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ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
POSITION PAPER
FISHERIES ISSUE F-2.2

EXECUTIVE SUMMARY

Statement of Issue:

Significance of potential changes in pH on salmon and resident fish habitats and populations downstream of the dams.

Position

It is the position of the Alaska Power Authority that potential changes in pH due to inundation of acid bogs and tundra soils by the project reservoirs will not significantly affect the pH of the reservoir or the river downstream of the dams. Therefore, no mitigation measures are needed.

Present Knowledge

The Susitna River watershed above Devil Canyon presently drains large areas of acidic tundra soils and bog or wetland habitats. The mainstem river water, however, contains sufficient alkalinity-producing ions to buffer against biologically harmful pH changes which otherwise might occur due to acidic tributary influents. The wetland mapping recently completed by the USFWS indicates that approximately 2.7 percent of the combined impoundment areas is "bog-like" wetland. The alkalinity buffering system which exists now will continue to minimize pH changes during project construction and operation.

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INTRODUCTION

Statement of Issue:

Significance of potential changes in pH on salmon and resident fish habitats and populations downstream of the dams.

Position

It is the position of the Alaska Power Authority that potential changes in pH due to inundation of acidic bogs and tundra soils by the project reservoirs will not significantly affect the pH of the reservoir or the river downstream of the dams. The amount of such acidic habitat is so small, about three percent of the area to be inundated, and the buffering capacity of the river so large, that potential changes in pH will be neutralized by the natural system.

DISCUSSION

The physical, chemical and biological characteristics of a water body (including its pH and alkalinity) will reflect the basic climatic and hydrologic regimes and biogeochemistry of its entire drainage basin, and not merely the small portion of the drainage which is under water (Hutchinson 1967, 1973, 1975, Wetzel 1975, Vollenweider and Kerekes 1980). The pH of upstream and downstream mainstem Susitna riverine habitats is presently regulated by the carbon dioxide-bicarbonate-carbonate and aluminum silicate dissolution buffering systems (Wetzel 1975, Stumm and Morgan 1970). These two buffering systems maintain pH values between 6.0 and 8.3 in most fresh water ecosystems of North America.

The drainage basin of the Susitna River upstream of the proposed Devil Canyon dam site encompasses approximately 5,810 square miles of unvegetated mountains and highland tundra. The watershed's bedrock, glacial till and glacial outwash materials contain alkalinity-producing carbonate and silicate minerals (APA 1983, R&M Consultants Inc. 1982). Overlying the watershed's lithic material is a substantial area of tundra consisting of saturated, peaty soils, which may be acidic in nature. Sphagnum bogs are frequent on the tundra and they commonly have a pH less than 4.5. Despite substantial inflow from tributary drainages with acidic soils and acidic bogs, the ionic composition of the mainstem river is presently sufficient to buffer tributary acidity and maintain low to moderate alkalinity values. Changes in mainstem pH values are seasonally variable but range between 6.0 and 8.1. The mean annual pH is greater than 7.0 in the mainstem water of the upper river watershed.

A wetlands mapping project has been completed by the USFWS in order to quantify the amount of different wetland types in both Watana and Devil Canyon impoundment zones. The estimated total of vegetated areas which are classifiable as wetlands equals 8,316 acres or 18.8 percent of the combined impoundment areas. The estimated total of all "bog-like" wetlands equals 1,182 acres or approximately 2.7 percent of the combined impoundment zone areas. The pH of the proposed reservoirs and downstream riverine habitats under with-project conditions will be regulated by the same chemical buffering system existing at present. Flooding of the small area of bog habitats is not anticipated to cause a biologically significant change of pH in riverine habitats downstream of the proposed project or in the reservoirs.

A number of references, including review articles, research reports and texts have been reviewed for any discussion of pH changes in reservoirs or their downstream habitats due to bog inundation (Supplementary References). No documentation of such a problem has been located in the open literature dealing with lake or larger reservoir limnology.

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