

Biological Effects of Cooling Water Intake System (CWIS) Entrainment

Why Large Entrainment Numbers Don't = Large Impacts

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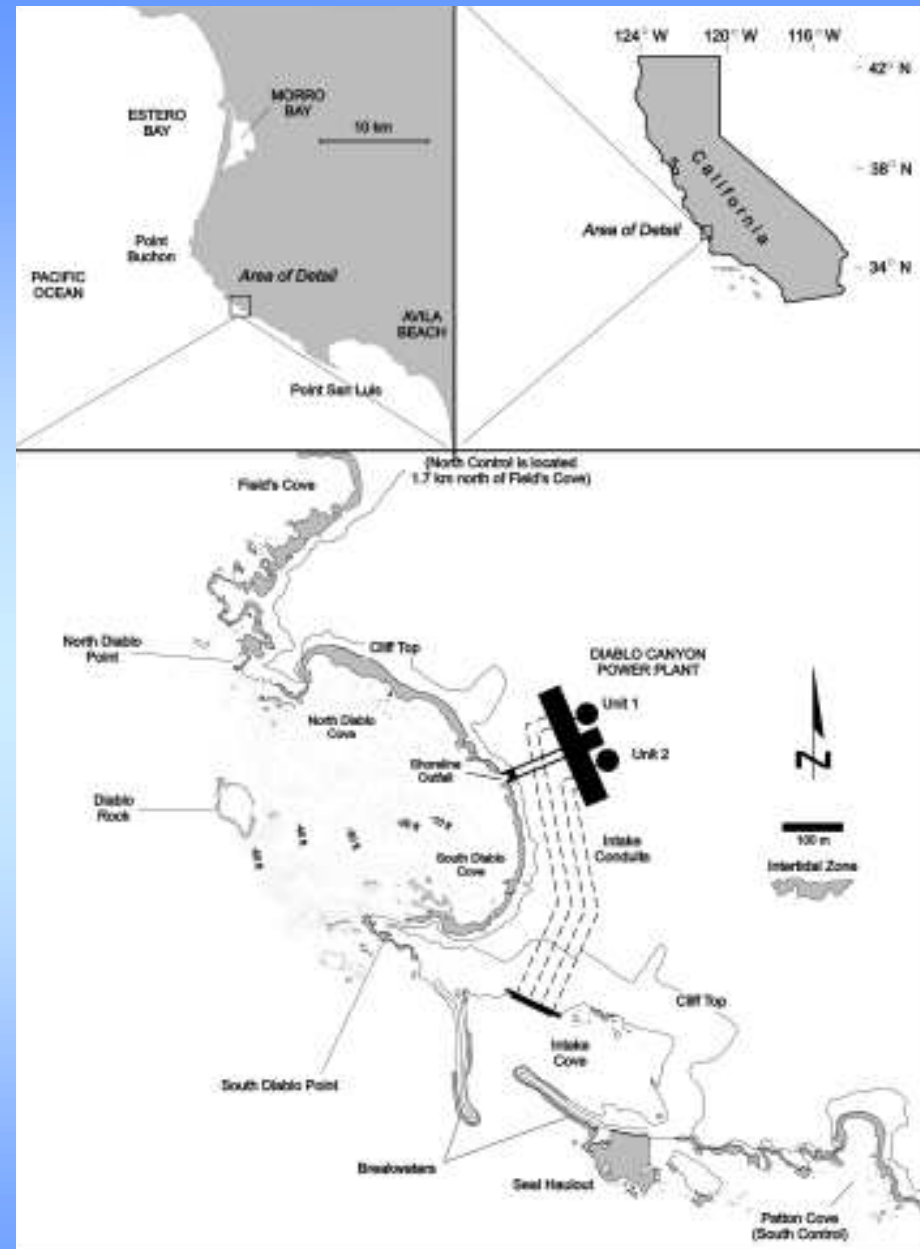
Diablo Canyon Power Plant



- Large intake volume – 2.5 billion gal d⁻¹
- High capacity factor
- Located on pristine open coast

Source Water Characteristics

- Open coast (open system)
- Processes affecting mortality and recruitment occur over large spatial scale
- Effects on larval populations are dispersed over large area



Average Proportional Mortality

(measure of entrainment effects on population of larvae)

- Averaged 8.6% for all 12 fishes analyzed
- Effects on adult populations much less
 - Conservative assumptions that overstate entrainment effects – exposure to entrainment
 - Compensation may be very strong in rocky reef fishes that may be more limited by habitat during settlement and not larval mortality
- Values much lower than levels set in CDF&G 2002 Nearshore Fisheries Management Plan that would initiate management actions (40% reduction)

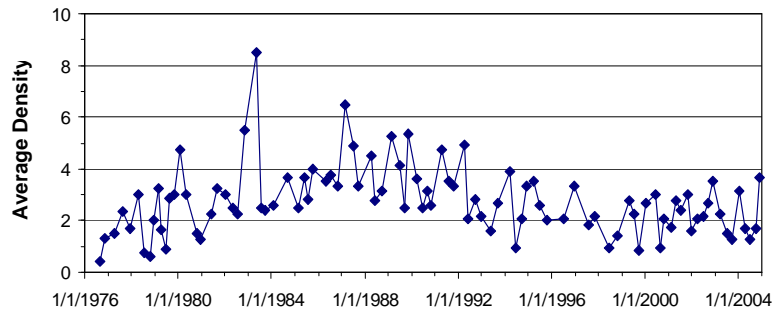
No Localized Effects

(Diablo Canyon Power Plant Fish Monitoring Data)

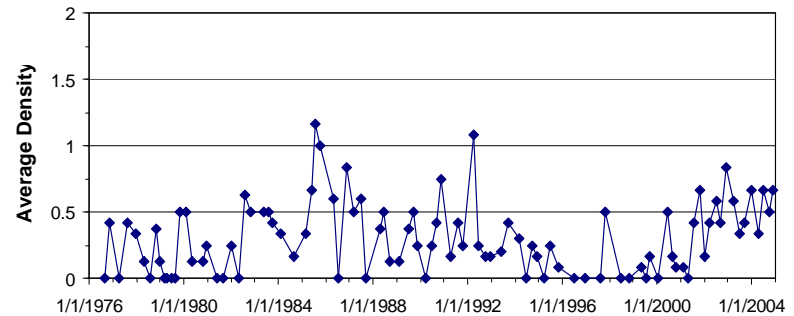
Fishery Species

Non-Fishery Species

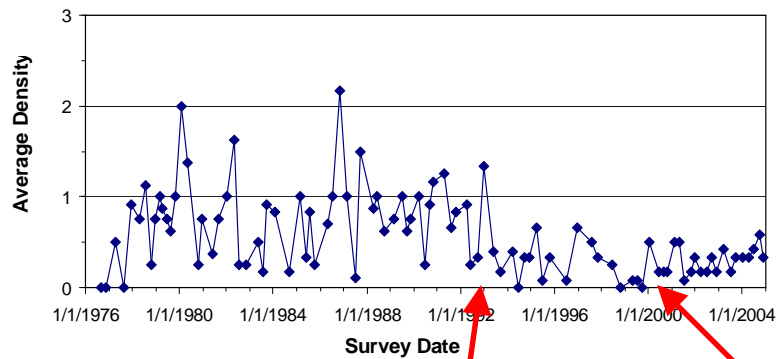
KGB Rockfish Adults



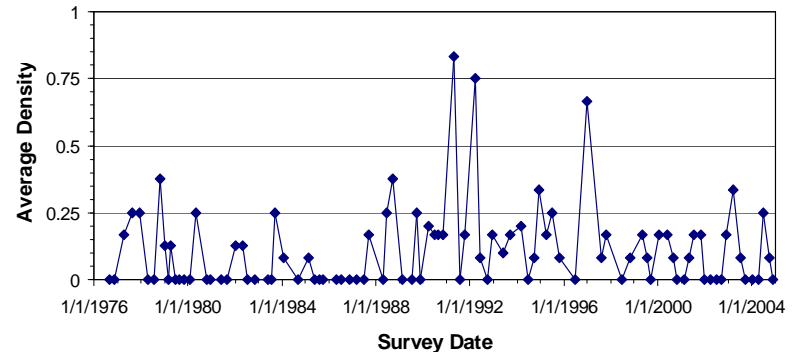
Snubnose Sculpin



Cabezon



Monkeyface Prickleback



Live Fish Fishery

Regulations

Larger Spatial Scale

- Recent studies directed by San Luis Obispo Marine Interest Group and funded by Packard Foundation and World Wildlife Fund showed fish stocks to be much healthier than other areas of the state
- No declines in local party boat fishing success
- Argued for managing central coast separately from rest of state

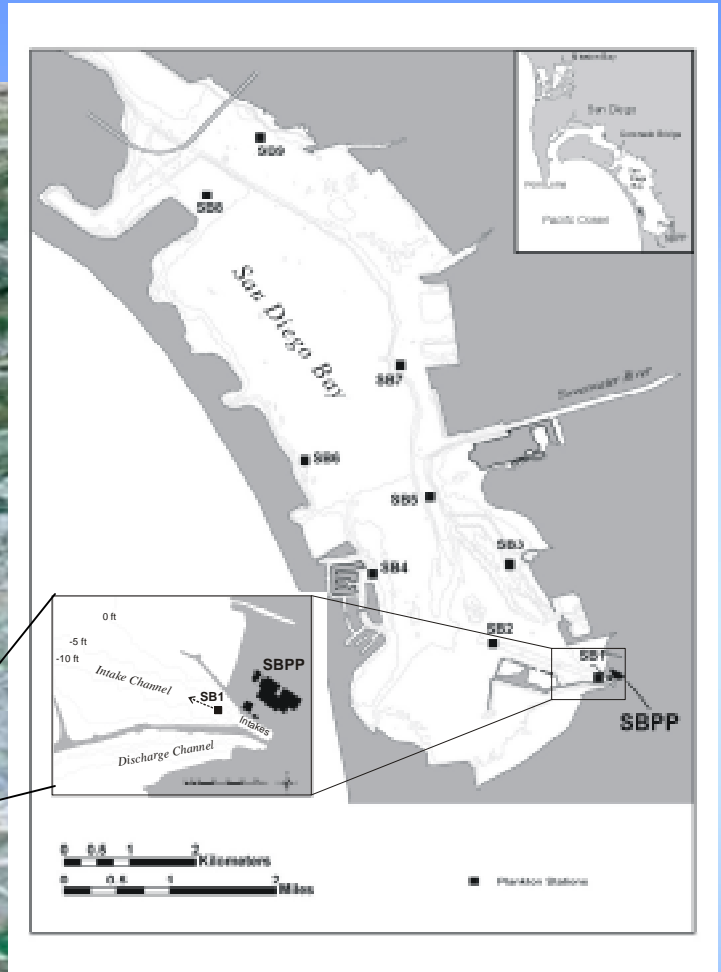
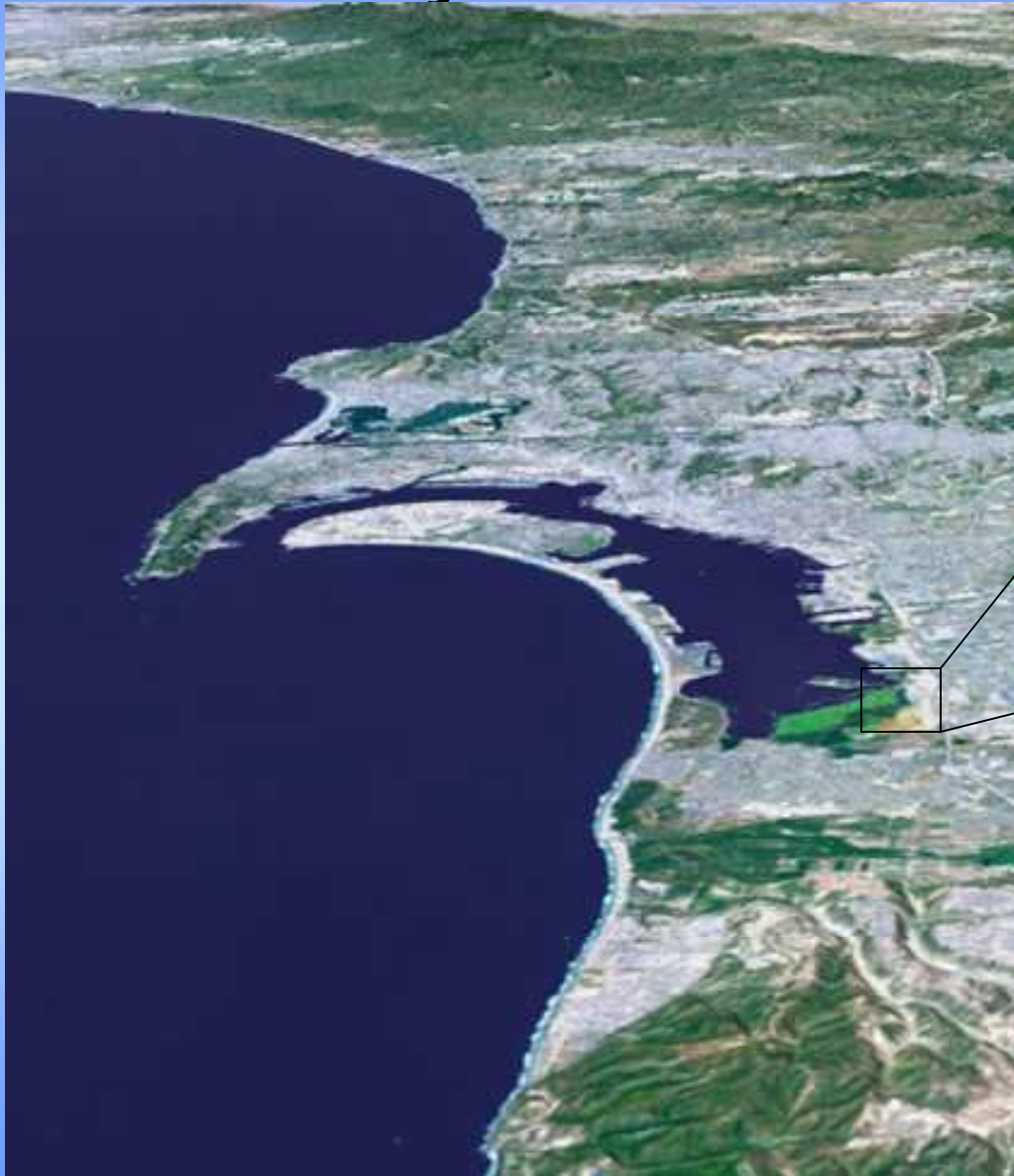
Plants in Estuarine Systems

Morro Bay Power Plant
(semi-closed system)



South Bay Power Plant
(closed system)

South Bay Power Plant



SBPP Results

- Higher average entrainment mortality than DCPP – 13.4% based on 5 fishes
- Highest estimated entrainment mortality for gobies – 21.5%
- Even high estimates lower than allowable catch rates set by CDF&G
- Other Evidence
 - Annual entrainment estimates for 2001 data almost identical to estimate from 1980 study
 - Study on adult fishes showed increases in gobies over period of study from 1994-99

Consistency with East Coast Studies

- Maryland Department of Natural Resources concluded that no identifiable impact on Chesapeake Bay fisheries - volume of CW withdrawal greater than any other estuarine area
- Hudson River striped bass populations increased by x10 with 5 plants and withdrawals exceeding 5 billion gal d⁻¹
- Studies before, during and after retirement of Connecticut Yankee Nuclear Station on Connecticut River showed no changes in fish populations attributable to plant operation

Questions?

