Case Studies of Desalination Brine Disposal Strategies in San Diego

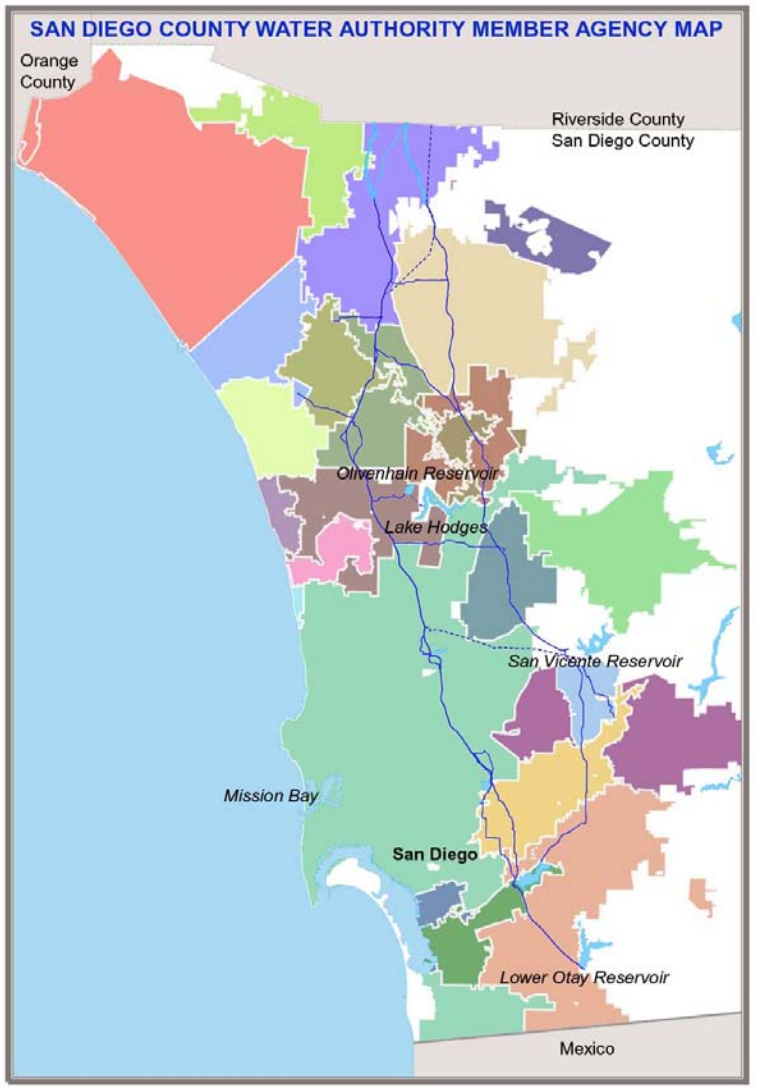
Science Advisory Panel

December 8, 2011

San Diego County Water Authority

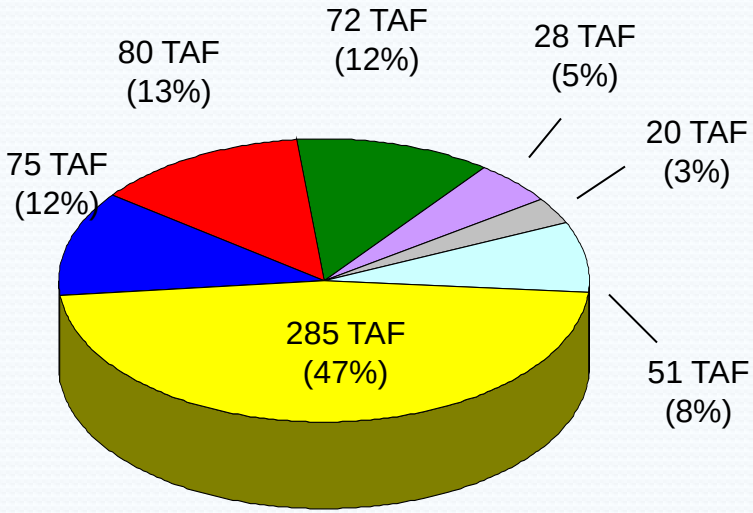
San Diego County Water Authority

- Wholesale water agency formed by State Legislature in 1944
- Mission to provide safe and reliable water supply
- Provide water service to 3.2 million people in San Diego
- Import ~70% of water supply
  - 2020 Goal: 7% seawater desalination



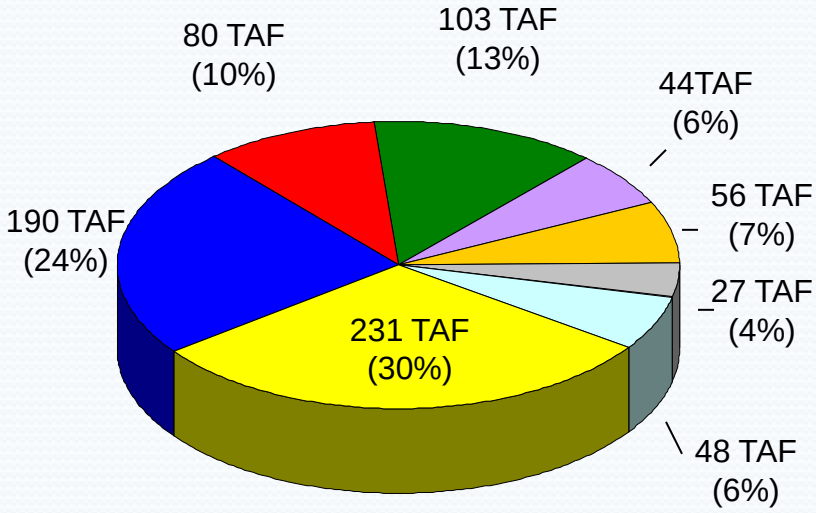
Increasing San Diego County's Water Supply Reliability through Supply Diversification

2011 (estimated)



Total = 611 TAF

2020



Total = 779 TAF

- Metropolitan Water District
- Imperial Irrigation District Transfer
- All American & Coachella Canal Lining
- Conservation (existing and additional)
- Recycled Water
- Seawater Desalination
- Groundwater
- Local Surface Water

Seawater Desalination Projects in San Diego

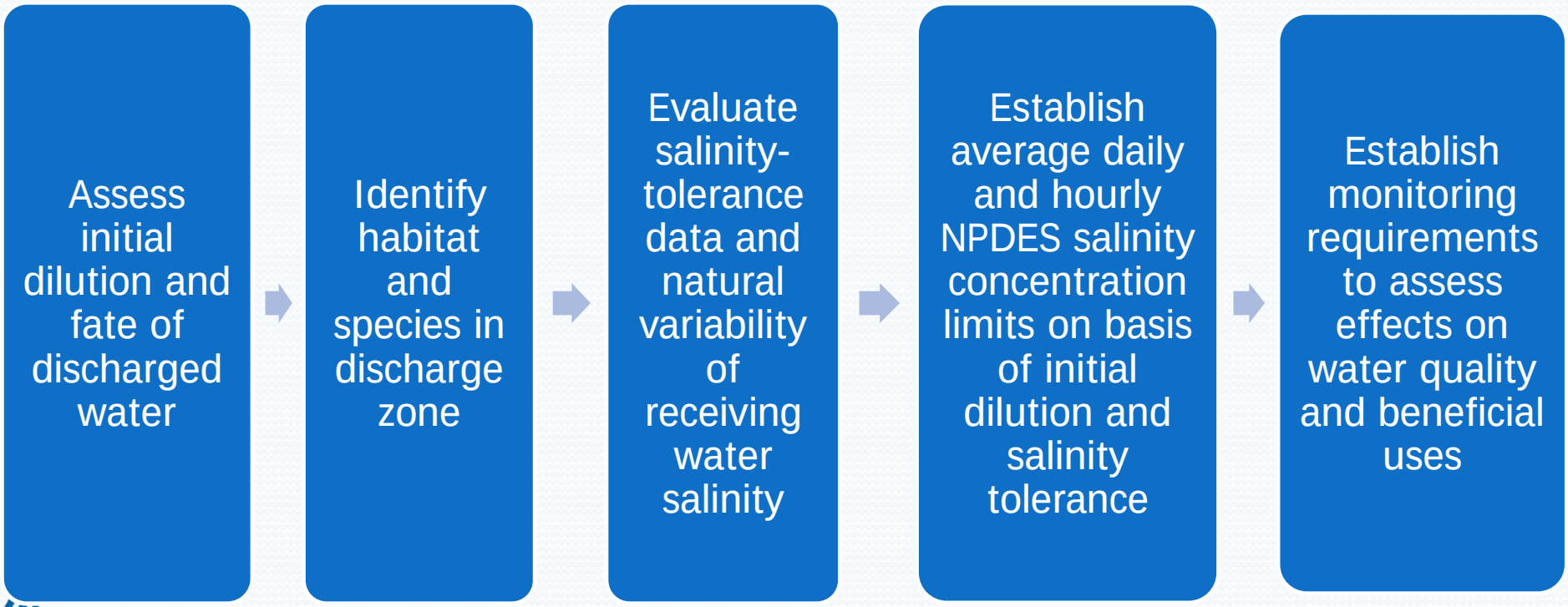
- Carlsbad Desalination Project
  - Fully permitted 50 mgd desalination project
    - Being developed by Poseidon Resources
    - Water purchase agreement negotiations underway with Water Authority
  - Online by 2016
- Proposed Camp Pendleton Desalination Project
  - Proposed facilities to produce up to 50-150 mgd
  - Feasibility/technical studies underway
  - Earliest online date in 2020

Encina Power Station, Carlsbad

Carlsbad Desalination Project

Process for developing NPDES permit limits for the Carlsbad Desalination Project

San Diego Regional Water Quality Control Board
NPDES Permit Adopted - August 16, 2006



Carlsbad Desalination Project: Overview of Brine Discharge Studies

- Hydrodynamic Modeling Studies: Identify potential salinity changes in marine environment
  - Simulated average and extreme conditions
- Marine Biology Studies: Evaluate potential impacts of increased salinity from desalination facility
  - Investigated salinity tolerance of local marine species
  - Determined that prolonged exposure to salinity at or below 40 ppt has no significant impact
  - Salinity over 40 ppt would be avoided under conditions placed on the Project

Carlsbad Desalination Facility
NPDES Salinity Concentration Limits:

NPDES Parameter	Maximum Allowable Salinity Concentration at Point of Discharge to Receiving Water
Hourly Maximum	44 ppt
Daily Maximum	40 ppt

"All studies indicated that [a project discharge meeting the following requirements] will not have a significant negative impact on aquatic life."
SDRWQCB, 2006

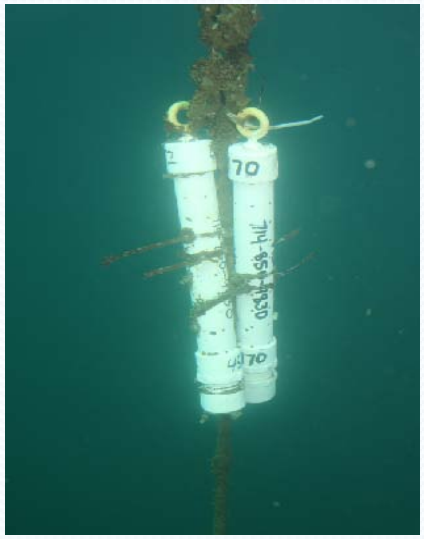
Proposed Camp Pendleton Project

- Proposed expandable 50 – 150 mgd regional project
  - Preliminary site evaluations and studies began in 2005
  - Two potential sites identified at Camp Pendleton
- Feasibility studies completed in 2009
  - Conceptual design of brine discharge diffuser system
  - Initial discharge modeling (near field only), based on existing available data and assumptions
  - Capital and O&M cost estimates
- Technical Studies Underway

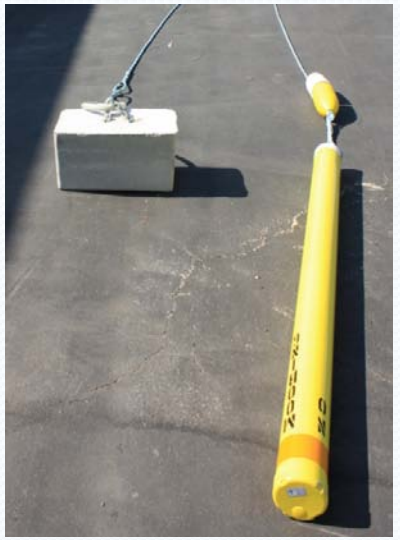
Technical Study Objectives for Brine Discharge

- Refine conceptual design for concentrate discharge diffuser systems
- Determine optimal location for brine discharge based on intake location, marine environment, and oceanography

ADCP



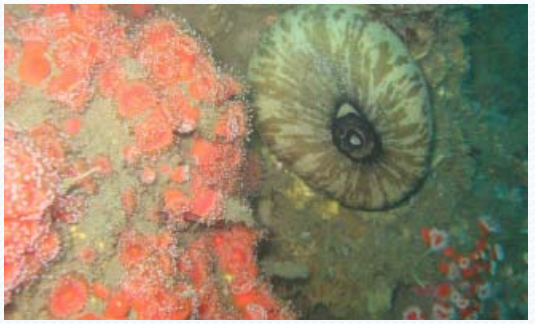
Thermistor Sensors



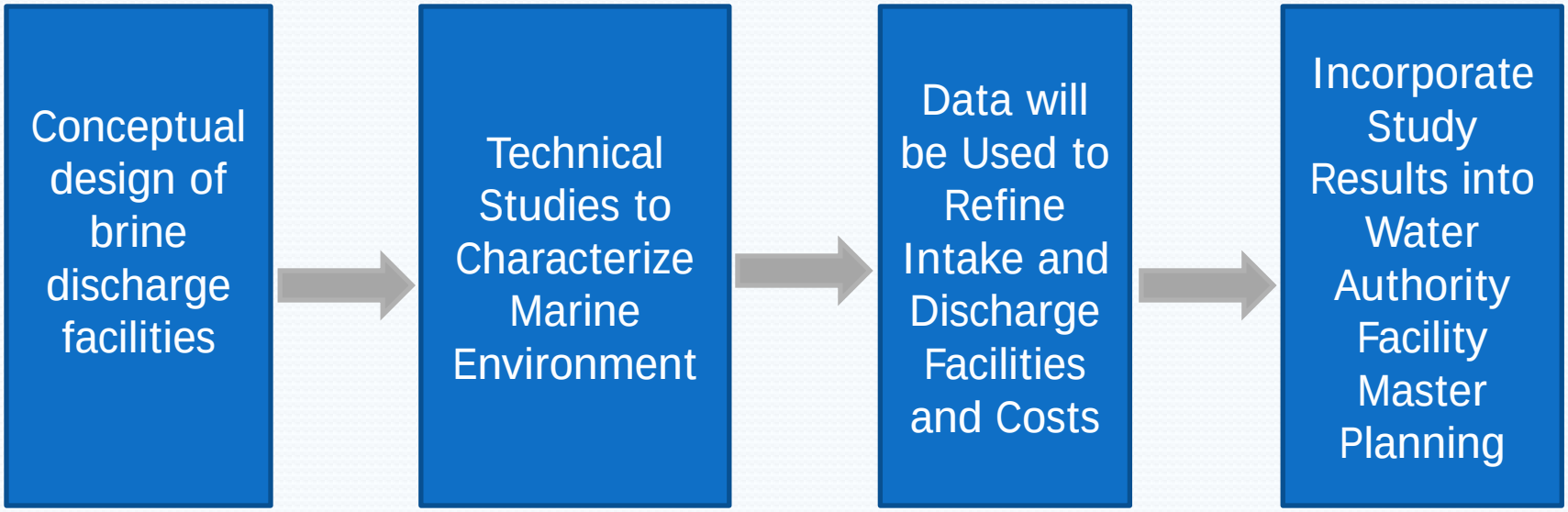
4-ft Spar Buoy

Marine Environment Studies

- Physical oceanography
  - Current profiling
  - Thermistor sensors
- Water quality sampling
- Sediment and infauna invertebrate sampling
- Demersal species sampling
- Ichthyoplankton sampling
- Reef survey



Conceptual Planning
Camp Pendleton Desalination Project



Conclusion

- Studies demonstrate that site-specific factors should be evaluated to establish appropriate permit requirements for protecting beneficial uses

- Carlsbad Desalination Project permit process demonstrates that Ocean Plan objectives provide adequate guidance for evaluating and protecting beneficial uses