314 CLEAN LAKES GRANT PROJECT
QUARTERLY PROGRESS REPORT NO.2
TO OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY

PROJECT: Phase I Feasibility Study - Smith and Bybee Lakes Flow Augmentation

EPA GRANT NO. CL-000863-01-0

PROJECT AND BUDGET PERIOD: June 18, 1993 - Sept. 30, 1994

REPORT NO. #2, FY94 First Quarter, October - December, 1993

REPORT DATE: January 26, 1994

DEQ CONTACT PERSON: Doug Larson (503) 229-6018

FUNDING: TOTAL BUDGET.....$30,000
TOTAL 314 GRANT AWARD.....$21,000
TOTAL 314 EXPENDITURE TO DATE.....Estimated $ 10,000

Quarterly Status of Planned Outputs/Milestones

Hydrodynamic Modeling

Additional soundings were made to expand the bathymetric database. By gaining greater detail of the lakes' bathymetry, there will be greater confidence in (1) refining the hydrodynamic model being developed as defined in the Scope of Work, (2) determining habitat changes associated with changes in lake level, and (3) evaluating other options for lake and associated habitat enhancement. The bathymetry map of Smith and Bybee Lakes is shown in Figure 1.

Lake Data Acquisition

Smith and Bybee Lakes water quality data for the period prior to this Phase I study has been acquired and entered into the database. Screening and verification of data sources has been conducted. Preliminary plots of nutrient and chlorophyll-*a* concentrations observed during 1992 and 1993 were made for evaluation of the sampling program (Figures 2, 3, and 4).

North Slough Water Quality

The re-introduction of water into the lakes through the North Slough is an option considered for improvement of lake conditions. There is concern with the present water quality conditions of the North Slough, given it is immediately adjacent to the St. Johns Landfill. Seeps were observed in the North Slough banks adjacent to the landfill, leading to concern of the effect of landfill leachate on slough water quality and potential effect on this restoration option. A parallel, independently-funded study on landfill leachate and its movement is being conducted by Metro Solid Waste Department, which will provide useful information for this feasibility study.

Early results of the longitudinal screening survey of North Slough water quality indicate water quality generally decreases proceeding from the Columbia Slough eastward to the end of the North Slough where the dam between Bybee Lake and the North Slough was built in 1982. A plot of specific conductivity indicate an increase in dissolved ions that may be attributable to introduction of landfill leachate into the North Slough (Figure 5). Plotting percent saturation of dissolved oxygen values observed along the same longitudinal survey of the North Slough (Figure 6), a pattern emerges showing supersaturation conditions in the Columbia Slough, declining to sub-standard oxygen levels at the eastern terminus of the North Slough. This is most distinctive as the slough hydrology becomes less influenced by the flows in the Columbia and Willamette Rivers during the summer.

Additional information

Sub-Contract for Preliminary Paleolimnological Survey

Better knowledge of the recent historical record of the water quality conditions of Smith and Bybee Lakes is needed to confidently evaluate restoration options. Paleolimnological surveys can provide such a record in particular lake conditions. Examination of sediment cores from lakes can provide information on historical lake trophic conditions, hydrologic changes, and significant perturbations to the lakes and their watershed. Success of this approach is dependent on reasonable stratigraphy or formation of varves in sediment cores, spatial variation in lake sediments and other factors. Before committing to a complete paleolimnological survey of Smith and Bybee Lakes, a pilot survey is warranted to ensure this approach is applicable to this particular system. E & S Environmental Chemistry, Inc. has been contracted to perform the survey in January, 1994. Results of the preliminary survey will be used to refine the scope of work in the remaining feasibility study.

Improvements/Actions Needed

An assessment of sediment structure and quality distributed throughout the lakes is needed to determine historical and recent effects of stormwater and landfill leachate/runoff on the lakes. This can be particularly useful in the areas where known discharges have occurred over time.

Figure 1..

Bathymetry of Smith and Bybee lakes

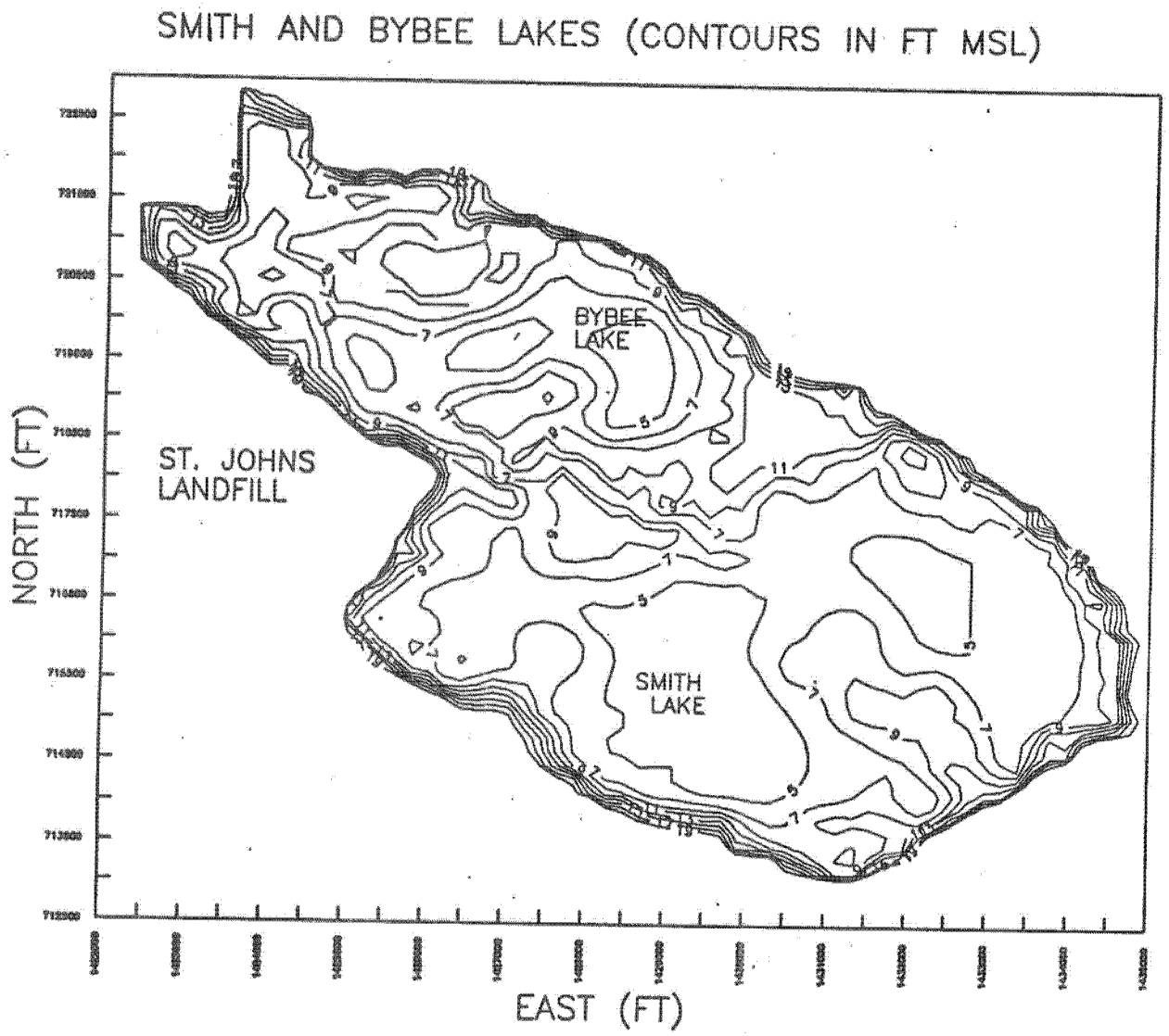


Figure 2.

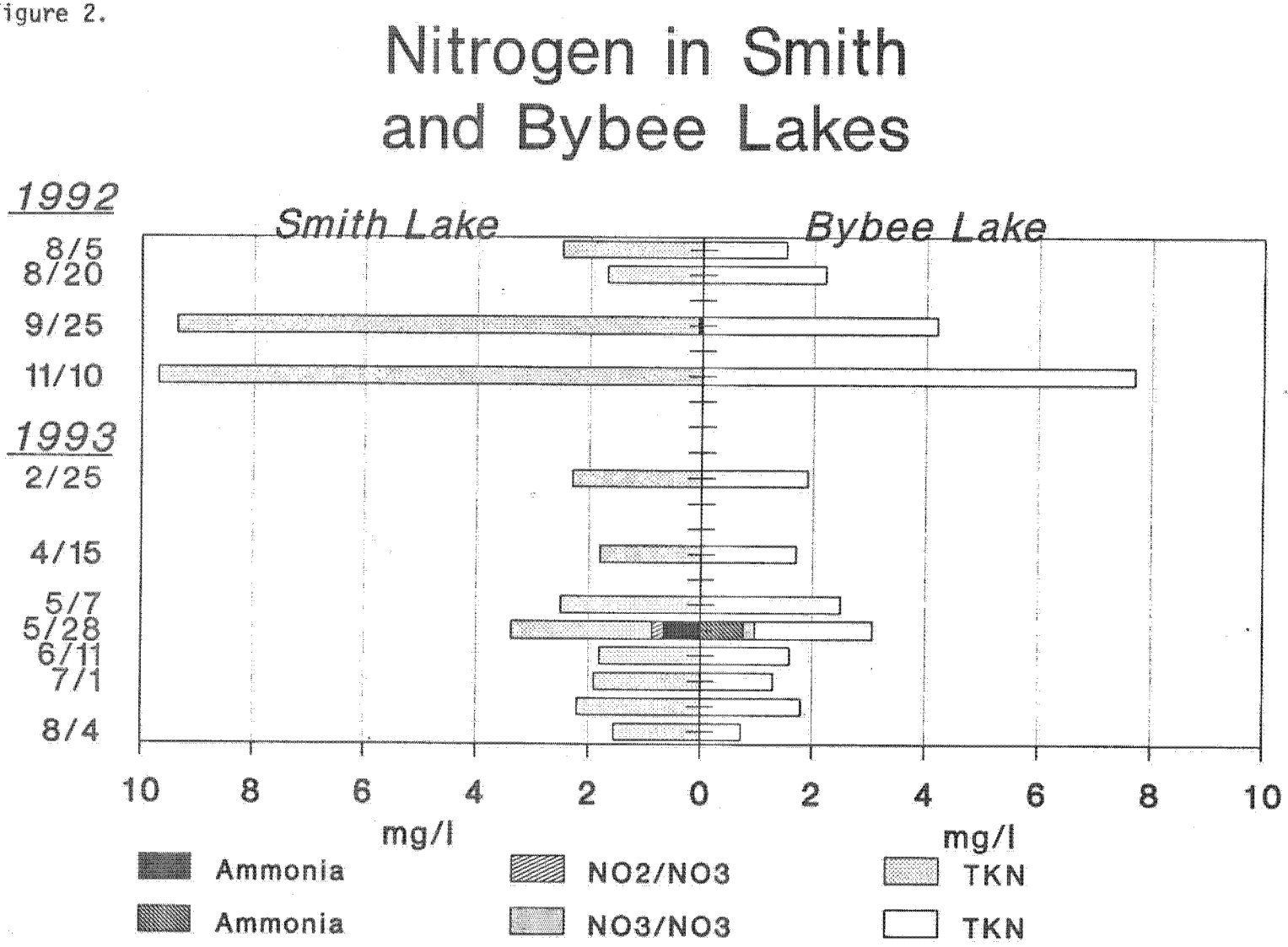

Nitrogen in Smith and Bybee Lakes
1992
Smith Lake
Bybee Lake
8/5
8/20
9/25
11/10
1993
2/25
4/15
5/7
5/28
6/11
7/1
8/4
10
8
6
4
2
0
2
4
6
8
10
mg/l
mg/l
Ammonia
Ammonia
NO2/NO3
NO3/NO3
TKN
TKN

Figure 3.

Phosphorus and Chlorophyll-a in Smith Lake

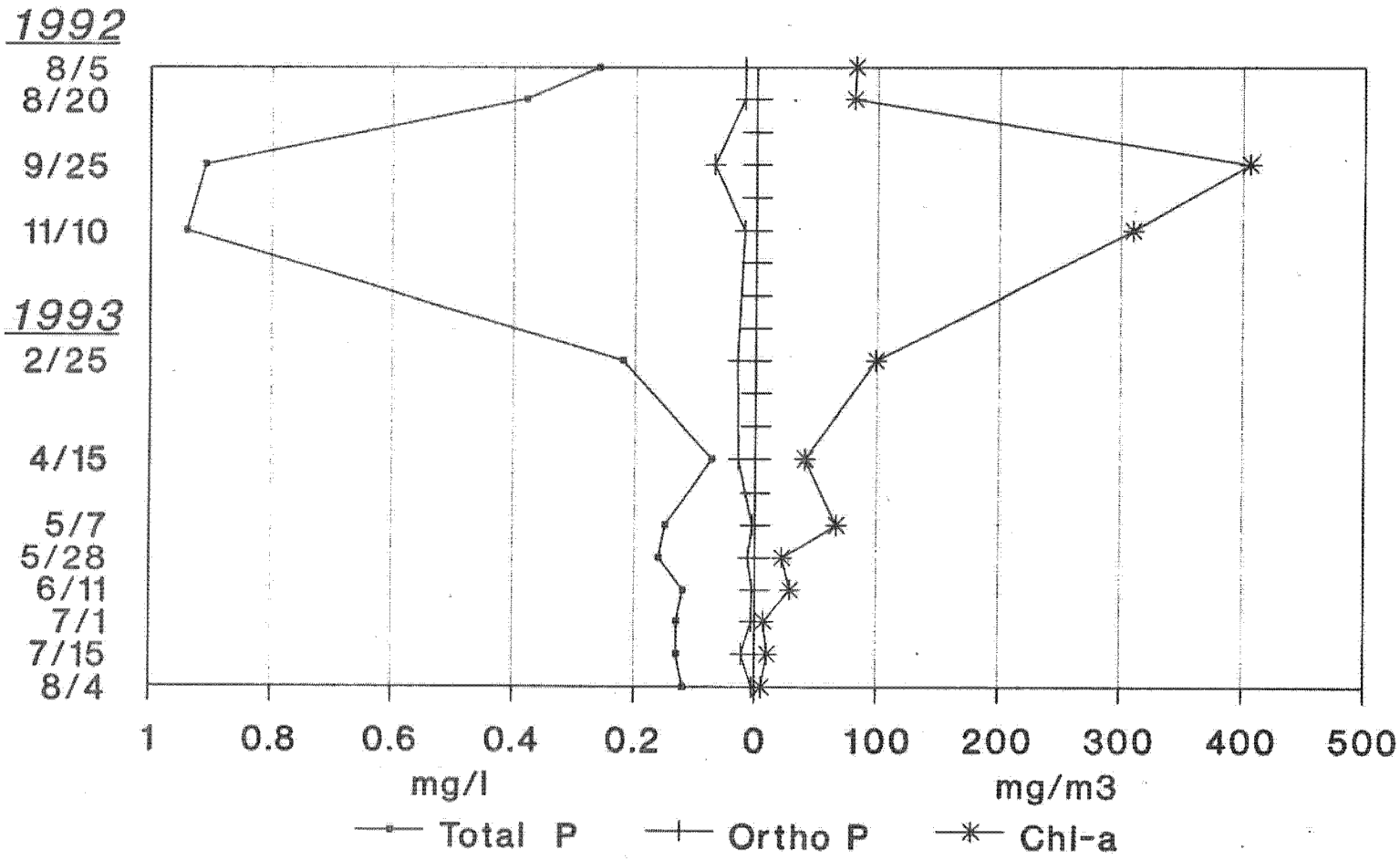


Figure 4.

Phosphorus and Chlorophyll-a in Bybee Lake

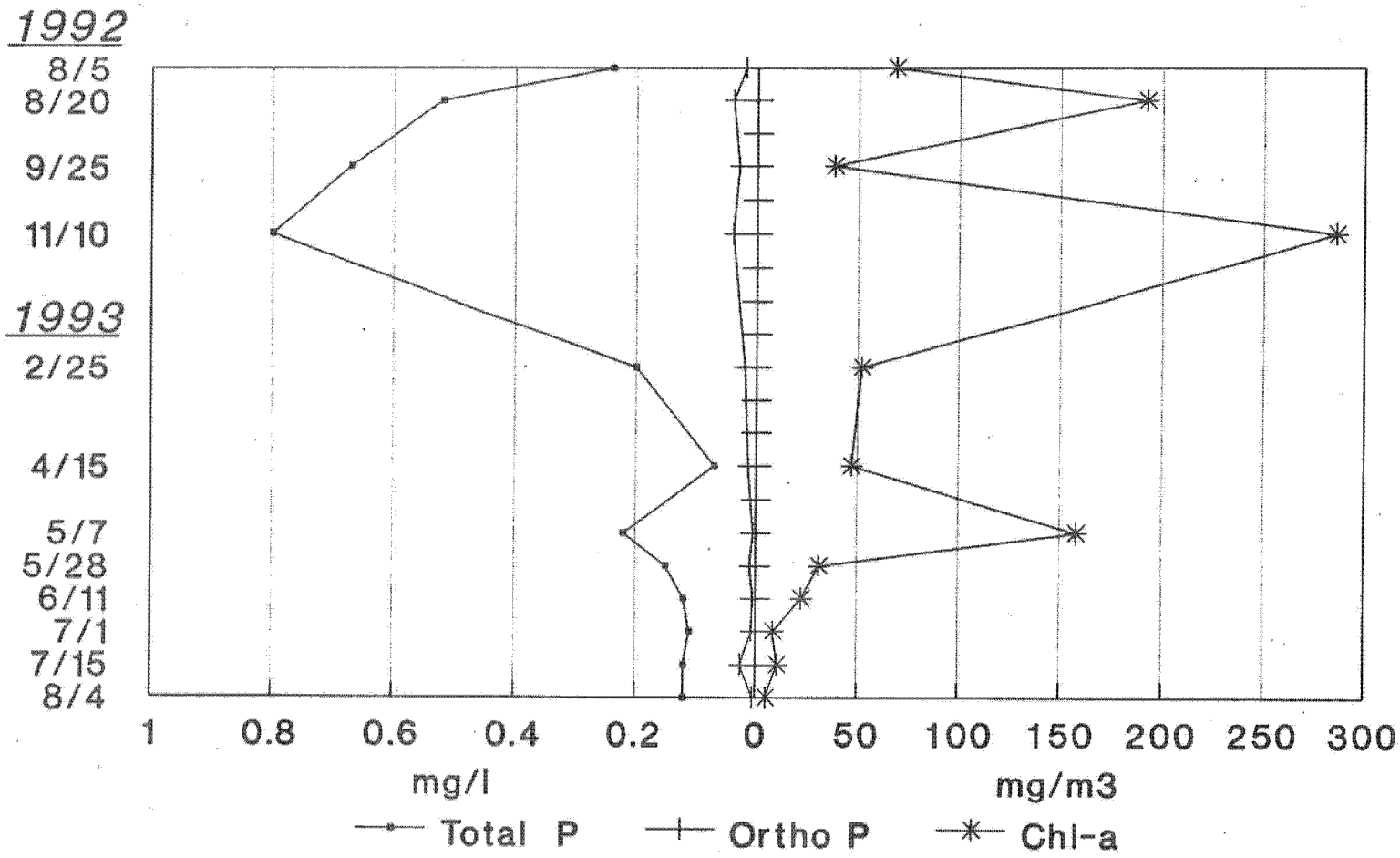


Figure 5.

Specific Conductance in North Slough - 1993

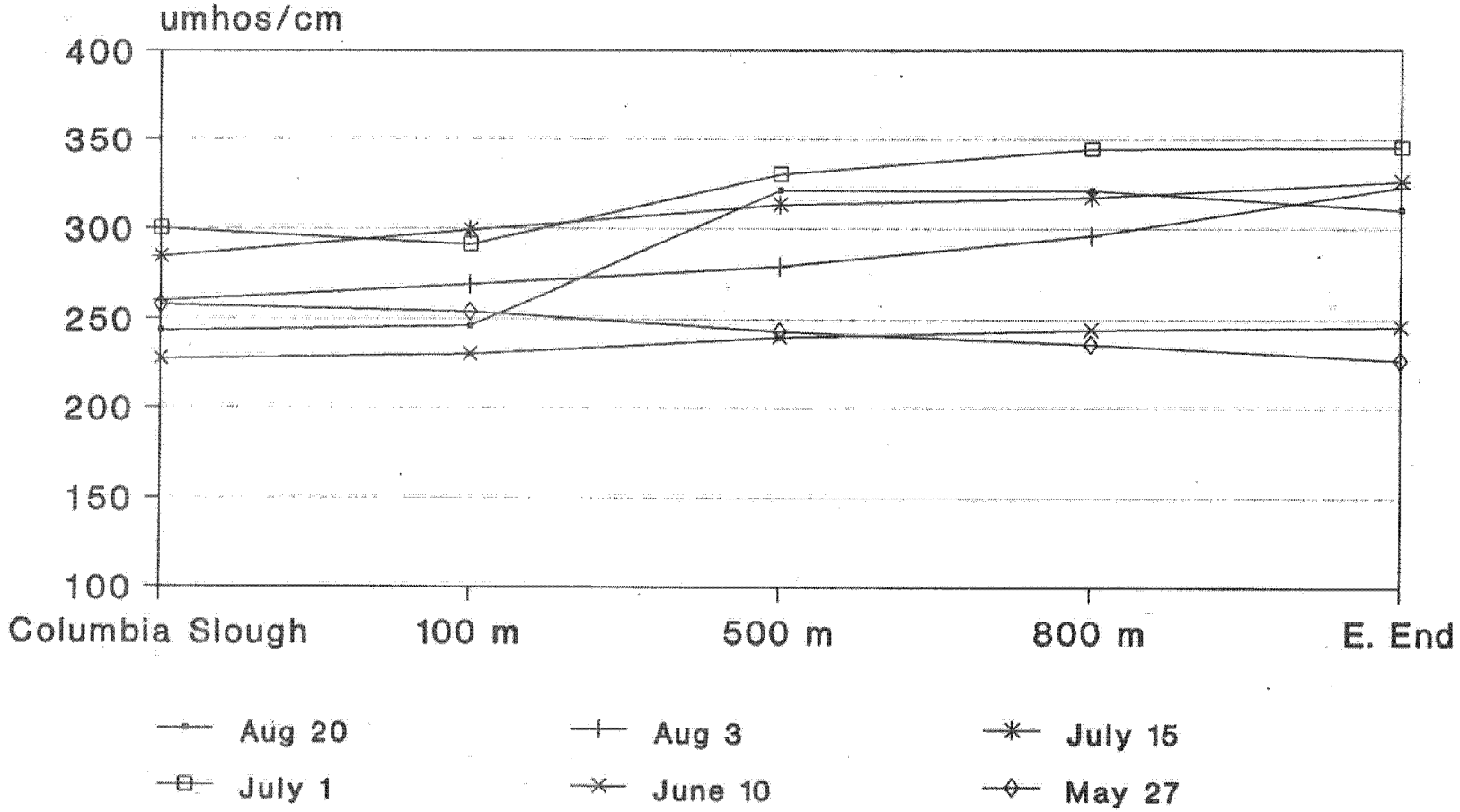
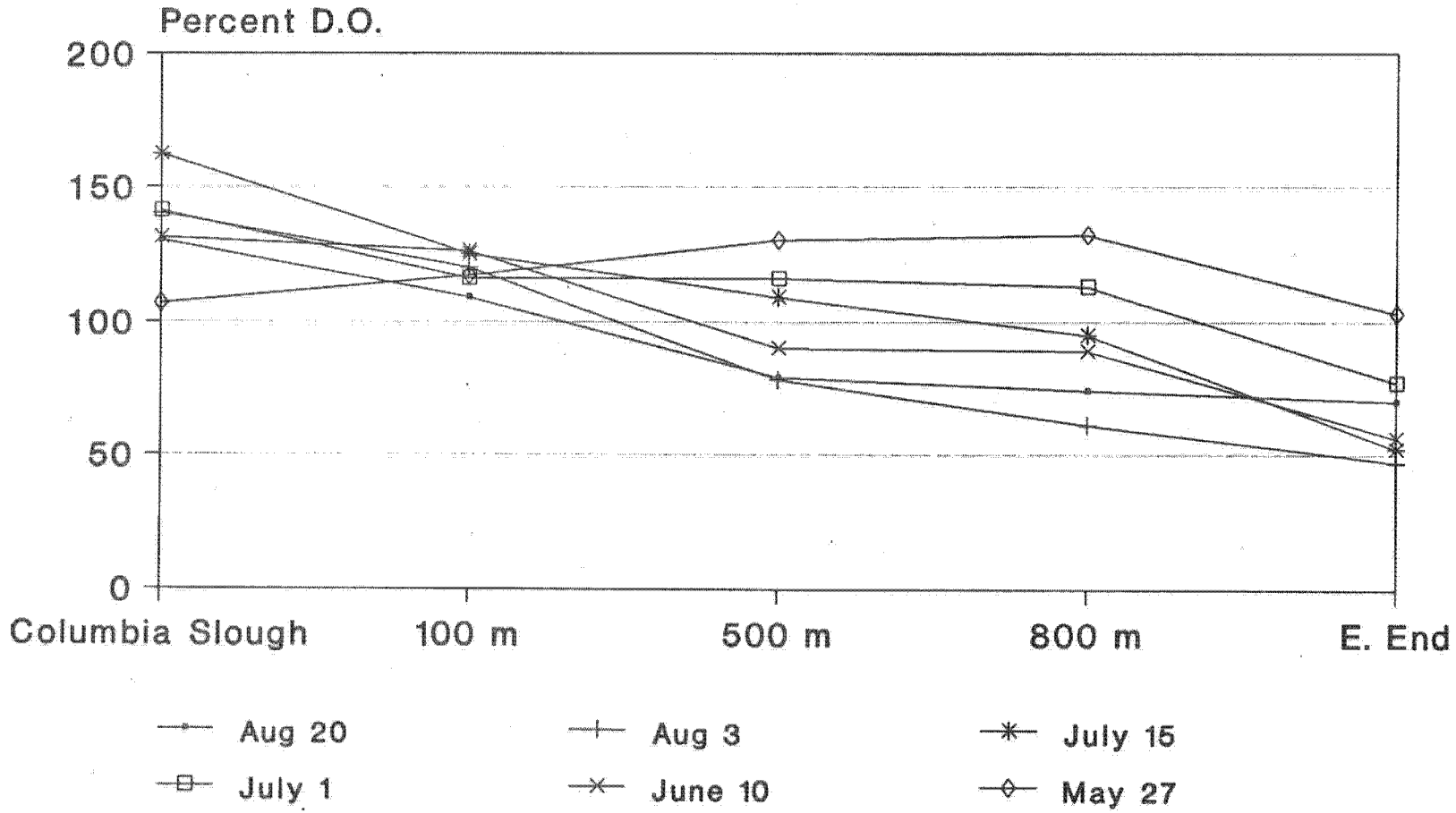


Figure 6.

Percent Saturation of Dissolved Oxygen in North Slough - 1993



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METRO

January 26, 1994

Doug Larson
DEQ Water Quality Division
811 S.W. Sixth
Portland, OR 97204

Dear Doug:

Enclosed is the Quality Assurance/Quality Control Plan for Smith and Bybee Lakes Feasibility Study. Also enclosed is the quarterly report for 1st Quarter FY93-94, October through December, 1993, for Phase 1 Feasibility Study of Smith and Bybee Lakes Flow Augmentation. I followed the same format as used in the last quarterly report, remaining brief as suggested. If you need any additional information or more detail than this, please let me know.

Thank you for your support in this project.

Sincerely,

Jim Morgan

Jim Morgan, Senior Regional Planner
Planning Department