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Preoperational Environmental Monitoring Studies Near WNP 1, 2 and 4 August 1978 Through March 1980

Prepared for:

Washington Public Power Supply System

By:

Beak Consultants Incorporated



AQUATIC ECOLOGICAL STUDIES
NEAR WNP-1, 2, and 4
AUGUST 1978-MARCH 1980

Prepared for

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EXECUTIVE SUMMARY

This report supplements previous aquatic ecological studies of the Columbia River near the WNP-1, 2, and 4 intake-discharge structures which commenced in September 1974 and were conducted by Battelle Northwest Laboratories. In addition, fish-power plant investigations were initiated during the present study which encompasses the period August 1978 through March 1980. Results are summarized below.

PHYTOPLANKTON

There was a marked increase in the number of species observed in each month of the study period compared to previous studies. As in past studies, diatoms dominated the phytoplankton community both in numbers of species and in percentage of the total monthly densities. Dominant species were small, centric diatoms.

Diversity indices were highest in summer, fall, and early winter when densities were highest. Diversity indices were higher for most months than previously reported. Unit densities were highest during late spring and lowest in November and December of 1978 and 1979. Chlorophyll a pigment was at highest levels in late spring and early summer, with lowest values occurring in late fall and early winter in both 1978 and 1979.

ZOOPLANKTON AND ICHTHYOPLANKTON

Seasonal variation in zooplankton dominance was similar to past years. Dominant taxa included Diaptomus, Cyclops, and Bosmina; a total of 45 taxa were identified. Maximum zooplankton densities in 1979 were similar to 1978 values, but much lower than the 1977 peaks.

Ichthyoplankton samples contained only a few yolk sac and post-yolk sac larvae. Maximum densities were 0.14 individuals/m³. These findings suggest low densities

and diversity of fish eggs and larvae in the water column of the area sampled.

BENTHIC MACROFAUNA AND MICROFLORA

Caddisflies (Hydropsychidae) and midges (Chironomidae) were dominant macrofauna numerically. Hydropsychidae and the snail Lithoglyphus contributed most to macrofauna biomass. Abundance was highest in September or December and lowest in March. Diversity was generally highest in June and lowest in December.

Statistical comparisons among sampling stations showed the most upriver (station 1) and downriver (station 8) sampling locations were consistently among the bottom three stations in mollusc biomass. One station (11 W) has ranked high in total density since its establishment in September 1977.

Diatoms were the dominant periphyton (attached microflora) taxa. Periphyton densities were highest in winter and diversity was highest in late summer or early fall. No consistent among-station differences were observed.

FISH

A total of 5,503 fish, representing 29 species and 12 families, were collected during the present study. This brings to 38 the grand total of species collected since initial sampling in 1974. The most common species collected were chinook salmon (predominantly fry), largescale sucker, chiselmouth, mountain whitefish, redbottom shiner, bridgelip sucker, and northern squawfish. These species collectively comprised about 95 percent of the total catch.

Comparison of past and present catch data showed some seasonal but no year-to-year variation. Statistical analysis of data showed highest gill-net catches of minnows (Cyprinidae) occurred at station 4 (crossriver from the intake-discharge structures), while there were no statistical among-station differences for gill-net

catches of suckers (Catostomidae). Largest beach-seine catches of chinook salmon (fry) occurred at stations 1 and 2 located downriver and crossriver, respectively, from the intake-discharge structures.

Chinook salmon fry migrated through the study area from late April through early July with peak movement in late May. An initial estimate of individual fry residence time in the study area was less than 10 - 15 days, which represented the shortest interval between samplings by beach seine.

Food items identified during stomach content examination of selected species included aquatic insect larvae and pupae (primarily caddisflies and midges), molluscs, small fish, algae, and detrital material. The diet was often reflective of the community composition identified during benthic macrofauna studies.

Various life history and population dynamics characteristics were described for selected species.

FISH-POWER PLANT INTERACTIONS

Effects of the WNP-2 intake structures on fish populations appeared negligible. Fish were sometimes observed near the intakes and may have been attracted to areas of reduced velocities. However, they were generally few in number and none were observed to be impinged against the intake pipes. SCUBA divers felt no suction when placing their hands directly on the perforated pipe, indicating intake velocities were quite low. No damage or other irregularities to the structures were noted during the dives.

The absence of fish eggs, larvae, and fry from entrainment samples indicates the flow field had not been modified in a manner that would be detrimental to juvenile recruitment to Columbia River fish populations. These results indicate entrainment is not likely to be a serious problem at WNP-2 with the present intake

design and placement, and that a 12-hour sampling interval with the entrainment cages provides sufficient coverage to detect and measure future entrainment.

Studies to date of the WNP-2 discharge plume indicate no effect of plume discharge on surrounding river velocity patterns.

Turbidity and suspended solids values during placement of the WNP-1/4 intake and discharge lines were well within the temporary water quality standard established by EFSEC.