

Marine Outfall Siting Study

Field Sampling and Analytical Program

Purpose of the MOSS Field Program

- ◆ Gather data on water quality in the Central Puget Sound basin to assist in:
 - ◆ calibrating oceanographic models;
 - assessing potential risks to human health, fish, and other aquatic wildlife;
 - evaluating spatial and temporal variations in water quality in the MOSS study area; and
 - understanding concentrations of conventionals, metals, and organics in Puget Sound, especially at King County outfalls for the HCP.

Outfall Siting Criteria to be Answered

1 Biological Resources Protection

- effects on fish and their habitat
- effects on benthic fauna and their habitat
- effects on mammals and birds and their habitat

2 Human Health Protection

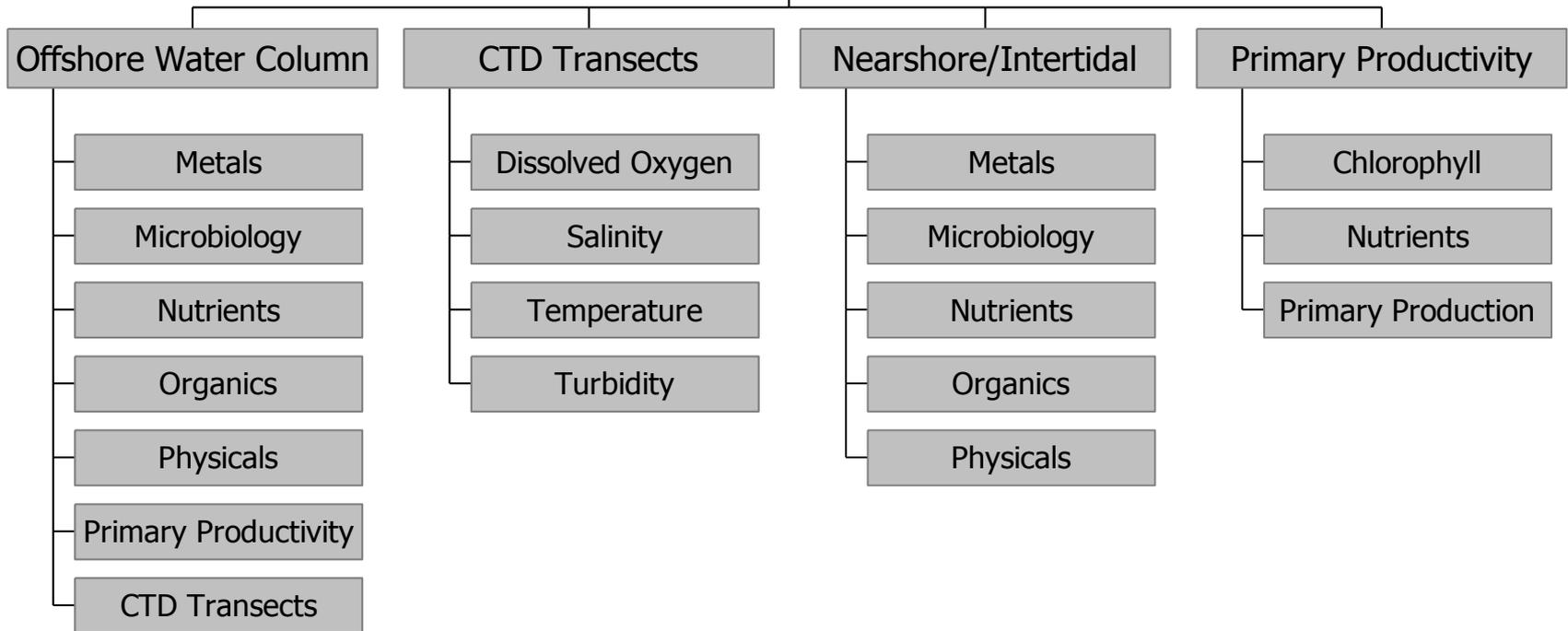
- human health risk related to work/recreation
- human health risk related to consumption

Examples of Questions to be Answered by the MOSS Field Program

- What are existing concentrations of trace metals and organic compounds in the Central Puget Sound Basin water column and intertidal environment?
- What are the seasonal variations in nutrient concentrations in the Central Puget Sound Basin water column and intertidal environment?
- Is primary productivity in the Central Puget Sound Basin nutrient-limited and are there spatial and temporal variations in this limiting factor?
- What are the seasonal variations in physical water quality parameters such as salinity and dissolved oxygen?

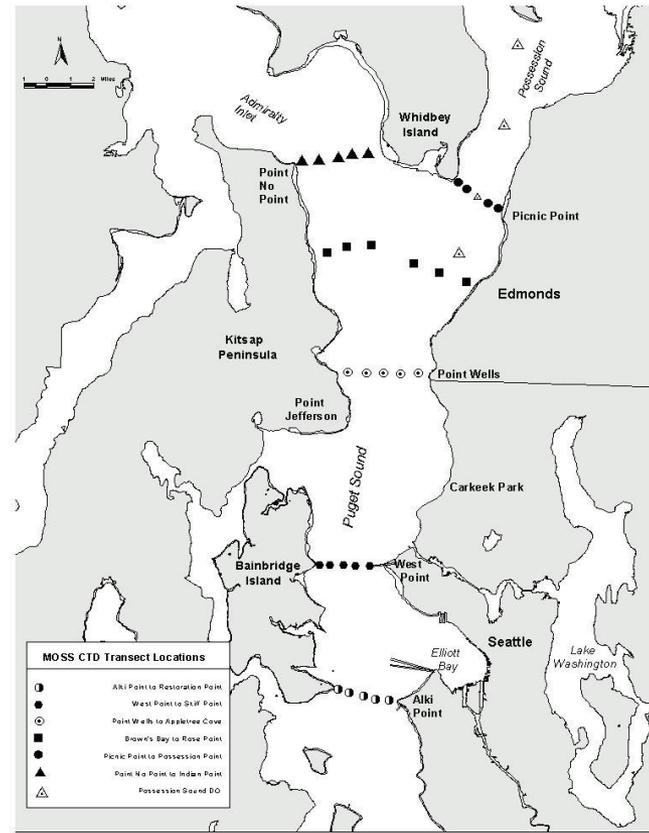
MOSS Field Program

Water Quality in the Central Puget Sound Basin



CTD Transects

- 7 CTD transects in Admiralty Inlet, Possession Sound, and the central basin
- special biweekly Possession Sound CTD transect from August through October to assess seasonal depression of dissolved oxygen
- other CTD transects performed monthly
- Admiralty Inlet transect discontinued after 18 months (enough data collected)

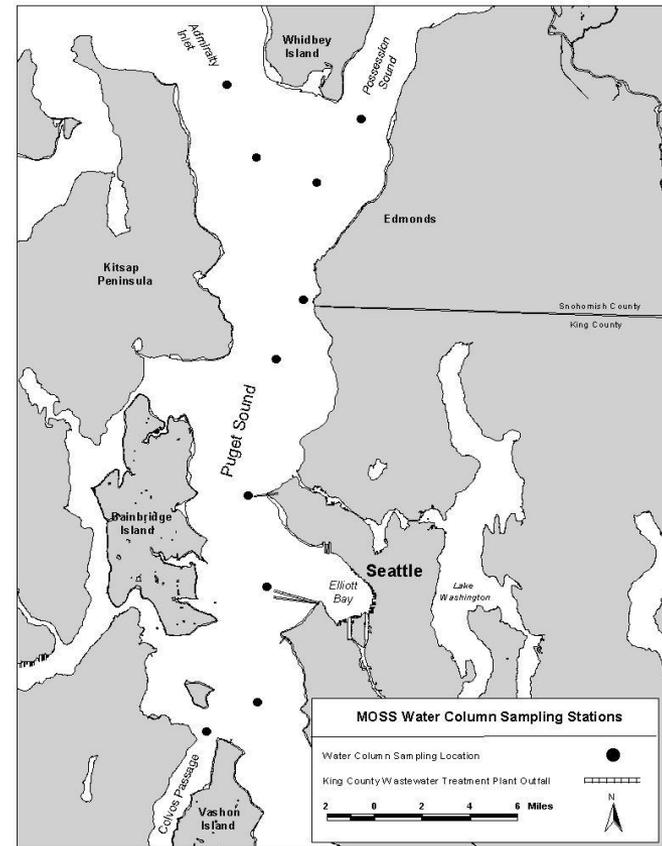


CTD Deployment



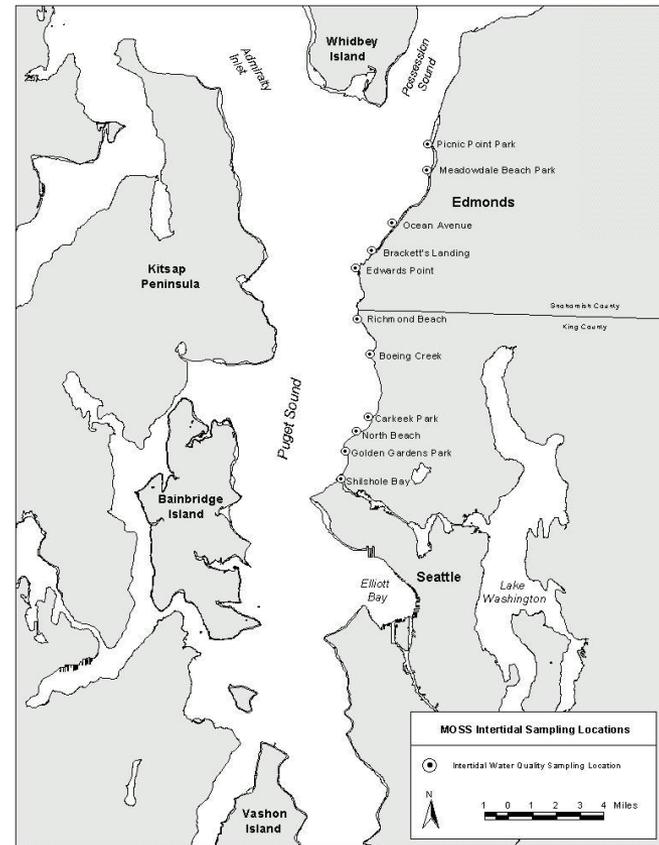
Offshore Water Column Study

- 10 sampling stations from Whidbey Island to Vashon Island (2 stations recently added)
- 5 to 7 depths sampled at each station
- all stations sampled monthly for metals, microbiology, nutrients, organics, and physicals
- metals and organics sampled for 1 year (complete)
- microbiology (surface only), nutrients, and physicals sampling ongoing



Nearshore/Intertidal Study

- 11 sampling stations from Picnic Point to Shilshole Bay
- sampling to occur from March 2000 to February 2001
- all stations sampled monthly for microbiology, nutrients, and physicals
- 3 stations sampled monthly for metals and organics
- all stations sampled quarterly for metals and organics



Intertidal Water Sampling

**Boeing Creek
March 8, 2000 sampling
Tide: about +3.5'**



Parameters Studied

- Metals - priority pollutant metals and other elements
- Microbiology - fecal coliforms, enterococcus, *e. coli*
- Nutrients - ammonia, nitrite/nitrate nitrogen, phosphorus, silica
- Organics - BNAs, chlorinated herbicides, chlorinated pesticides, organophosphorus pesticides, PCBs
- Physicals - dissolved oxygen, PAR, salinity, solids, temperature, turbidity
- Primary Productivity - chlorophyll-*a* & phaeophytin, nutrients, PAR, primary production

Field Work Completed to Date

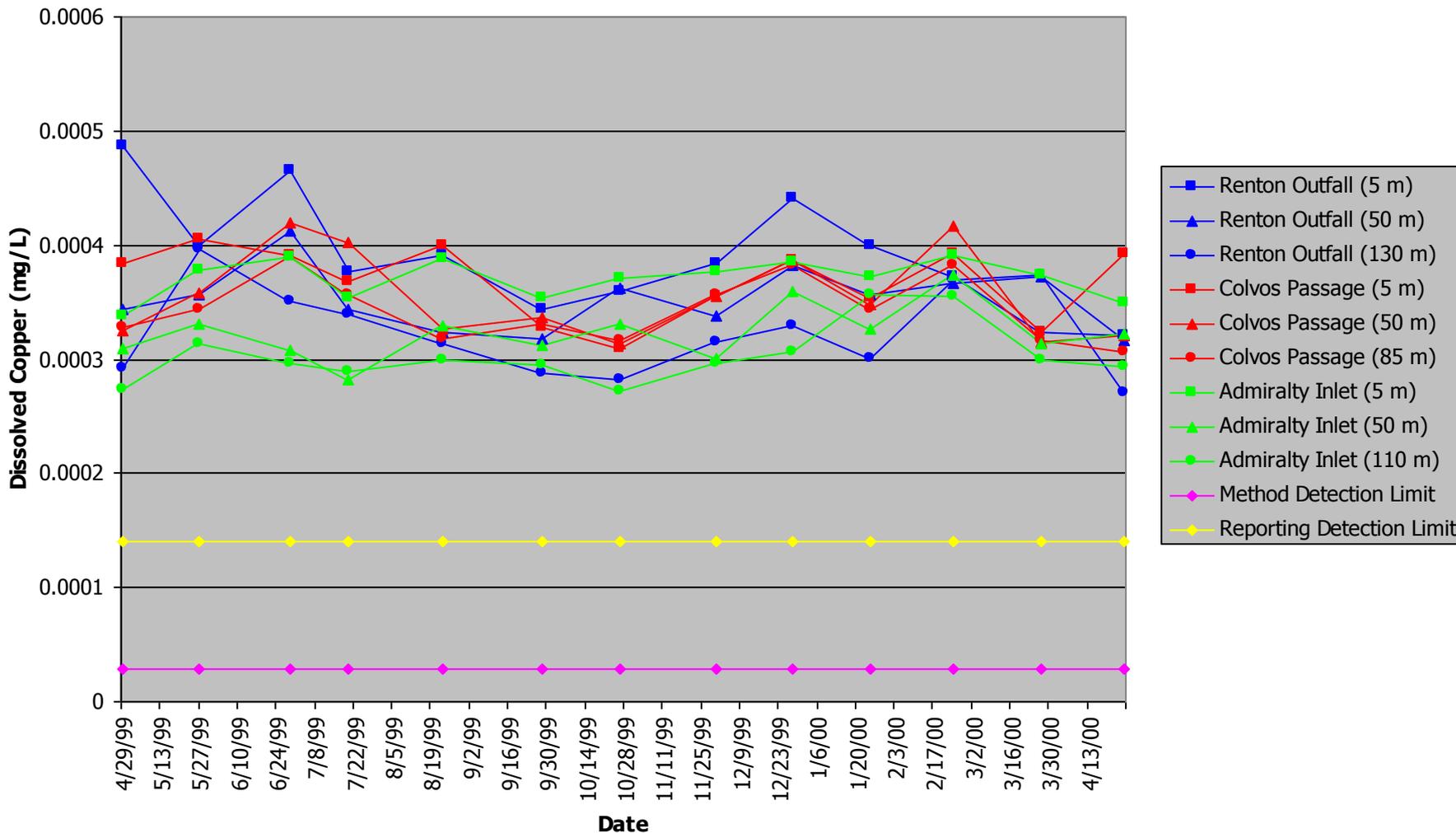
- 2 years of primary productivity data collected
- 2 years of CTD data collected
- 18 months of nutrient and microbiology data collected
- 1-year metal and organic studies completed
- 7 months of data collected toward 1-year nearshore study, including 3 quarterly sampling events

What's Being Done with the Data?

- **Water Column Study**
 - metals concentrations have been characterized over entire study area
 - nutrient data indicate classic patterns of seasonal variations in nutrient concentrations due to primary production cycles
 - most organic compounds not detected
- **CTD Transects**
 - data are forwarded to UW/KC modelers and oceanographic consultants for continuing analysis and direction of other studies
- **Nearshore/Intertidal Study**
 - data have not been analyzed
- **Primary Productivity Study**
 - data indicate that primary production mainly limited by light in winter and nutrients in summer
 - some temporal and spatial variations seen

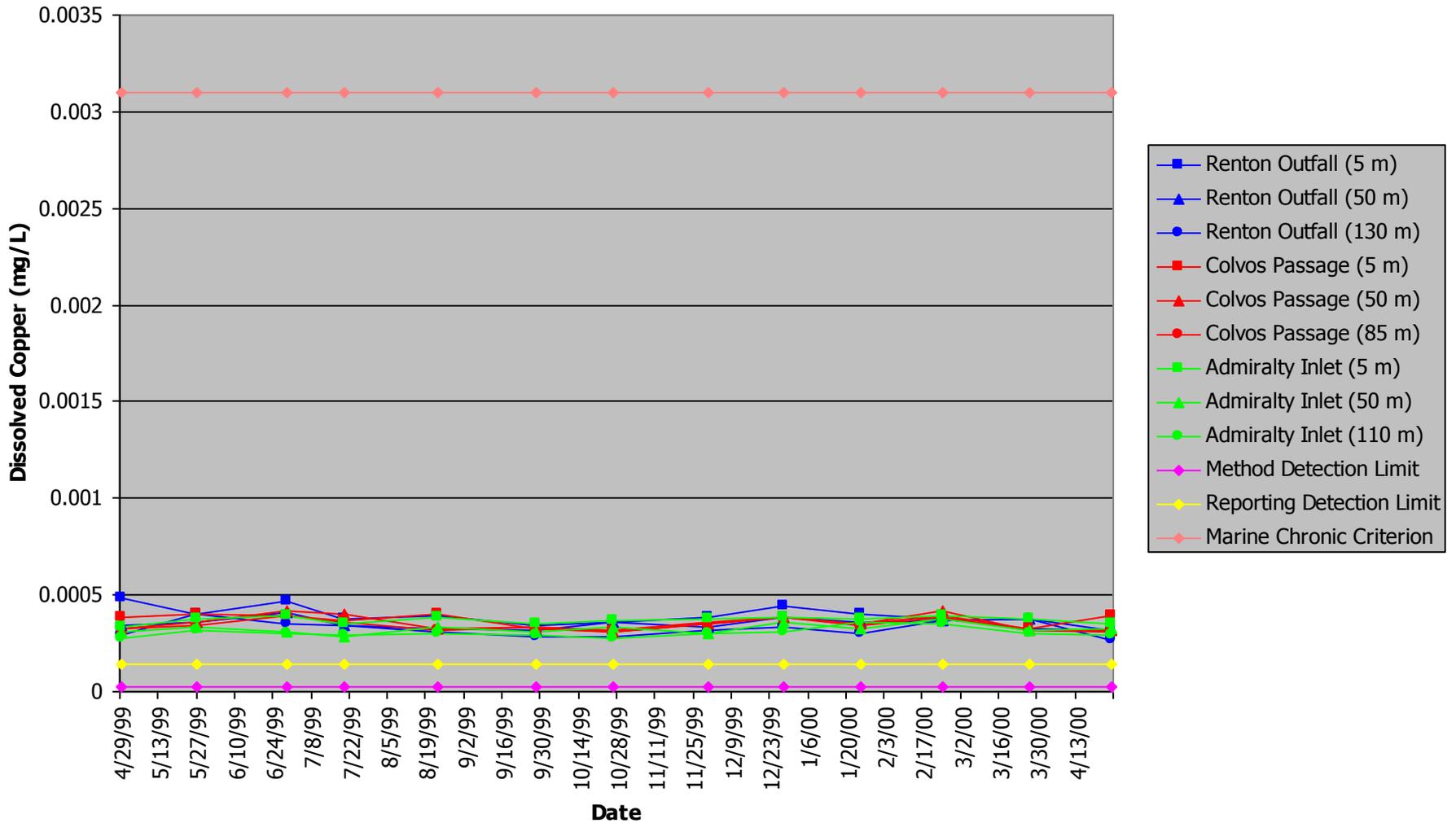
Dissolved Copper Concentrations in Puget Sound

(Washington State Marine Water Quality *Chronic* Criterion is 0.0031 mg/L)

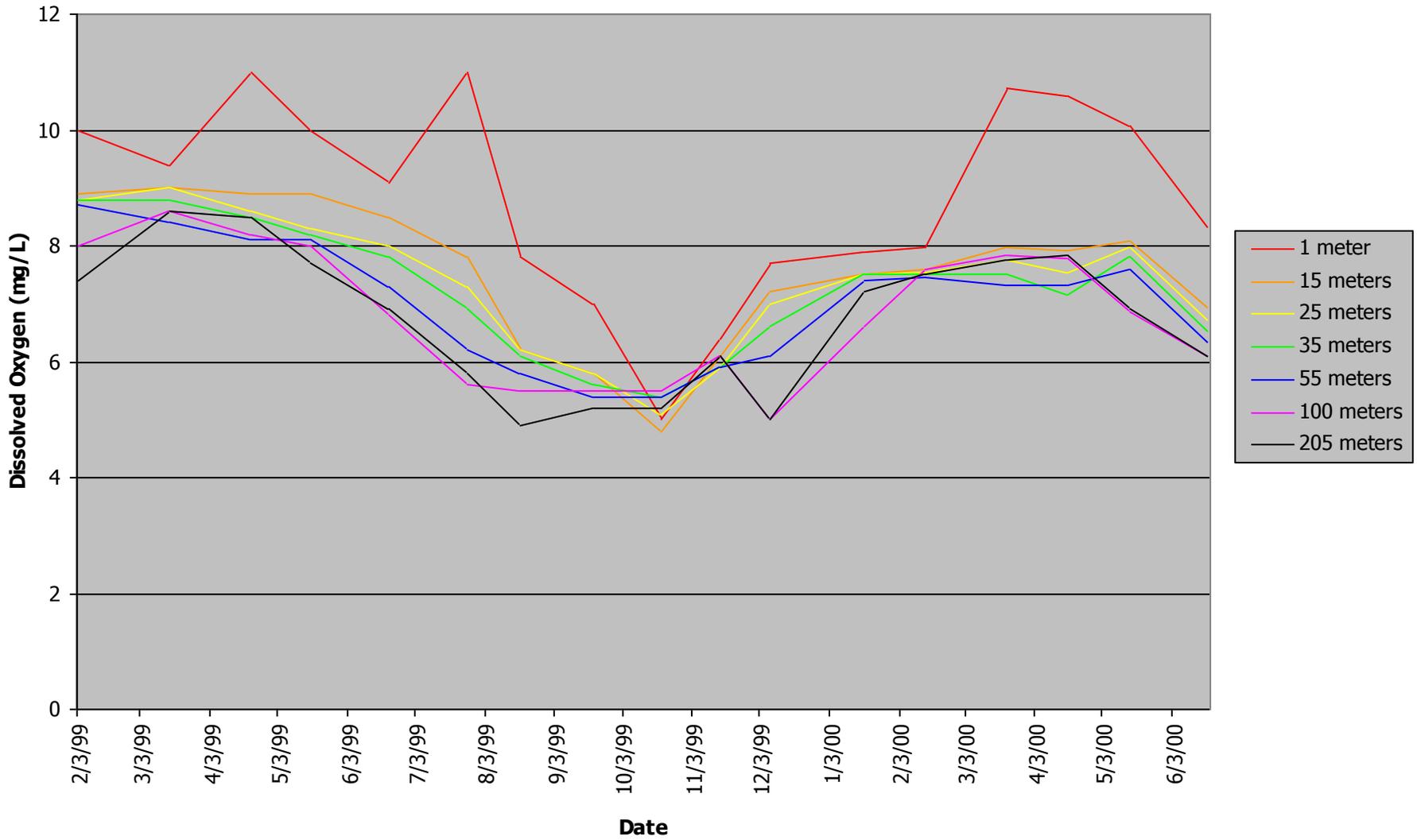


Dissolved Copper Concentrations in Puget Sound

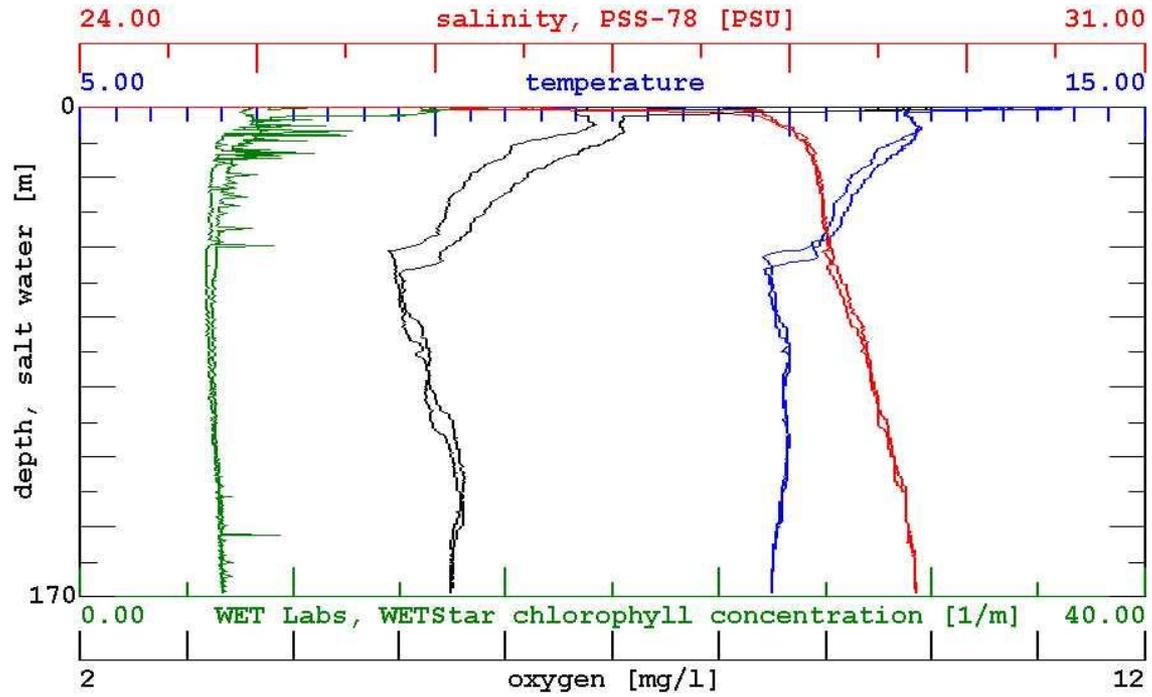
(Washington State Marine Water Quality *Chronic* Criterion is 0.0031 mg/L)



Dissolved Oxygen in Possession Sound Between Possession Point and Picnic Point



Ctd10799.hex:



MOSS Field Work for Next 6 Months

Continuation of . . .

- primary productivity study (every 2 to 5 weeks)
- offshore nutrient/microbiology cruises (monthly)
- CTD transects (monthly)
- nearshore/intertidal study (monthly with final quarterly round in December)

Acknowledgements

Field Crew

Steve Aubert

John Blaine

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