

DRAFT

**Mussel Watch Monitoring in California:
Long-term Trends in Coastal Contaminants
and Recommendations for Future
Monitoring**

**A.R. Melwani, J.A. Davis, M. Stephenson,
K. Maruya, G. Lauenstein**

Context

- SMW largely discontinued in 2003 - continued in minimal mode with Endowment
- SWAMP and BOG began activities in 2006
- Early emphasis on sport fish, but BOG Long-term plan (“Business Plan” - not fully developed yet) includes consideration of mussel monitoring and other indicators (e.g., bird eggs, small fish)
- Unspent \$35K was authorized for conversion of Endowment data into SWAMP format and reporting (BOG email 2/6/08)
 - 9,663 results added
 - Report has been on the back-burner

Goals of the Report

- Report Endowment data (adding to SMW time series)
- Compare SMW/Endowment, NMW, and RMP
- Recommendations for future monitoring using this indicator in SWAMP (rationale that can be used in the “Business Plan”)

Advantages of Mussel Monitoring

1. indicating the presence of contaminants that bioaccumulate
2. higher concentrations than in water
3. integrated measure of contaminant abundance over time
4. sessile - valuable indicators of local conditions and broader spatial variation
5. relatively low rates of metabolism
6. residents are easily sampled
7. clean mussels can be transplanted
8. large numbers provide statistical power
9. provide information on exposure of humans and wildlife consumers of shellfish
10. potential for studies of effects of contaminants on the bivalves

Disadvantages of Mussel Monitoring

1. not a major exposure pathway for humans or sensitive wildlife species
2. typically not the best effects indicator
3. distribution of resident bivalves is limited
4. transplants somewhat resource-intensive and sometimes clean bivalves can be difficult to find
5. bivalves regulate or rapidly depurate some metals
6. variation in feeding rates or seasonal variation in physiology (reproduction) may affect uptake
7. uptake will vary with environmental conditions such as salinity, turbidity, and food availability
8. uptake of some contaminants of concern may be negligible or slow

History of Mussel Watch in California

PAST WORK/PROGRAMS

- National Pesticides Monitoring Program – 1960s
- Southern CA – Young et al. – early 1970s
- SF Bay – Girvin, Risebrough – early and mid 1970s
- U.S. Mussel Watch – USEPA – 1976-1978
- State Mussel Watch – 1977-2003

History of Mussel Watch in California

CONTINUING PROGRAMS

- Endowment Monitoring
- NMW – NS&T - 1986
- RMP - 1993
- CCLEAN - 2002
- DPH Biotoxin Monitoring

SWAMP Objectives and Potential Role of Mussel Monitoring

Objective	Value	Comments
Status: Fishing BU	Moderate	<ul style="list-style-type: none"> ▪ Important for marine biotoxins – covered by DPH ▪ Contaminants not a major issue
Status: Aquatic Life BU Trends in Impact on Fishing and Aquatic Life	Moderate High	<ul style="list-style-type: none"> ▪ Bivalves usually not the highest priority effects indicator ▪ Especially valuable at established long-term trend stations ▪ Valuable for early detection of bioaccumulative emerging contaminants – NOAA pilot very beneficial ▪ Strategic archiving important to allow for retrospective analysis
Sources and Pathways	Moderate	<ul style="list-style-type: none"> ▪ Some value, but range limitations ▪ Other biota may be better (e.g., small fish) ▪ PSDs more versatile
Effectiveness of Management Actions: Regional Scale	High-Moderate	<ul style="list-style-type: none"> ▪ Effective for regional trends ▪ Sometimes a disconnect with fish trends however
Effectiveness of Management Actions: Local Scale	Moderate	<ul style="list-style-type: none"> ▪ Some value, but range limitations ▪ Other biota may be better (e.g., small fish) ▪ PSDs more versatile

Near-term Strategy for Mussel Monitoring

- Participate and collaborate with NOAA pilot study
- RMP work will continue
- Initiate sound archiving plan for long-term stations
- Continuation of monitoring at stations with long time series and usable archives is a priority