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INTERIM REPORT ON FISHERIES PROBLEMS ASSOCIATED
WITH THE KEMANO PHASE II POWER DEVELOPMENT

PREPARED BY FISHERIES SERVICE,
DEPARTMENT OF THE ENVIRONMENT

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Interim Report on Fisheries Problems Associated
with the Kemano Phase II Power Development
November, 1971

Field studies were carried out this season on the Nanika, Morice and Nechako rivers and it is now possible to expand somewhat on our preliminary report of February 1971, entitled "Fisheries Problems and Requirements Relating to the Kemano Development".

The studies included two comprehensive surveys of the Nanika River, one prior to the spring freshet at a discharge of 150 cfs and the second during the spawning period at a discharge of 80 cfs; a preliminary survey of a section of prime chinook spawning grounds on the Morice River; and a visual inspection of present spawning conditions on the Nechako River above Fort Fraser. It was not possible to conduct a meaningful survey this year on the Nechako River due to the large quantity of water being released through Skins Lake spillway and nothing of value can be added to our February 1971 report at this time. However, with cooperation from Alcan it is hoped that the flows can be reduced during June and July 1972 to enable the collection of data at flows more representative of post-development conditions.

Discharge and temperature recording gauges are now being installed on the Kemano River to provide data for an assessment of the effects of increased flows on the Kemano

fish stocks. A gauge will also be installed on the lower Dean River to obtain a relationship between discharges over the spawning grounds and those now being recorded by Alcan at the diversion site. However, approximately one year's records are required before any definite conclusions can be reached on either of these rivers.

Following is a report on the Nanika, Morice and Bulkley rivers and a general economic statement on the fisheries to be affected by the Kemano Phase II power development.

1. Nanika River

The 1951 Fisheries report on the development concluded that a release of 60,300 acre-feet would maintain a large proportion of the Nanika sockeye run. It was also concluded that water temperatures would have to be controlled over the spawning grounds by installing outlets at the dam to draw water from the reservoir surface or from below the thermocline at rates of up to 200 cfs.

After investigating the spawning grounds more extensively, it is now considered that the above estimate of water requirements is low. Not only would the water velocities over the spawning gravel be reduced well below tolerable limits, there would be no opportunity to provide for the large surges of water required during the spring to flush spawning gravel and induce fry to migrate into Morice Lake.

Sockeye salmon begin their migration into the Nanika River on approximately August 25 of each year and spawning occurs over the following six weeks. The migration and spawning of chinook salmon occurs almost simultaneously with the sockeye. Sufficient flows are required during this period to attract fish into the river and to provide the necessary depth-velocity conditions over the spawning grounds. It is now considered that an average discharge of 800 cfs will be required to meet these conditions, preferably with a range in discharge of 600 to 1000 cfs to simulate natural flows during the period.

Adequate flow is also required for incubation of the eggs during winter months. In this regard, it is necessary to prevent ice from penetrating into the gravel and to provide sufficient inter-gravel flow to meet oxygen demands and remove waste products from the deposited eggs. It is considered that a discharge of 150 cfs will be necessary to meet these requirements.

In lieu of natural spring freshets, which act to cleanse spawning gravel and flush newly emerged fry into Morice Lake, it will also be necessary to release 2000 cfs over a two week period during late May or early June. No water temperature problems are anticipated at this time of the year and this discharge could be released from the reservoir surface or through a low level outlet.

Although the Nanika River is utilized mainly by sockeye salmon which migrate to Morice Lake immediately after their emergence from the gravel, there are a significant number of coho and chinook salmon which rear in the river for up to one year before migrating to sea. To ensure suitable rearing habitat for these fry, water should be released from Kidprice Lake at a minimum rate of 150 cfs whenever spawning, incubation and flushing flows are not required. This will also be of benefit in supplying at least a minimum amount of nutrient to Morice Lake.

In summary, the residual flows required to maintain natural salmon stocks in the Nanika River are as follows:

| | | | | |
|------------------------|---|--|---|---------------|
| Spawning | - | 800 cfs for 6 weeks | = | 66,500 ac ft |
| Flushing | - | 2000 cfs for 2 weeks | = | 55,500 ac ft |
| Incubation and rearing | - | .150 cfs for 44 weeks | = | 91,500 ac ft |
| | | Total annual release | = | 213,500 ac ft |
| | | Average annual runoff at the outlet of Kidprice Lake | = | 800,000 ac ft |
| | | Percentage required for fisheries | = | 26.7% |

It is probable that the existing temperature regime of Kidprice Lake will be altered by creation of the proposed Nanika-Kidprice reservoir. If surface temperatures are substantially increased, intolerable water temperatures could occur in the lower Nanika River and would necessitate the provision of a low level outlet to draw water from

below the thermocline. However, further analysis of the watershed is required to determine the need for such an outlet and the required rate of diversion if one is indeed necessary. This will be included in the future studies currently being planned by the Fisheries Service.

In addition to contributing about 40 percent of the flow in the Morice River, the watershed above Nanika Falls comprises 40 percent of the total drainage area to the outlet of Morice Lake. Therefore, it is considered that the Nanika River contributes significantly to the nutrient supply in Morice Lake and Morice River and its diversion could conceivably cause a decline in productivity of the system. The Fisheries Service will be giving consideration to this possibility in future studies on the development.

2. Morice River

The Morice River provides spawning ground for the five species of Pacific salmon and also major populations of steelhead trout. The most abundant of the salmon species is the chinook salmon, which spawn mainly in the upper 8 miles of the river. Sockeye salmon migrate through the river to Morice Lake and the Nanika River. Other species spawn in the mainstem river and various tributary streams along its entire length.

The field investigations conducted recently on the Morice River were concentrated on a representative section

of chinook spawning ground a short distance below Morice Lake. A survey was conducted during the spawning season at a discharge of approximately 2500 cfs and it is planned to resurvey the section prior to the spring freshet when flows will be much lower. Although a great deal of information was obtained in the original survey, the results must be considered as preliminary until the final survey is completed.

(a) Effects of Nanika River Diversion

On the basis of the preliminary survey, it is estimated that diversion of the entire Nanika flow would dry up 10 to 15 percent of the Morice River spawning ground and may render other areas unsuitable by virtue of decreased spawning velocities. However, if minimum flows are maintained in the Nanika River as recommended above, the diversion should have no significant effect on the Morice River spawning grounds.

(b) Effects of Pumping Scheme

A pumping scheme to divert water from Morice Lake to Nanika Lake at an average rate of 1700 cfs, as indicated in the B. C. Energy Board's letter of April 7, 1971, would have a profound effect on the fisheries of Morice Lake and Morice River. It is noted that the average annual flow recorded in the Nanika River combined with the proposed average pumping rate is almost equal to the entire Morice River flow. Even with the required minimum flows in the

Nanika River, spawning in the Morice River would be almost totally eliminated. Furthermore, the storage required for such a pumping scheme would flood out sockeye beach spawning areas in Morice Lake and may present certain fish passage problems at the proposed dam site. Therefore, a pumping scheme of this magnitude would be unacceptable to the Fisheries Service.

3. Bulkley River

In view of the pulpmill being proposed at Houston, the flow in the Bulkley River is of critical importance to the fishery of the Morice and Bulkley rivers. Toxic effluents from the pulpmill could cause mortalities to all species of fish in the Bulkley River. It is also considered that even with existing low flows sufficient dilution of the pulpmill effluent may not be provided to prevent fish tainting problems from developing. This effect has been demonstrated on resident fish in the Kootenay River below the Crestbrook pulpmill at Skookumchuk. If such a tainting problem were to develop in the Bulkley River, it would most certainly impair the sports fishery for steelhead trout and other resident fish species. Diversion from the Nanika and Morice rivers would aggravate these problems and more extensive and costly treatment facilities would therefore be required at the pulpmill. The diversions would also increase the probability of fish mortalities due to accidental release of effluent during low flow periods.

It is reasonable to assume that the Bulkley Valley offers good potential for industrial and agricultural development with resultant increased demands on the Bulkley River. Therefore, in planning the Nanika and Morice diversions, it is important that consideration be given to the water requirements of such developments so as to avoid any future conflict with the fisheries.

4. Economic Statement on Fisheries Affected by the Power Development

Proper assessment of the implications of the Kemano Phase II power development includes an economic evaluation of the affected stocks and their contribution to the commercial, native food, and recreational fisheries of the Province. The data available at this time permits only a cursory look at the overall economic effect of the development. Nonetheless, it is obvious from the information available that the project as currently envisioned could result in considerable economic and social hardship to certain segments of the population and to the people of British Columbia. Practically every waterway directly or indirectly affected by the development makes some contribution to commercial, food, or recreational fisheries of the Province.

A proper evaluation of the fishery problems associated with the development can only be made with specific reference to each proposal. However, preliminary investigation indicates that a potential commercial landed value loss of between \$5,000,000 and \$7,000,000 annually (1971 dollars)

could result from the project. Very roughly, in terms of wholesale values, this would amount to a total annual economic loss in the neighbourhood of \$12,000,000. Moreover, the localized nature of the commercial fisheries in the central coastal region suggest that in some instances loss of income through loss in fish production might cause greater than proportional hardship to certain small communities or Indian villages in this area.

Studies conducted by the Fisheries Service and by the British Columbia Fish and Wildlife Branch* indicate that in excess of 14,000 resident sport fishermen live in the affected area. Preliminary estimates suggest that perhaps as many as 440,300 angler days fishing effort take place in both fresh and tidal waters annually by resident fishermen in and around the waterways which are to be incorporated in the development. On this basis the area's total recreational fishery would be worth, when considering non-resident participation, well in excess of \$3,000,000 annually. The general trend towards more and more participation in all outdoor activities, together with improved facilities and greater access to the fishing locations in this portion of the Province, suggest that within the next 5 years the recreational value of the fishery could increase 5 or even 10 times.

* Study Report No. 4 & 5 on the Economics of Wildlife and Recreation by Pearse Bowden Economic Consultants Ltd.

In addition to the commercial and recreational fisheries, the Indian Food Fishery is of economic importance to a large number of Indians throughout the Province. On the two major river systems affected by the Kemano Phase II power development, the Fraser and the Skeena, there are in the neighbourhood of 1800 Food Fish permits issued annually. These permits are issued to Indian families and not to individuals. On the basis of only 4 persons to a family, a loss of fish in either of the 2 major systems would, to some degree, affect the economic well-being of 7200 individual Indians. On the Fraser River system alone, the Nadina and Stellako rivers account for more than 22 percent of the total Fraser River food catch. As yet similar estimates have not been developed for the Morice Lake or for the Morice, Kemano, Nanika, and Dean rivers. However, salmon and steelhead stocks destined for all of these waterways are exploited by significant Indian Food fisheries.

The foregoing estimates are based for the most part on existing use of the affected fisheries. In many cases, the total commercial, and especially the recreational benefit potential, is far in excess of the rough value estimates provided here. Some of the rivers included in the development have produced runs of several times their current production. It is our belief that in every case when assessing the effect on a particular river, realistic estimates of total potential fish production should be

taken into consideration. This is especially important in light of the diminishing number of waterways which are available solely for fish habitat and the decline in the number of areas which support good quality steelhead and chinook salmon fishing.

The particular area of the Province in which this power development will take place is one of the main production areas for chinook salmon and steelhead on the coast. Chinook salmon on a per pound basis is our most valuable salmon, and steelhead and chinook salmon are two of the most prized sport fish species available.

Consistent with the belief that potential production should be given consideration, it must be remembered that the very rough values used here are adopted on a "user approach" basis. There are also values over and above user values which should be taken into account. Many Canadians gain considerable utility just from knowing that good fishing and an aesthetically pleasing environment are available. The opportunity to fish, even if never taken advantage of, is worth something to the average citizen.

It is the responsibility of the Fisheries Service of the Department of the Environment to ensure that water resource developments are not pursued at the expense of the fisheries resource. Experience has shown that provision of adequate fisheries flows and the maintenance of the natural aquatic environment is the best guarantee to assure the perpetuation of fish stocks. In some

instances compensatory facilities such as spawning channels or hatcheries may be considered as a possible alternative. The choice of technique used has to be adapted to the species and problems encountered on the specific river. However, such facilities have not always been successful. In addition they require high capital, operating and maintenance costs and are prone to mechanical breakdowns and human error.

The method or alternative adopted for maintaining existing fish stocks will depend on the biological, engineering and economic findings of studies initiated for this express purpose.

