

Proposed Amendments to Water Quality Control Plans

# **Desalination Facilities and Brine Disposal**

*California Ocean Plan  
and  
Enclosed Bays and Estuaries Plan*

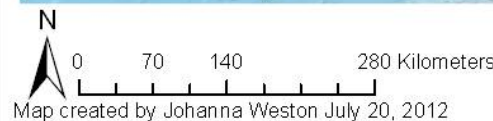
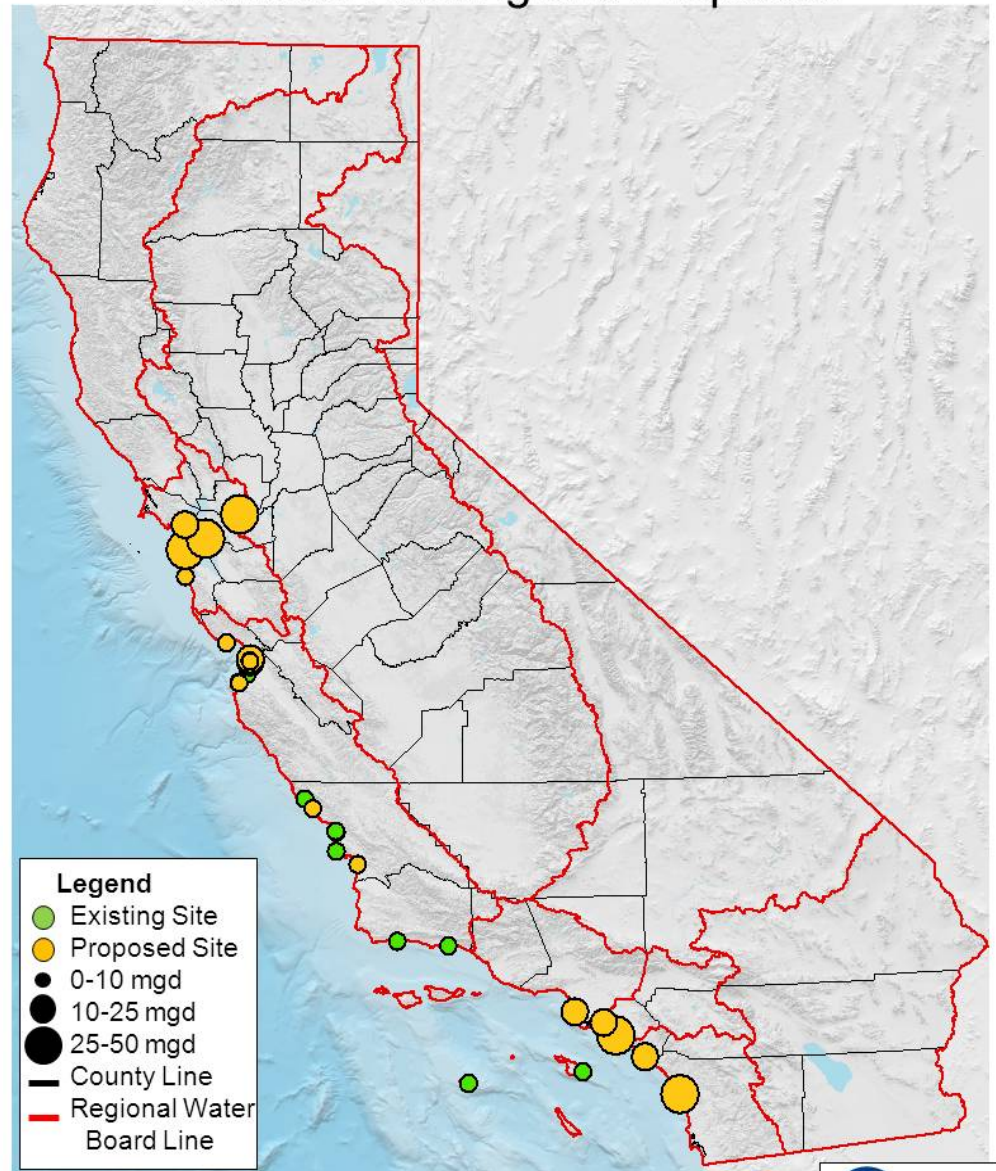
**January 30, 2013 Stakeholder Meeting**



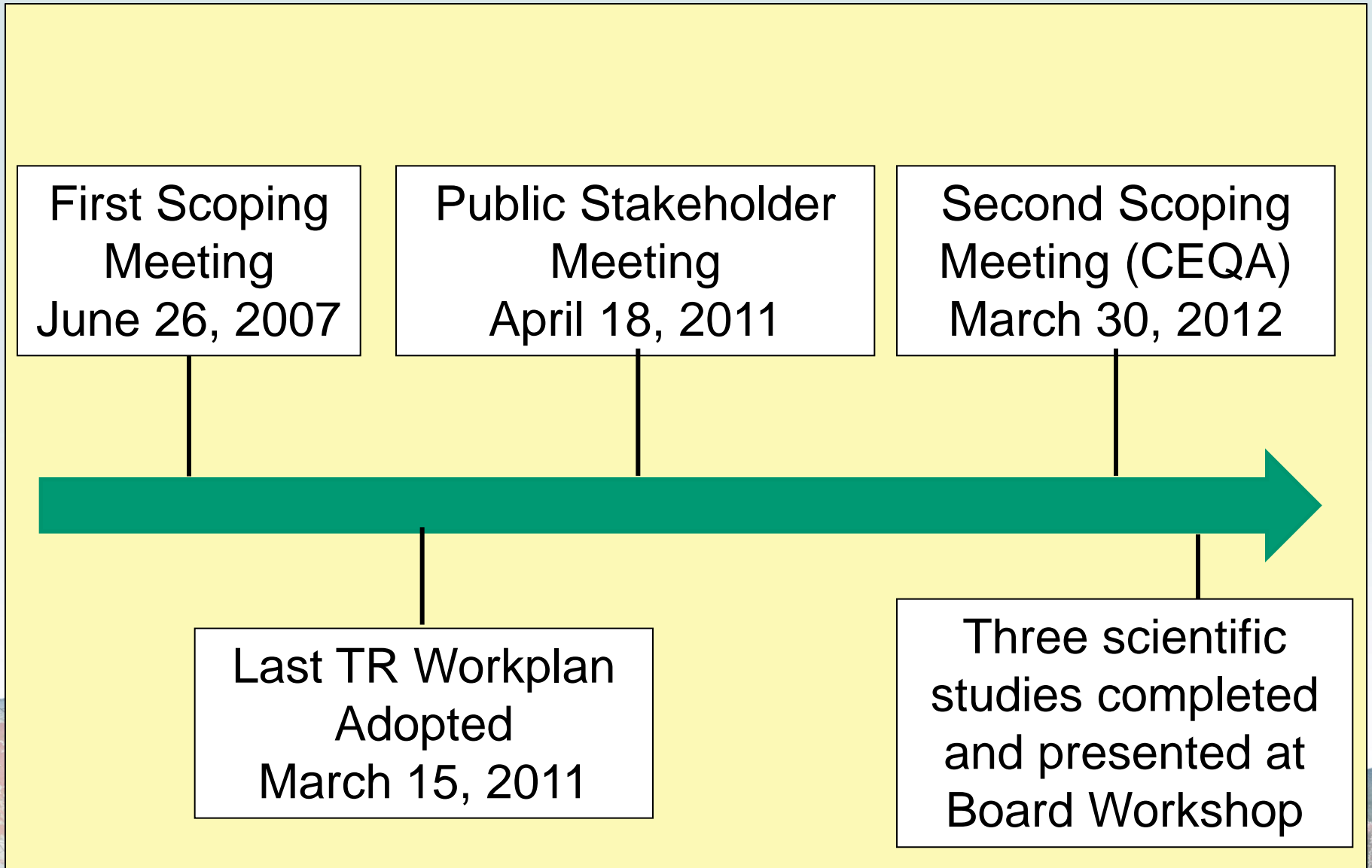
# Why is new regulation needed?

- Many new desalination projects have been proposed along the California coast to alleviate water shortages.
- The projects in Carlsbad and Huntington Beach (NPDES permitted) would be the largest desalination plants in operation in the U.S.

## Statewide Desalination and Brine Disposal Facilities: Existing and Proposed



# Project Status



First Scoping Meeting  
June 26, 2007

Public Stakeholder Meeting  
April 18, 2011

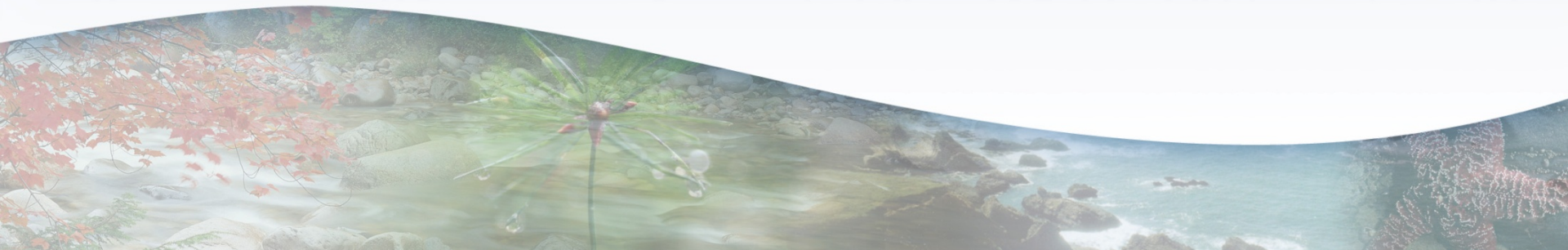
Second Scoping Meeting (CEQA)  
March 30, 2012

Last TR Workplan Adopted  
March 15, 2011

Three scientific studies completed and presented at Board Workshop

# Some Outstanding Issues after Board Workshop

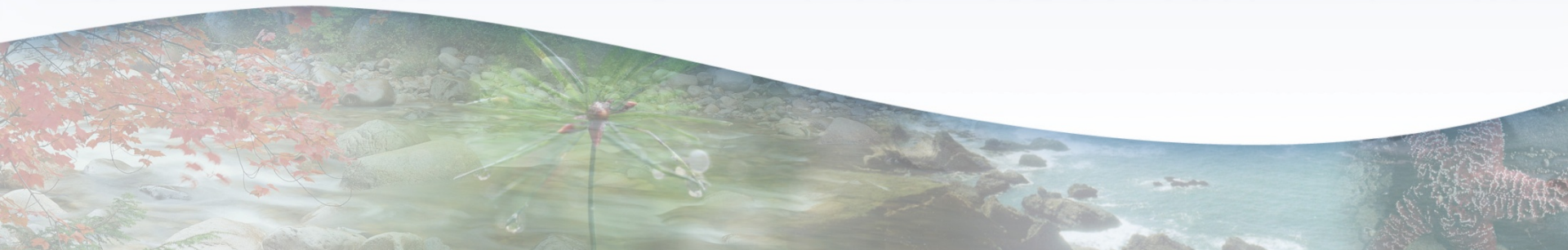
- Effects of stresses on planktonic organisms in the water column due to diffusers
- Peer review of West Basin salinity (done) and entrainment studies (Tenera study not complete yet)
- Concern about the use of fees as a mitigation approach
  - Consideration of a resource economist as a reviewer
- Potential for more work by ERP...



# Potential Impacts from Desalination Facilities

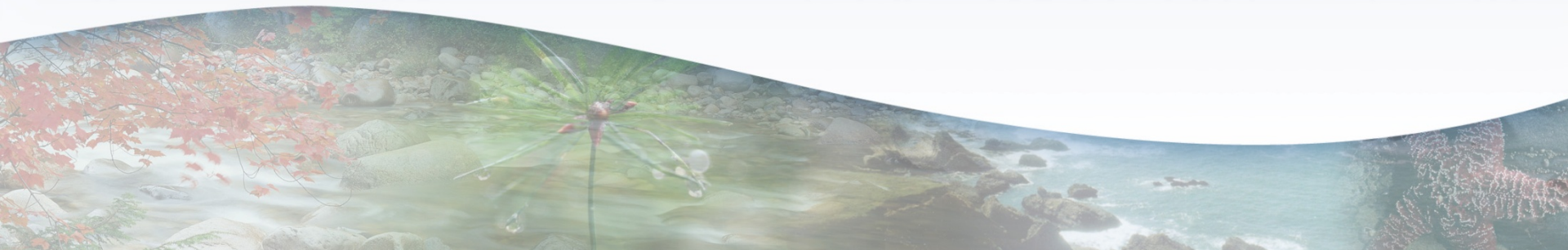
Impacts to marine life may occur when the desalination facility withdraws seawater to use as source water and discharges the concentrated waste water back to the ocean.

- **Intakes:** Withdrawal of seawater may entrain or impinge aquatic life.
- **Discharge:** Brine wastes discharged into the ocean may form a dense plume that settle on the ocean floor and harm benthic marine life.



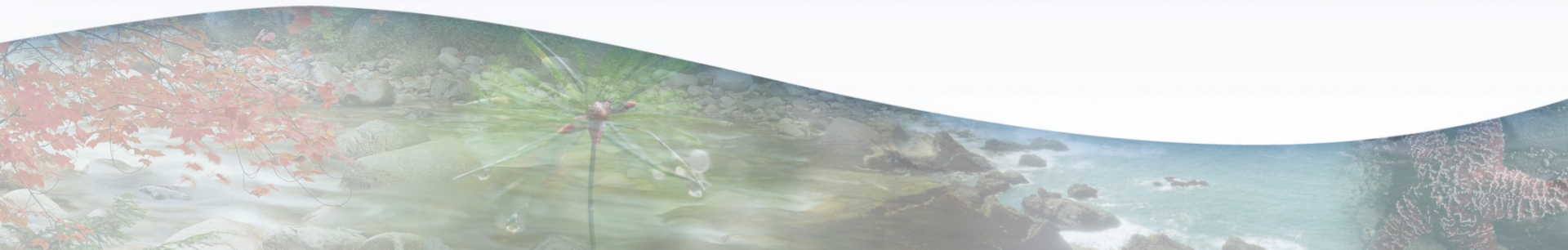
# Controlling Intake Impacts

- Porter-Cologne Section 13142.5(b) requires that a *“new or expanded power plant or other industrial installation using seawater for cooling, heating, or industrial processing [use] the best available site, design, technology, and mitigation measures feasible...to minimize the intake and mortality of all forms of marine life.”*
- The State Water Board’s once-through cooling water policy addresses intake impacts from existing **power plants** (effective October 1, 2010).



# Staff Recommendations - Intakes

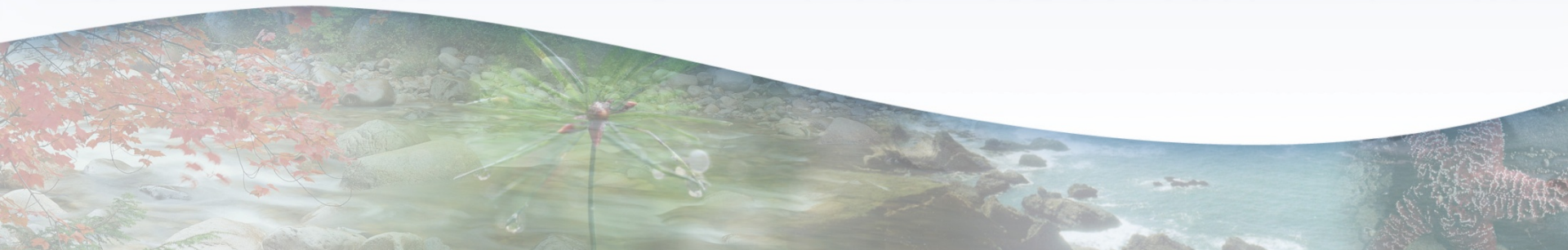
- Track 1 - Subsurface (below ground or seabed)
  - Wells - brackish or saline groundwater – preferred!
- Track 2 - Surface water
  - Below substrate - infiltration galleries (installation and maintenance impacts)
  - Surface water
    - Reducing intake velocity (<0.5 fps)
    - Fine Screens (still no empirical evidence of efficacy)
    - Deep water intakes (may just entrain different organisms)



# ERP II Recommendations on Intake Impacts and Mitigation

How should any remaining IM&E be mitigated after the best site, design and technology are determined for a new desalination plant intake?

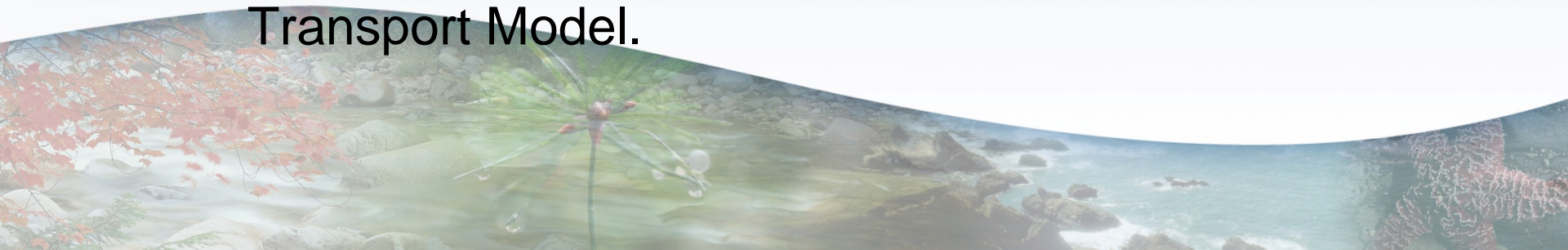
- A fee based on Area of Production Foregone could be used to mitigate for entrainment losses.
- Provided an equation that could be used to determine a per MG fee





# Staff Recommendations – Process and Mitigation

- Process: Best site and design for a new facility to be determined by the Water Boards following a collaborative process with other state agencies involved in the permitting of that facility.
  - Consider any prior project-specific determinations made by the State Lands Commission or by the California Coastal Commission.
- Mitigation: For residual impacts after intake controls, mitigation based on Habitat Production Foregone, determined using an Empirical Transport Model.



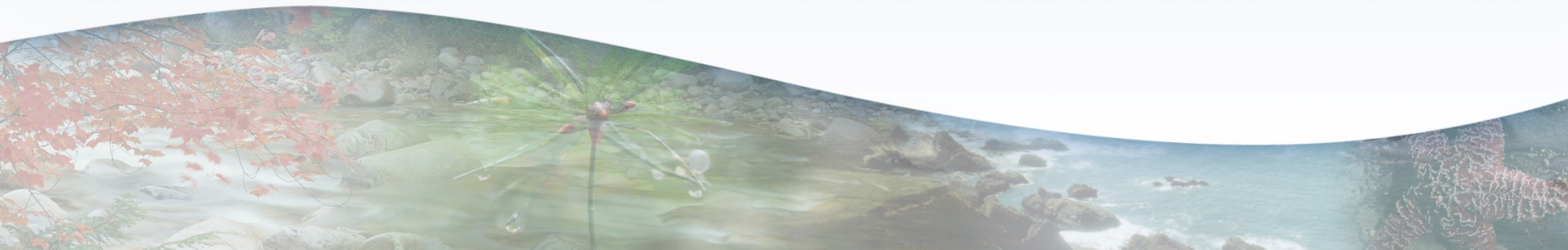
# Potential Discharge Impacts

Brine wastes discharged into the ocean may form a dense plume that tends to settle to the ocean floor.

The effects of exposing benthic marine life to a dense highly saline plume is not well understood.

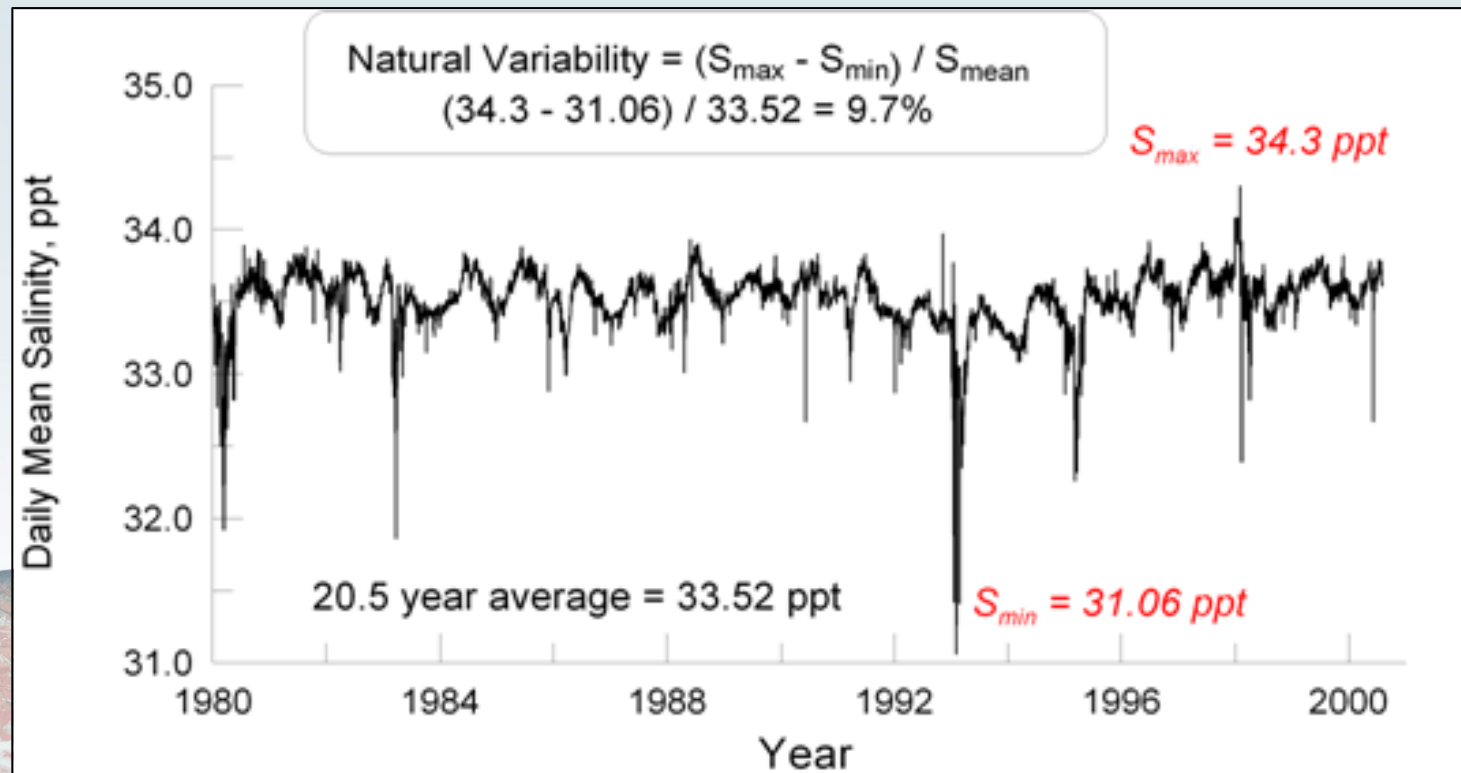
A 1992 SCCWRP study showed that purple sea urchin embryos were reduced 56-75% in salinities of 36.5g/kg.

Approximately 33.5g/kg is the average nearshore salinity along California coast, but it varies.



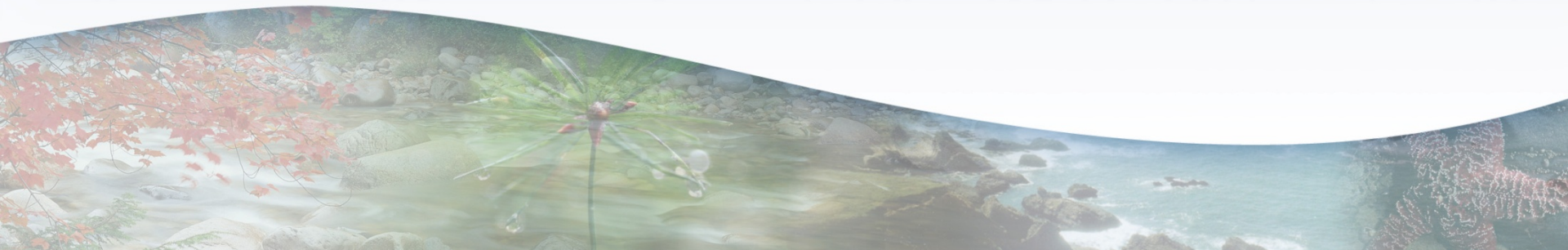
# Long-term ambient salinity in the Southern California Bight

Seasonal ambient salinity varies widely due to runoff, but maximum salinity rarely exceeds 34.3 ppt.



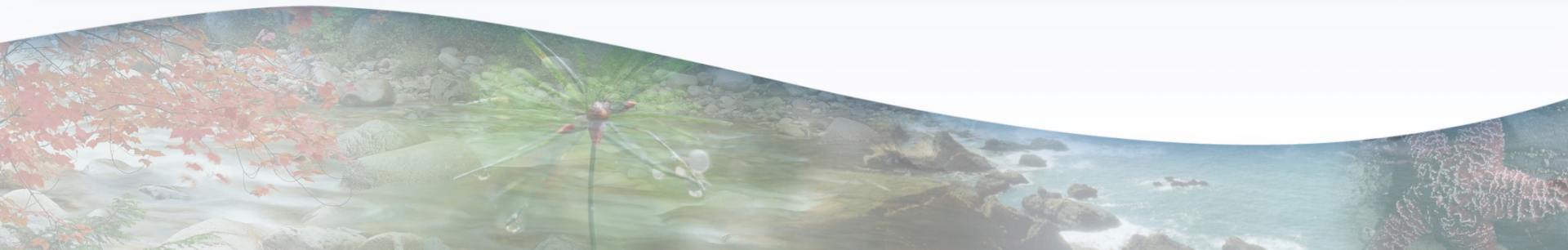
# Results of the Granite Canyon Brine Toxicity Study

- Most sensitive species were invertebrates
  - abalone (mean EC 36.8 ppt)
  - urchins (mean EC 38.1 ppt)
  - sand dollars (mean EC 39.6 ppt)
- Development test is the most sensitive protocol.
- Salinity tolerance values collaborated by other studies.



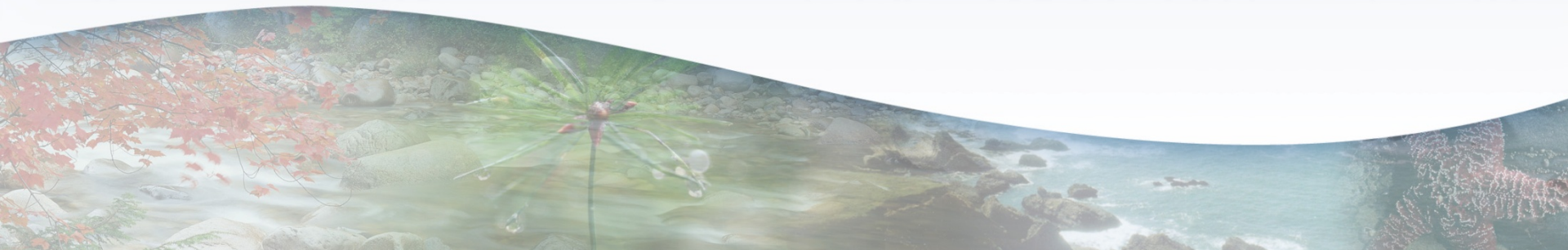
# Brine Panel Recommendations on Brine Fate and Disposal

- A salinity increase of no more than 2-3 ppt in the receiving waters around the discharge appears protective to biota.
- WQOs must be met at the edge of a regulatory mixing zone that extends vertically through the water column up to 100 m from the discharge structure in all directions.



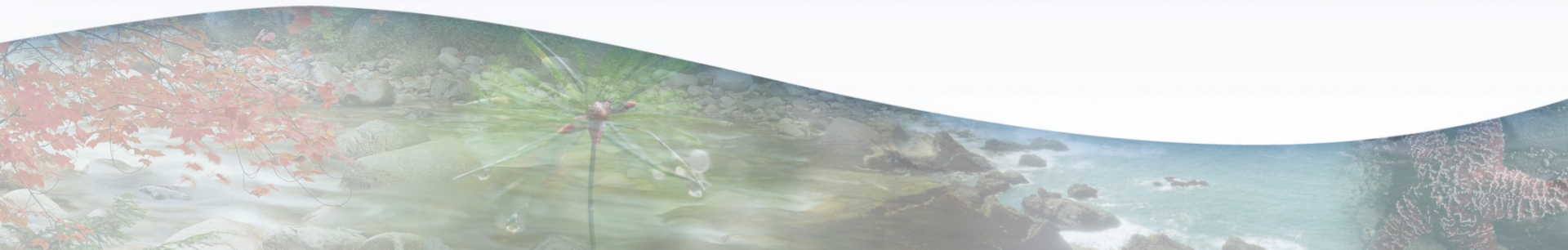
# Salinity Objective to Address Discharges

- A narrative objective for elevated salinity which can vary relative to background salinity.
  - Salinity shall not exceed two parts per thousand of that which occurs naturally.
  - Applies at the edge of the ZID.



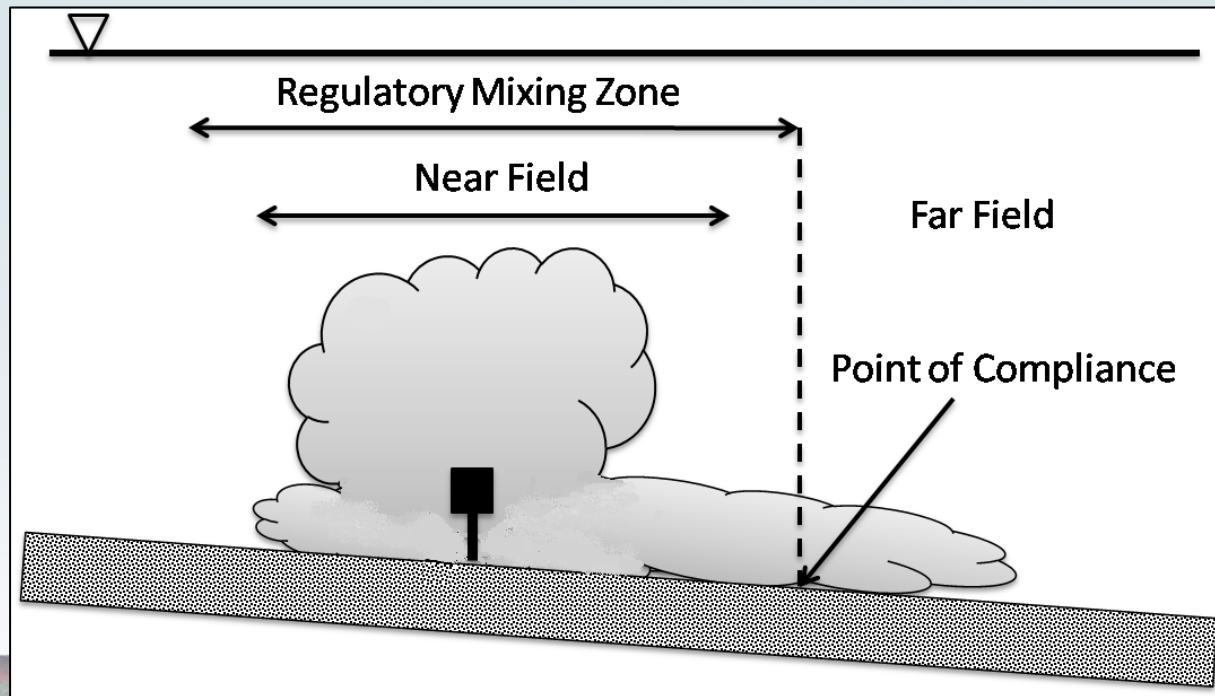
# Brine Panel Recommendations on Brine Fate and Disposal

- Excess salinity at the mixing zone boundary should not exceed 5% (or 2 psu, whichever is less) of background.
- This reduction can be achieved through near field hydrodynamic mixing that results in an overall dilution not less than 20:1.



# Recommendations on Brine Fate and Disposal

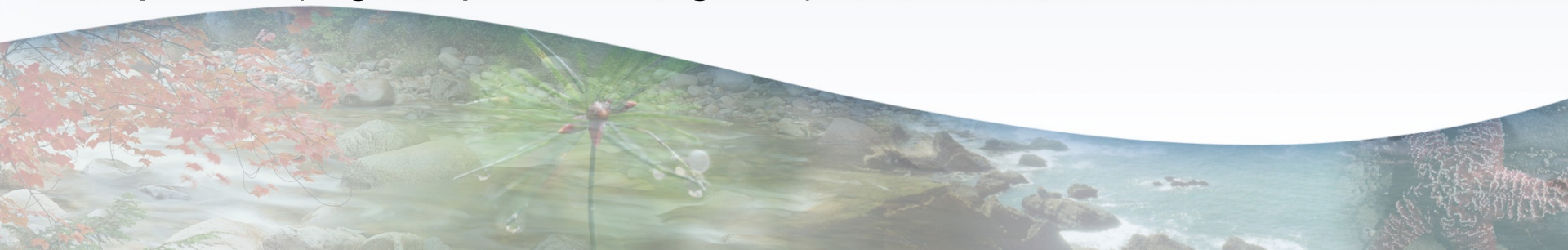
- Must meet objectives at the edge of the zone of initial dilution (**ZID**).





# Staff Recommendations - Controlling Discharge Impacts

- Prohibition on the use of seawater from a surface water intake for the specific purpose of increasing in-plant dilution (flow augmentation).
- Co-mingling with treated POTW wastewater allowed as long as end-of-pipe effluent limits and receiving water objectives are met.
- Multiport diffusers provide the highest dilution of dense discharges, and is preferred for a new discharge containing only brine.
- Discharges should avoid bathymetric depressions and sensitive species (e.g. kelp and surf grass).



# Initiate Formal Public Planning Process

