Understanding Groundwater: Our Greatest Resource

Groundwater Overdraft in Monterey County

LandWatch monterey county

Presented by LandWatch Monterey County

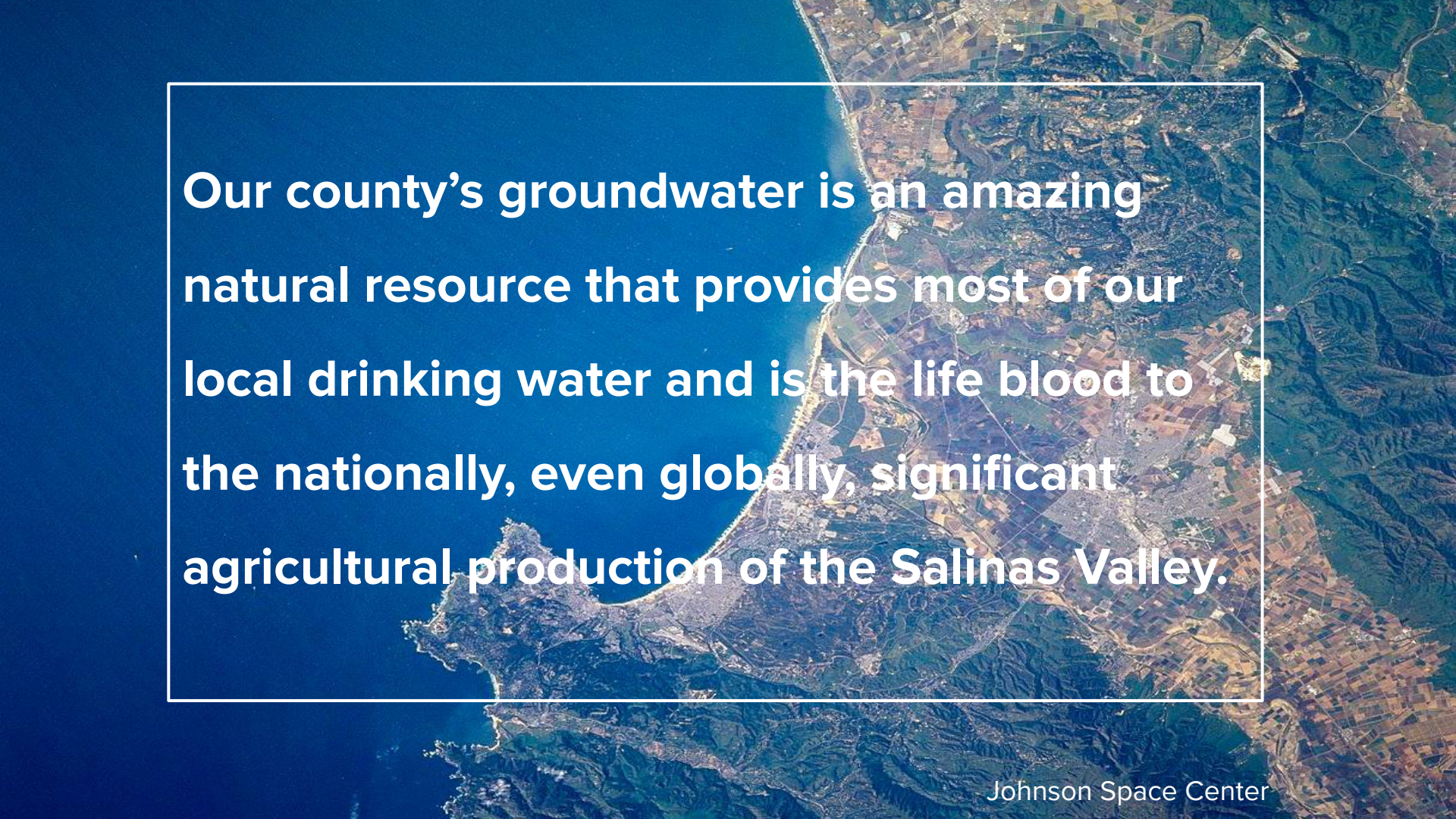
Since 1997 LandWatch has protected and enhanced Monterey County's incredible quality of life for current and future generations.

LandWatch's mission is to promote sound land use policies that better our community – its long-term economic vitality, high agricultural productivity, environmental health, and social equity.

Through organizing grassroots action and encouraging greater public participation in planning, LandWatch connects people to government, addresses human needs, and inspires conservation of natural resources.

What we should know:

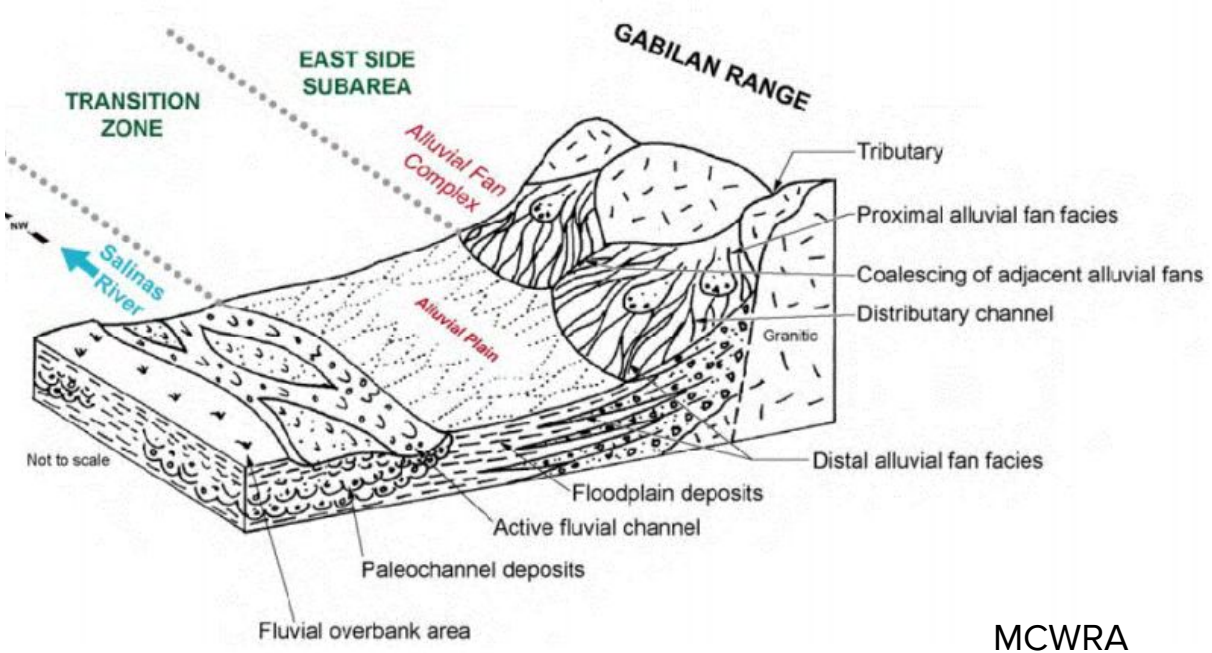
- **What is groundwater?**
- **Why is groundwater significant to all in Monterey County?**
- **What groundwater overdraft is, how we know our water supply is suffering from it, and why is it an issue now?**
- **What are we doing to mitigate overdraft, and secure a sustainable water supply?**


Our county's groundwater is an amazing natural resource that provides most of our local drinking water and is the life blood to the nationally, even globally, significant agricultural production of the Salinas Valley.
Johnson Space Center

“Wet Sand in a Bathtub”

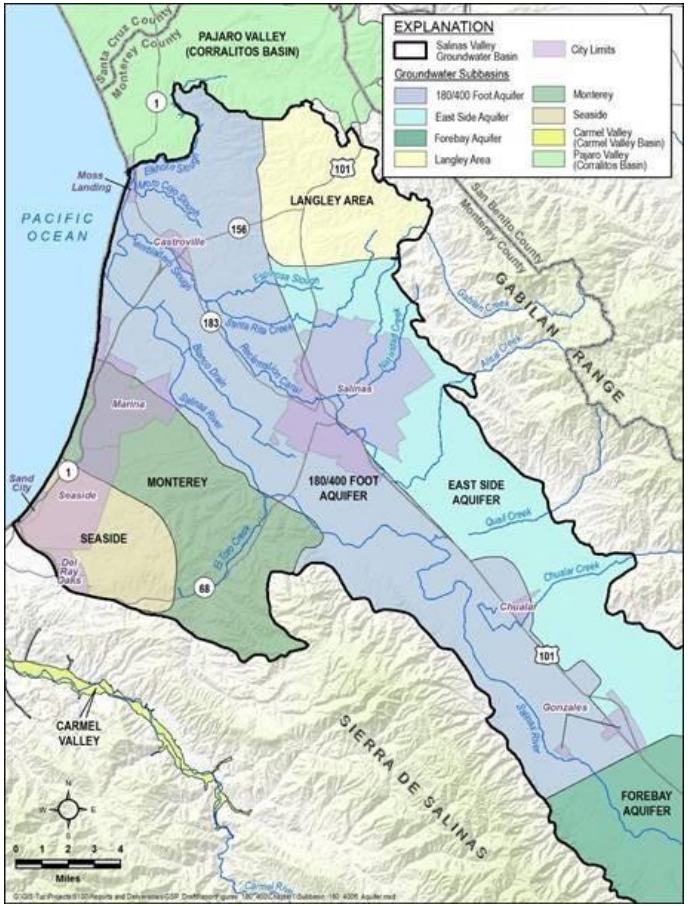
Eons of ancient continent and seafloor have formed the layers of coarse-grained sediment below our feet.

Rainwater filters down to store in this porous rock, creating **aquifers**, vast underground water reserves that can be extracted by pumping.



MCWRA

Our Groundwater Sub-basins



- Salinas Valley (6 sub-basins)
- Seaside sub-basin
- Carmel River watershed

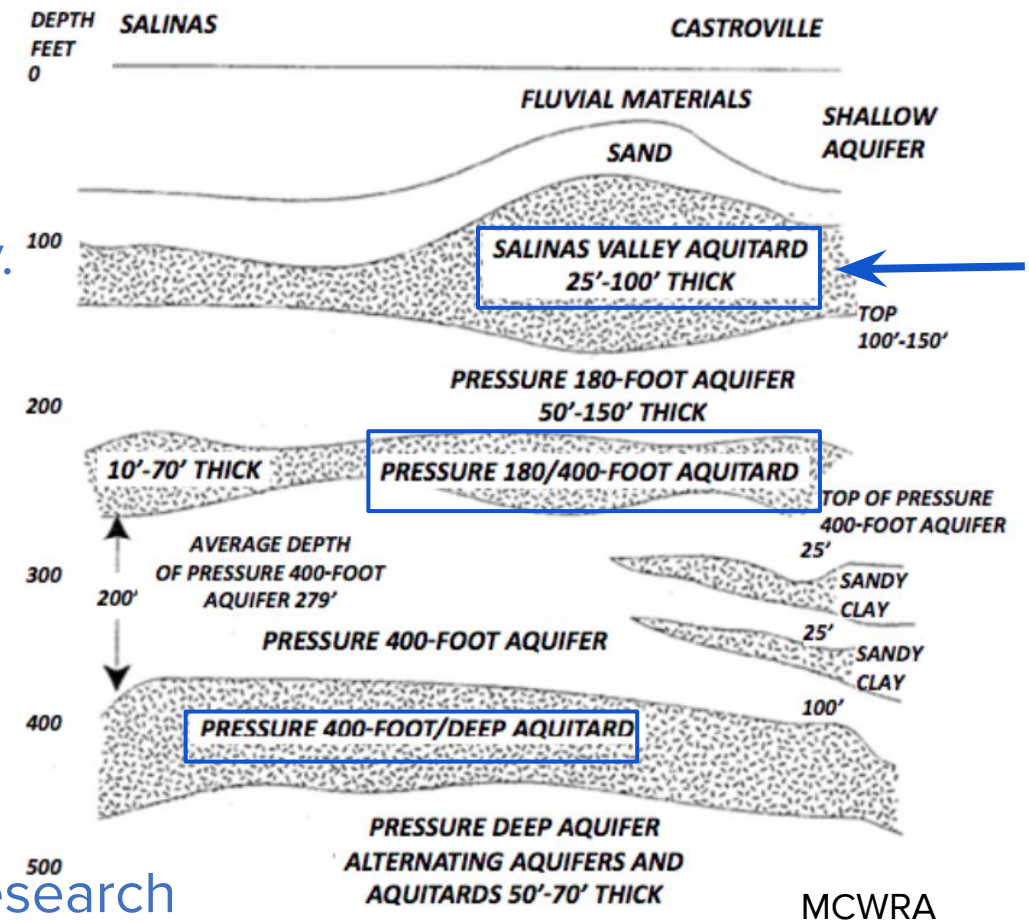
SVBGSA

The three main aquifers under the Salinas Valley.

180ft pressure

400ft pressure

800ft pressure (DEEP)



MCWRA

Despite lack of research and regulation, the deep aquifer is being exploited.

Aquitards are non-porous rock that basically separate the aquifers, but are not continuous and water can flow between aquifers in certain areas.

of water used in Monterey County is groundwater. Municipal use in the Salinas Valley accounts for about 7%, while the other 93% is used for agriculture.

All Our Water Is Local

City of Salinas

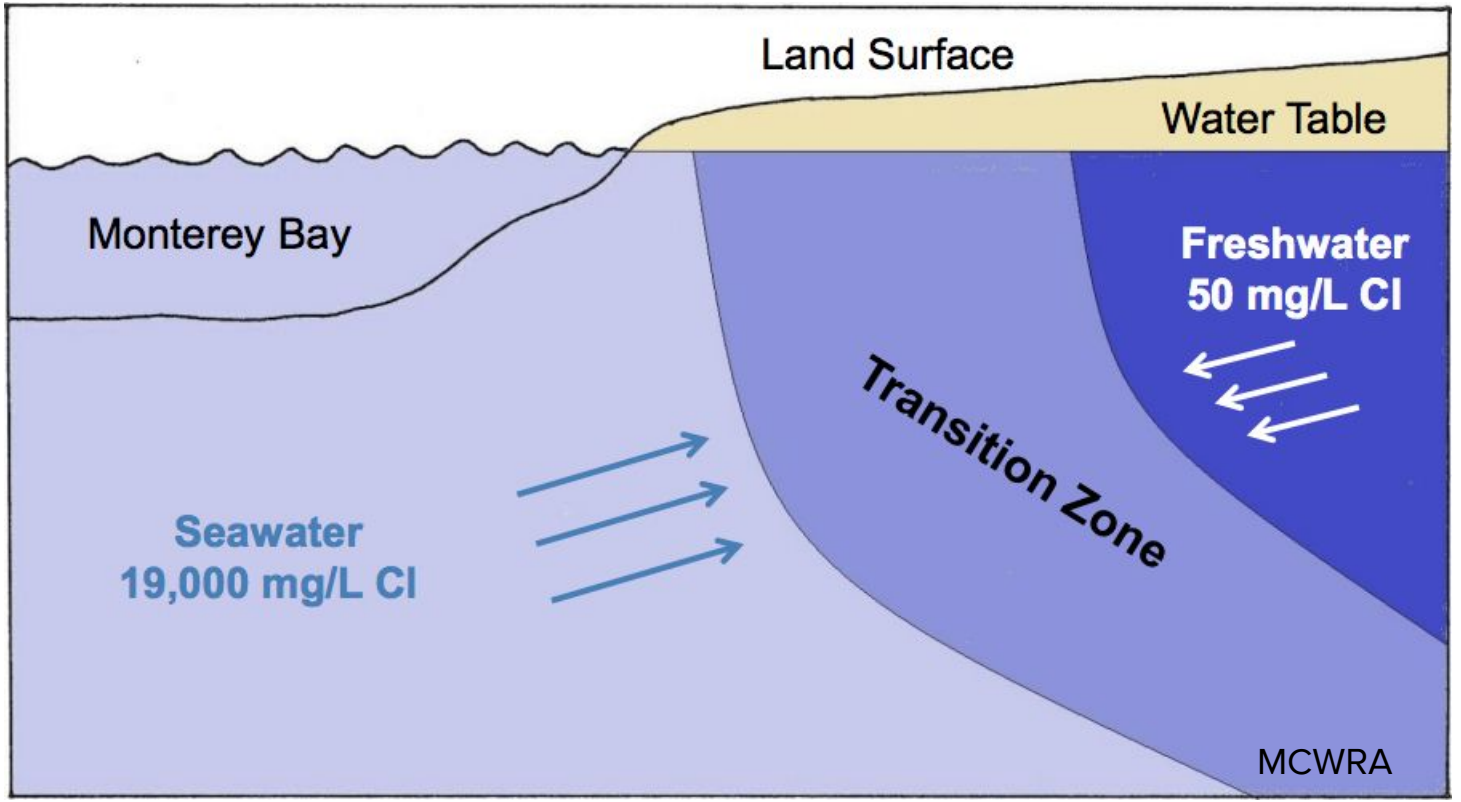
- **Salinas Valley** cities rely on groundwater for nearly their entire water supply.
- **Peninsula** cities pump most of their water from the Carmel River, which is the main source of recharge for the Carmel Valley aquifer.
- A regional recycled water project, **Pure Water Monterey**, will provide water as well. A proposed desalination facility may also be built.

Groundwater is the Cornerstone to the Salinas Valley Agricultural Industry

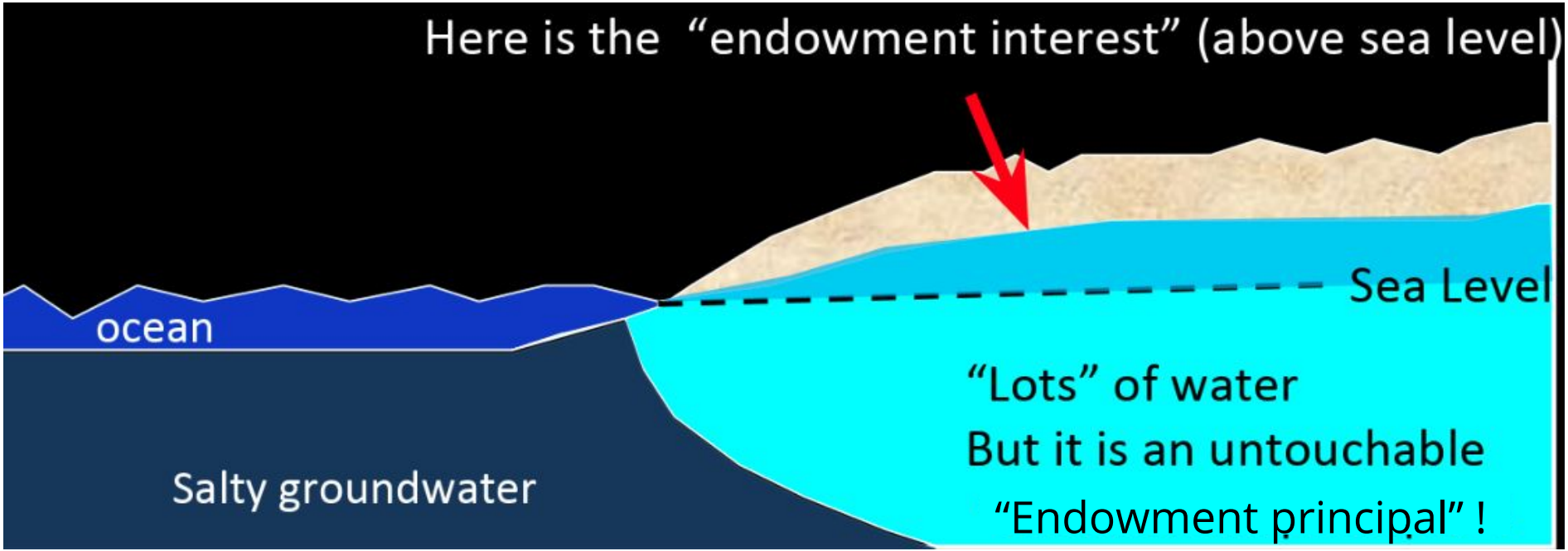
- Almost **25%** of the jobs in Monterey County are directly supported by agriculture
- In 2017 **424 million pounds** of produce from the Salinas Valley was exported abroad
- Salinas Valley produces about **60%** of leaf lettuce, celery, and head lettuce, **50%** of broccoli, **40%** of spinach, **30%** of cauliflower and strawberries grown in the US

A Healthy Coastal Aquifer: Pressure balance between offshore seawater and inland freshwater.

Water flows downhill, whether above or underground. The water table–groundwater surface level–must be above or equal to sea level to prevent seawater intrusion.

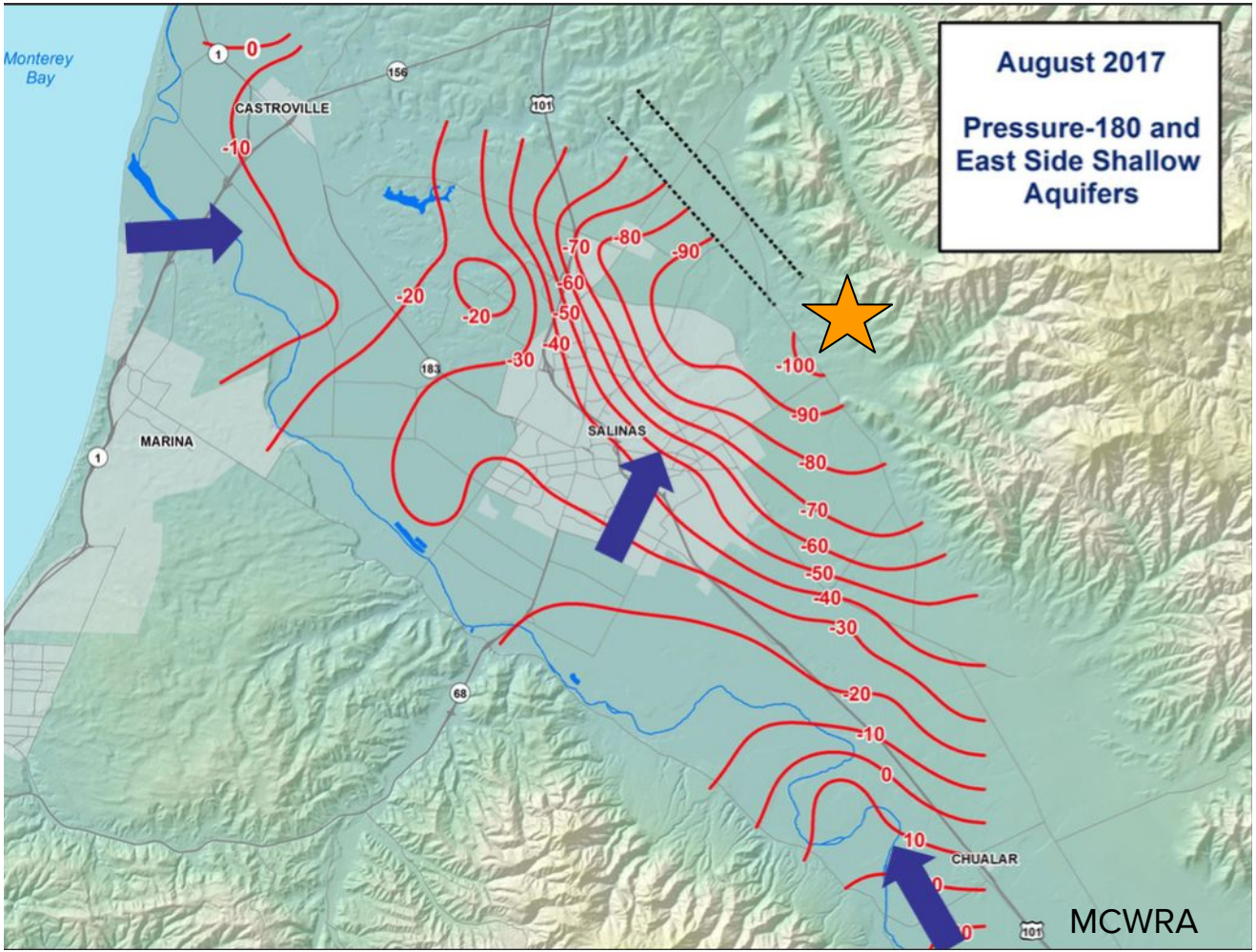


Our Groundwater Bank Account



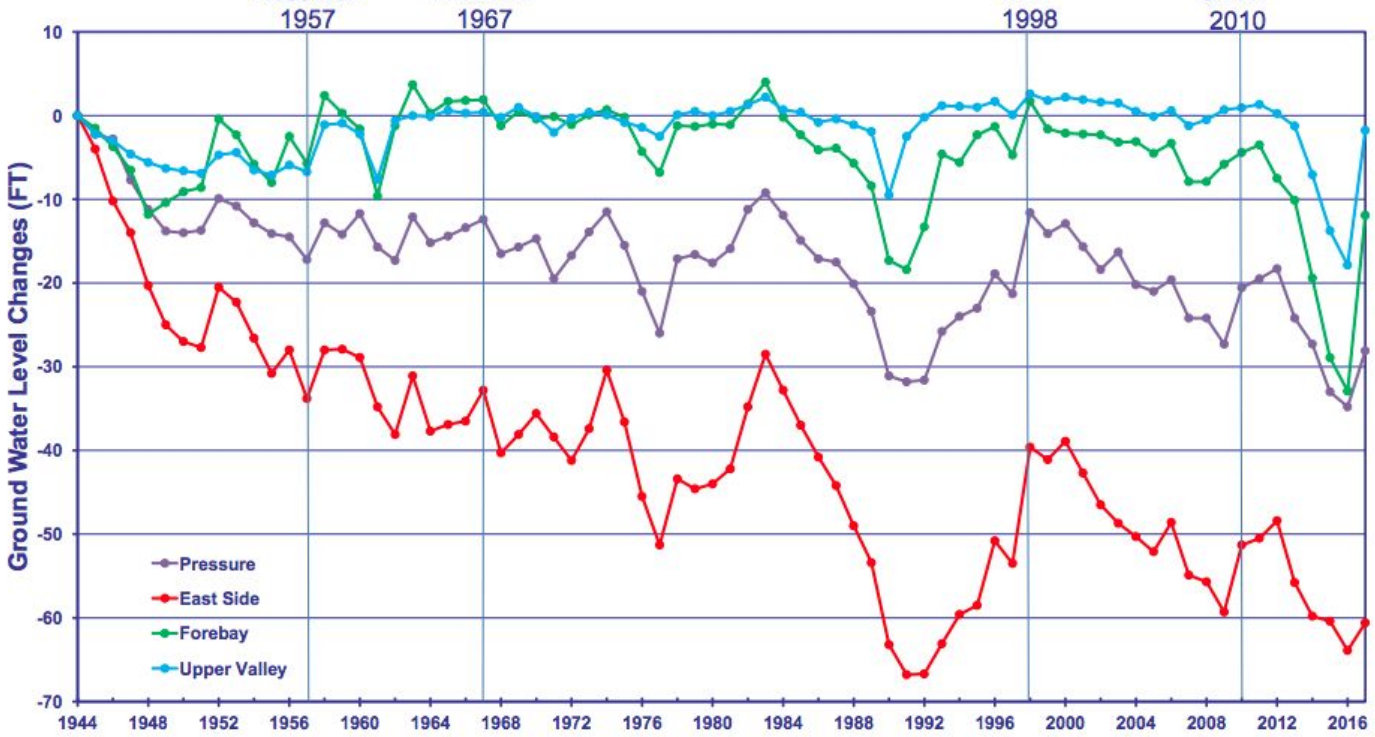
Courtesy of Dr. Doug Smith, CSUMB

These red contour lines show water table depth, with sea level labeled as 0. The blue arrows display the direction of groundwater flow. The orange star highlights where the water table is **100 ft below sea level**.



Recharge is the water that naturally percolates underground, the aquifer's supply. Overdraft occurs when the rate of water pumped from an aquifer exceeds the rate of recharge.

Groundwater Level Change by Subarea from 1944-2018



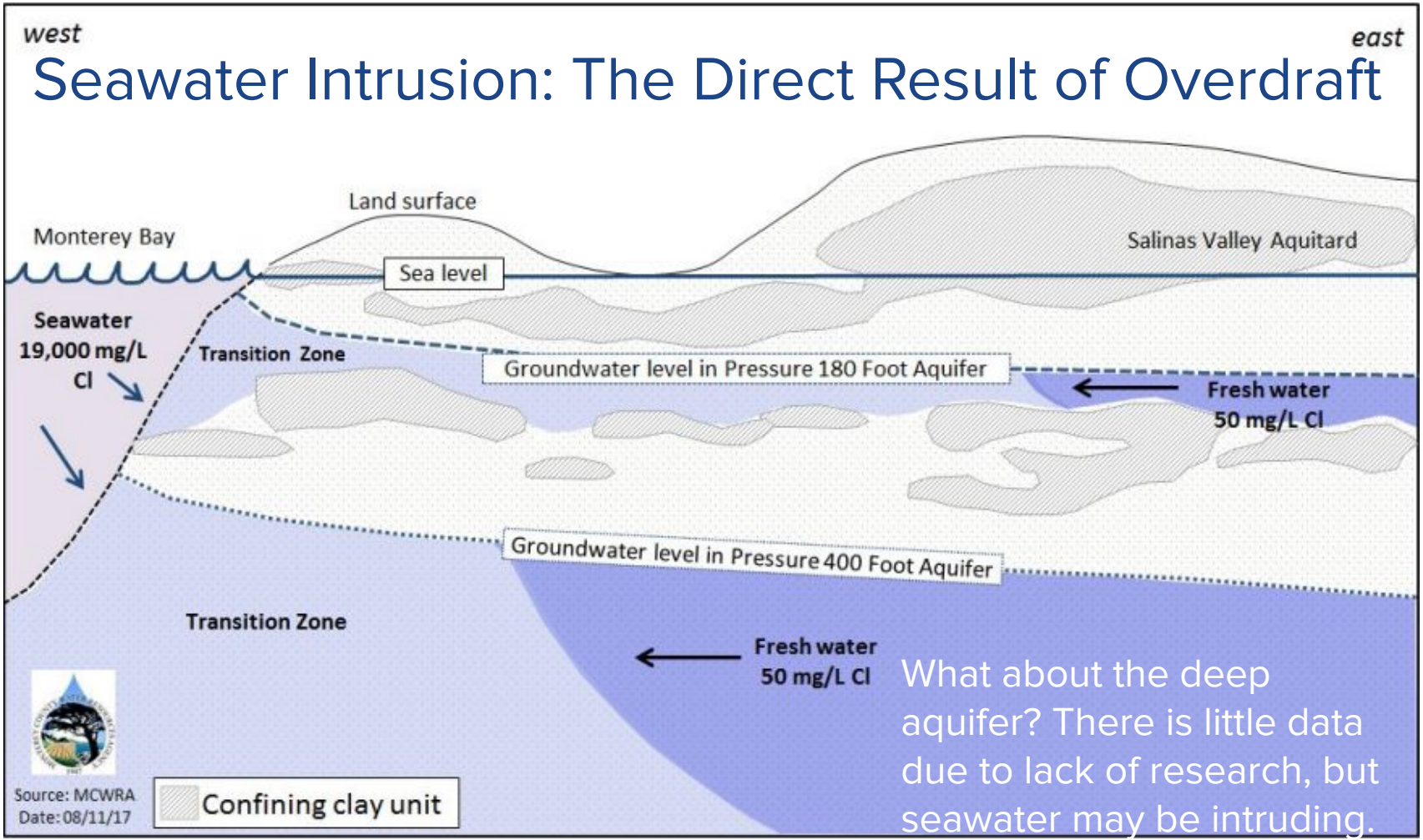
Groundwater is recharged unequally throughout the valley, explaining the more drastic change seen in the East Side subarea, shown in red.

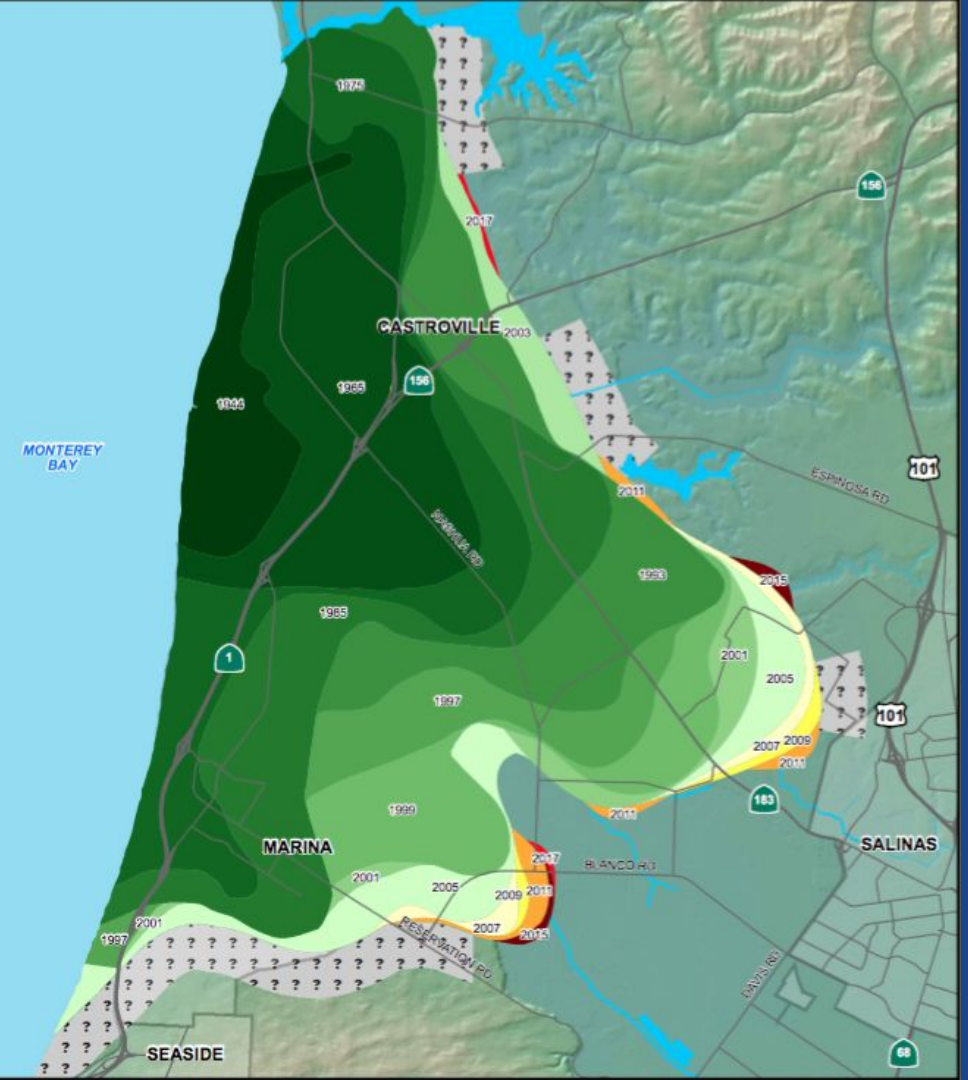
Notice the dip from 2012 to 2016: tangible effects of our recent drought.

Drought

- Climate change effects in our region include **hotter, longer dry seasons**, paired with **shorter, more intense wet seasons**
- This combination is a recipe for **less recharge**
- Droughts are predicted to be **longer and more frequent**, further exacerbating overdraft

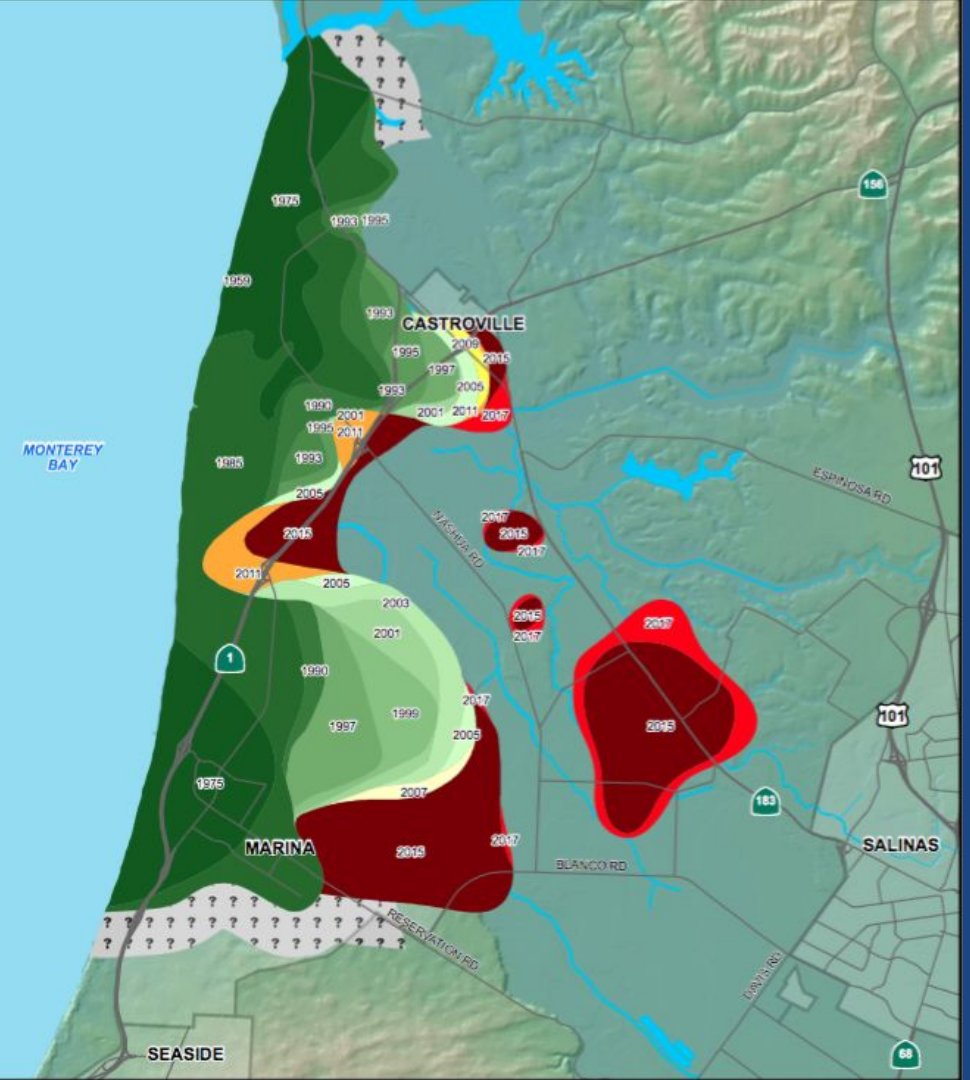
Seawater Intrusion: The Direct Result of Overdraft





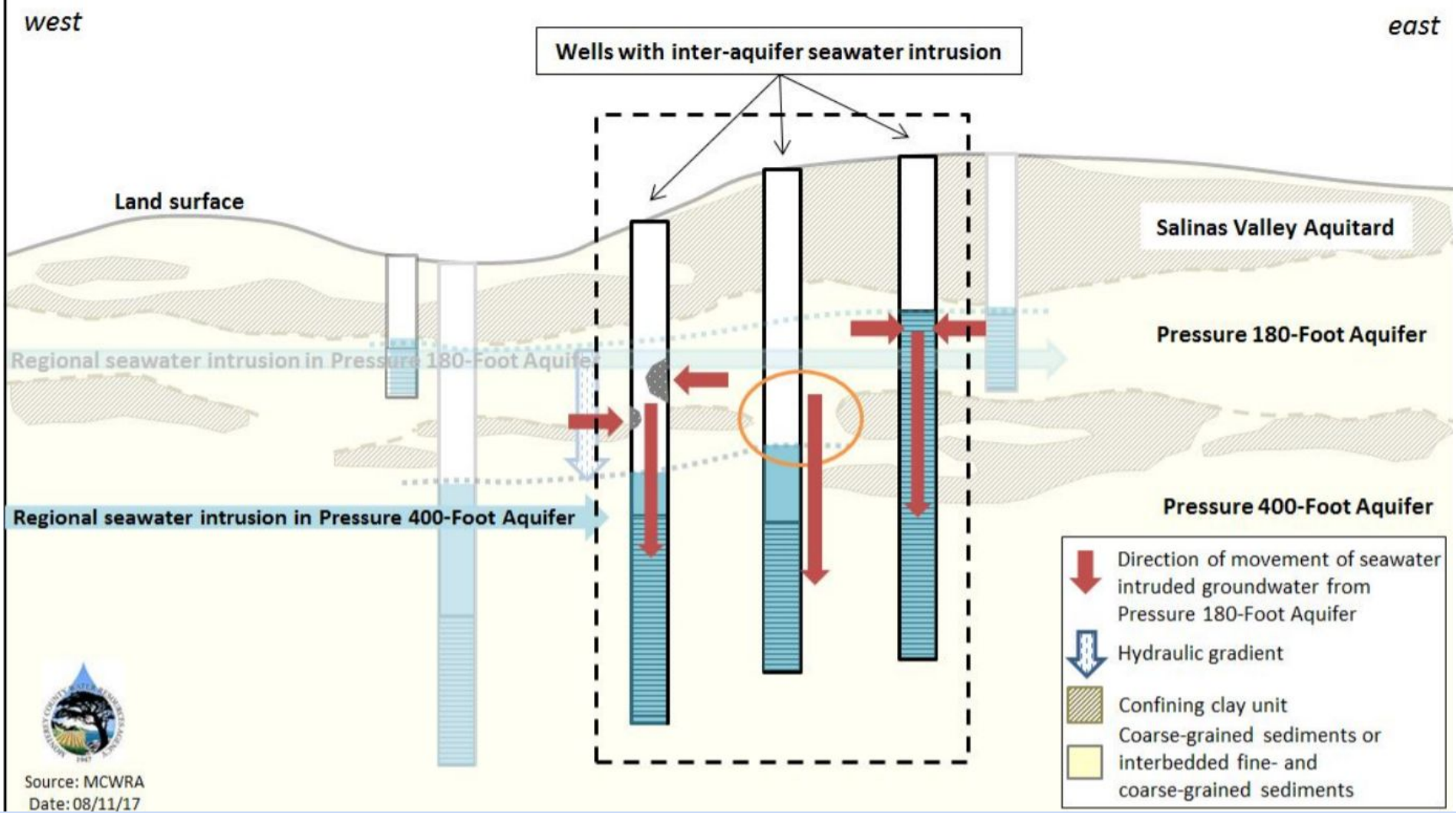
Seawater has advanced 5 miles into the Salinas Valley in the 180ft aquifer since 1920s.

2017 180ft Historical Seawater Intrusion, MCWRA



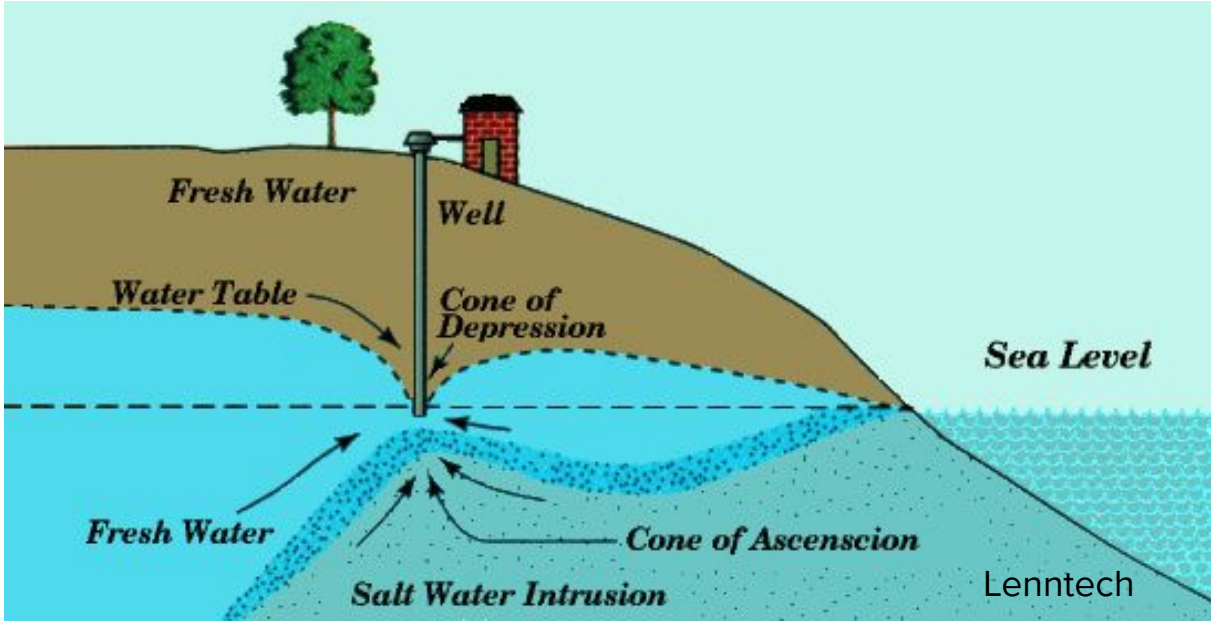
Moreover, damaged and abandoned wells have allowed seawater to penetrate and contaminate the 400ft aquifer, creating those ominous "blobs."

2017 400ft Historical Seawater Intrusion, MCWRA


west
east
Wells with inter-aquifer seawater intrusion
Land surface
Salinas Valley Aquitard
Pressure 180-Foot Aquifer
Regional seawater intrusion in Pressure 180-Foot Aquifer
Regional seawater intrusion in Pressure 400-Foot Aquifer
Pressure 400-Foot Aquifer
Direction of movement of seawater intruded groundwater from Pressure 180-Foot Aquifer
Hydraulic gradient
Confining clay unit
Coarse-grained sediments or interbedded fine- and coarse-grained sediments
Source: MCWRA
Date: 08/11/17

Economic Cost, “Tragedy of the Commons”

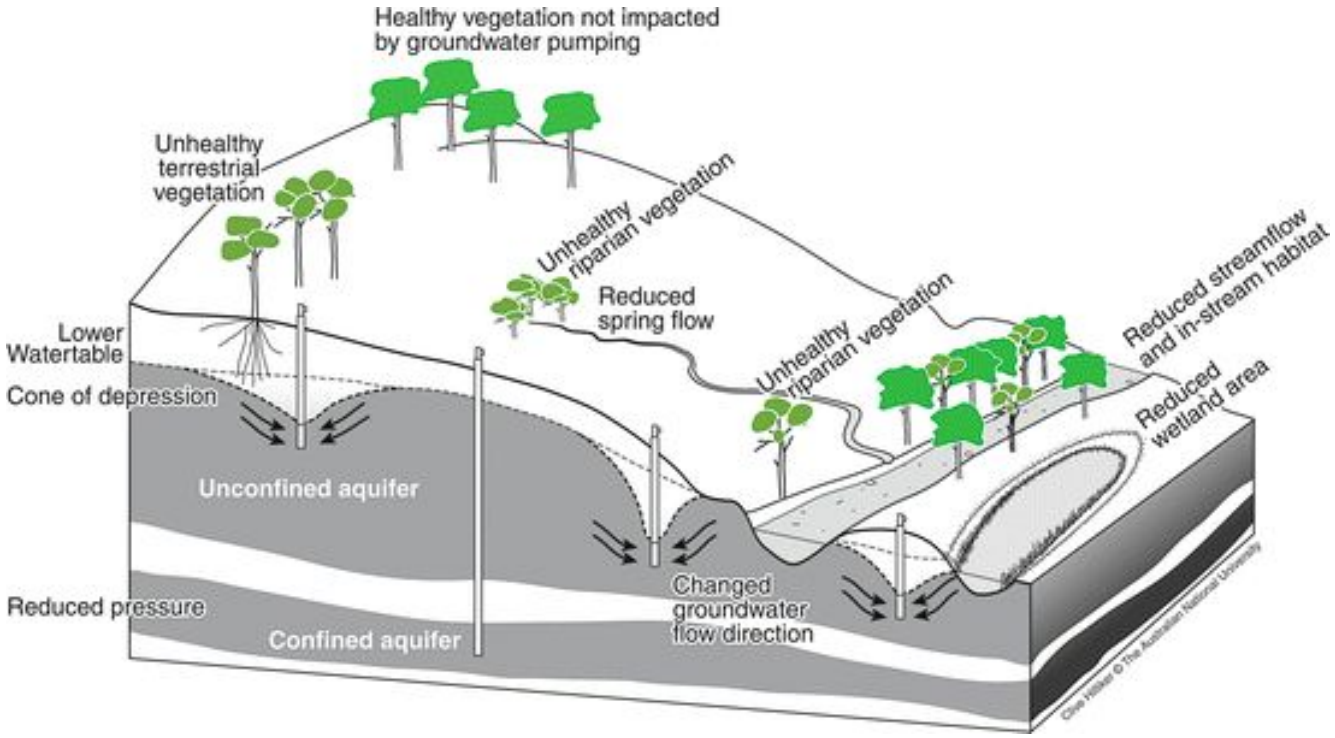
- Our aquifers are a shared resource than can be exploited by those with the means to dig the deepest well for short-term gain.
- When wells become contaminated because of overdraft, deeper ones must be drilled. These are costly to drill, and require more energy to pump a given quantity of water.



“Rural landowners and small-scale farmers are disproportionately affected by overdraft as they have fewer financial resources to dig new or deeper wells or diversify their water supply.”

Water in the West, Stanford Woods Institute for the Environment

Ecosystem frailty



Ground and surface waters are interconnected. Overdraft leads to reduced stream and river flow, putting dependent ecosystems at risk.

Groundwater-dependent ecosystems of the Monterey Peninsula and Salinas Valley

- Riparian habitats
  - The Salinas River, Carmel River and their springs and tributaries
- Estuaries
  - Elkhorn Slough, Moro Cojo Slough, and other wetlands
- Phreatophic (deep rooted) vegetation
  - Live oak tree groves throughout the county

There's no doubt about it. The 180ft and 400ft aquifers of the Salinas Valley have been determined by the DWR of California to be critically overdrafted.

*Department of Water Resources

In 2014 the State passed the Groundwater Sustainability Act, which is the first statute in Californian history to mandate sustainable groundwater use. The Salinas Valley Basin Groundwater Sustainability Agency, along with newly formed agencies throughout the state, is working to carry out the state mandate that each critically overdrafted basin reach sustainability by 2042.

Salinas Valley Basin
Groundwater Sustainability Agency

GROUNDWATER: **It's the water we drink and the crux of our agricultural industry. How we manage it now will directly impact the future water supply for Monterey County.**

Credits

This presentation was researched and assembled by Olivia Myers, a LandWatch intern.

LandWatch is a 501 (c)(3) nonprofit.

Sources

MCWRA: Slides 4, 6, 7, 8, 10, 12, 15, 16, 17, 18, 19

Monterey County Farm Bureau: Slide 9

“California in Overdraft” *The Californian*: Slide 20

Groundwater Exchange: Mapping Groundwater Dependent Ecosystems in California: Slides 21, 22

SVBGSA: Slide 26