

<p align="center">CHARACTERIZATION OF SURFACE WATER DATA HIGH-FREQUENCY MONITORING OCT. 1998 TO DEC. 1999</p>
--

**% Violations of Dissolved Oxygen Minimum of 4.0 mg/l
(OAR 340-041-0445)**

	<u>N. Portland Bridge</u>	<u>N. Slough-East</u>	<u>Lombard Bridge</u>
Dry Season	0.0%	9.0%	0.0%
Wet Season	7.1%	0.1%	0.0%

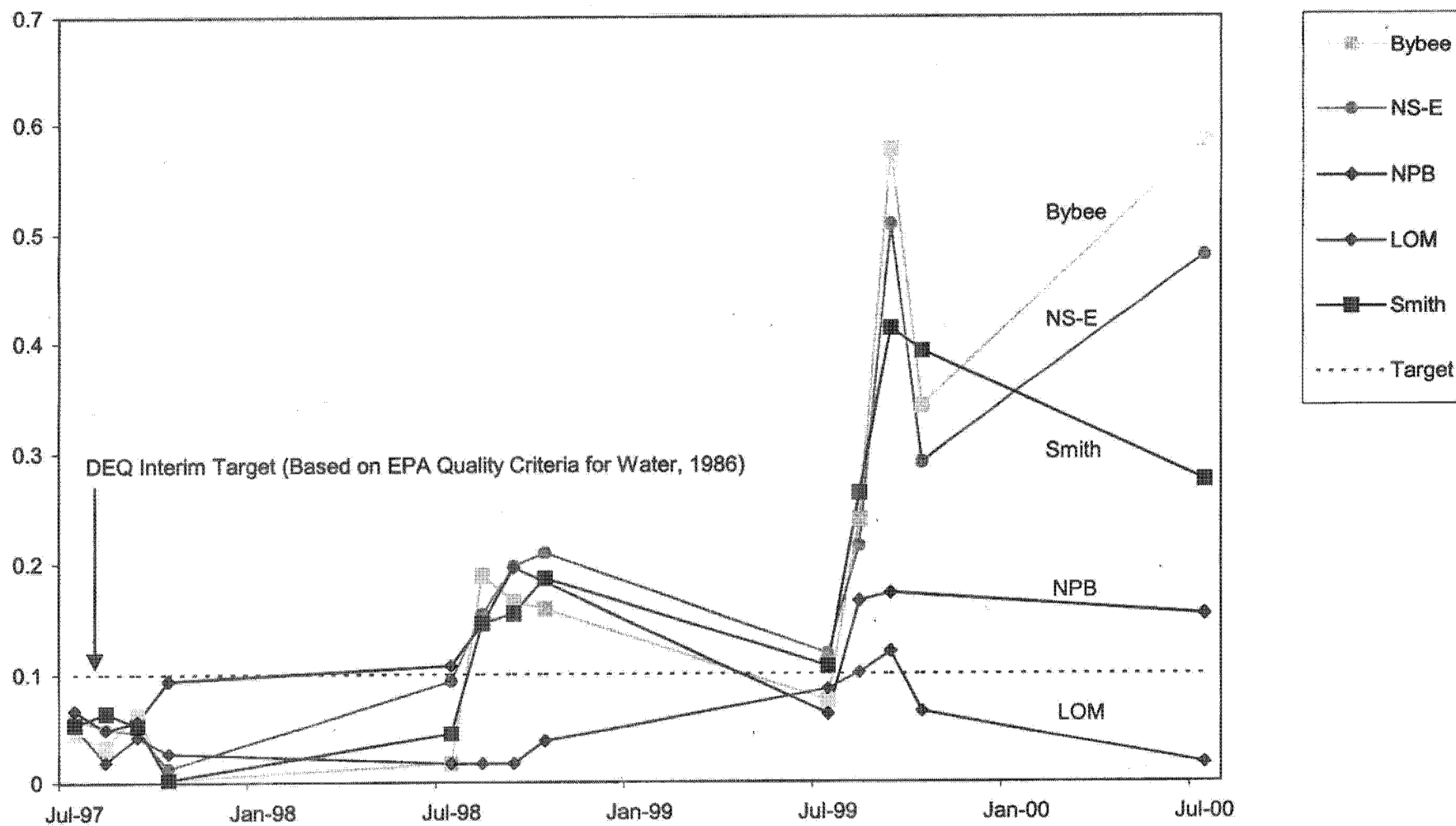
**% Violations of 7-Day Average Daily Mean Dissolved Oxygen Minimum of
5.0 mg/l (OAR)
(OAR 340-041-0445)**

	<u>N. Portland Bridge</u>	<u>N. Slough-East</u>	<u>Lombard Bridge</u>
Dry Season	0.0%	62.9%	0.0%
Wet Season	14.8%	0.0%	2.8%

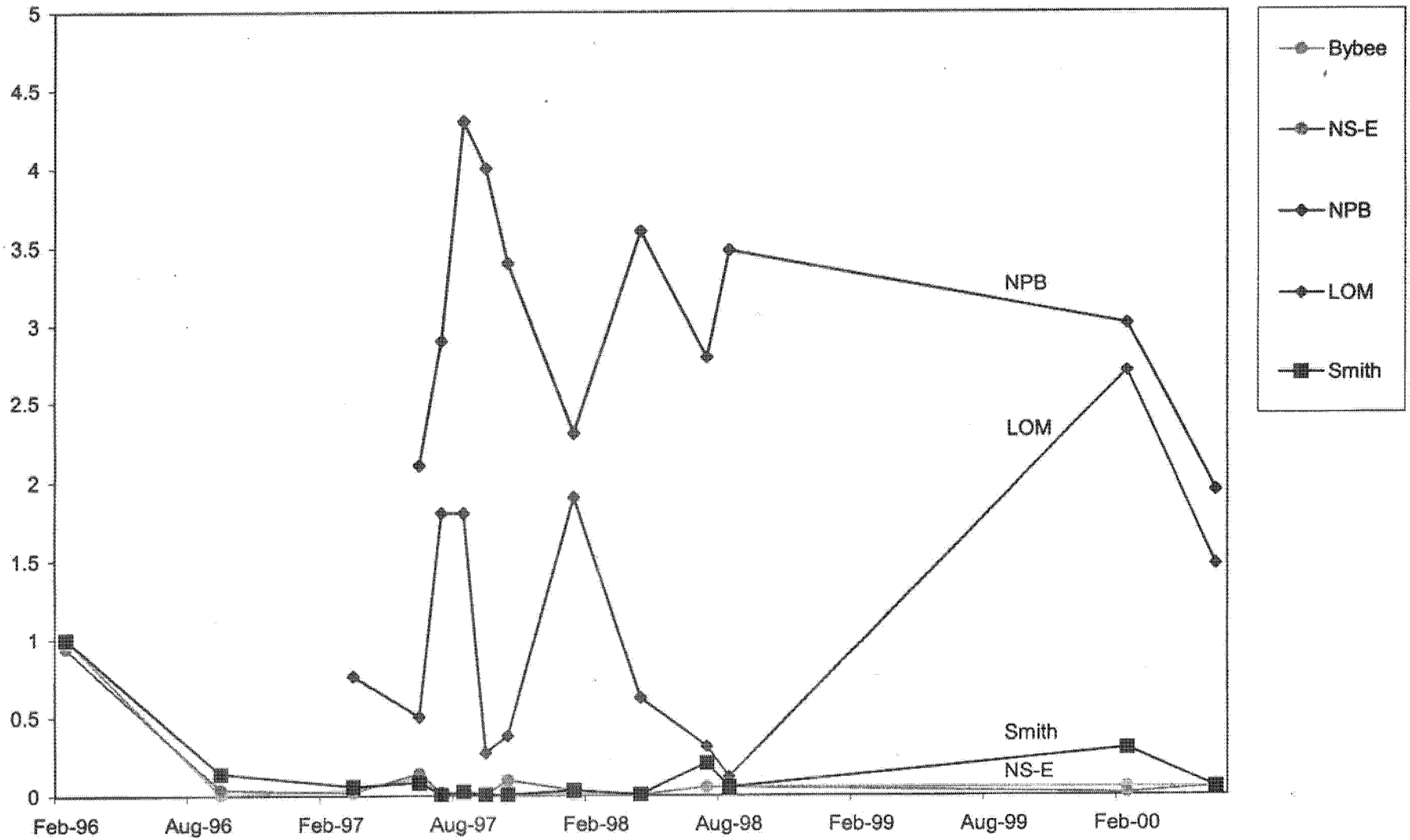
Annual Average Values of Water Quality Parameters

	<u>N. Portland Bridge</u>	<u>N. Slough-East</u>	<u>Lombard Bridge</u>
Spec. Conductance (μ S/cm)	161	87	138
Temperature	62.2 °F	60.2 °F	54.4 °F
pH	7.4	7.2	7.3

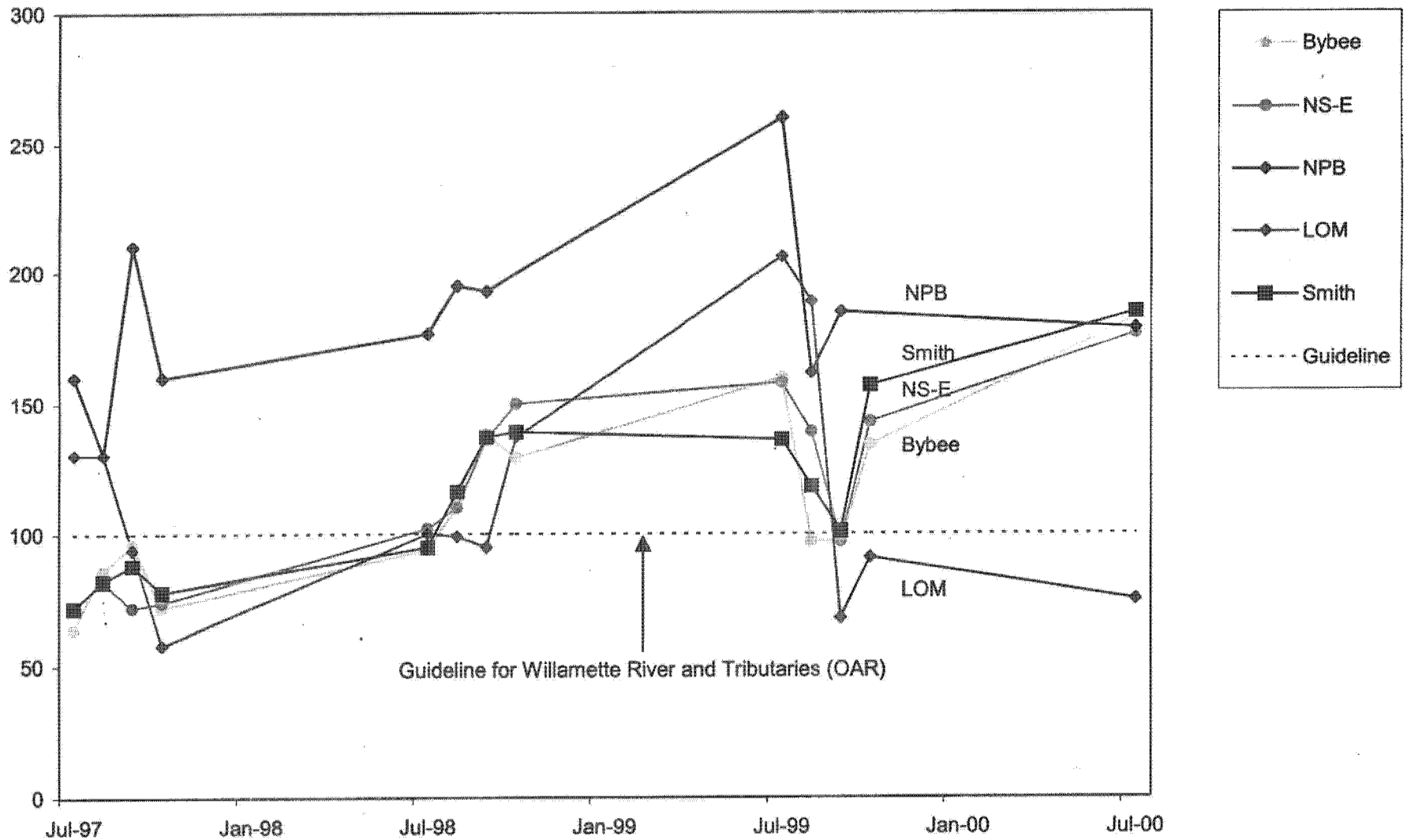
Phosphorus (mg/l) in Surface Water
Dry Season Data from July 1997 to July 2000



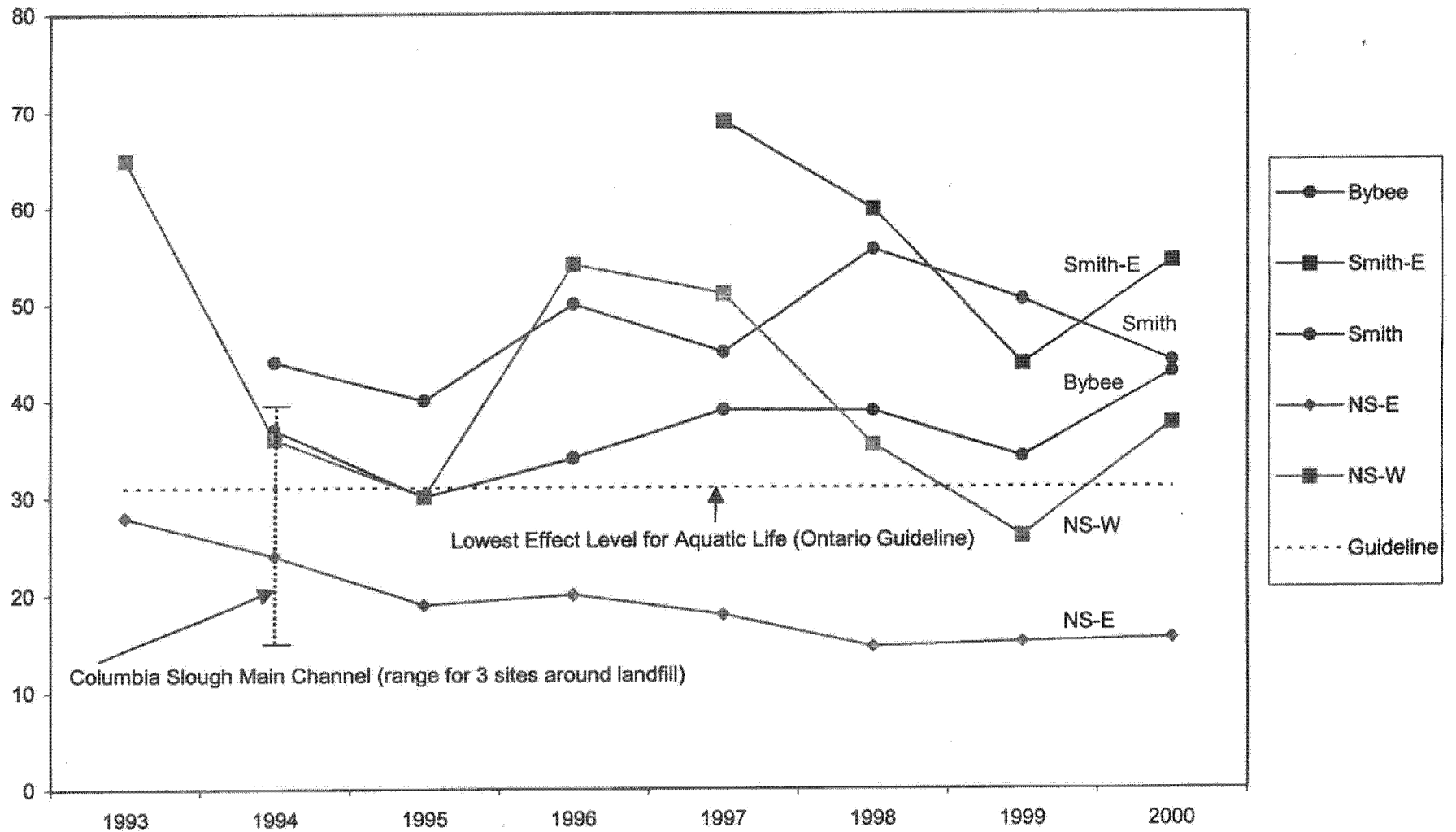
Nitrate (mg/l) in Surface Water
Data from February 1996 to June 2000



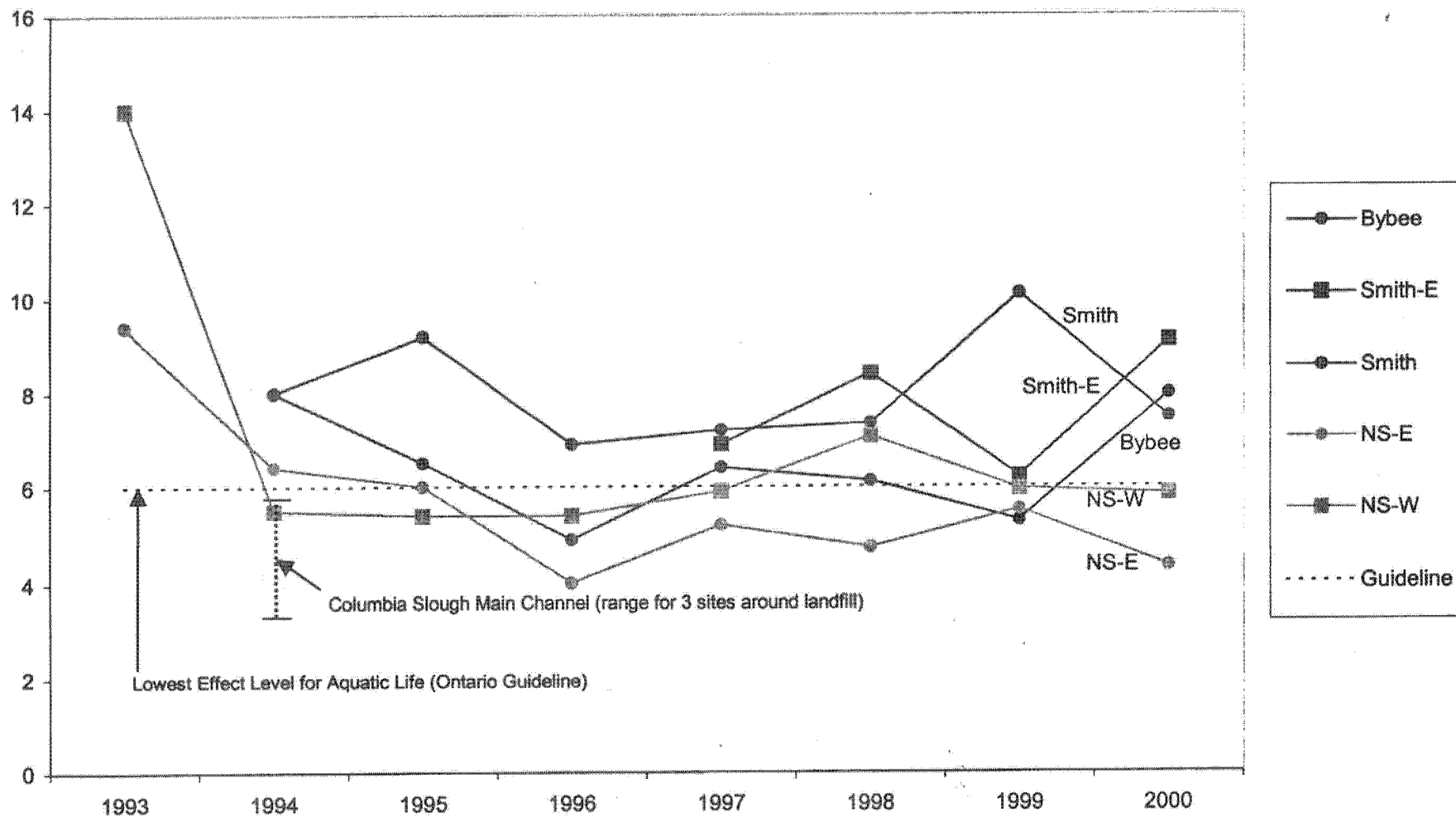
Total Dissolved Solids (mg/l) in Surface Water
Dry Season Data from July 1997 to July 2000



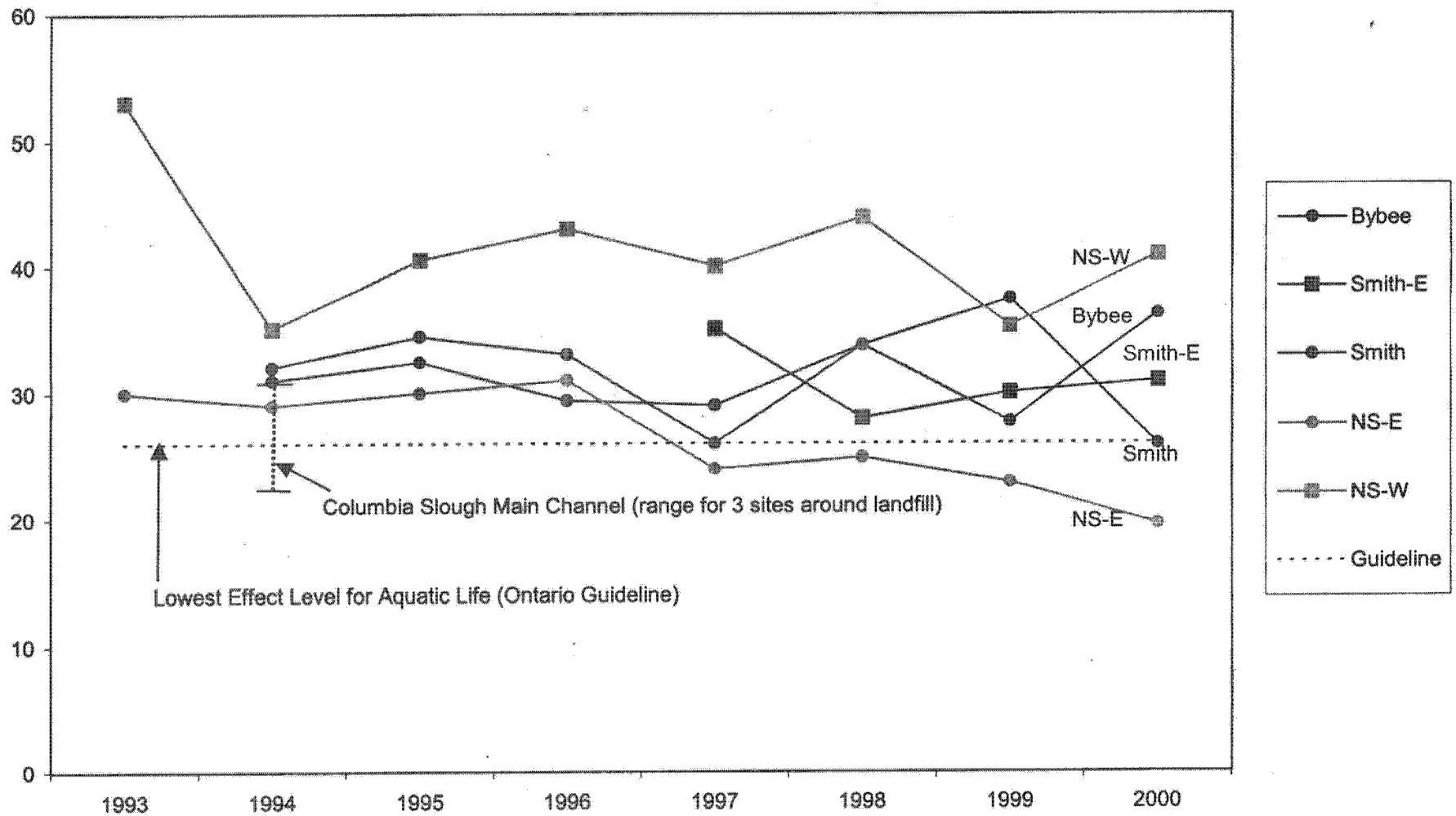
Lead in Sediments (mg/kg dry wt.)



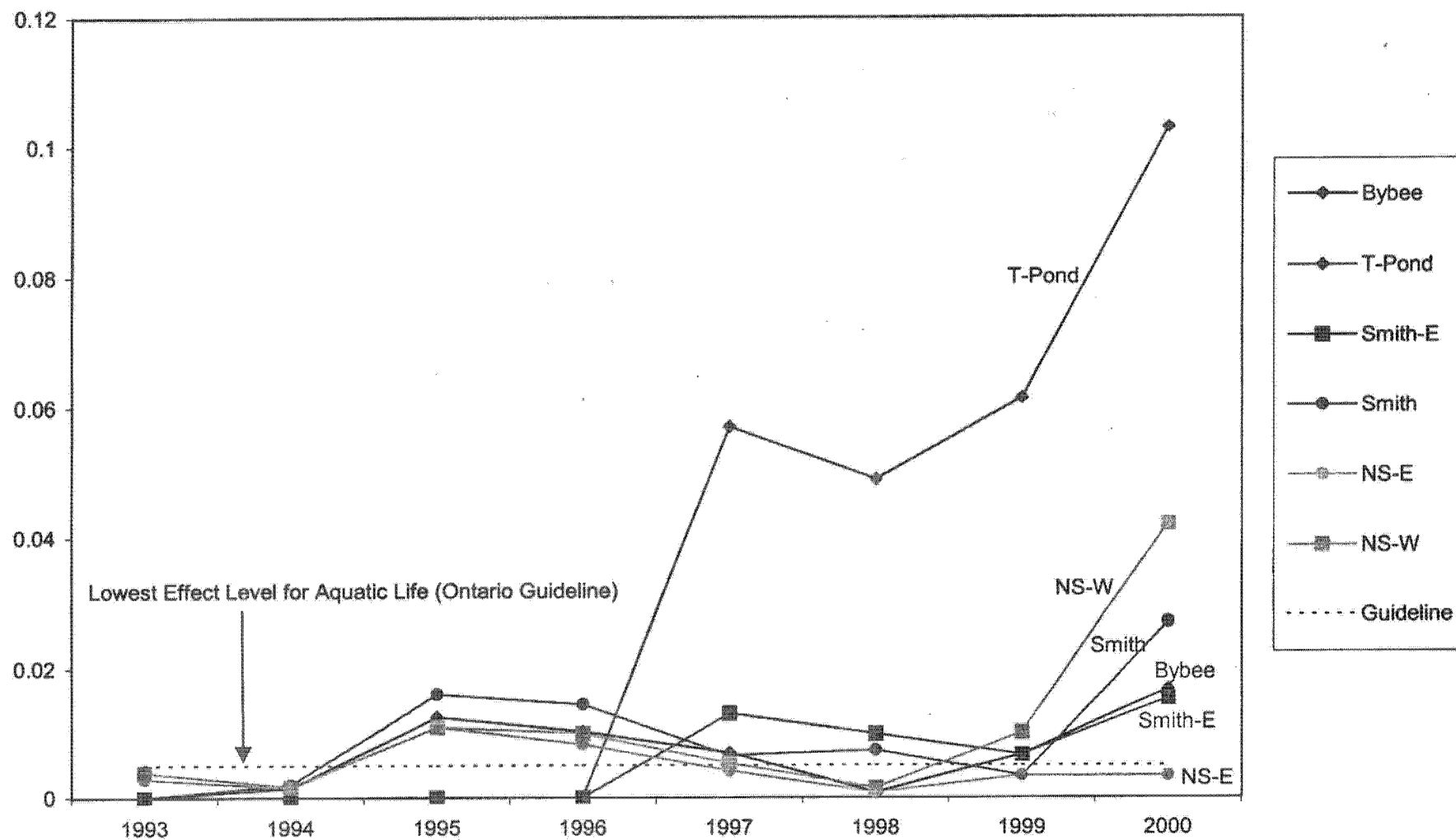
Arsenic in Sediments (mg/kg dry wt.)



Chromium in Sediments (mg/kg dry wt.)



p,p-DDE in Sediments
(mg/kg dry wt.)



GROUNDWATER / SLOUGH / LAKE INTERACTION LANDFILL LEACHATE

Groundwater Model -- St. Johns Landfill and Vicinity¹

- If the lakes were reconnected to tidal flow, groundwater upwelling to Bybee lake would occur. The strength of exchange between the lake and aquifer would be very weak.
- Leachate migration from the landfill in the lower aquifer is not affected by lake levels, but by the effect of Columbia River levels on groundwater regional flow.
- If contaminants were to move in the lower aquifer toward Bybee Lake, it would be at a very slow mean regional flow, by molecular diffusion.
- Movement of contaminants from the solid waste into surrounding aquifers is significantly inhibited by low permeability soil under and around the waste.

Surface Water Model -- Lower Columbia Slough²

- If the lakes were reconnected to tidal flow, Willamette River water would be the source of nearly all water entering the lakes through the North Slough.
and,
- Any effects of contaminants from the landfill in the North Slough would be reduced because of high dilution -- on the order of 1000.

Risk Assessment -- Smith-Bybee Lakes Wildlife Area³

- If the lakes were augmented with lower aquifer groundwater from near the landfill, risks from phosphorus and lead would increase slightly, and risks from all other contaminants would decrease or remain unchanged.

Groundwater Monitoring Data -- St. Johns Landfill and Vicinity⁴

- Leachate indicators such as chloride, specific conductance and hardness are detected in the lower aquifer in one monitoring well at the landfill perimeter (but not off-site) in the model-predicted area of potential migration of contaminants.
- Lower aquifer data in the model-predicated area of potential migration of contaminants show little or no contamination by toxic substances.

REFERENCES

¹Shu-Guang, and Thomas Lowry, 1995. St. Johns Landfill Groundwater Modeling System: Predicting Leachate Mounding, Fluxes and Offsite Migration, Technical Report EWR-9-95, Portland State University. Prepared for Metro.

²Scott Wells, 1995. Hydraulic and Water Quality Modeling of Opening Smith and Bybee Lakes to the Lower Columbia Slough, Technical Report EWR-6-95, Portland State University. Prepared for Metro.

³Parametrix Inc., 1995. Screening-Level Risk Assessment for the Smith-Bybee Natural Resources Management Area. Prepared for Metro.

⁴Metro Environmental Monitoring Information System.