SEASIDE GROUNDWATER BASIN

SUSTAINABLE YIELD

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Presented to the Seaside Basin Technical Advisory Committee

February 13, 2019

SAFE YIELD

- Assumes the “safe” amount to pump cannot be more than the rate of natural recharge
- This is referred to as the “Water-Budget Myth”
- It is an oversimplification of information needed to understand the effects of using a groundwater system
- As human activities change the system, the components of the water budget (inflows, outflows, and changes in storage) change and must be accounted for in any management decision

GROUNDWATER (1988 – 2017) BUDGET

Recharge Source	Northern Coastal Subarea	Northern Inland Subarea	Southern Coastal Subarea	Laguna Seca Subarea	Total
	Acre-feet per Year				
Basin Inflows					
Percolation from streams	0	0	0	0	0
Deep Percolation					
Rainfall	510	1,670	130	900	3,210
Irrigation & System Losses	150	20	100	10	280
Injection wells	260	0	0	0	260
Groundwater inflow					
From adjacent subareas	2,900	1,520	520	360	5,300
From adjacent basins	130	400	50	770	1,350
From offshore area	490	0	10	0	500
Total inflows	4,440	3,610	810	2,040	10,900
Basin Outflows					
Wells	3,660	70	170	680	4,580
Groundwater outflow					
To adjacent subareas of the Basin	290	2,710	550	1,750	5,300
To adjacent basins	280	1,310	70	490	2,150
To offshore area	260	0	60	0	320
Total outflows	4,490	4,090	850	2,920	12,350
Storage Change					
Based on Inflows-Outflows	-50	-480	-40	-880	-1,450

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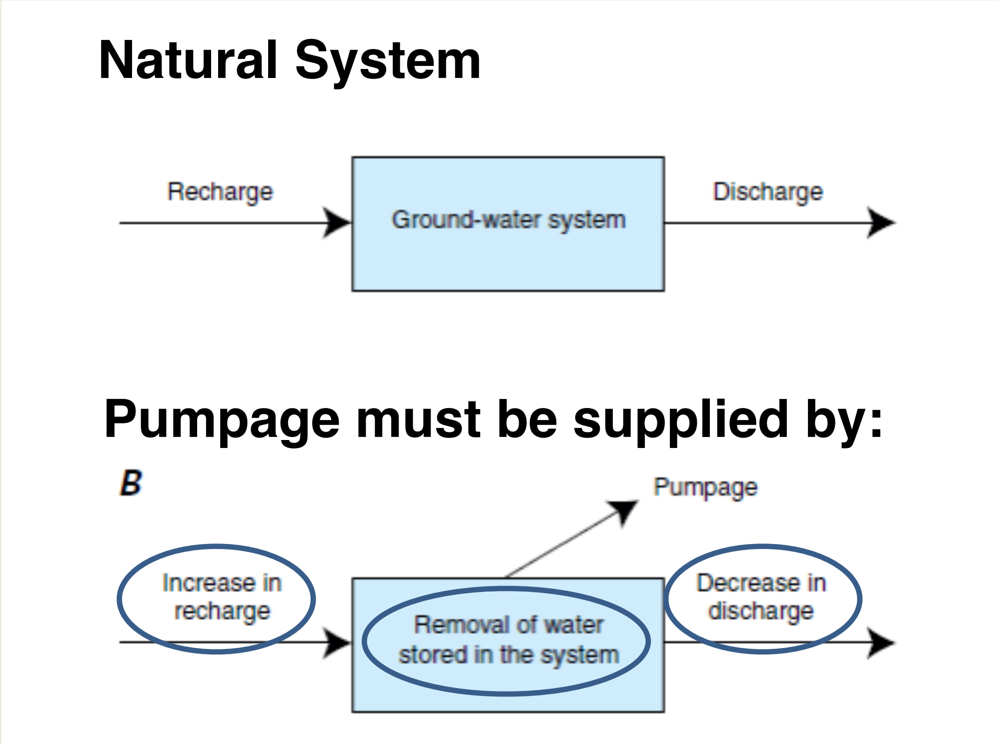
NATURAL FLOW SYSTEM CHANGES

- We change the natural flow system by pumping water for use, changing recharge patterns by irrigation and urban development, changing the type of vegetation, and other activities



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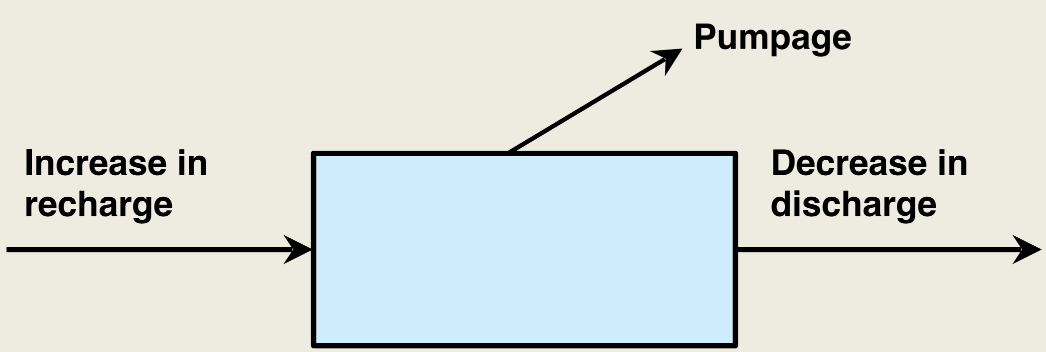
BALANCED SYSTEM

- Pumping starts and the groundwater system readjusts
- Initial response to pumping is change in storage
- If system comes to equilibrium, changes in storage stop and inflows will again balance outflows:

Pumpage = Increased recharge + Decreased discharge



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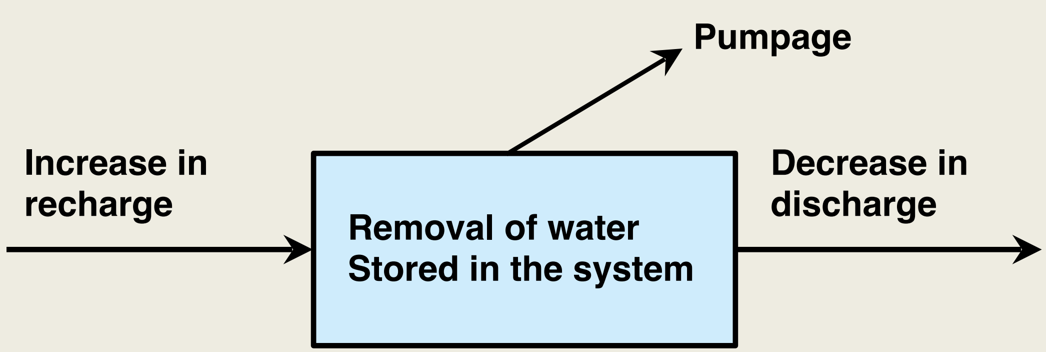
UNBALANCED SYSTEM

- If system does not comes to equilibrium, changes in storage continue (i.e. falling groundwater levels):

  Pumpage = Increased recharge + Decreased discharge + Decreased storage



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SUSTAINABLE YIELD

- How much ground water available for use depends upon how changes in inflow and outflow affect the surrounding environment and what the users define as undesirable effects on the environment or groundwater system
  - Changes to inflows and outflows are very complex
  - Not possible to use the water budget to determine how much groundwater is available for use
  - Groundwater model is the best tool to use because it allows for spatial effects

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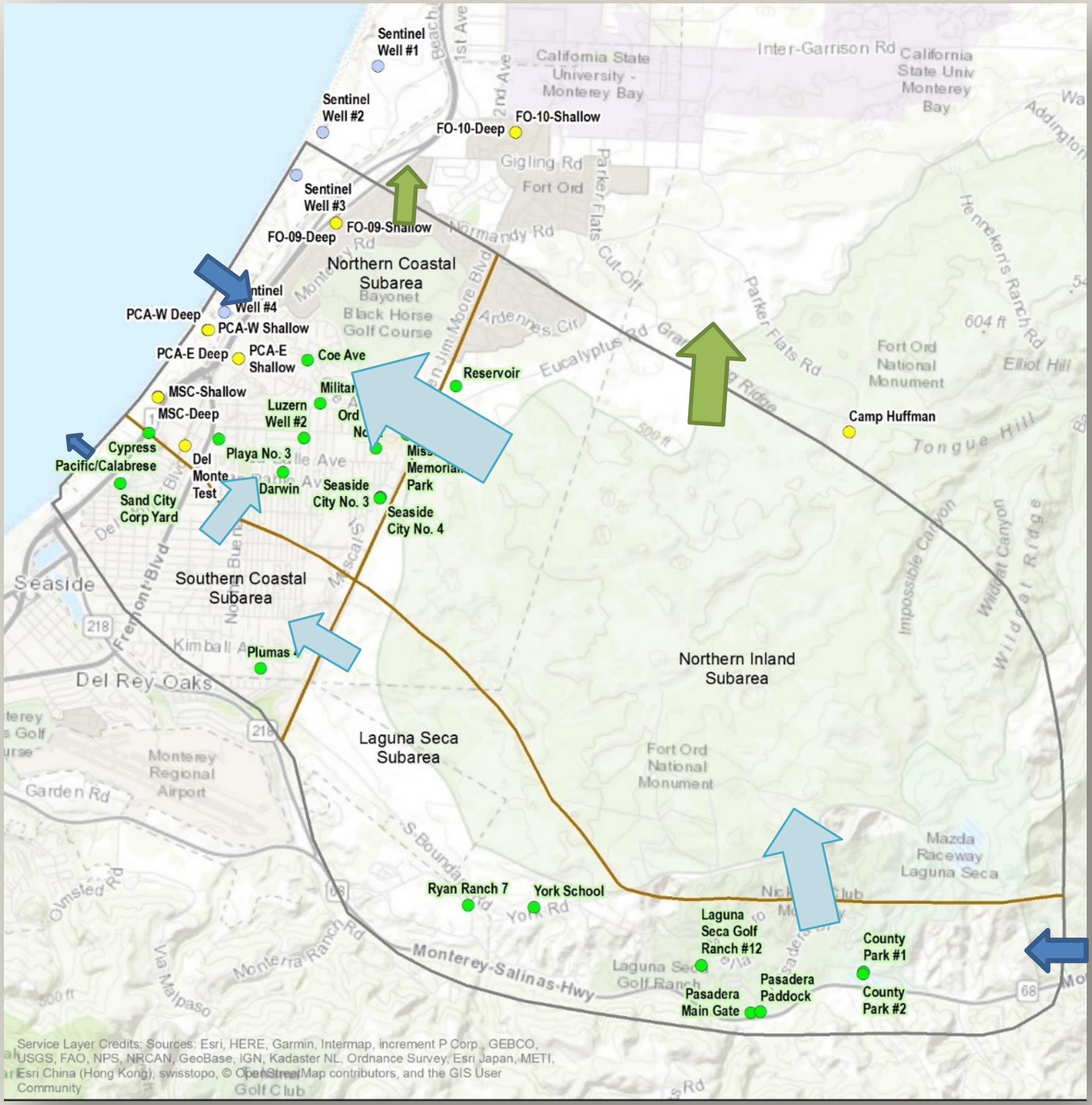
SUBSURFACE FLOWS BETWEEN SUBAREAS, OCEAN & OTHER BASINS



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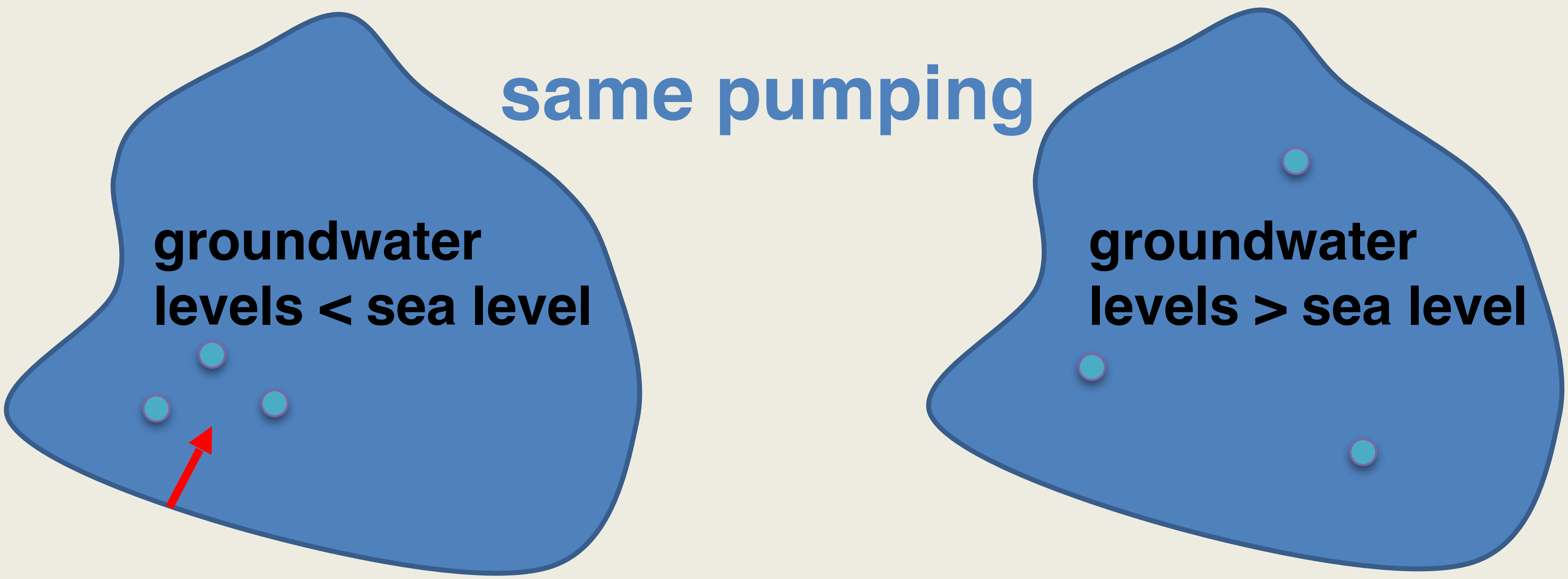
LOCALIZED EFFECTS

- Localized effects of pumping need to be accounted for



Greater impact on local groundwater levels

Lesser impact on local groundwater levels

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MODELING APPROACH FOR DETERMINING SUSTAINABLE YIELD

Task 1: Develop Operational Parameters & Management Targets

- Operational parameters include how each well is expected to be pumped in the future

- Management targets are groundwater levels that the basin should be managed to. Examples are:
  - Meet protective groundwater elevations at the coast
  - To stop declining groundwater levels
  - Recover groundwater levels in the basin to a certain level

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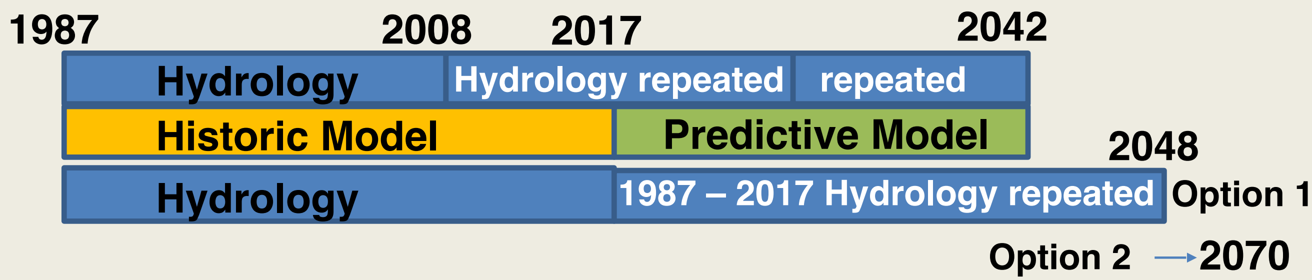
MODELING APPROACH FOR DETERMINING SUSTAINABLE YIELD

Task 2: Extend Predictive Model Climate

- Extend Historical Hydrology Baseline Scenario



- Convert Historical Climate Baseline Scenario Model to Future Climate Condition Model (Optional)

Task 3: Incorporate Sea Level Rise at Ocean Boundaries (Optional)

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MODELING APPROACH FOR DETERMINING SUSTAINABLE YIELD

Task 4: Incorporate All Existing & Approved/Planned Supplemental Supply Projects into Baseline Model

Task 5: Optimization Scenario Simulations

- **Use Sustainable Optimization Model to optimize pumping to achieve management targets**
- **Prepare Scenario Inputs - Need TAC input Two yield numbers will result**
  - **Interim Yield needed to achieve management targets (lower than Sustainable Yield)**
  - **A Sustainable Yield that maintains targets (this will be a higher yield than the Interim Yield**

Task 6: Prepare Technical Memo

Task 7: Attend TAC and Board Meetings

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QUESTIONS?

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