Smith and Bybee Lake Phase I

Issues To Be Addressed in Phase I Project

Salmonids

Establishing a channel connecting Smith/Bybee Lakes with the Columbia River would most likely allow the movement of juvenile salmon in and out of the lakes, unless the connection was designed to exclude this movement. The movement of juvenile salmon into the lakes during their migration downriver was observed in 1986 when juvenile chinook salmon entered the lakes during high water levels of the February freshet. Data indicates that the lakes and Columbia Slough are heavily utilized by juvenile salmon during the spring. Abundant zooplankton provide food and warmer temperatures favor rapid growth of these young fish. A study of nearby Vancouver Lake, WA, supports the conclusion that Smith and Bybee Lakes provide a good rearing environment for juvenile salmon during spring and early summer; food is abundant and predation is minimal.

Management of water levels through control of the structure connecting the lakes to the river and the existing control structure on North Slough will consider the release of juvenile salmon from the lakes during June as a priority. This management objective will be included in all design considerations. A management strategy will be developed that will address this task by the Smith and Bybee Lakes Technical Advisory Committee, which includes representation from National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Oregon Fish and Wildlife Service. This committee will review all proposals for flow augmentation and water level management of the lakes.

Macrophytes

An improvement in water quality of the lakes resulting from the proposed project may yield an increase in water clarity. This could result in an increase in aquatic macrophyte growth, particularly submergent species. Using the 1992 aquatic macrophyte survey results conducted by Metro and a results from a similar survey planned for 1993, a baseline condition will be established for assessing the effects on macrophyte growth of changes in water quality. Changes in water clarity and nutrients predicted by the water quality model will be used to evaluate the impact on aquatic macrophytes in the lakes.

Toxins

Due to the lakes proximity to the St. Johns Landfill and the hydrologic connection with the Columbia Slough, there is potential for the presence of toxins in the lakes system. Earlier sediment and water column studies do not indicate toxins are of a concern within the lakes. However, the proximity of the landfill and stormwater discharges into the lakes will continue to pose potential for sources of toxins. Monitoring the sediments for toxins is a cost-effective means for evaluating impacts of water quality changes that may result from these potential sources. A change in sediment quality is a good indicator of long-term changes in water quality.

A total of four sediment stations will be sampled in summer in Smith and Bybee Lakes and two stations in the North Slough for the parameters listed in Table 2 below. Data on toxins in the sediments of Columbia Slough will be obtained from City of Portland's comprehensive Columbia Slough Sediment Analysis and Remediation Project. Data on toxins in the Columbia River will be derived from sources listed in Sources of Biological, Chemical, and Physical Information for the Lower Columbia River (1990) by Robert McConnell.

TABLE 2
Smith and Bybee Lakes
Sediment Parameters

Copper	PAH's (lake sediments only)
Lead	Pesticides listed in RCRA Method 8080/NPDES Method 608
Zinc	Total organic carbon
Cadmium	
Chromium	
Arsenic	Biological
Mercury	Macroinvertbrates

Water Quality

Existing and newly-acquired water quality monitoring data will be entered into the water quality model that will be used to evaluate the potential impact of connecting the lakes directly to the Columbia River. Available water quality data on the Columbia River will be compiled from the on-going Lower Columbia River Bi-State Study. Columbia Slough water quality data, with additional Columbia River monitoring data, will be acquired from current City of Portland Columbia Slough studies.

Lakes' water quality will be evaluated using limited historical data (i.e. quarterly sampling at two locations) and expanded monitoring results. Since 1980, water locations were sampled and tested for following parameters: pH, alkalinity, hardness, conductivity, BOD, COD, Cl, and NH_3. Beginning in August, 1992, parameters for which lake sampling at two lake stations occurred are listed in Table 1.

TABLE 1
Smith and Bybee Lakes and Slough
Water Quality Parameters

Basics	Nutrients
Water Temperature	NH_3-N
Secchi Disk *	NO_2+NO_3-N
Dissolved Oxygen	Total Kjeldahl Nitrogen
Electrical Conductivity	Total Phosphorus
pH	Dissolved Ortho-Phosphorus
Redox Potential	
	Biological
Solids	Fecal Coliform Bacteria *
Total Solids *	Enterococci Bacteria *
Total Suspended Solids *	Chlorophyll *a*

* Parameters will be added in February, 1993

In 1993, sampling frequency at two lake stations and one North Slough station will be bi-monthly in December-March, once in April and November, and twice-monthly May-September.

The water quality model will be used to evaluate the effect of introducing Columbia River water into the lakes, focusing, at a minimum, on nutrients and suspended sediments. Modeling sub-tasks will include:

(i) literature of sediment loadings in the Columbia system;
(ii) model simulation analyzing suspended sediment transport into the lakes;
(iii) evaluation of potential designs of a sedimentation basin within the channel from the Columbia River to Smith/Bybee, if necessary;
(iv) model the lake system for phosphorus;
(v) calibrate the model with available data (Temp., DO, nutrients, chl-*a*);
(vi) analyze the effect of low phosphorus water from the Columbia on phosphorus and chlorophyll levels in the lakes.