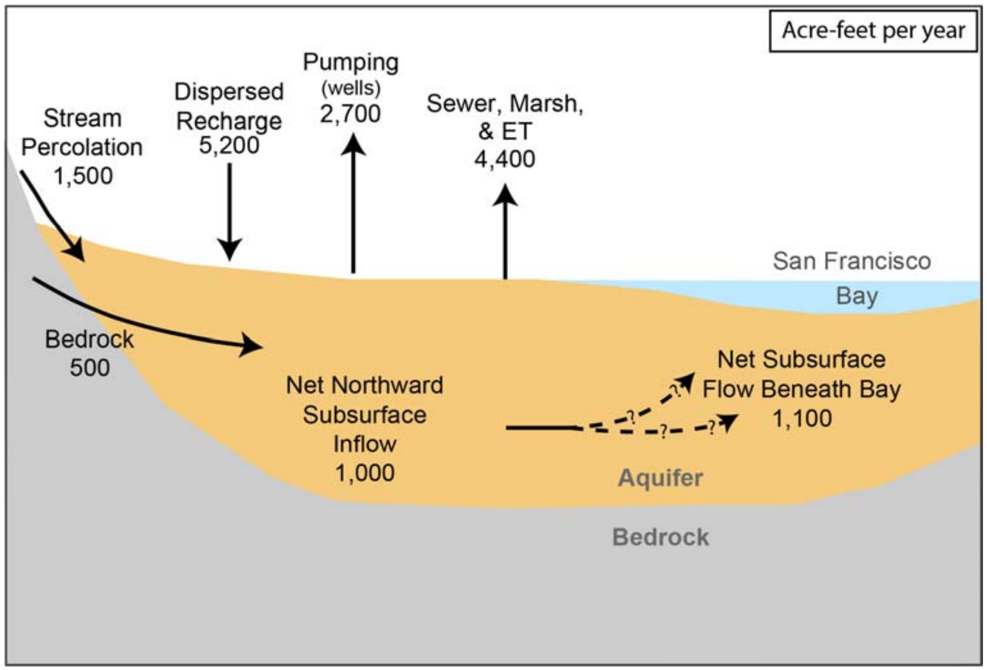
TEMPORAL MODELING APPROACH (AVERAGE 1987-1996 CONDITIONS)

Employed Steady-State approximation:

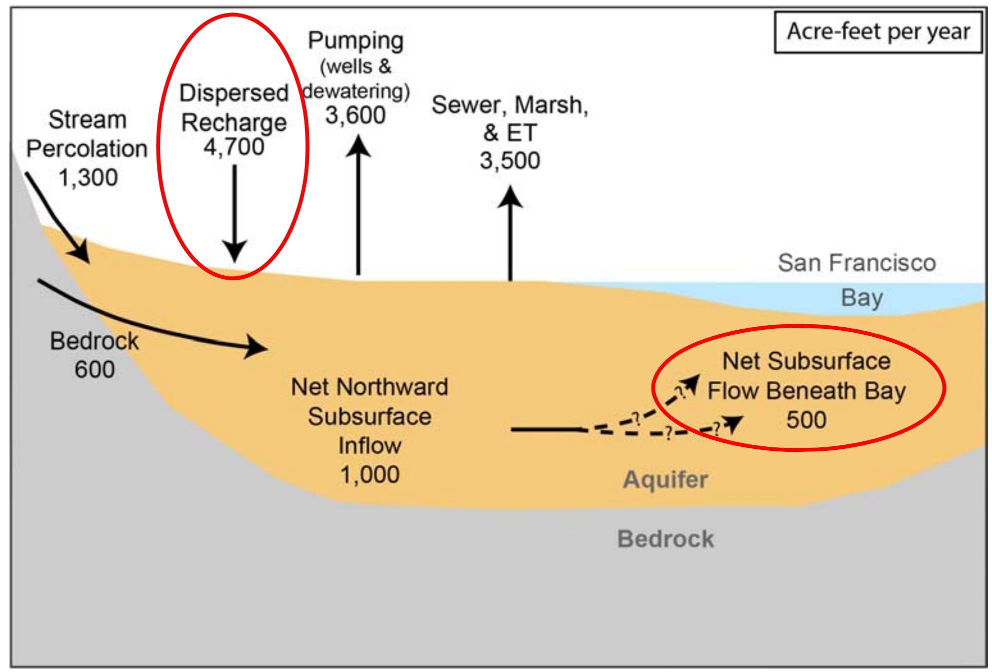
- Average groundwater conditions represented by median measured water levels in wells.
- Calibrate hydraulic conductivity
- Assess hydraulic consistency of the Basin conceptual model
- Evaluate average annual water balance



PHASE 1 AND PHASE 2 STEADY-STATE MODEL WATER BUDGET RESULTS

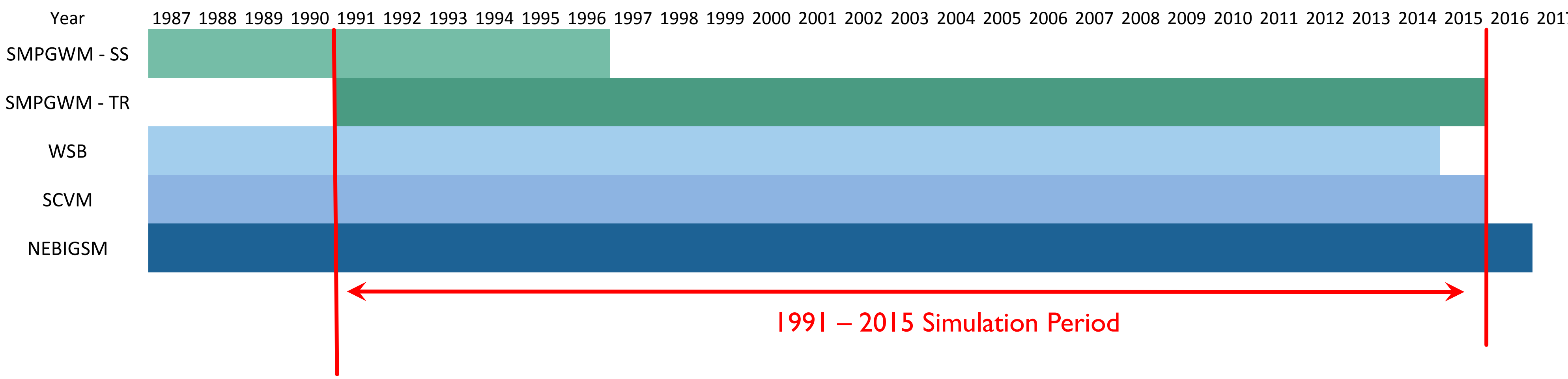


Phase 1



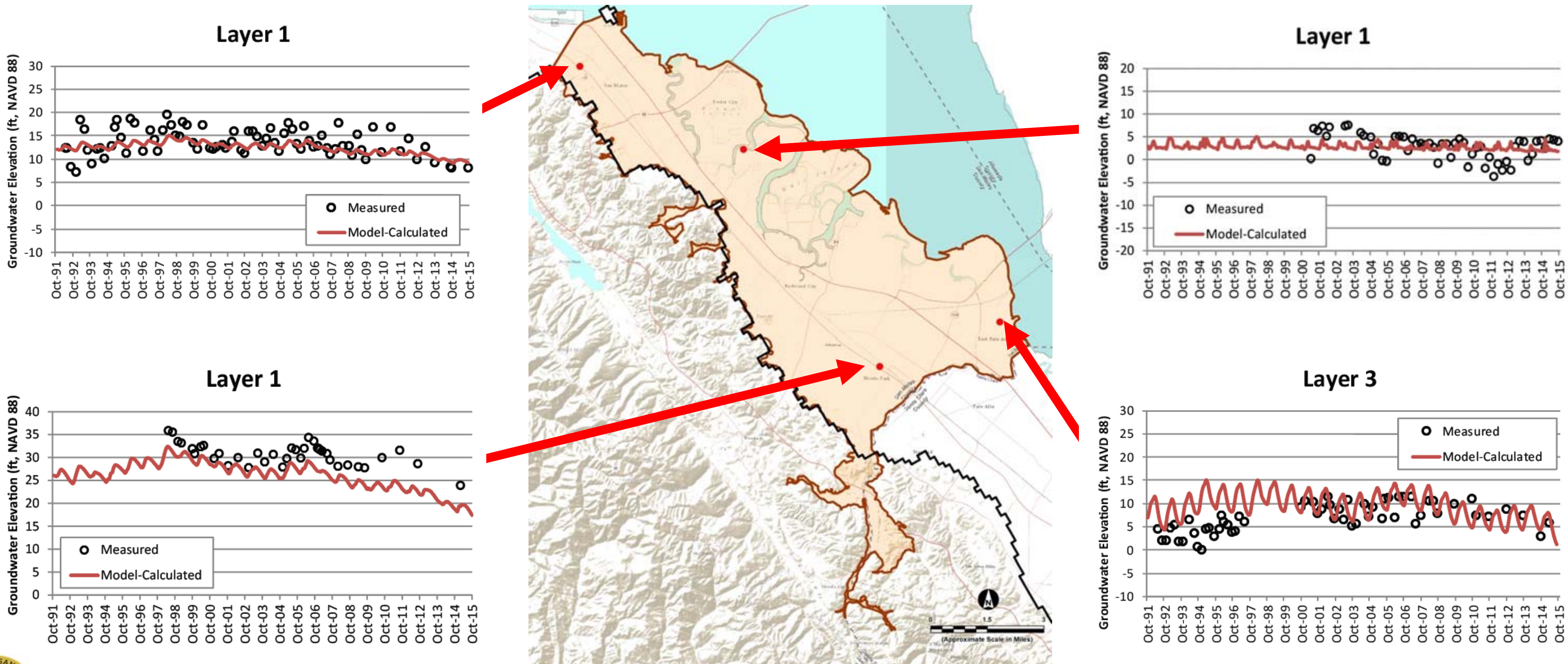
Phase 2

SIMULATION TIMELINE



- SMPGWM – SS — San Mateo Plain Groundwater Model – Steady State
- SMPGWM – TR — San Mateo Plain Groundwater Model - Transient
- WSB — Westside Basin Model
- SCVM — Santa Clara Valley Water District Model
- NEBIGSM — Niles Cones and South East Bay Plain IGSM

PHASE 2 TRANSIENT MODEL
MEASURED AND CALCULATED WATER LEVELS



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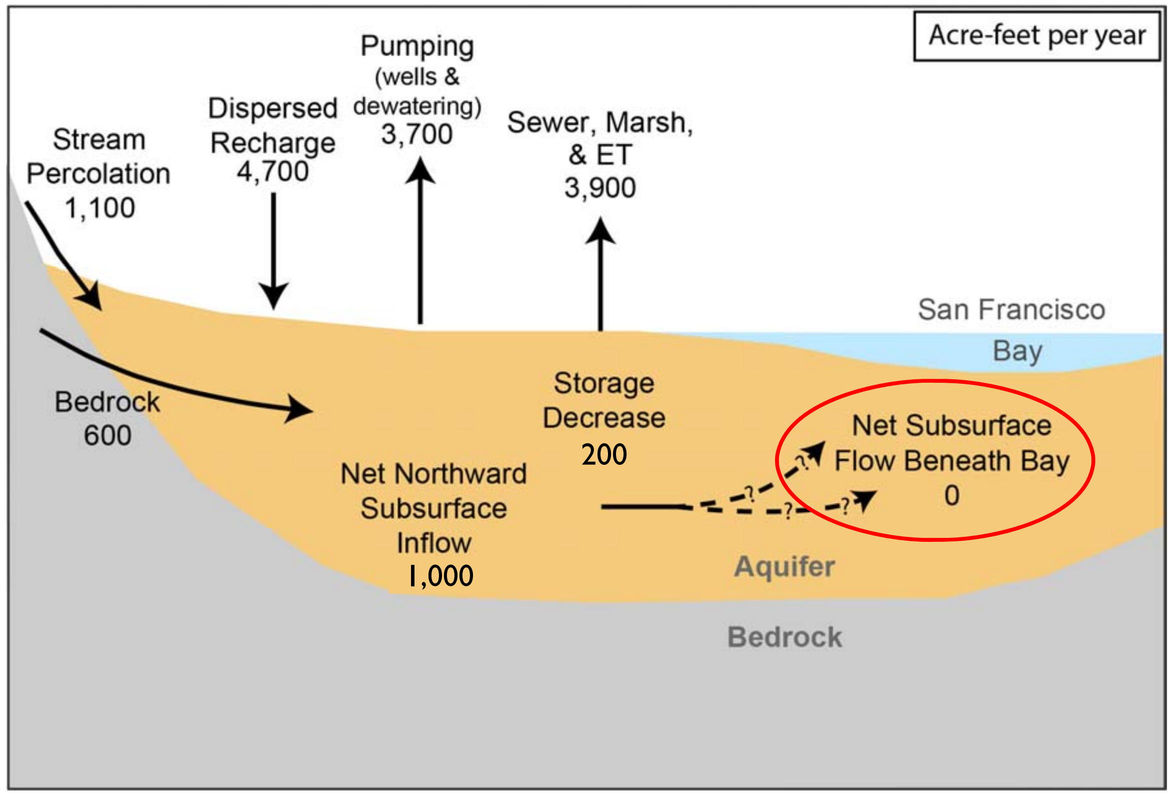
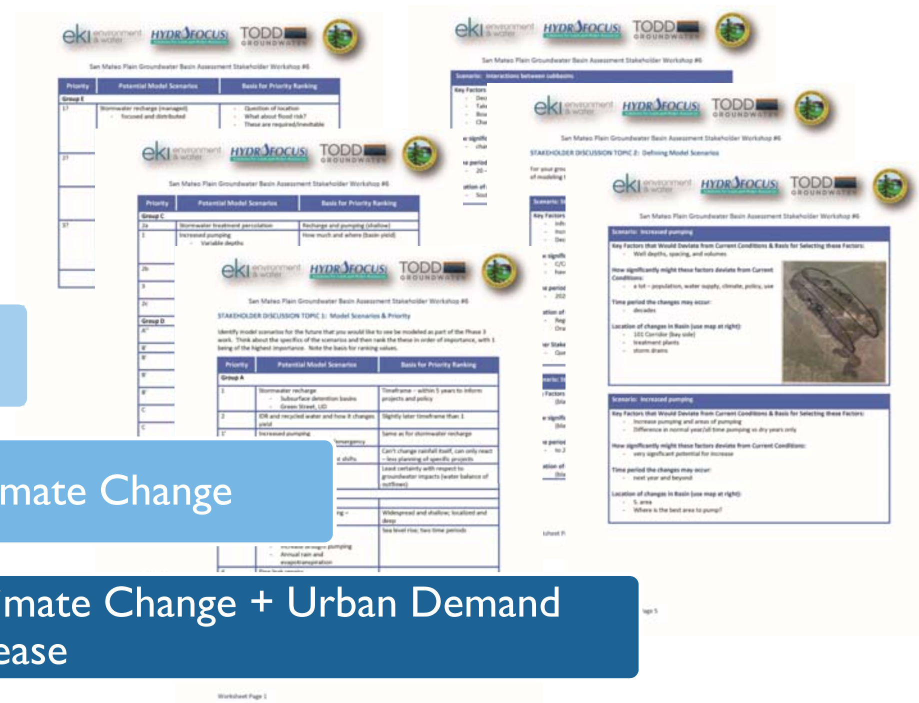
PHASE 2 TRANSIENT MODEL AVERAGE WATER BUDGET ("HISTORICAL" 1992-2015)

- Seepage to sewer, marsh and riparian ET greater than in steady-state model
- Net subsurface flow beneath Bay decreases to zero



MODEL SCENARIO DEVELOPMENT

- Reflects input from Workshops 6 and 7
- Stepwise approach allows for measurement of incremental effects
- Reflects accumulation of effects and potential local changes to mitigate those effects



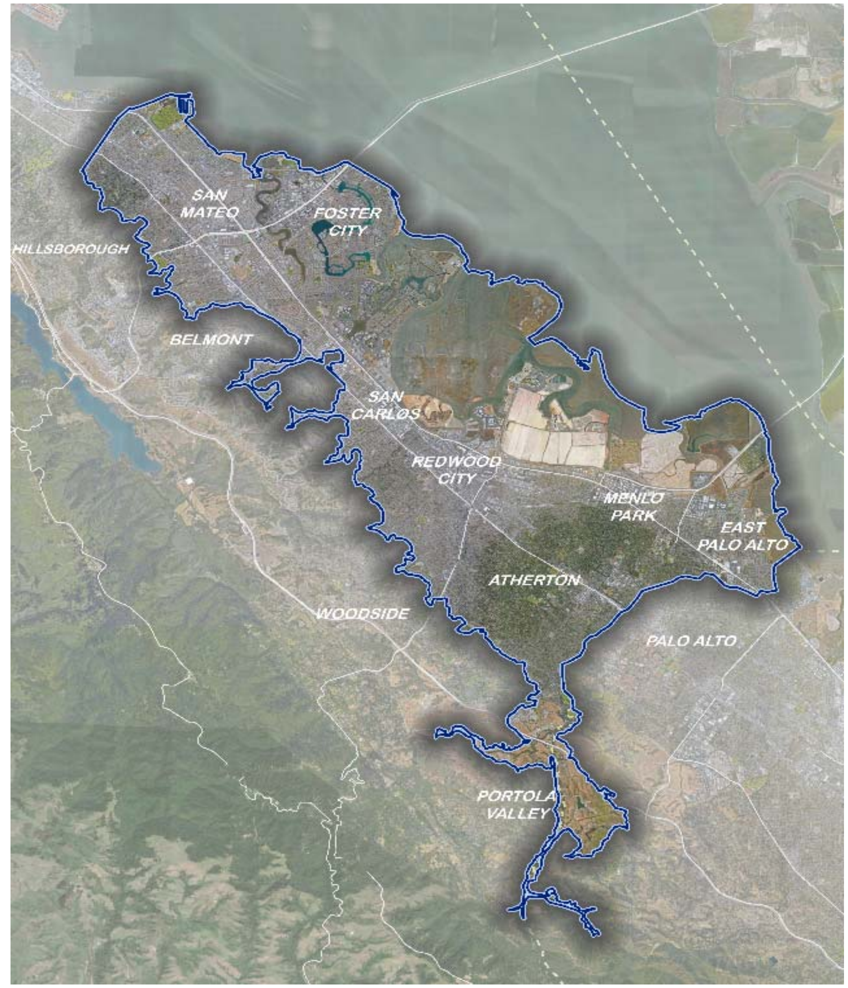
Baseline

Baseline + Climate Change

Baseline + Climate Change + Urban Demand Pumping Increase

Baseline + Climate Change + Urban Demand Pumping Increase + Implementation of Recharge Projects

PHASE 3 SCENARIO MODELING METHODS AND RESULTS



PHASE 3 SCENARIO MODELING: FOUR SCENARIOS

Baseline

Baseline + Climate Change

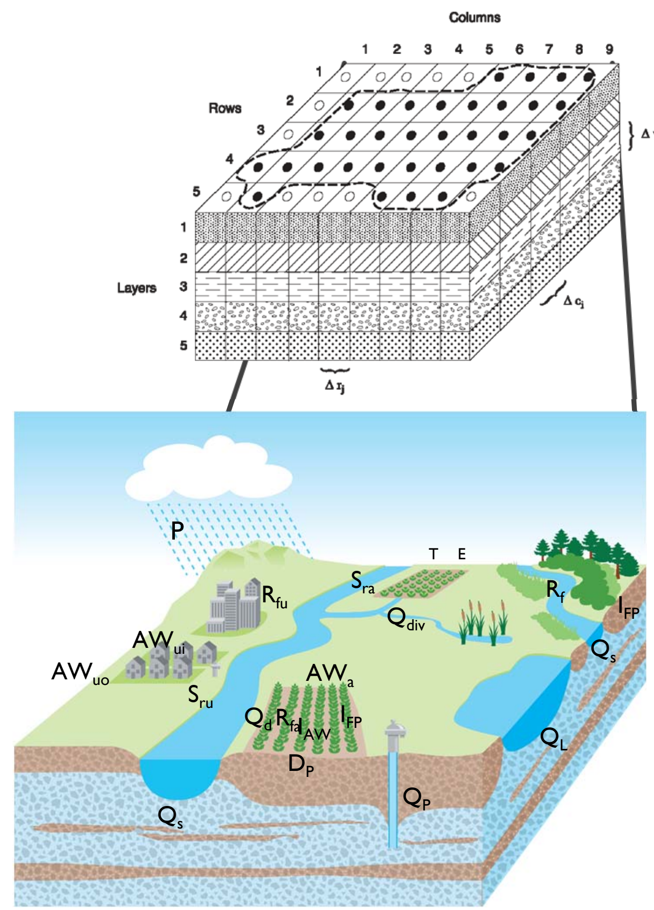
Baseline + Climate Change + Urban Demand Pumping Increase

Baseline + Climate Change + Urban Demand Pumping Increase + Implementation of Recharge Projects

- Stepwise approach allows for measurement of incremental effects
- Reflects accumulation of effects and potential local changes to mitigate those effects

MODEL LIMITATIONS & CONSIDERATIONS

- Goal is to understand the Basin's sensitivity to changed conditions or management
- The more complex the scenarios, the fewer that can be completed for Phase 3 – selected 4 scenarios
- Focused on changes <u>within</u> the San Mateo Plain Basin only
- <u>Not</u> intended to analyze the impact of any single project or collection of projects (within or outside of Basin)*



*Model will be available to others to use for this purpose, as desired

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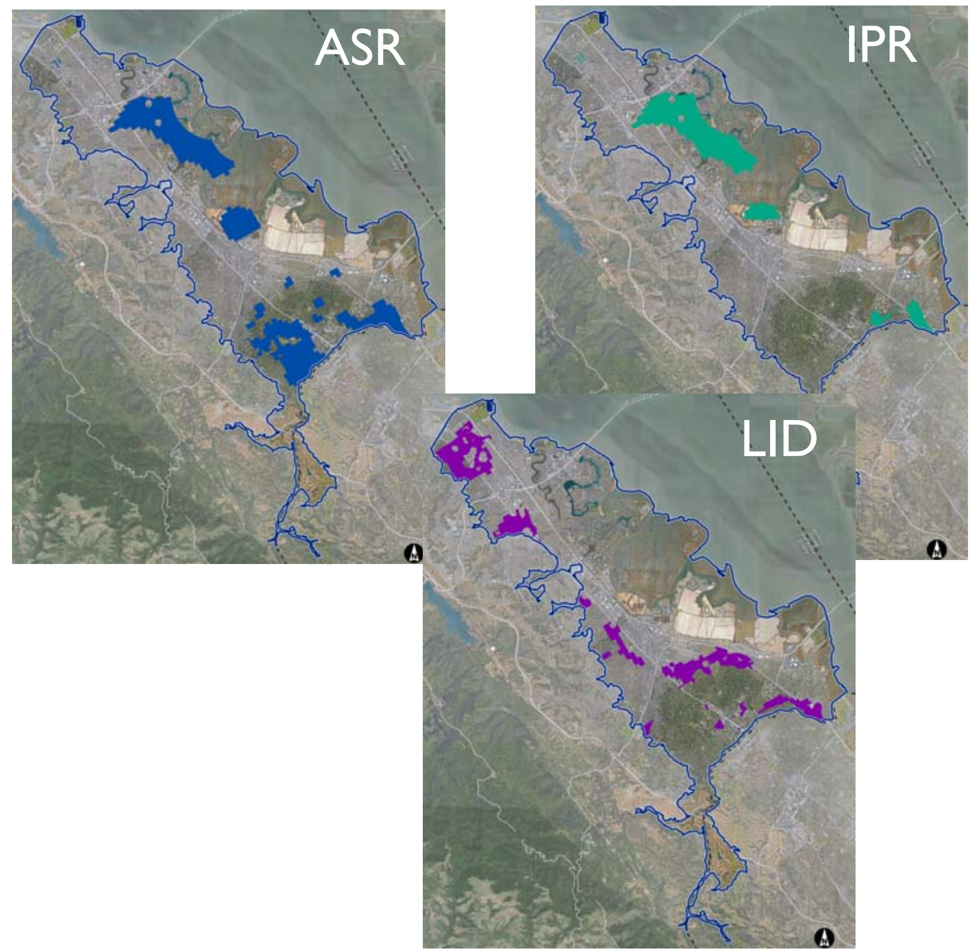
CONSTRAINTS ANALYSIS

- Refined the evaluation of areas for potential projects:
  - Aquifer Storage and Recovery (ASR)
  - Indirect Potable Reuse (IPR)
  - Stormwater Recharge (LID)
- Used to identify locations where future pumping, distributed recharge, and injection are modeled

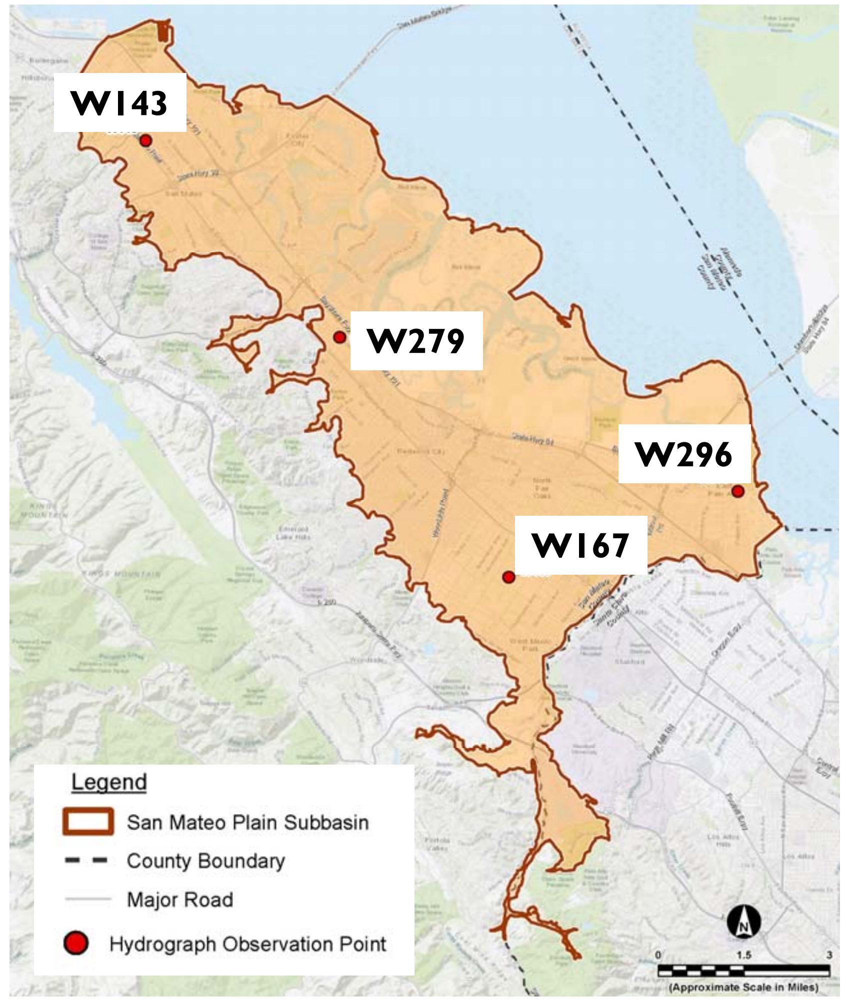


COMPARATIVE EVALUATION OF RESULTS

- Hydrographs at Selected Simulated "Observation" Points
- Groundwater Elevation Contours – Absolute and Difference Compared to Baseline
- Long-Term Average Water Budget

HYDROGRAPH WELL LOCATIONS

Well	Location in Basin	Screened Interval (ft bgs)
W143	North	Deep: 60 to 180
W279	Central	Shallow: 7 to 20
W167	South, SF Cone	Deep: 80 to 180
W296	South, near Bay shore	Deep: 164 to 184



SCENARIO 1: BASELINE

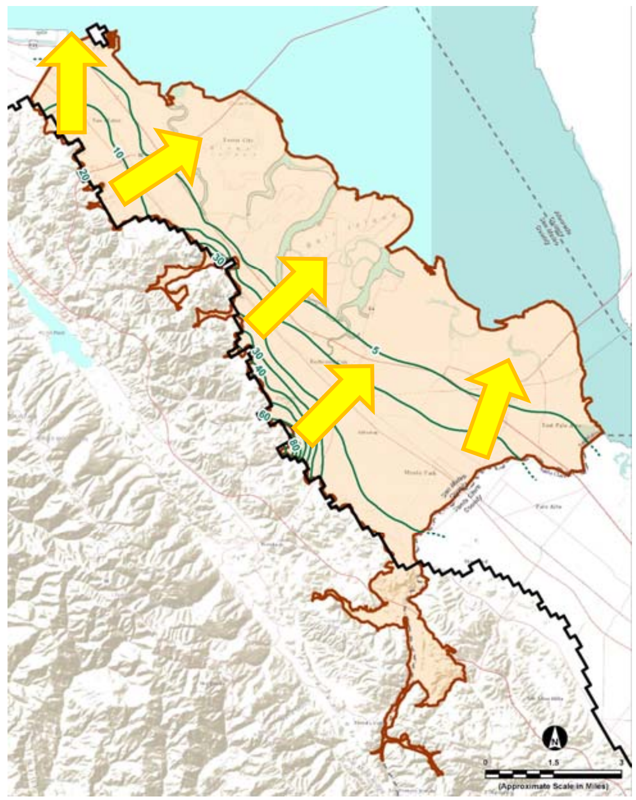
Hydrology (rainfall and ET)	1991 – 2015 (repeated)
Land and Water Use	Based on 2015 conditions
Average Dispersed Recharge and Bedrock Recharge	5,300 AFY (repeat of 1991 – 2015)
Stream Percolation	1,100 AFY (repeat of 1991 – 2015)
Average Specified Groundwater Pumping (in Basin)	2,500 AFY (average from 2011-2015); slightly greater than 1991 – 2015 average

MODEL-CALCULATED WATER LEVELS

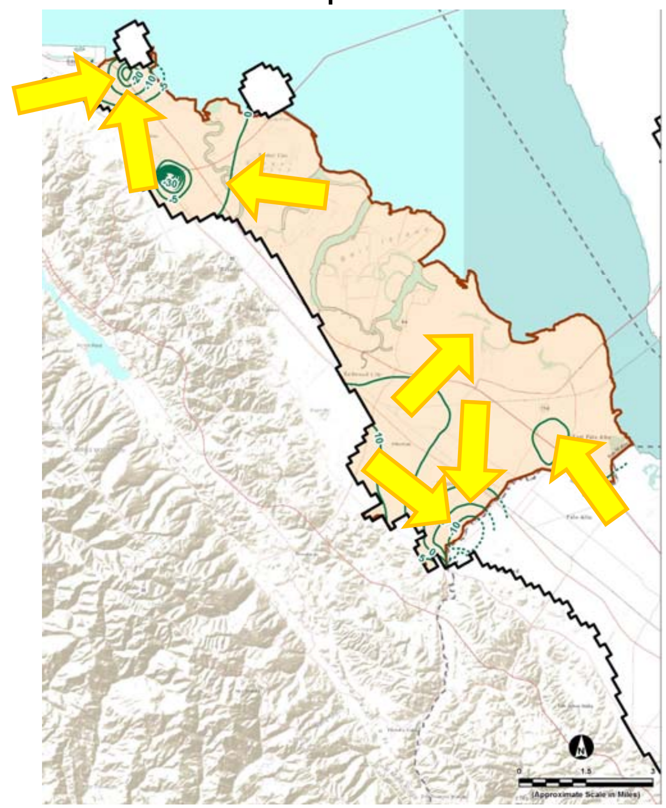
Snapshot at end of simulation period (low point)

- Shallow Zone (Layers 1, 2)
  - Flow generally towards Bay
  - Some outflow to north and inflow from south
- Deep Zone (Layers 3, 4, 5)
  - Flow towards pumping centers
  - Some inflow from east and outflow to south
  - Water levels in majority of Basin above sea level

Shallow Zone



Deep Zone



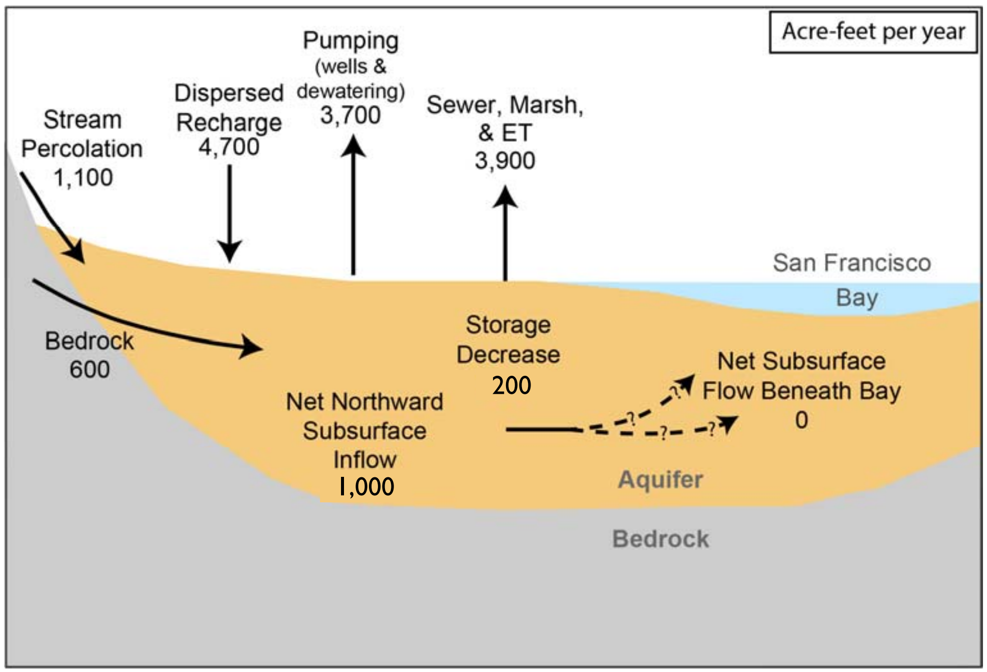
	Historical Period (WY 1992-2015)	Projected Future Scenarios			
		Scenario 1	Scenario 2	Scenario 3	Scenario 4
Inflows (AFY)					
Dispersed Recharge	4,700	**4,700**	4,700	4,700	4,900
Stream Percolation					
San Francisquito Creek	400	**400**	[illegible]	[illegible]	400
San Mateo Creek	200	**200**	[illegible]	[illegible]	200
Other creeks	500	**500**	[illegible]	[illegible]	500
Bedrock Inflow	600	**600**	[illegible]	[illegible]	600
Injection	0	**0**	0	0	1,800
Inflow from the South (from Santa Clara Subbasin)	1,100	**300**	[illegible]	[illegible]	100
Inflow from the East (beneath San Francisco Bay)	0	**800**	[illegible]	[illegible]	400
TOTAL INFLOWS	7,500	**7,500**	7,000	8,100	8,800
Outflows (AFY)					
Wells	2,700	**2,500**	[illegible]	[illegible]	4,500
Dewatering	1,000	**900**	[illegible]	[illegible]	1,000
Groundwater Seepage					
Riparian ET, Creeks and Tidal Wetlands	2,500	**2,600**	1,300	1,100	1,300
Sewers	1,400	**1,300**	1,500	1,300	1,500
San Francisco Bay	0	**0**	500	400	500
Outflow to the East (beneath San Francisco Bay)	0	**0**	0	0	0
Outflow to the North (to Westside Basin)	100	**200**	200	100	200
TOTAL OUTFLOWS	7,700	**7,500**	7,000	8,400	9,000
STORAGE CHANGE	-200	**-100**	0	-200	-100

Decreased inflow from Santa Clara Subbasin relative to "Historical" period

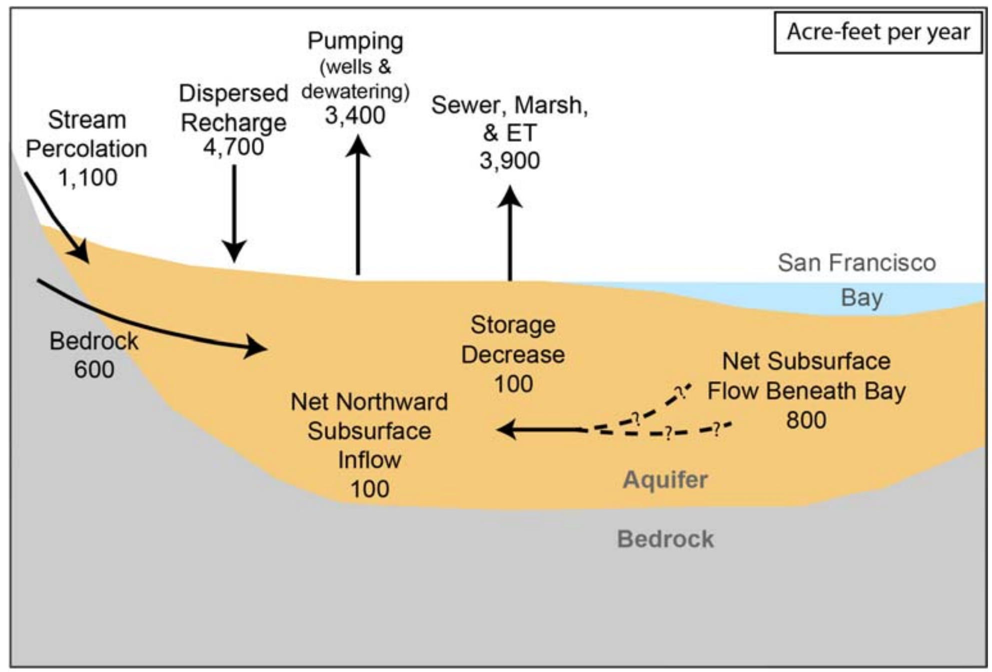
Increased inflow from Beneath the Bay

Decreased pumping and dewatering

HISTORICAL AND BASELINE MODEL RESULTS



"Historical" Simulation



Baseline Scenario

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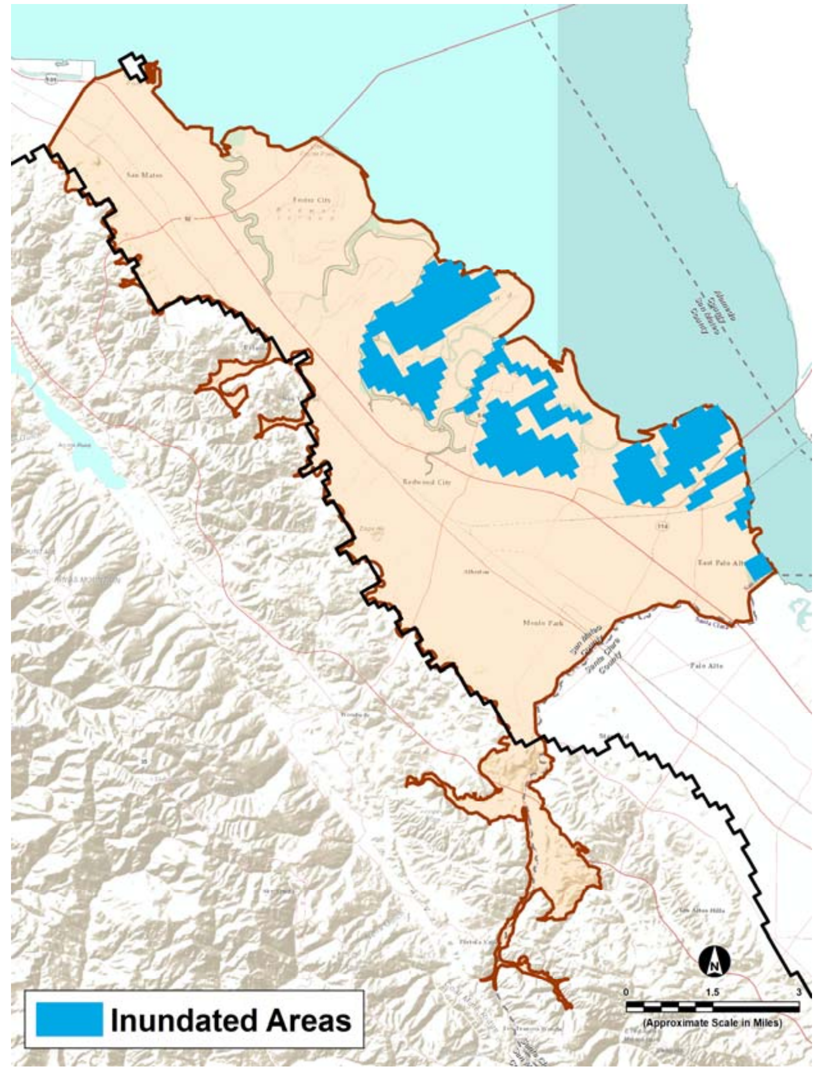
SCENARIO 2: BASELINE + CLIMATE CHANGE

Hydrology (rainfall and ET)	1991 – 2015, modified to include 2026-2050 estimated climate change: **Rainfall increase 4%** **Reference Evapotranspiration increase 3%**
Land and Water Use	Based on 2015 conditions, modified to account for Sea Level Rise **Sea Level increase 8.5 ± 3 inches by 2040**
Average Dispersed Recharge and Bedrock Recharge	
Stream Percolation	
Average Specified Groundwater Pumping (in Basin)	

MODELING CONDITIONS WITH SEA LEVEL RISE (2040)

- Estimated model areas inundated by projected 8.5 inch sea level rise by 2040 (California Ocean Protection Council, 2013, State of California Sea-Level Rise Guidance Document.)
- Converted model cells from "Drain" boundary condition to "General Head" boundary condition



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Land and Water Use	Based on 2015 conditions, modified to account for Sea Level Rise **Sea Level increase 8.5 ± 3 inches by 2040**
Average Dispersed Recharge and Bedrock Recharge	5,300 AFY (repeat of 1991 – 2015); **revised using updated Hydrology – effect was negligible**
Stream Percolation	1,100 AFY (repeat of 1991 – 2015); **revised using updated runoff – effect was negligible**
Average Specified Groundwater Pumping (in Basin)	

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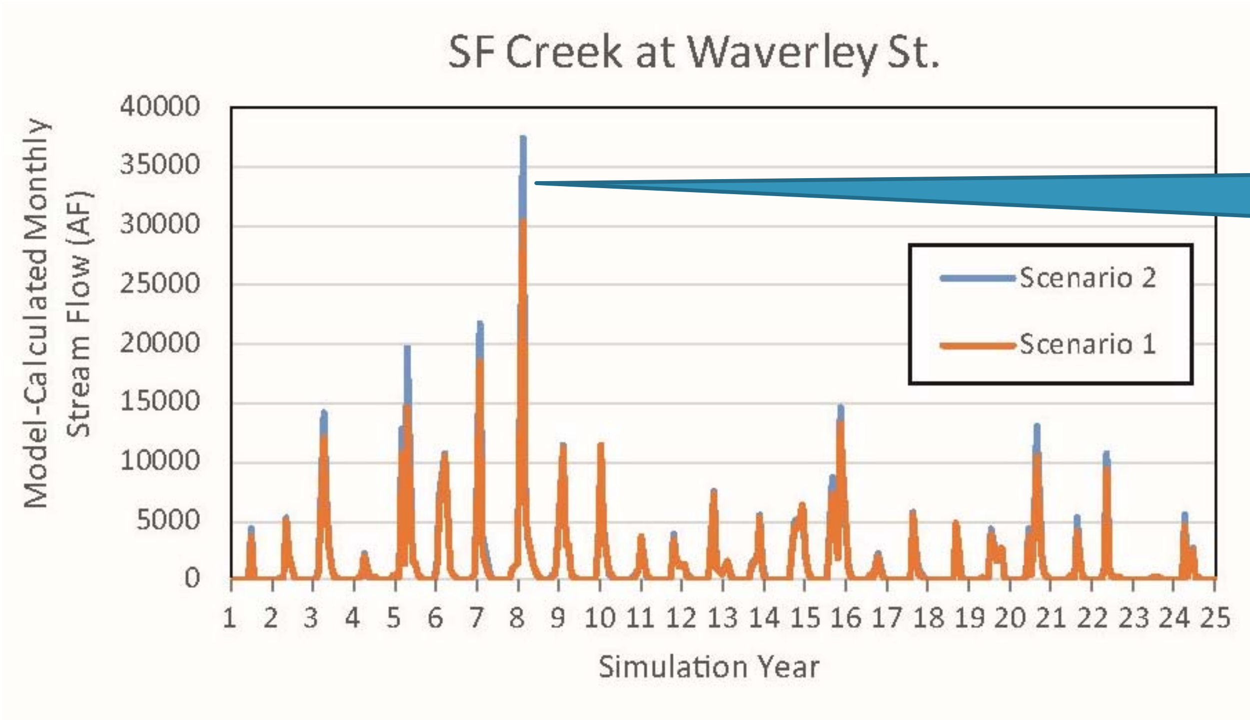
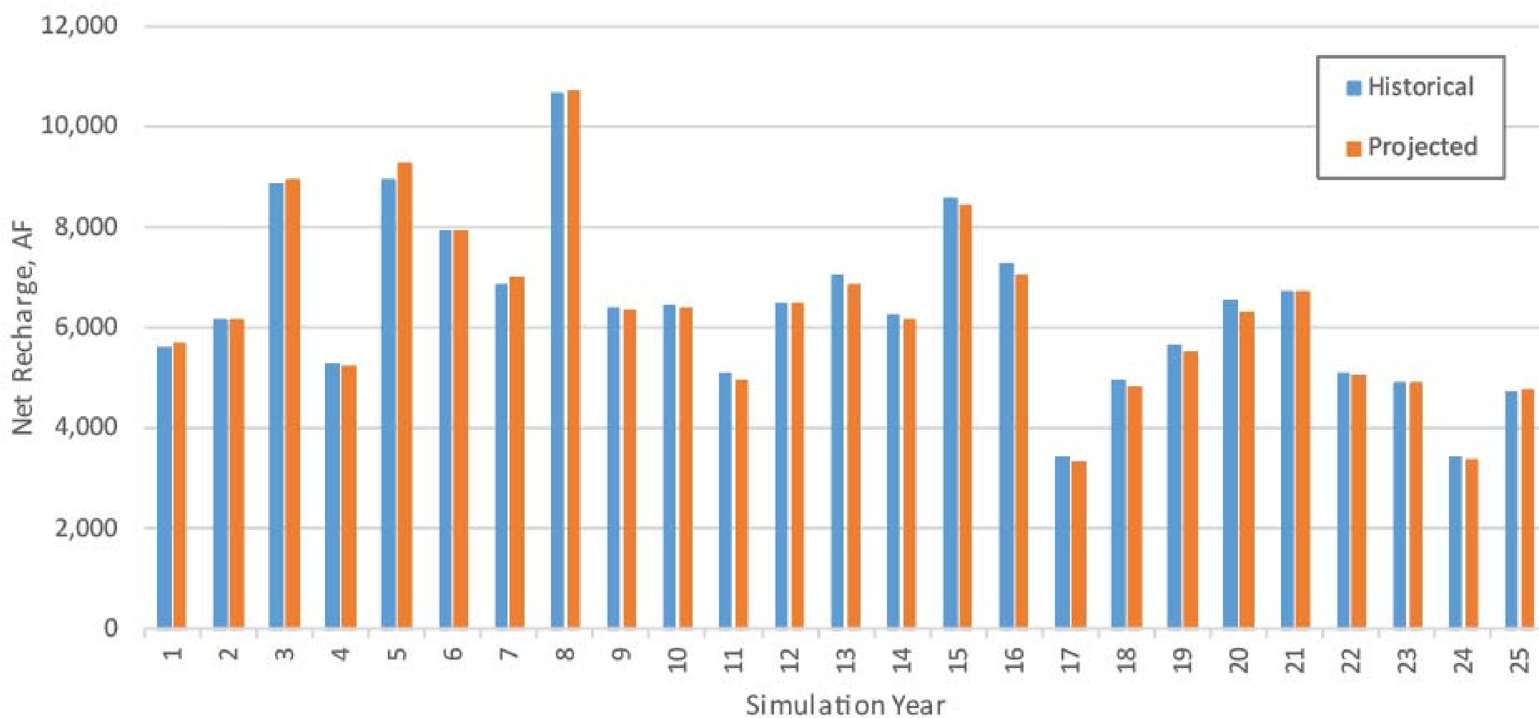
MODEL-CALCULATED STREAM FLOWS



Projected climate change results in higher peak flows during wet years

HISTORICAL AND PROJECTED NET RECHARGE WITH CLIMATE CHANGE



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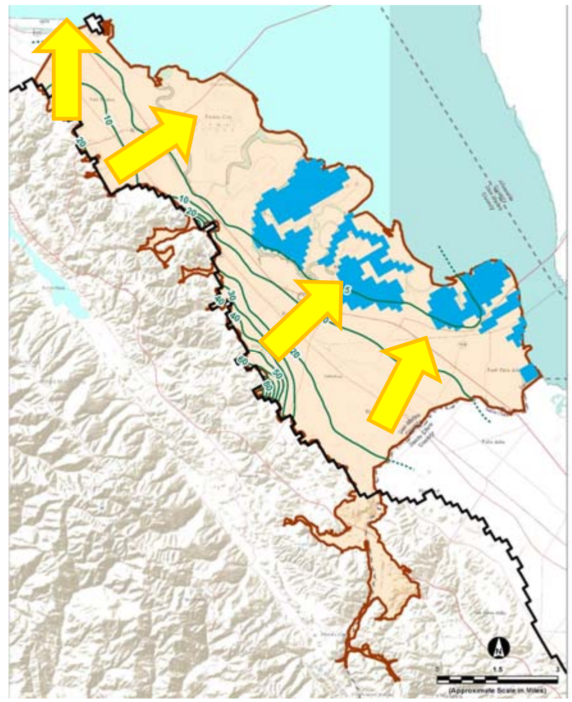
Average Dispersed Recharge and Bedrock Recharge	5,300 AFY (repeat of 1991 – 2015); **revised using updated Hydrology – effect was negligible**
Stream Percolation	1,100 AFY (repeat of 1991 – 2015); **revised using updated runoff – effect was negligible**
Average Specified Groundwater Pumping (in Basin)	2,500 AFY (average from 2011-2015); **Revised using updated irrigation demand – effect was negligible**

MODEL-CALCULATED WATER LEVELS

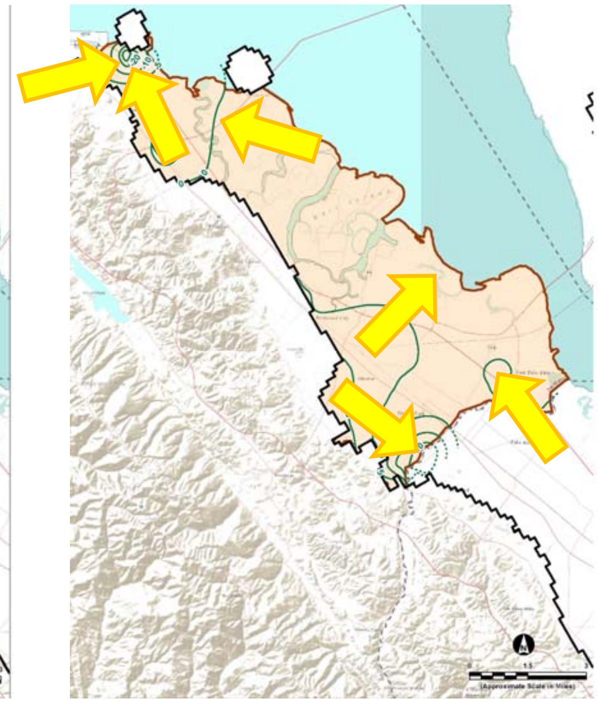
Snapshot at end of simulation period (low point)

- Both Shallow and Deep Zones very similar to Scenario 1 Baseline
- Shallow Zone
  - Flow generally towards Bay
  - Some outflow to north and inflow from south
- Deep Zone
  - Flow towards pumping centers
  - Some inflow from east and outflow to south
  - Water levels in majority of Basin above sea level

Shallow Zone



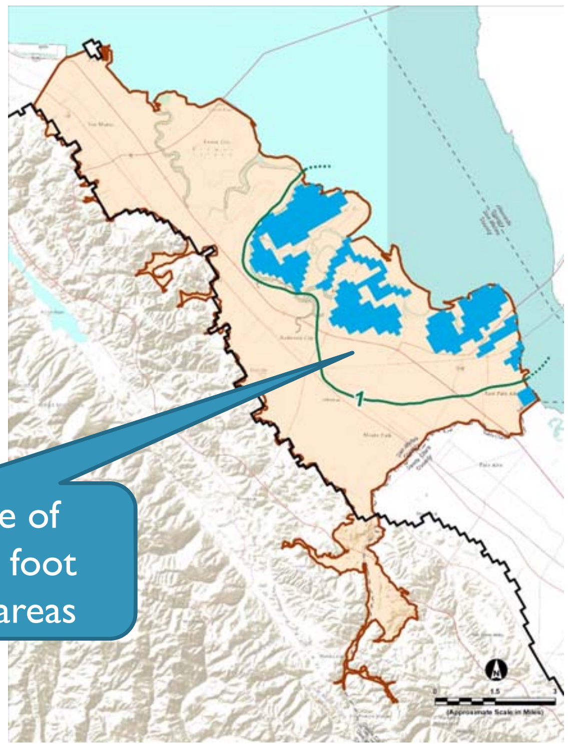
Deep Zone



MODEL-CALCULATED WATER LEVELS

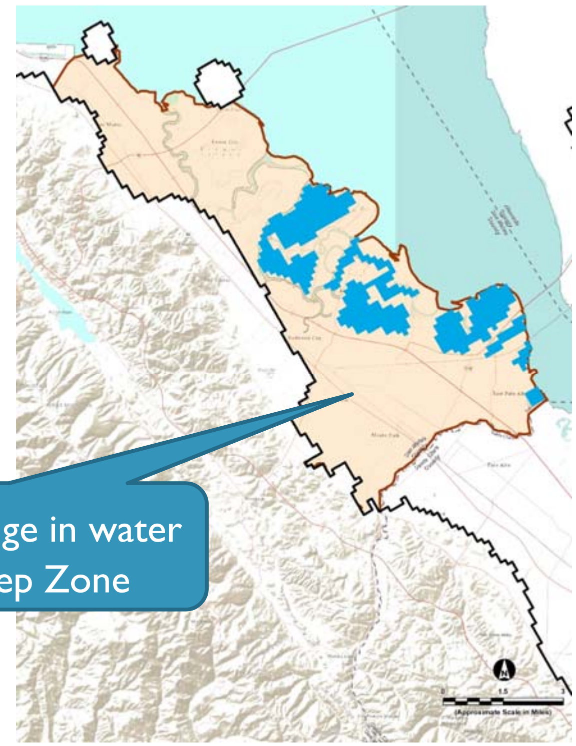
Difference Between Baseline (Scenario 1) and Scenario 2

Shallow Zone



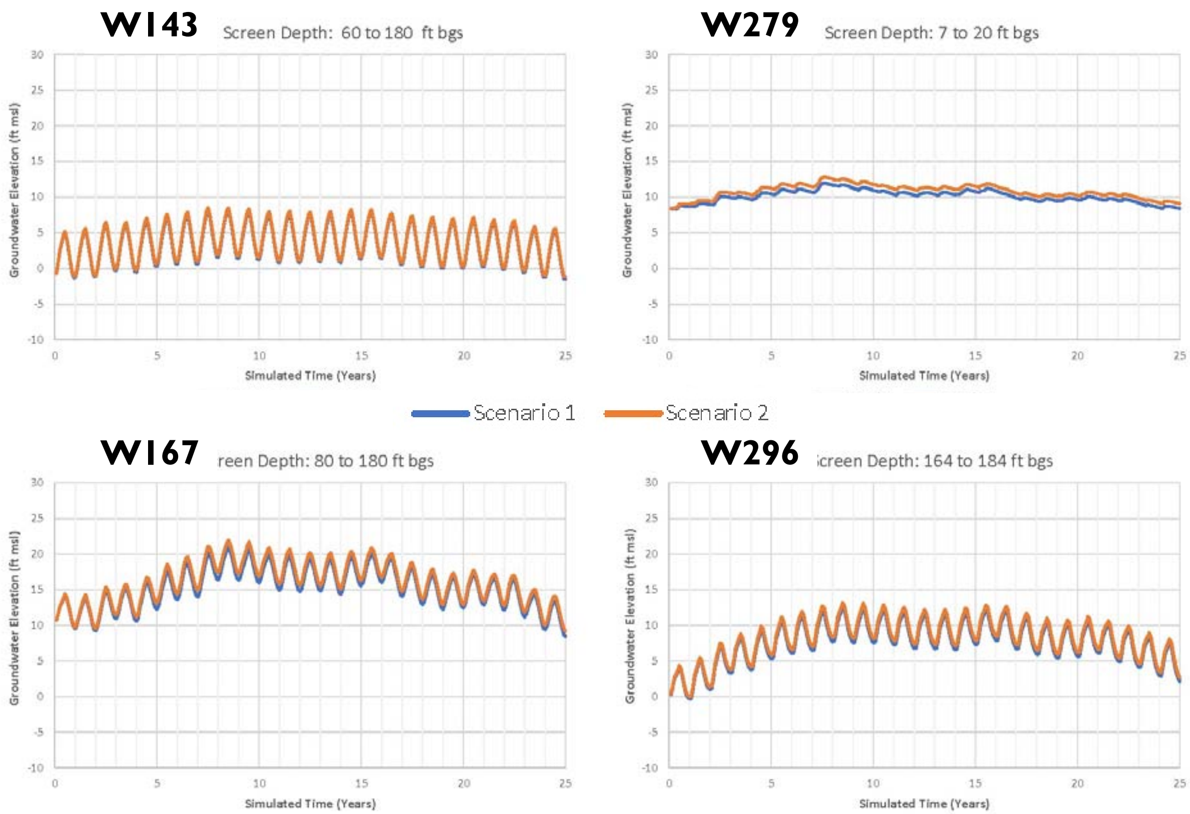
Water level rise of greater than 1.0 foot near inundated areas

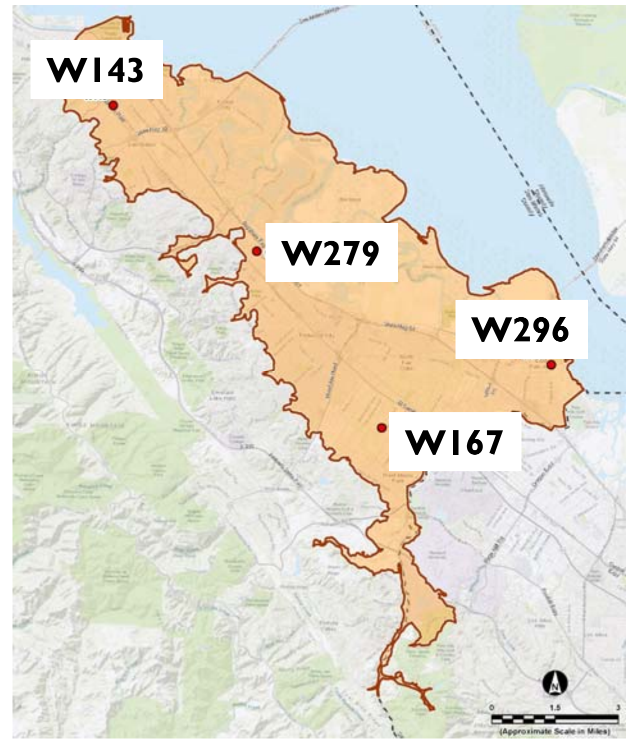
Deep Zone



Negligible change in water levels in Deep Zone

MODEL-CALCULATED WATER LEVELS





	Historical Period (WY 1992-2015)	Projected Future Scenarios			
		Scenario 1	**Scenario 2**	**Scenario 3**	**Scenario 4**
Inflows (AFY)					
Dispersed Recharge	4,700	4,700	**4,700**	4,700	4,900
Stream Percolation					
San Francisquito Creek	400	400	**400**		
San Mateo Creek	200	200	**200**		
Other creeks	500	500	**500**		500
Bedrock Inflow	600	600	**600**	600	600
Injection	0	0	**0**	0	1,800
Inflow from the South (from Santa Clara Subbasin)	1,100	300	**100**		
Inflow from the East (beneath San Francisco Bay)	0	800	**500**		
TOTAL INFLOWS	7,500	7,500	**7,000**		
Outflows (AFY)					
Wells	2,700	2,500	**2,500**		
Dewatering	1,000	900	**1,000**		
Groundwater Seepage					
Riparian ET, Creeks and Tidal Wetlands	2,500	2,600	**1,300**		
Sewers	1,400	1,300	**1,500**		
San Francisco Bay	0	0	**500**		
Outflow to the East (beneath San Francisco Bay)	0	0	**0**		
Outflow to the North (to Westside Basin)	100	200	**200**		
TOTAL OUTFLOWS	7,700	7,500	**7,000**		
STORAGE CHANGE	-200	-100	**0**		

Decreased inflow from Santa Clara Subbasin

Decreased inflow from beneath the bay

Decreased seepage from riparian ET, creeks, and tidal wetlands due to change in boundary condition and increased sea level

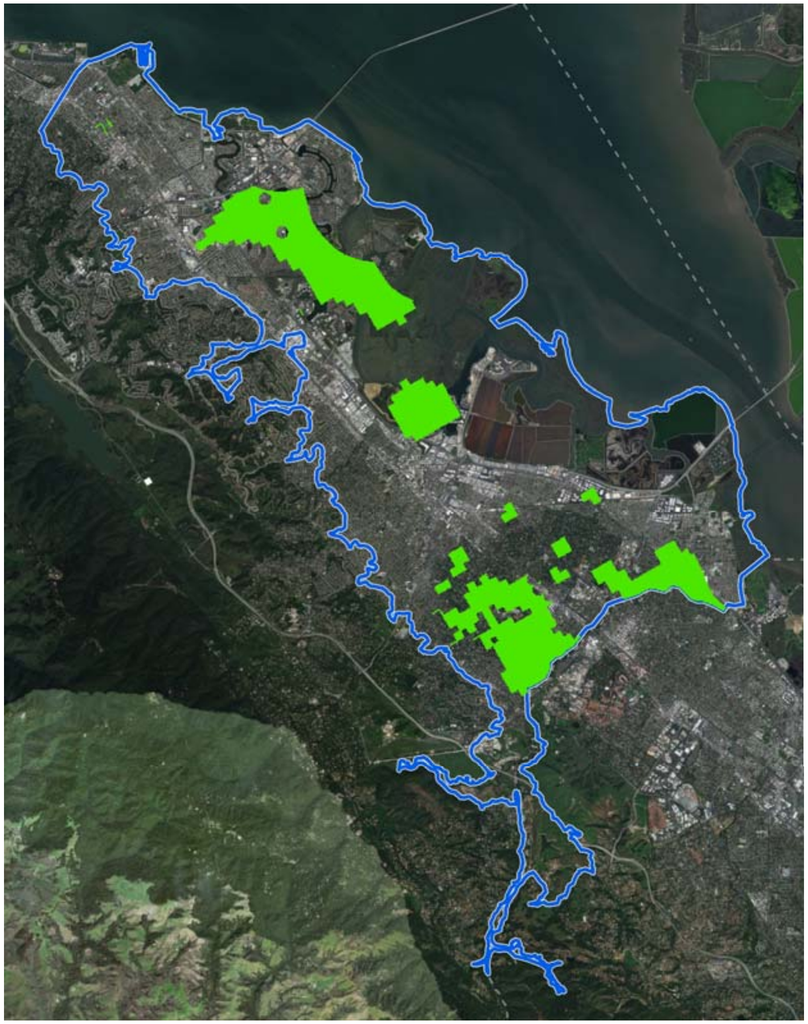
Increased seepage to SF Bay due to change in boundary condition

SCENARIO 3: BASELINE + CLIMATE CHANGE + URBAN DEMAND PUMPING INCREASE

Hydrology (rainfall and ET)	1991 – 2015, modified to include 2026-2050 estimated climate change: **Same as Scenario 2**
Land and Water Use	Based on 2015 conditions, modified to account for Sea Level Rise **Same as Scenario 2**
Stream Percolation	1,100 AFY (repeat of 1991 – 2015); **Same as Scenario 2**
Average Specified Groundwater Pumping (in Basin)	4,500 AFY (average from 2011-2015); **Increased Deep Zone pumping by 2,000 AFY to reflect potential increased demand**
Average Dispersed Recharge and Bedrock Recharge	5,300 AFY (repeat of 1991 – 2015); **Revised based on increase specified urban pumping; effect is negligible (less than 100 AFY increase)**

CONSTRAINTS ANALYSIS TO EVALUATE POTENTIAL INCREASED GROUNDWATER PUMPING AREAS

- Areas where pumping could potentially increase:
  - Combined thickness of model layers 3-5 > 100 ft
  - Fraction of coarse-grained material > 40% in at least one layer
  - Minimum 500 ft from open contamination site
  - Minimum 1 mile from existing or projected Bayshore
- 2,000 AFY increase in extraction rate in Basin relative to Baseline



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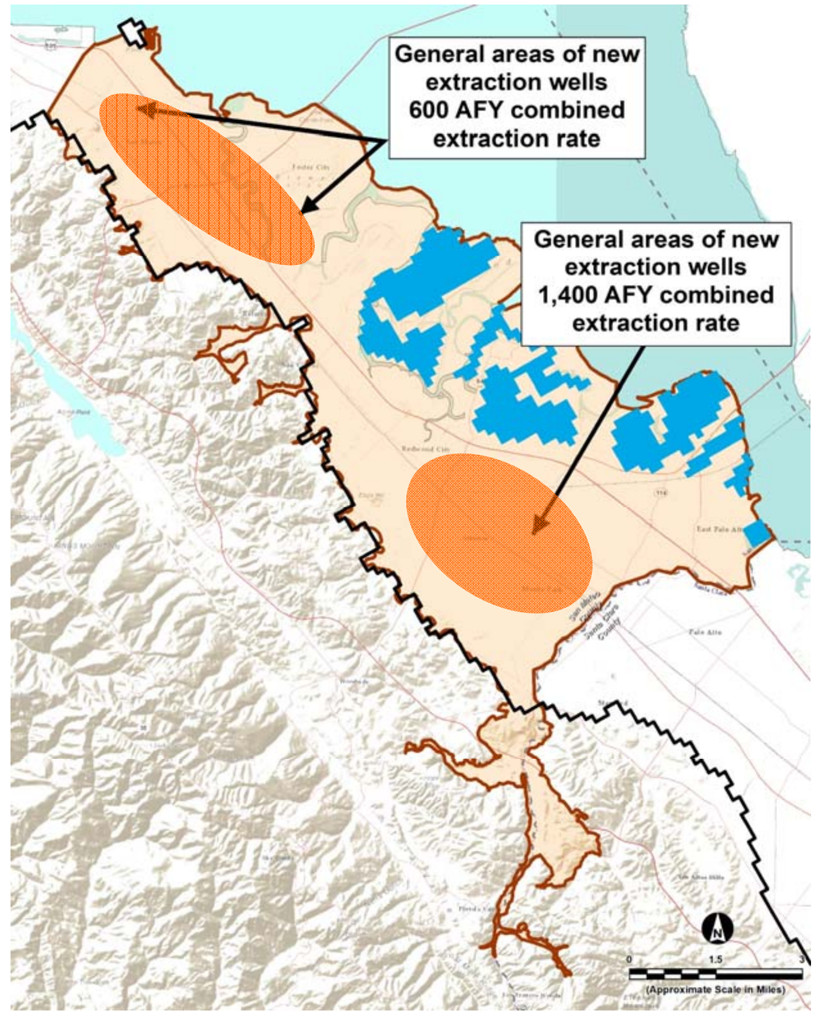
MODELING POTENTIAL INCREASED GROUNDWATER DEVELOPMENT

- 2,000 AFY increase groundwater production within the Basin
- Distributed into northern and southern portions of Basin
  - North: approx. 30% or 600 AFY
  - South: approx. 70% or 1,400 AFY
- Minimum 1,500 ft separation between extraction wells (existing and new).

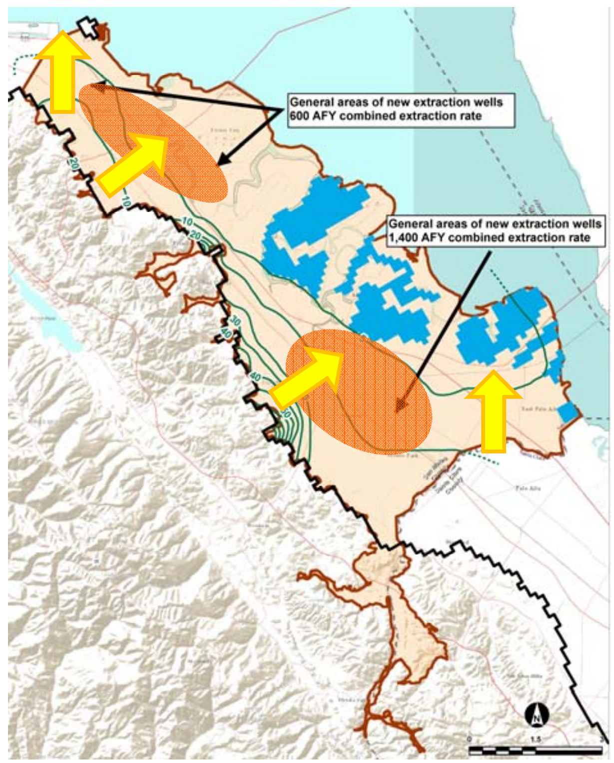


MODEL-CALCULATED WATER LEVELS

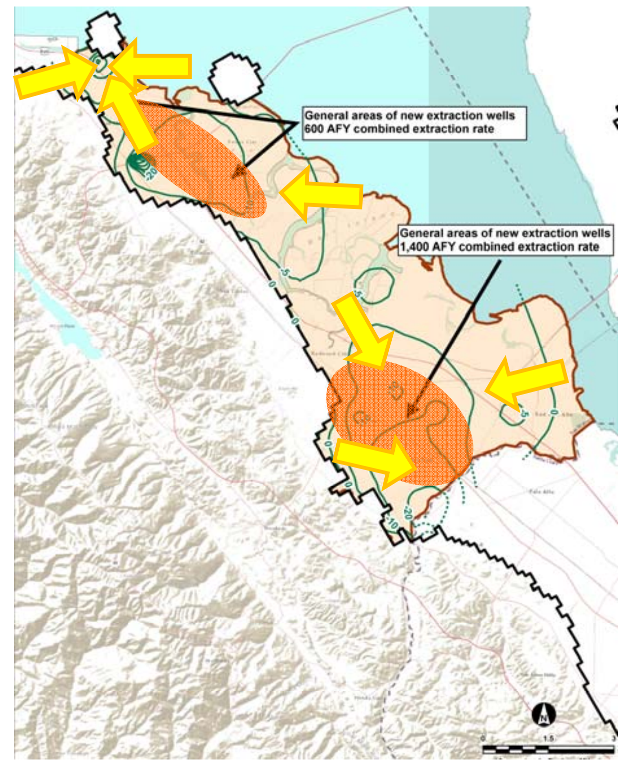
Snapshot at end of simulation period

- Shallow Zone
  - Flow still generally towards Bay
  - Some outflow to north and inflow from south
- Deep Zone
  - Large areas of Basin have Deep Zone water levels less than 0 ft msl

Shallow Zone



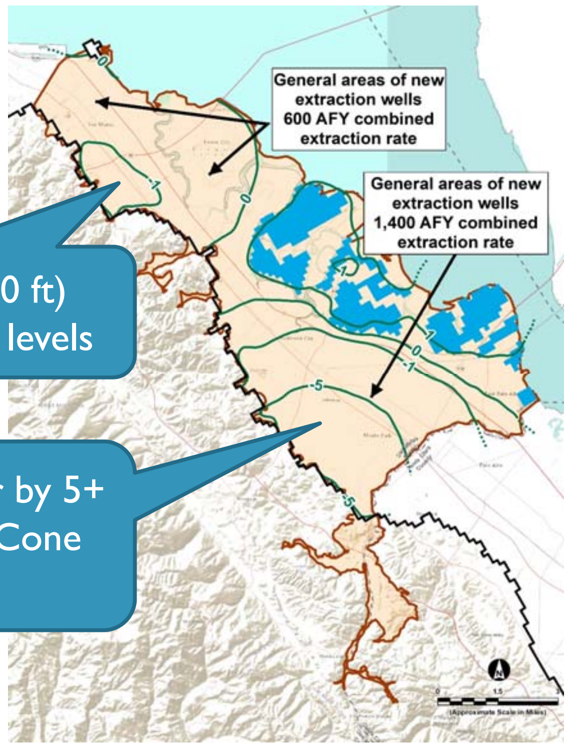
Deep Zone



MODEL-CALCULATED WATER LEVELS

Difference Between Baseline and Scenario 3

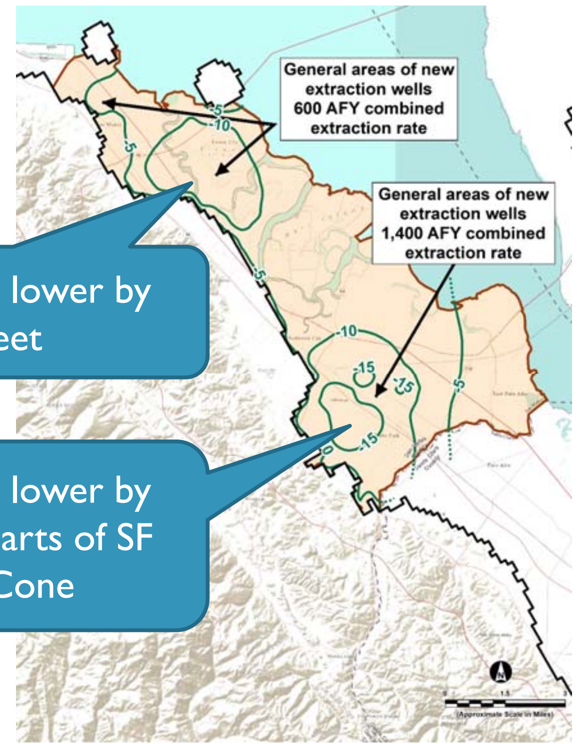
Shallow Zone



Small (approx. 1.0 ft) decrease in water levels

Water levels lower by 5+ feet in SF Creek Cone area

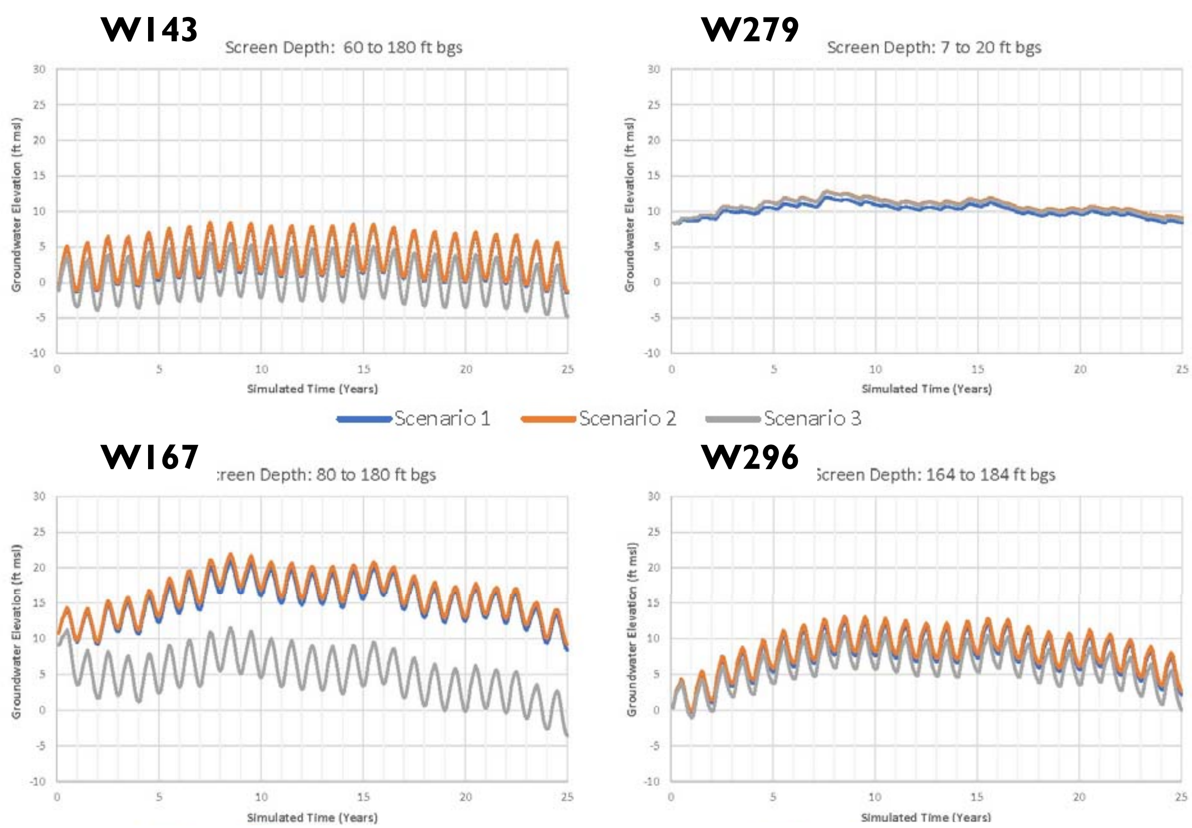
Deep Zone

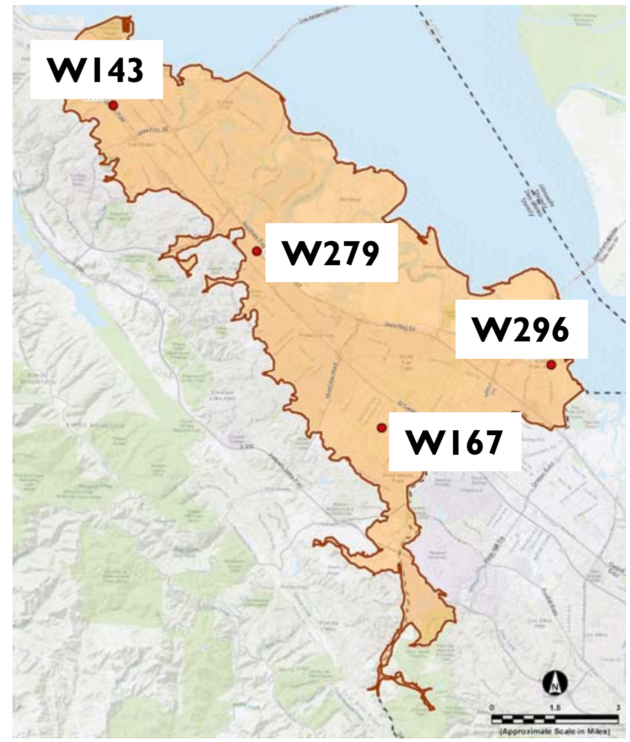


Water levels lower by 10+ feet

Water levels lower by 15+ feet in parts of SF Creek Cone

MODEL-CALCULATED WATER LEVELS





	Historical Period (WY 1992-2015)	Projected Future Scenarios			
		Scenario 1	**Scenario 2**	**Scenario 3**	**Scenario 4**
Inflows (AFY)					
Dispersed Recharge	4,700	4,700	4,700	**4,700**	4,900
Stream Percolation					
San Francisquito Creek	400	[illegible]	[illegible]	**400**	400
San Mateo Creek	200	[illegible]	[illegible]	**200**	200
Other creeks	500	500	[illegible]	**500**	500
Bedrock Inflow	600	[illegible]	[illegible]	**600**	600
Injection	0	[illegible]	[illegible]	**0**	1,800
Inflow from the South (from Santa Clara Subbasin)	1,100	[illegible]	[illegible]	**700**	100
Inflow from the East (beneath San Francisco Bay)	0	800	500	**1,000**	400
TOTAL INFLOWS	7,500	7,500	7,000	**8,100**	8,800
Outflows (AFY)					
Wells	2,700	2,500	2,500	**4,500**	4,500
Dewatering	1,000	[illegible]	[illegible]	**900**	1,000
Groundwater Seepage					
Riparian ET, Creeks and Tidal Wetlands	2,500	2,600	1,300	**1,100**	1,300
Sewers	1,400	1,300	1,500	**1,300**	1,500
San Francisco Bay	0	0	500	**400**	500
Outflow to the East (beneath San Francisco Bay)	0	[illegible]	[illegible]	**0**	0
Outflow to the North (to Westside Basin)	100	[illegible]	[illegible]	**100**	200
TOTAL OUTFLOWS	7,700	[illegible]	[illegible]	**8,400**	9,000
STORAGE CHANGE	-200	[illegible]	[illegible]	**-200**	-100

Increased inflow from Santa Clara Subbasin

Increased inflow from beneath the bay

Increased pumpage

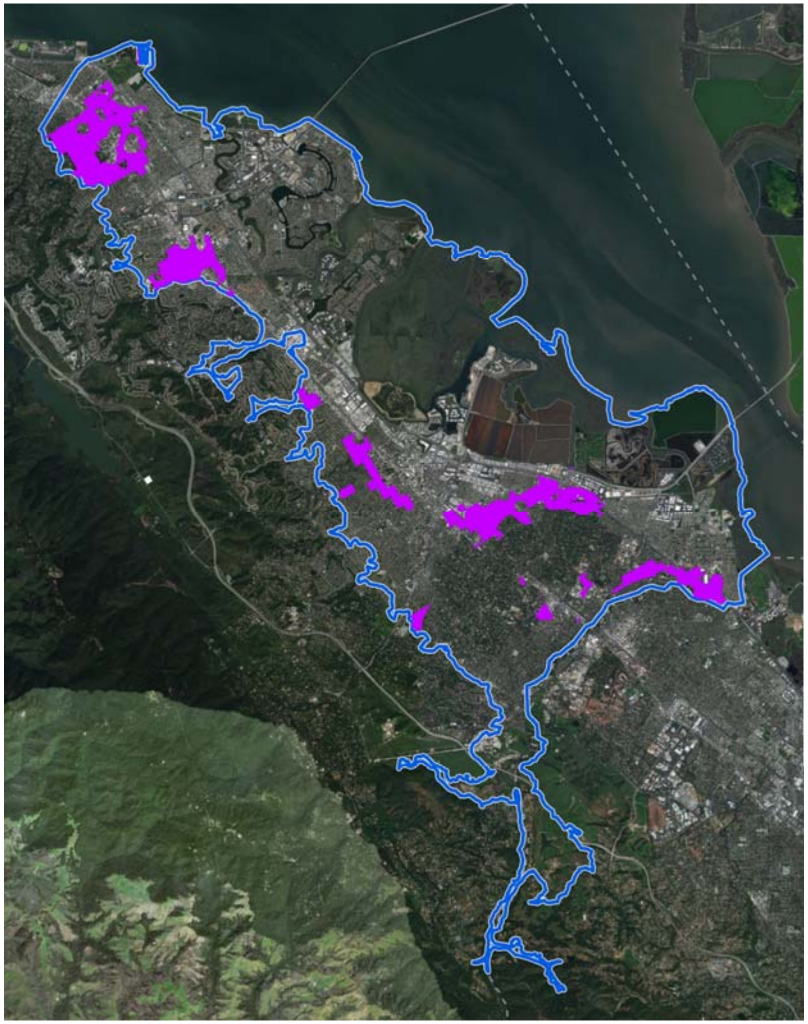
Decreased discharge from the shallow zone via dewatering and seepage

SCENARIO 4: BASELINE + CLIMATE CHANGE + URBAN DEMAND PUMPING INCREASE + IMPLEMENTATION OF RECHARGE PROJECTS

Hydrology (rainfall and ET)	1991 – 2015, modified to include 2026-2050 estimated climate change: **Same as Scenario 2**
Land and Water Use	Based on 2015 conditions, modified to account for Sea Level Rise **Same as Scenario 2**
Stream Percolation	1,100 AFY (repeat of 1991 – 2015); **Same as Scenario 2**
Average Specified Groundwater Pumping (in Basin)	4,500 AFY (average from 2011-2015); Increased Deep Zone pumping to reflect potential increased demand**;** **Same as Scenario 3**
Average Dispersed Recharge, Bedrock Recharge and Injection	7,300 AFY (repeat of 1991 – 2015); **Increased dispersed recharge by 200 AFY to reflect potential LID; Added 1,800 AFY of injection to reflect potential IPR**

CONSTRAINTS ANALYSIS TO EVALUATE POTENTIAL STORMWATER RECHARGE (LID)

- Areas where Stormwater Recharge are likely to be most effective:
  - Exclude soils identified as hydrologic soils group C or D (slow to very slow infiltration rates).
  - Slope < 5%
  - Non-existent or thin shallow confining layer
  - Minimum 500 ft from open contamination site
- Simulated 200 AFY additional recharge from LID



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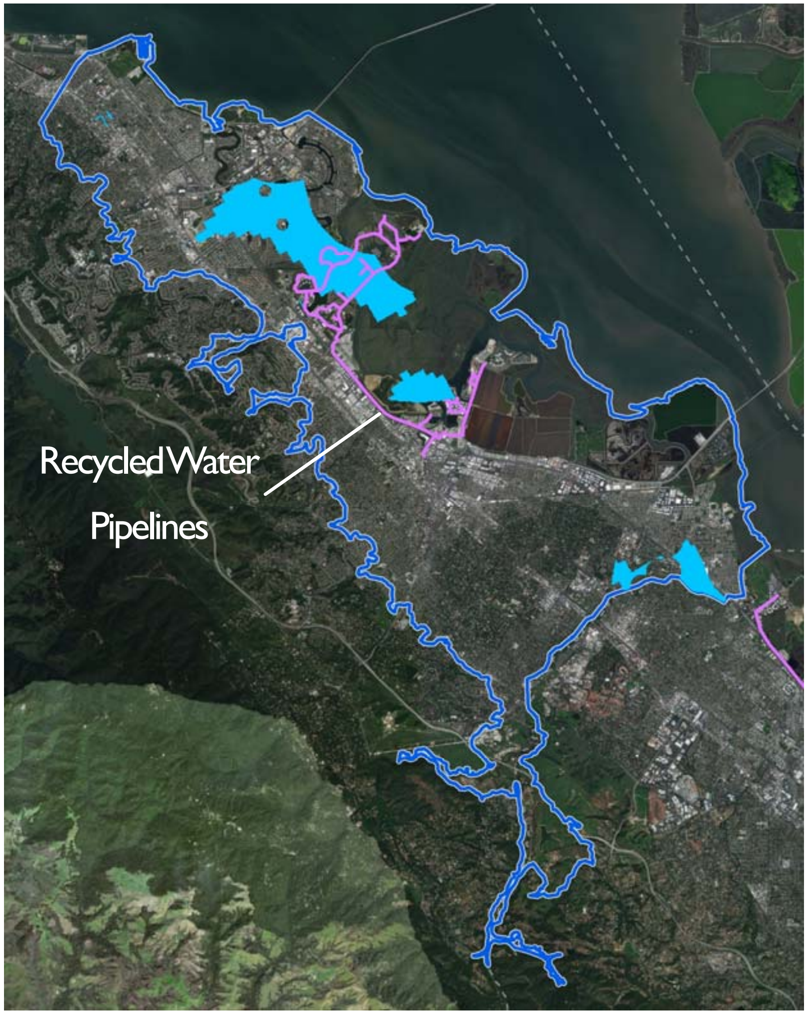
CONSTRAINTS ANALYSIS TO EVALUATE POTENTIAL INDIRECT POTABLE REUSE (IPR) AREAS

- Areas where IPR is likely to be most effective:
  - Combined thickness of model layers 3-5 > 100 ft
  - Fraction of coarse-grained material > 40% in at least one layer
  - Minimum 1,000 ft from public supply or large irrigation well
  - Minimum 500 ft from open contamination site
  - Minimum 1 mile from existing bayshore
- 1,800 AFY Injection Rate

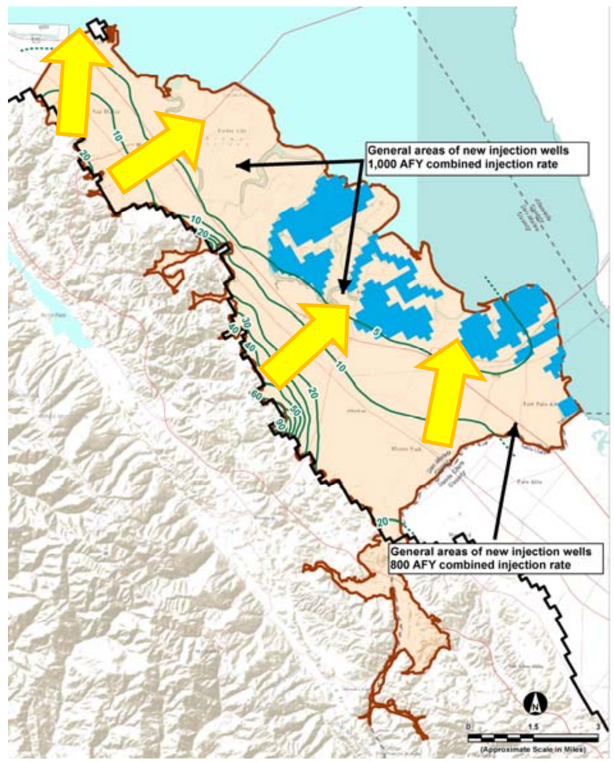


MODEL-CALCULATED WATER LEVELS

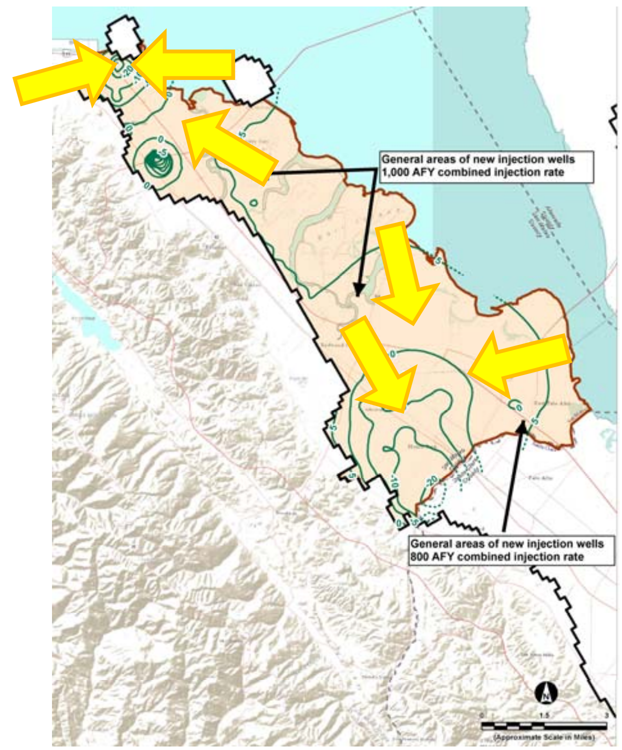
Snapshot at end of simulation period

- Shallow Zone
  - Similar flow directions as Scenario 3
- Deep Zone
  - Drawdown from pumping partially mitigated by recharge from IPR
  - Smaller area of groundwater levels less than 0 ft msl

Shallow Zone



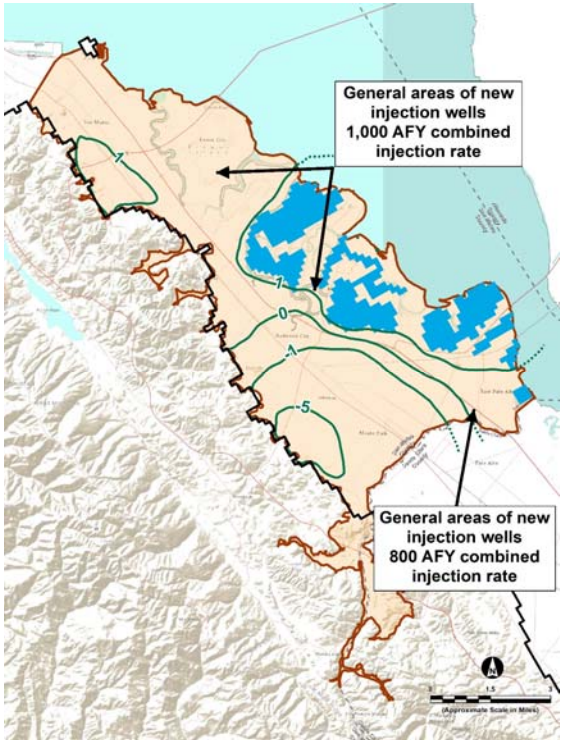
Deep Zone



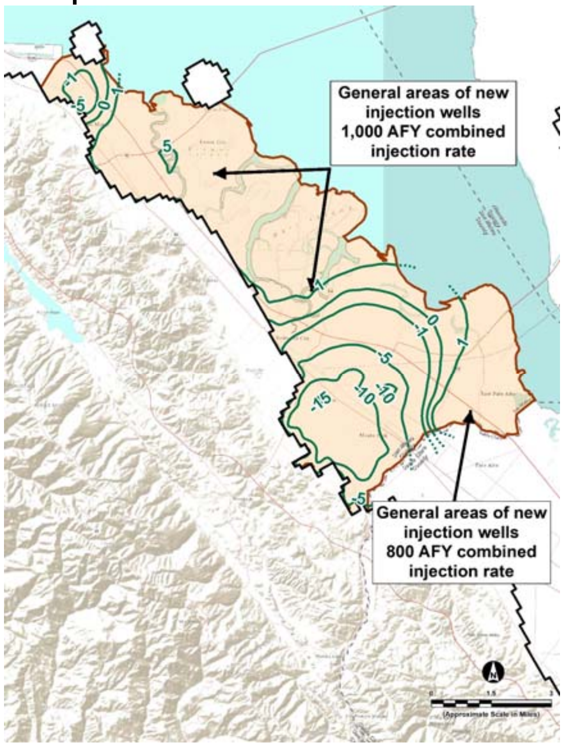
MODEL-CALCULATED WATER LEVELS

Difference Between Baseline and Scenario 4

Shallow Zone



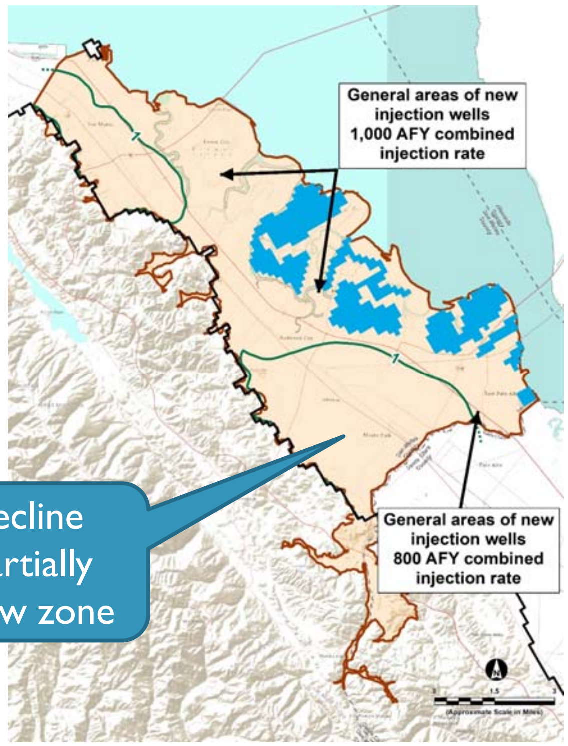
Deep Zone



MODEL-CALCULATED WATER LEVELS

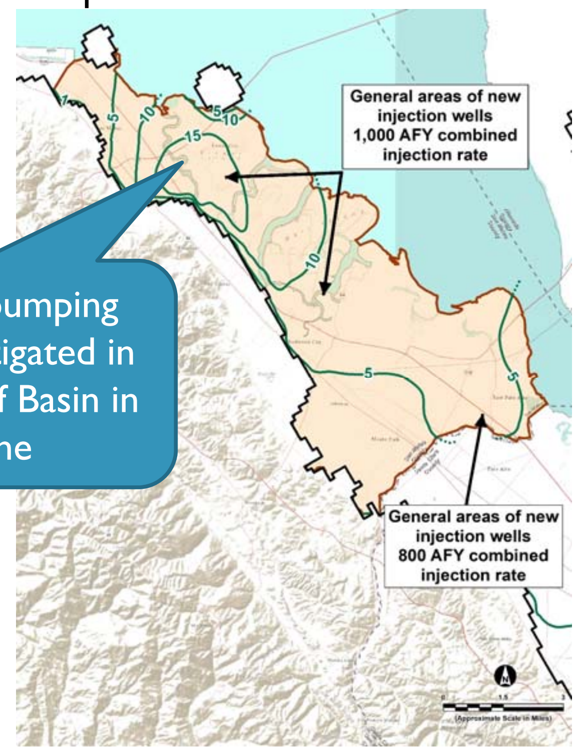
Difference Between Scenario 3 and Scenario 4

Shallow Zone



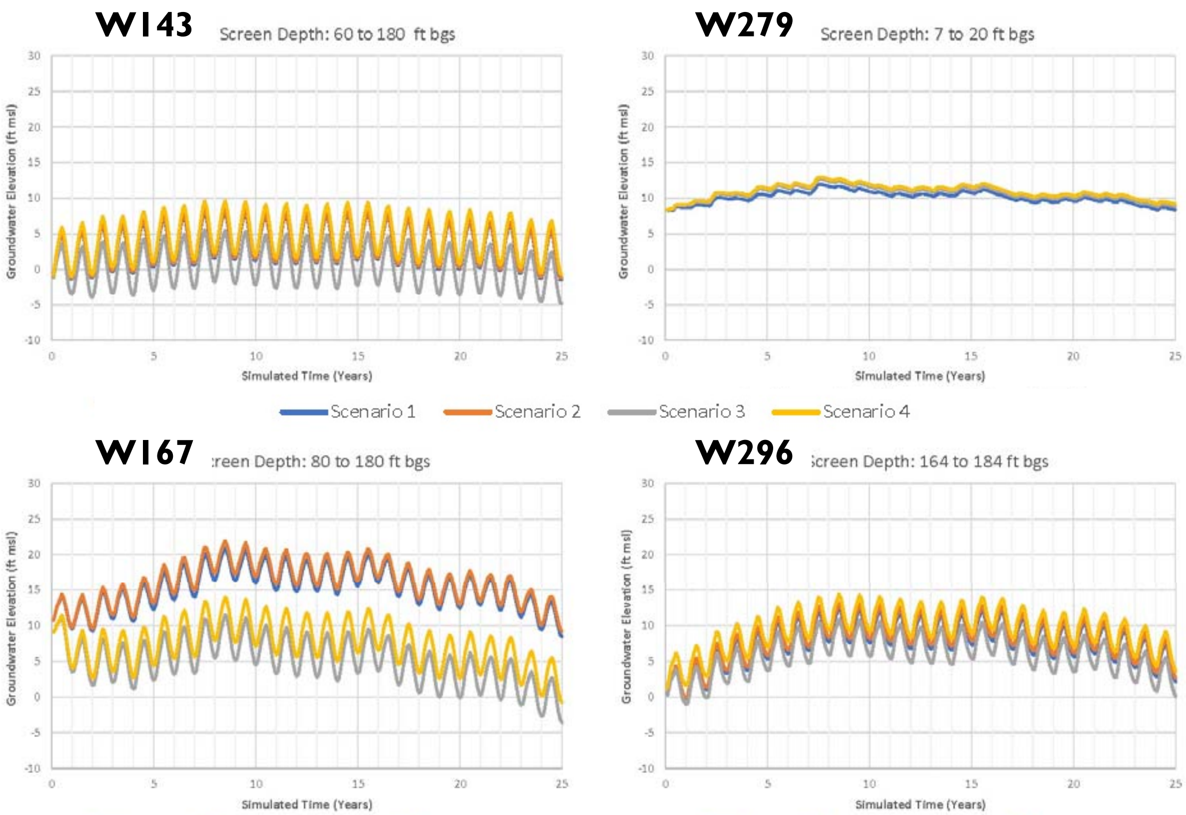
Groundwater decline from pumping partially mitigated in shallow zone

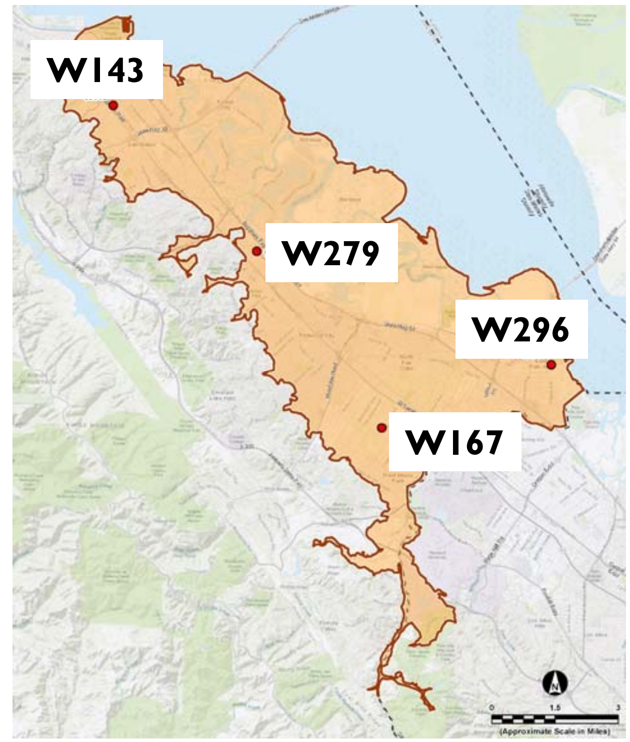
Deep Zone



Decline from pumping substantially mitigated in northern part of Basin in Deep Zone

MODEL-CALCULATED WATER LEVELS





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Stream Percolation					
San Francisquito Creek	400	[illegible]	[illegible]	400	**400**
San Mateo Creek	200	[illegible]	[illegible]	200	**200**
Other creeks	500	500	500	500	**500**
Bedrock Inflow	600	[illegible]	[illegible]	600	**600**
Injection	0	[illegible]	[illegible]	[illegible]	**1,800**
Inflow from the South (from Santa Clara Subbasin)	1,100	[illegible]	[illegible]	700	**100**
Inflow from the East (beneath San Francisco Bay)	0	800	500	1,000	**400**
TOTAL INFLOWS	7,500	[illegible]	[illegible]	[illegible]	**8,800**
Outflows (A[illegible]					
Wells	2,700	[illegible]	[illegible]	4,500	**4,500**
Dewatering	1,000	[illegible]	[illegible]	900	**1,000**
Groundwater Seepage					
Riparian ET, Creeks and Tidal Wetlands	2,500	2,600	1,300	1,100	**1,300**
Sewers	1,400	1,300	1,500	1,300	**1,500**
San Francisco Bay	0	0	500	400	**500**
Outflow to the East (beneath San Francisco Bay)	0	[illegible]	[illegible]	[illegible]	**0**
Outflow to the North (to Westside Basin)	100	[illegible]	[illegible]	100	**200**
TOTAL OUTFLOWS	7,700	[illegible]	[illegible]	8,400	**9,000**
STORAGE CHANGE	-200	[illegible]	[illegible]	-200	**-100**

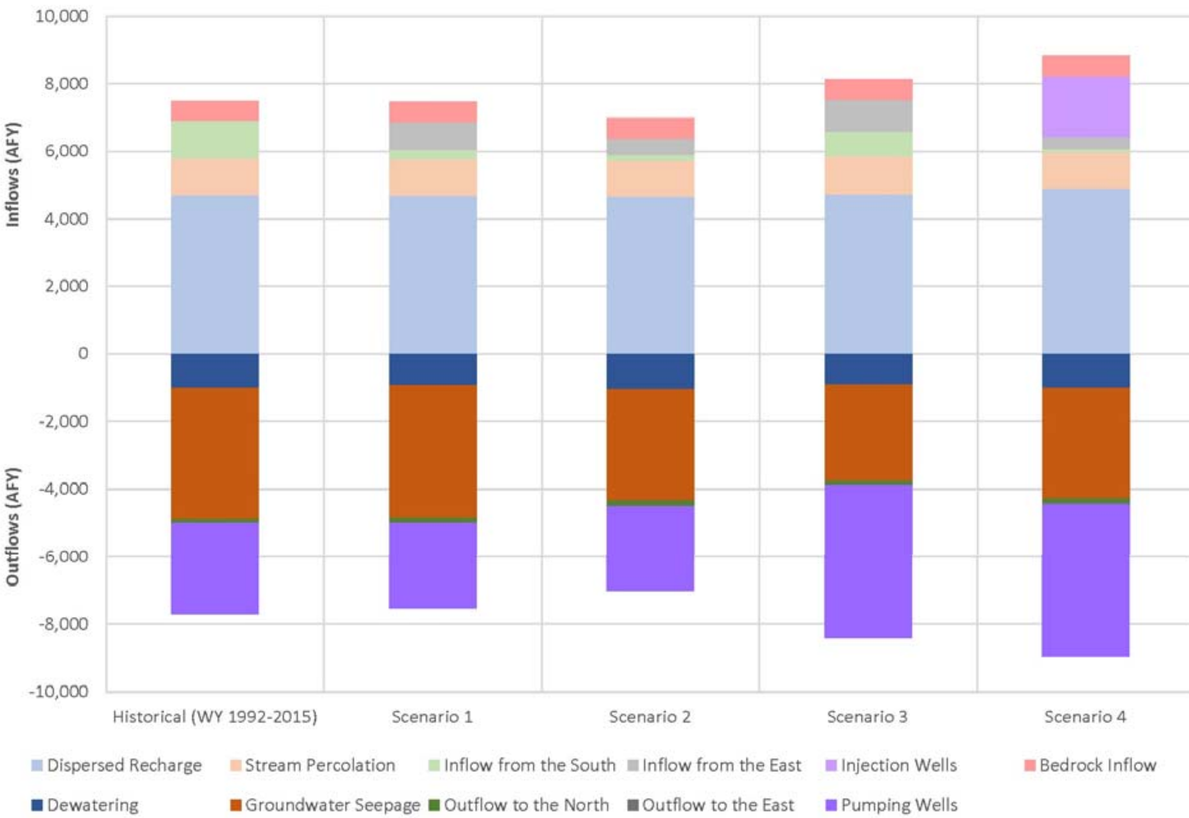
Increased Dispersed Recharge (LID)

Increased Recharge From Injection (IPR)

Decreased Inflow from Santa Clara Subbasin and from beneath the bay

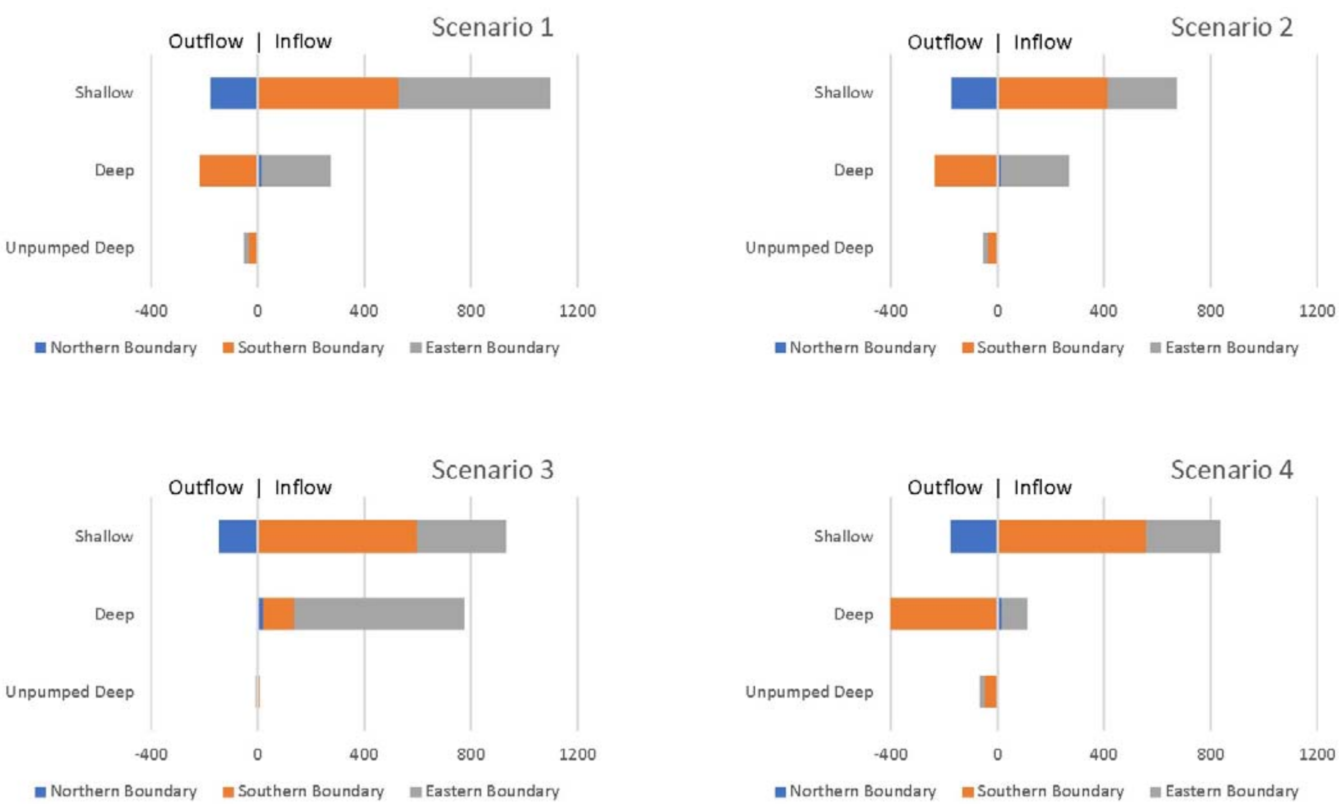
Increased discharge from the shallow zone via seepage

OVERALL WATER BUDGET CONCLUSIONS



- Model predicts generally balanced inflows and outflows for all scenarios (avg. change in storage less than 200 AFY; ~2% of total inflows)
- Different boundary conditions (SLR) and stresses (pumping, injection) lead to changes in Basin "throughput"

GROUNDWATER FLOW ACROSS BASIN BOUNDARIES



- Most groundwater exchange with adjacent basins occurs through Shallow Zone (model Layers 1 & 2)
- Climate change (Scenario 2) results in less inflow
- About 1/2 of increased pumping (Scenario 3 vs. 2) comes from inflow from adjacent basins
- About 70% of increased recharge (Scenario 4 vs. 3) goes to outflow to adjacent basins

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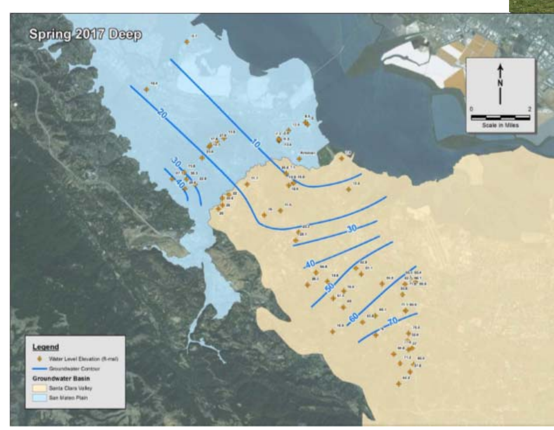
OVERALL SCENARIO MODELING CONCLUSIONS

- Projected climate change:
  - Minimal influence on groundwater recharge
  - Sea level rise was most influential on groundwater levels and the Basin water budget
- Increased groundwater use (pumping increases) are expected to increase subsurface inflow from Santa Clara Subbasin and from beneath San Francisco Bay
- Increased recharge partially mitigates drawdown from increased pumping
  - Low Impact Development (LID) likely provides modest increase in groundwater recharge
  - Greatest offset to pumping obtained by groundwater injection (IPR)

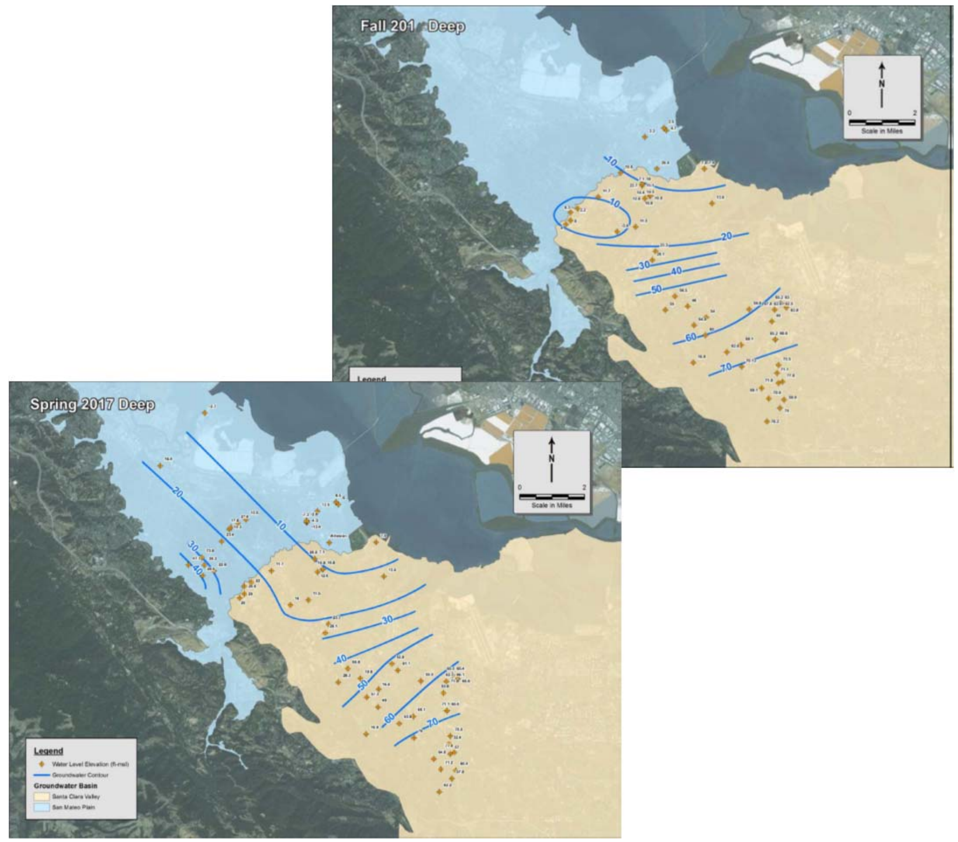
CALIFORNIA STATE GROUNDWATER ELEVATION MONITORING (CASGEM)

- Developed by Department of Water Resources in 2009
- Established a permanent, locally-managed program of regular monitoring to track seasonal and long term trends in groundwater elevations
- Voluntary, but …



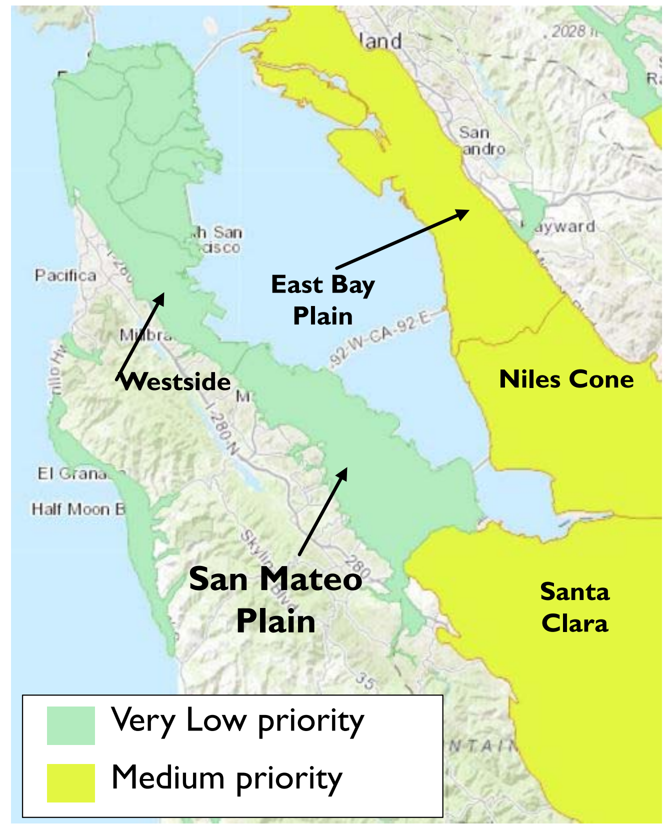
CASGEM BENEFITS

- Makes the groundwater elevation information available publicly
- If no monitoring entity, local agencies ineligible for certain state (DWR) funding
  - Enforcement of this has been focused on higher priority basins



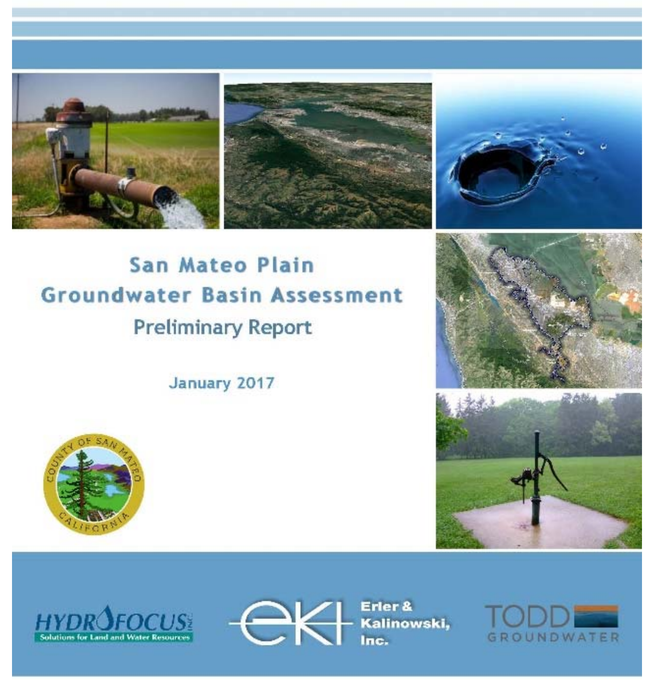
CASGEM PRIORITIZATION

- Basins ranked on population and growth, size, # wells and types, groundwater reliance, and other factors
- San Mateo Plain Subbasin was designated as '**Very Low**' priority in 2014



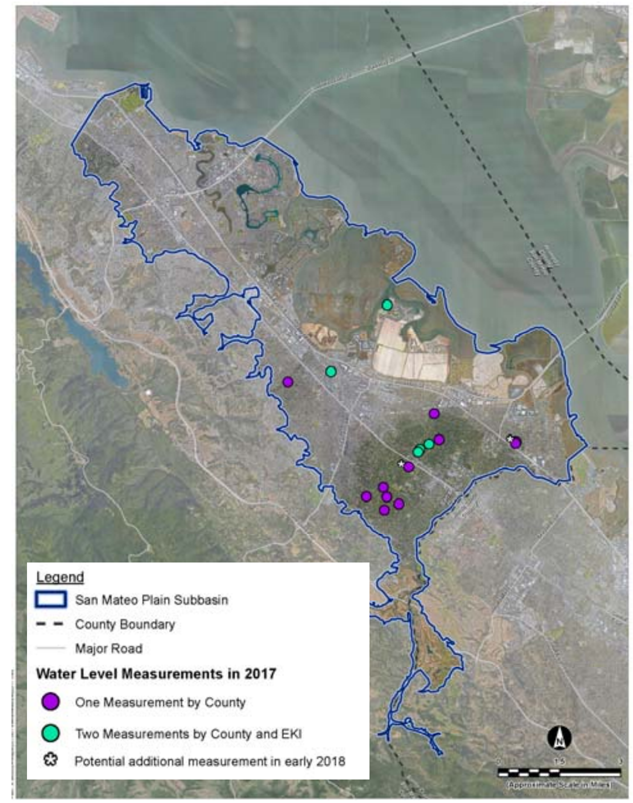
CASGEM PRIORITIZATION

- Groundwater usage less than 2,000 AFY
  - Default score of 0 overall
- Would have been 'Medium' priority otherwise
- DWR is updating the CASGEM basin prioritizations in 2018
- Basin may be re-designated



PARTICIPATING AGENCIES CONTRIBUTIONS

- Access to wells
- Staff time collecting and compiling data
- Coordinating with partners and DWR
- Uploading data through portal



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UPCOMING ACTIVITIES

- Working with BAWSCA and other agencies to explore development of CASGEM-compliant groundwater monitoring well network
- Prepare Phase 3, Final Report
  - Report will reflect data collected and aggregated by January 2018
- Final Stakeholder Workshop – Anticipated June 2018

QUESTIONS?

TODD GROUNDWATER

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