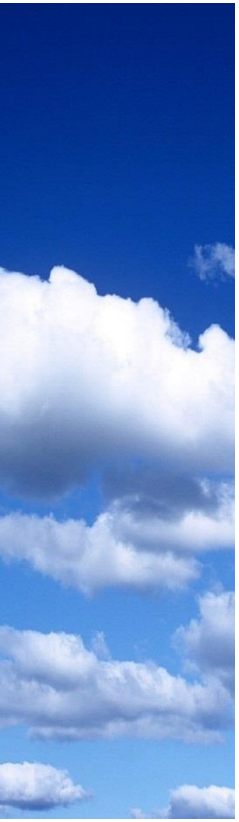
Climate & Water Quality Standards



An Arid West Point of View

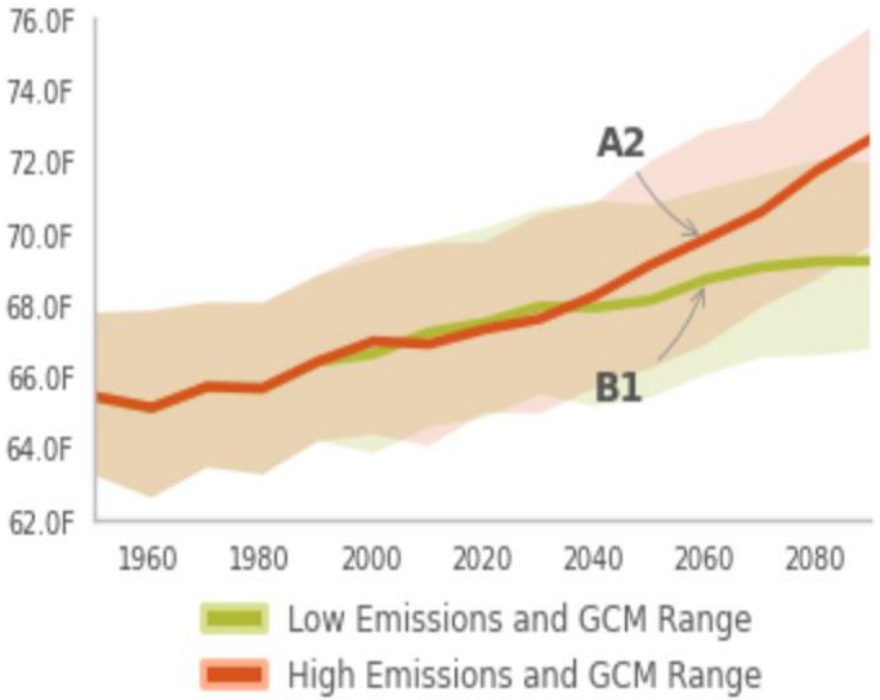
Deb Smith
CA Regional Water Quality Control Board
Los Angeles Region

Climate Change in the Southwest

Projections

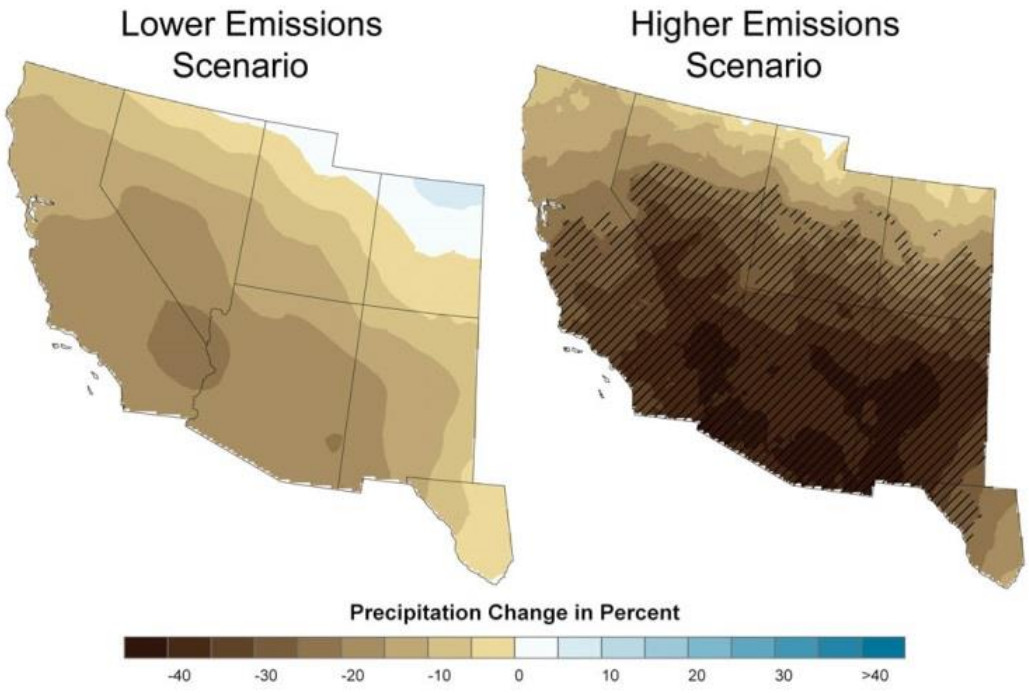
Temperatures

- By 2050, California is projected to warm by approximately 2.7°F above 2000 averages, a threefold increase in the rate of warming over the last century.
- By 2100, average temperatures could increase by 4.1–8.6°F, depending on emissions levels.
- Springtime warming — a critical influence on snowmelt — will be particularly pronounced.
- Summer temperatures will rise more than winter temperatures, and the increases will be greater in inland California, compared to the coast.
- Heat waves will be more frequent, hotter, and longer.



Predicted annual temperatures in Los Angeles area (http://cal-adapt.org/)

Precipitation



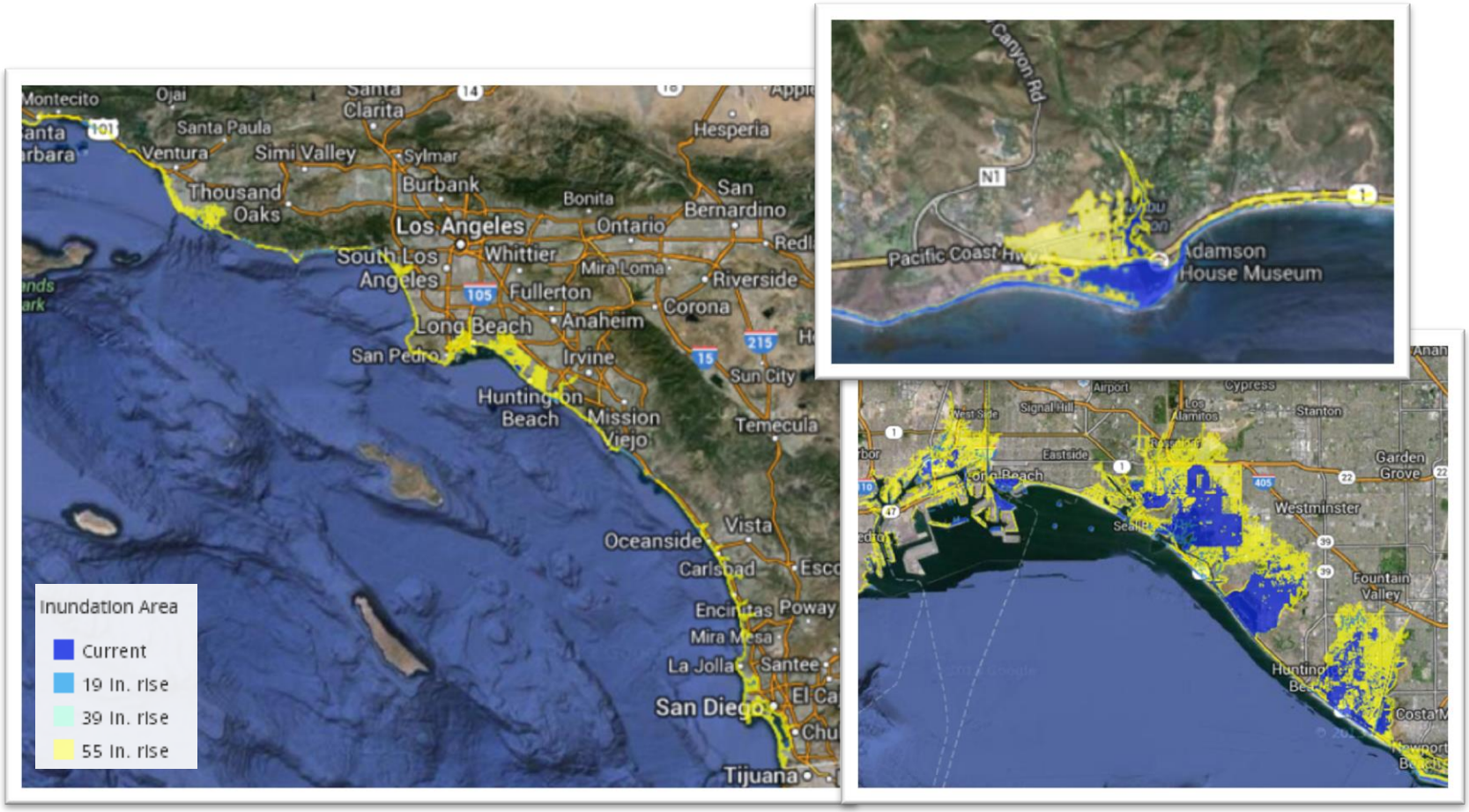
Spring precipitation change for 2080-2099 compared to 1961-1979 under two emissions scenarios.

(USGCRP, 2009)

- Several models show shift toward drier conditions by the mid-to-late 21st century in Central and, most notably, Southern California.
  - By 2050, 30-year average precipitation in the San Diego region will decrease by more than 8 %, even under a lower emissions scenario.
  - By 2100, 30-year average precipitation will decline by more than 10 % below the historical average in half the projections.
- Drying trend caused by an apparent decline in the frequency of rain and snowfall.
- Even in projections with relatively small or no declines in precipitation, central and southern parts of the state can be expected to be drier from the warming effects alone.

Sea Level Rise

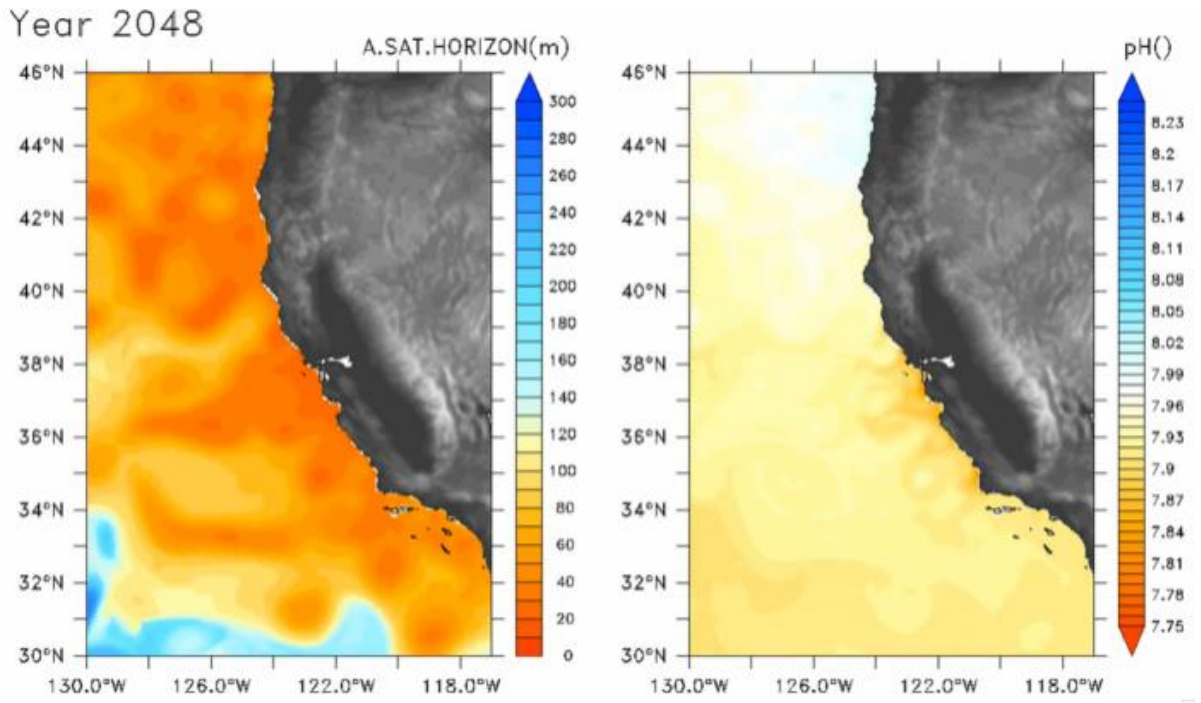
- California may see up to a 55 inch (140 cm) rise in sea level within this century given the expected rise in temperatures around the world.



Areas that may be in threat of inundation during an extreme flood event (100 year flood) in South California (http://cal-adapt.org/)

Ocean Acidification

- Since preindustrial times, ocean acidity has increased by 30%. By 2100, it is expected to rise by as much as another 150%.
- Declining pH of seawater reduces the amount of carbonate ions in the water, which many shell-building organisms combine with calcium to create the calcium carbonate that they use to build their shells and skeletons.



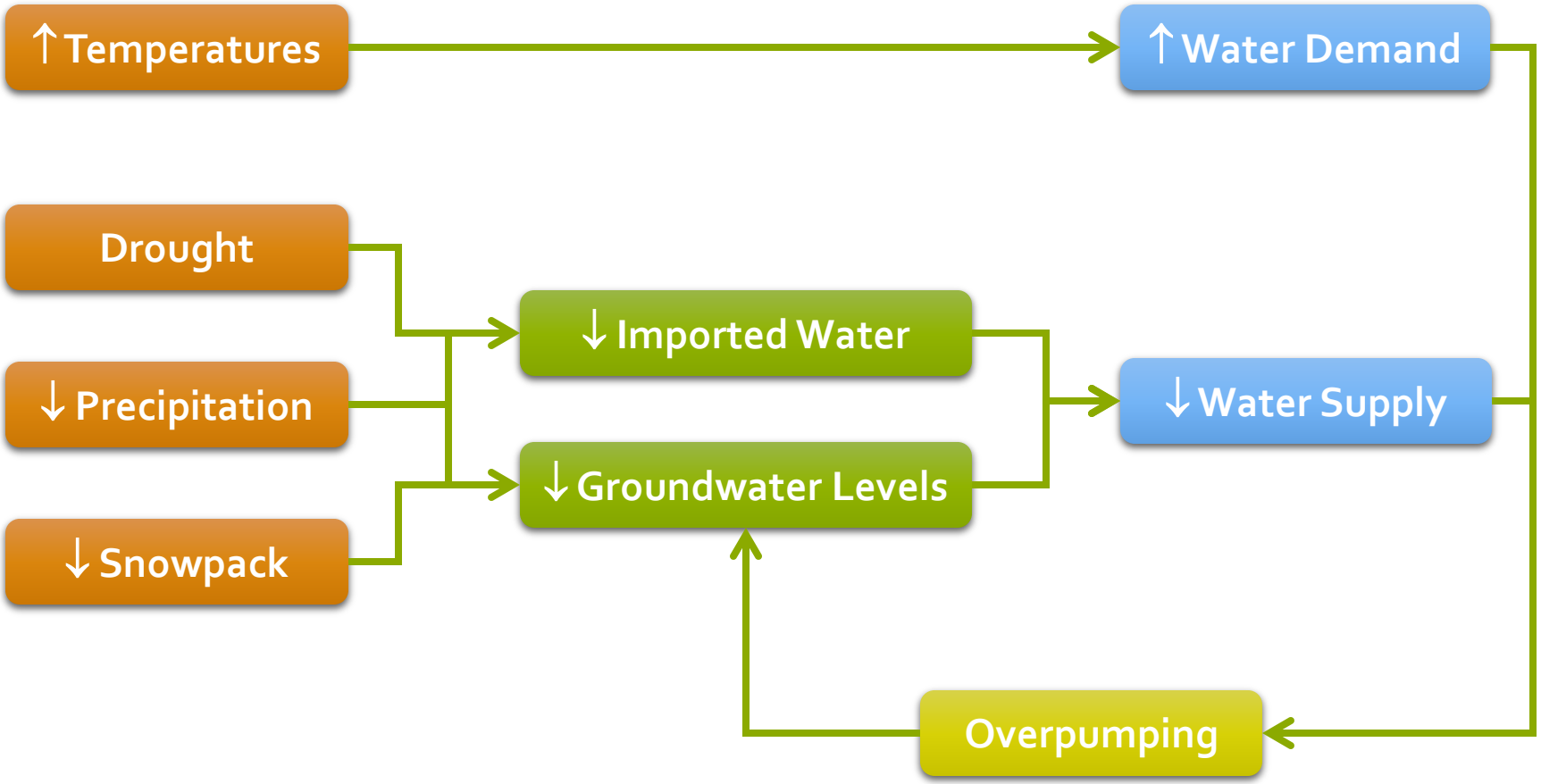
Predicted aragonite saturation levels (left) and surface pH (right) off the coast of California in 2048.

(http://news.sciencemag.org/2012/06/rising-tide-acid-california?ref=hp)

Why do we care?

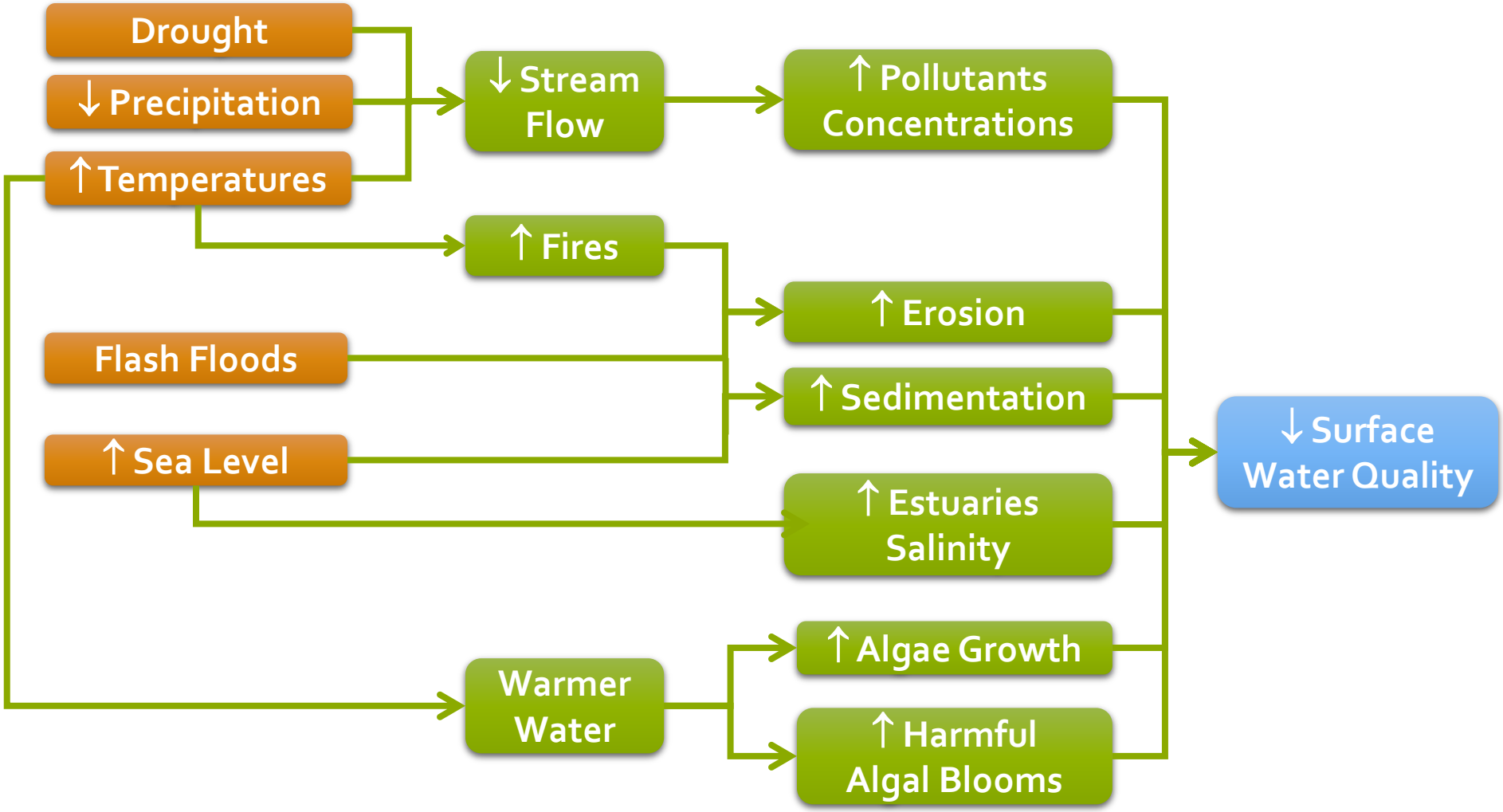
Impact to Water Resources

Impact to Water Supplies

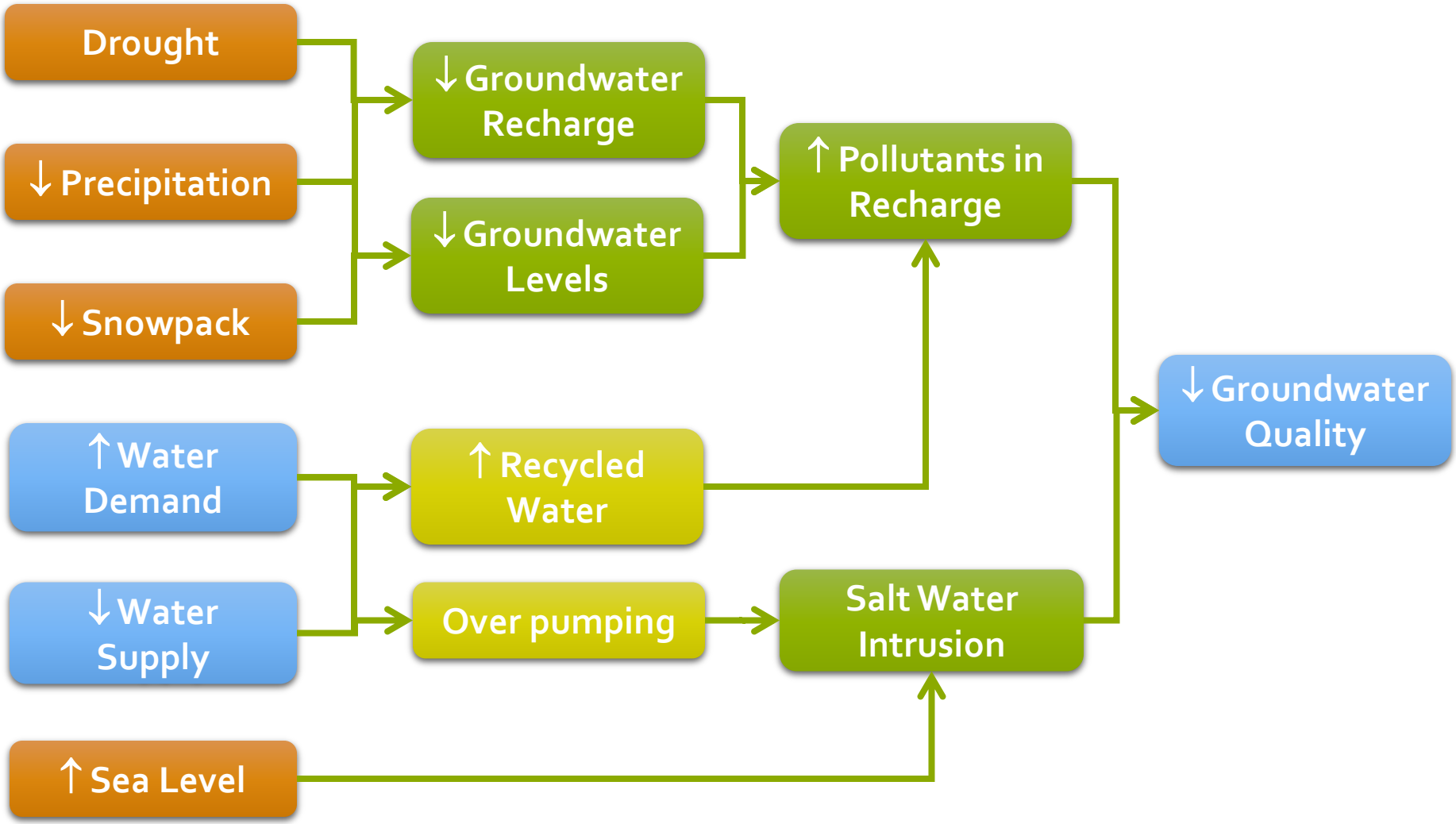


Impact to Water Quality

Surface Waters



Impact to Water Quality
Groundwater



Impact To Water Quality Standards

Impacts to Water Quality Standards

- Possible change in reference conditions
- Added complexity in the development of numeric objectives
- May require reconsideration of wq standards or new standards
- Increase in use of recycled water precedes standards for CECs

Impacts to Water Quality

- Efforts to increase water supply may decrease water quality
- Water conservation increases pollutant levels in POTWs influent and receiving waters
  - NPDES permit for Joint Outfall System - change in performance limits based on an increase of pollutant concentrations related to conservation measures resulting in lowers flows in the system.

    ⇒Arsenic and Ammonia effluent limits increased by 25% and 11% respectively
  - Camarillo WRP - increased reliance on local groundwater versus imported water, combined with conservation measures

    ⇒Average concentrations in blended water potable supply of TDS, sulfate and chloride increased by 32%, 31% and 20%
- New desalination projects will create more brine which needs to be managed such that it does not degrade coastal water quality
- Recycled water often has high levels of salts, nutrients, & CECs

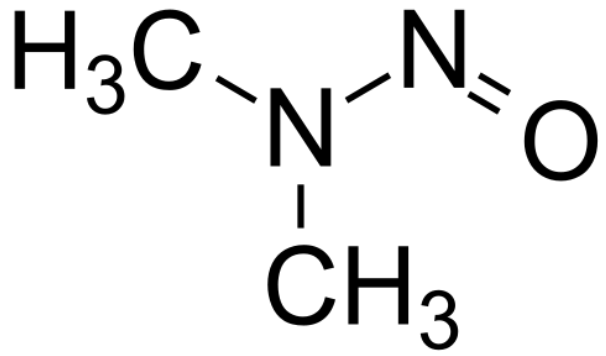
Impacts to Water Quality Standards

- Potential change in beneficial uses
  - Higher temperatures may impact COLD/WARM designations and impact fisheries
  - Ocean acidification may impact shellfish production and impact food web
  - Warmer water could bring more invasive species
  - Increased salinity, lower flow, sea level rise, displacement of coastal and wetland habitat may impact beneficial uses

- Exacerbated need for the development of new water quality criteria

NDMA

- *N*-Nitrosodimethylamine
- Disinfection by-product that has been found in Advanced Water Treatment Plants (AWTPs) after chloramination of the wastewater.
- Highly toxic, especially to the liver, and a suspected human carcinogen
- CDPH notification level 10 ng/L
- Wastewater levels range up to 450 ng/L



What can we do?

Adapt to Change while Preserving Water Quality

What We Can Do ?

- Expedite the development of new water quality criteria
  - E.g., NDMA
- Review water quality objectives and beneficial uses. Explore protective site-specific criteria
  - Continued relaxation of water quality objectives is not a sustainable option because eventually it will impact beneficial uses

What We Can Do ?

- Incorporate climate change actions as a priority in our Triennial Review
- Prioritize our actions - Identify and map the most vulnerable surface and groundwaters that need to be protected
- Identify programs that should incorporate climate actions
- Integrate actions - conservation, recycled water use, stormwater management, water supply management

What We Can Do ?

- Direct more resources to the 401 program to cope with extreme flash floods, loss of coastline, sea walls, and inundation of facilities
- Monitor stream flows and groundwater levels
- Continue to conduct necessary research and policy development on CECs

What We Can Do ?

- THE KEY: Long Term Vision/Strategies
  - Salt and Nutrient Management Planning
  - Development of models that can predict and verify impacts
  - Balance wastewater loads with stormwater recharge where appropriate
  - Promote/require green infrastructure
  - Implement antidegradation policies with more care