

Potential Ambient Water Effects



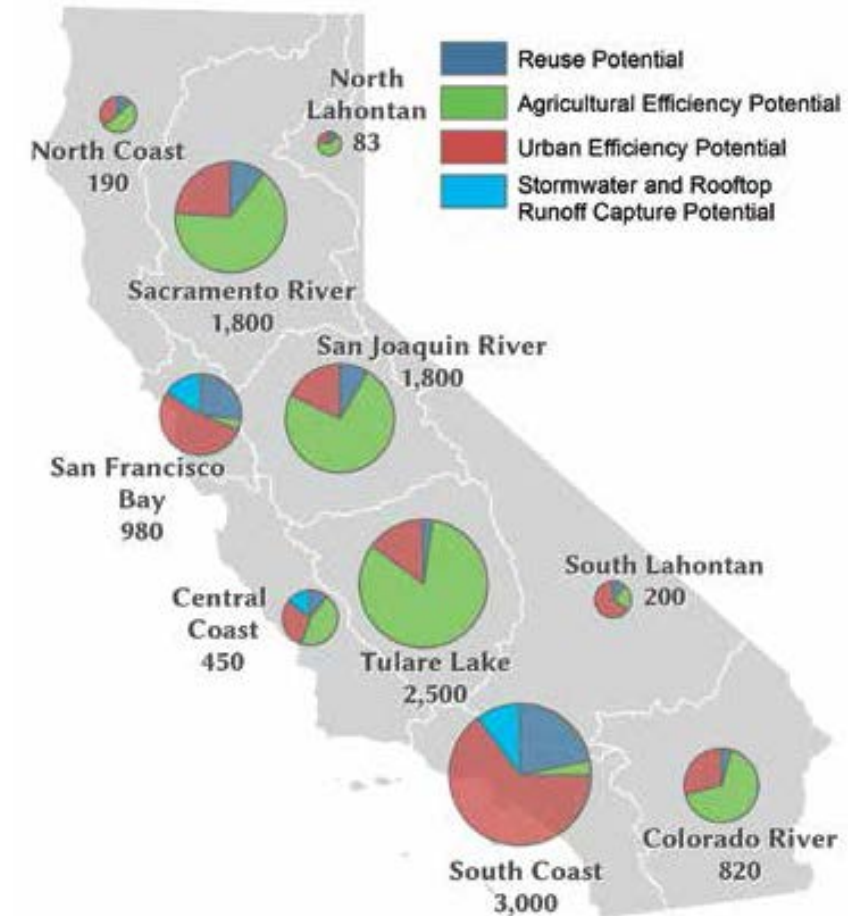
ERIC STEIN

*S. CA. COASTAL WATER RESEARCH
PROJECT (SCCWRP)*



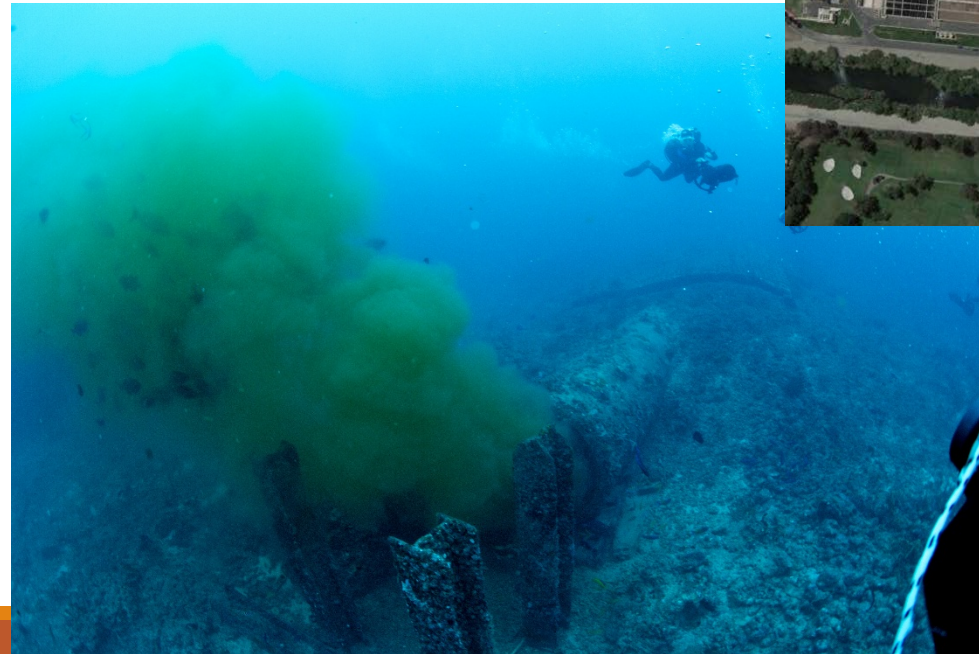
Why Ambient Water Issues

- ❑ Past work on water reuse has focused heavily on human health issues
- ❑ Relatively less attention on ecological health issues
- ❑ Desire to increase reuse of wastewater AND stormwater
 - Wastewater use for IPR and DPR
 - State recycled water policy calls for an increase in stormwater use by 500,000 acre feet by 2020 and 1 million acre feet by 2030



Potential Effects on the Ambient Environment

- ❑ Changes in flow patterns
- ❑ Changes in concentration



Considerations for Changes inFlow

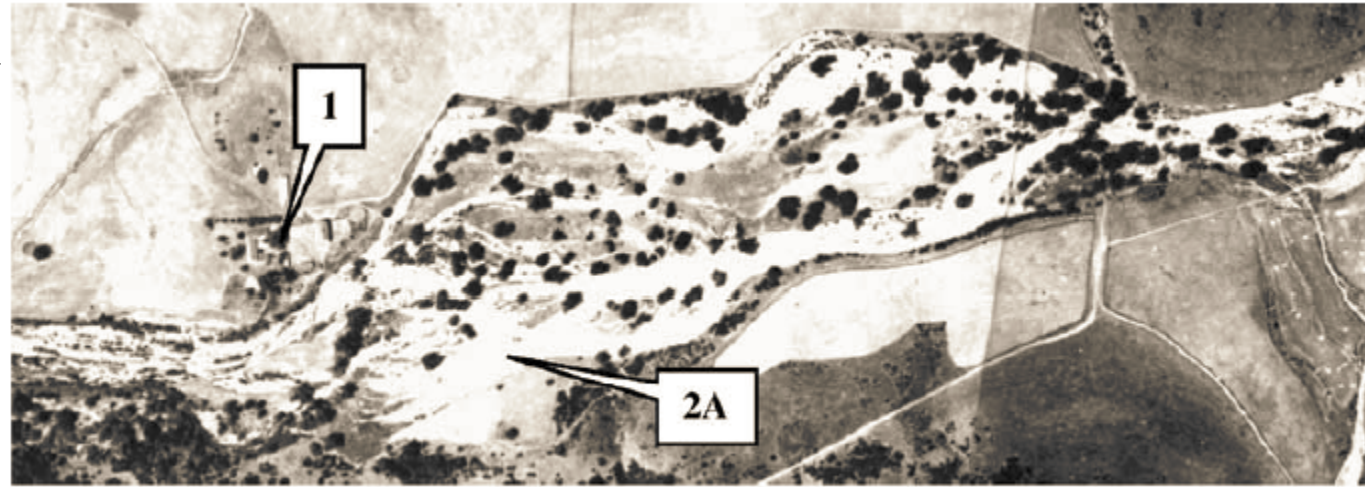
- ❑ Effects on sensitive species
- ❑ Effects on habitats
- ❑ Effects on reference expectations
- ❑ Potential management benefits

Consideration of Flow Effects on Species



Consideration of Flow Effects on Habitat

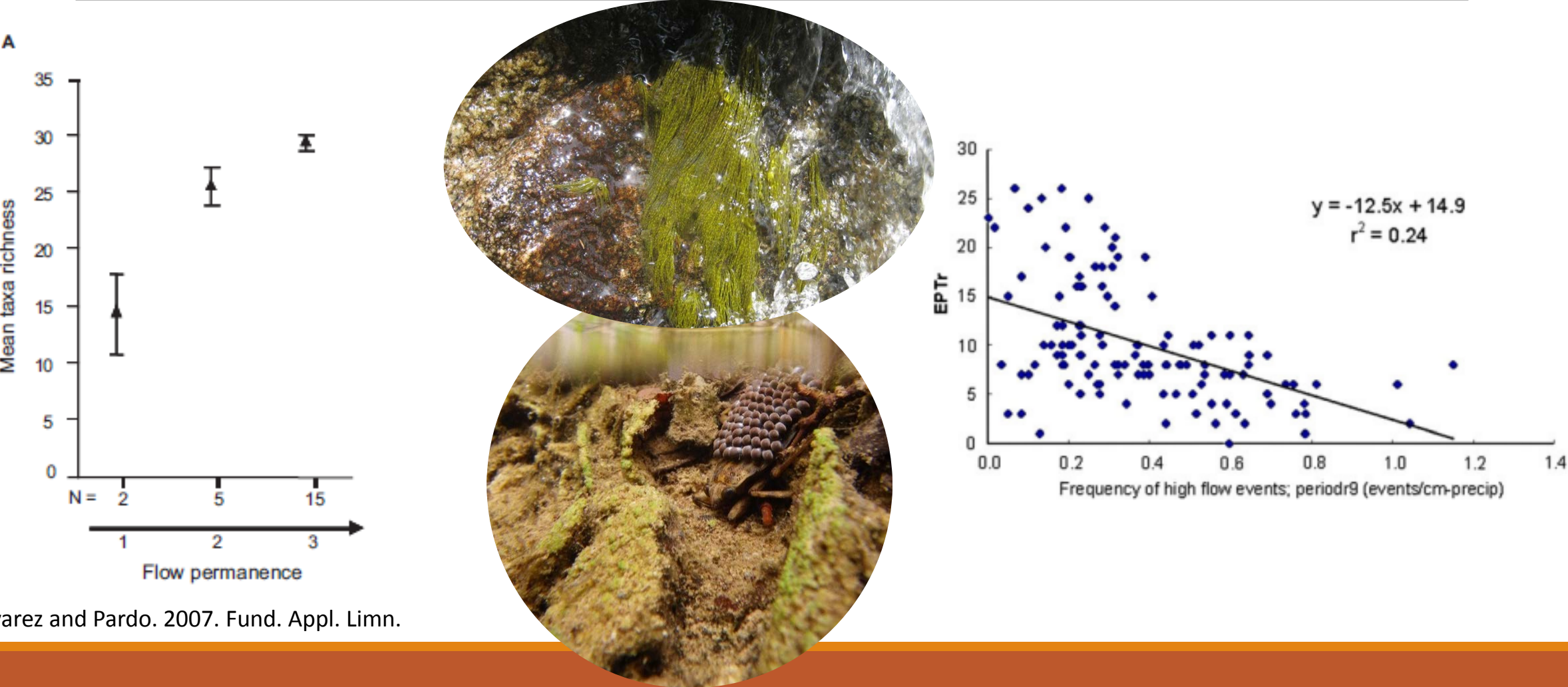
- Changes in extent and type of wetland and riparian habitat
- Changes in substrate composition



A. 1928



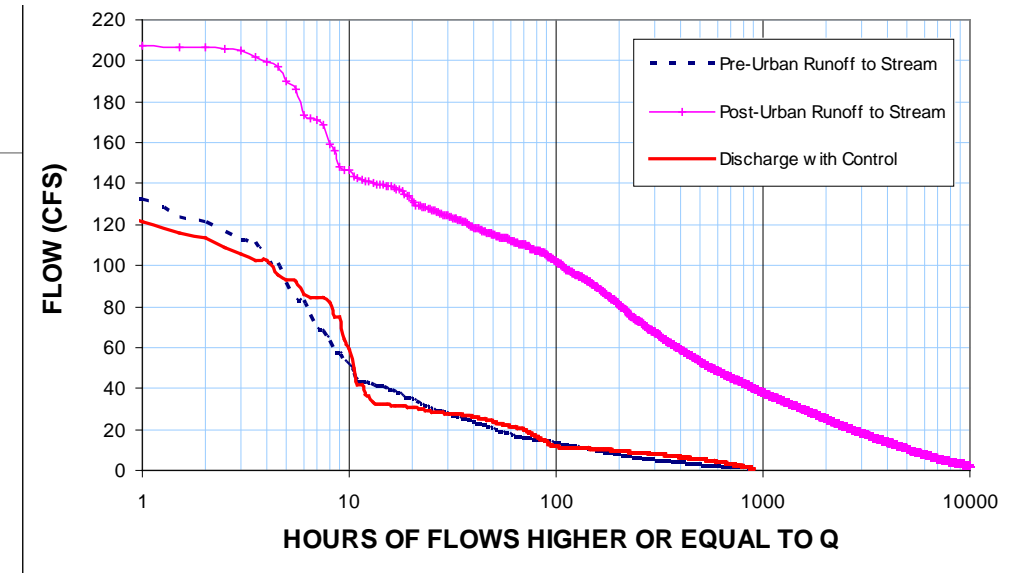
Effects on Expectations for Biological Indicators



Alvarez and Pardo. 2007. Fund. Appl. Limn.

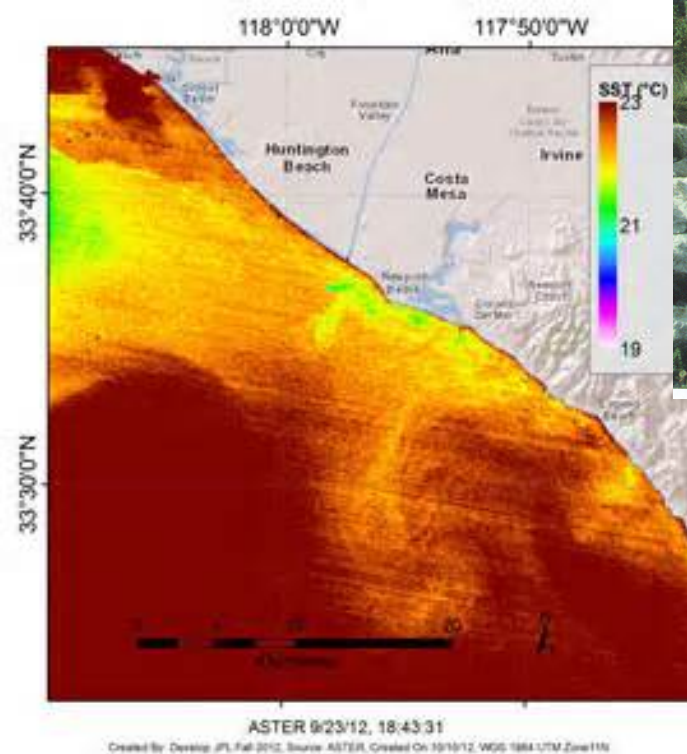
Potential Management Benefits

- ❑ Reduced hydromodification effects
- ❑ Reduced habitat for invasive species



Changes in Concentration Due to Reuse

- Potential effects of concentrate on natural communities
 - Streams
 - Estuaries
 - Ocean



Concentration Effects in Streams

- ❑ Many urban streams are dominated by wastewater effluent during the dry season
 - Reduced wastewater effluent may alter dilution characteristics and effect instream concentrations

- ❑ Potential load reduction
 - Stormwater can account for 30-40% of the total annual volume discharged
 - Increased stormwater use can reduce contaminant loading
 - May help achieve TMDL compliance



Concentration Effects in the Ocean

- ❑ Increased reuse leads to less discharge volume

- Increased contaminant concentration

- ❑ Increased plume density due to higher concentration

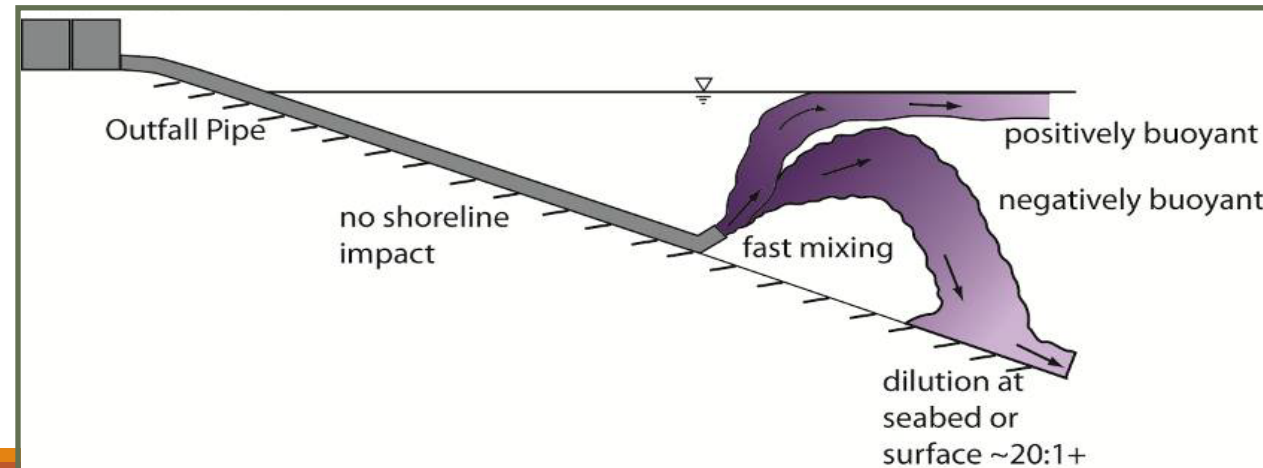
- Less plume dispersion

- Increased salts, reclamation byproducts, emerging contaminants



- ❑ Increased contact with benthos and fish

- Potential changes in biotic communities near outfalls



Flow Effects : Science Needs

- ❑ Develop flow-ecology relationships to protect desired beneficial uses
 - Sensitive species
 - Fisheries
 - Benthic invertebrates and other bioassessment targets

- ❑ Science to support targets in consideration of temporal variability
 - short-term drought cycles
 - longer-term climate change

- ❑ Develop models to better predict how reduced flow may affect stream morphology
 - Potential management tool to meet hydromodification management requirements
 - Effect of changes in load on water quality targets



**Recommendations for Determining
Regional Instream Flow Criteria for Priority Tributaries
to the Sacramento-San Joaquin Delta**

A report to the
California State Water Resources Control Board

Concentration Effects: Science Needs

- ❑ Understanding the ambient effect of CECs and disinfection byproducts that may be concentrated in discharges
 - Chronic effects of higher salts and brines on marine benthic communities
 - Toxicity and bioaccumulation of emerging contaminants and their transformation products
- ❑ Refine existing models to evaluate dilution characteristics and migration patterns of denser wastewater plumes
- ❑ Tools to inform BMP design and placement to maximize water capture while meeting water quality objectives

Priority Research Areas

- ❑ Flow-ecology relationships on bioassessment indicators
- ❑ Improved models for low flow effects on water quality
- ❑ Leverage water reuse for hydromodification management
- ❑ Effects of changes in flow on sensitive species habitat
- ❑ Modeling fate and transport of denser wastewater plumes
- ❑ Effect of salts, brines, disinfection byproducts, and other CECs on marine benthos and fish



Thank You

Eric Stein

erics@sccwrp.org

www.sccwrp.org