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MANUSCRIPT REPORT



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## MANUSCRIPT REPORT

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Review of fishery potential and problems  
on the Tusket River, Yarmouth Co., N.S.

by

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Review of fishery potential and problems on the Tusket  
River, Yarmouth Co., N. S.

The purpose of this memorandum is to summarize the current fisheries problems on the Tusket River system, Yarmouth Co., N. S. and briefly describe present engineering proposals to improve fish passage for adult and juvenile stocks of fish. The summary involved searching through existing records as far back as the early 1920's in order to gather background information to assist in conducting pending negotiations with the Nova Scotia Power Commission concerning major improvements to existing fish passage installations and additional juvenile facilities.

Since 1962 there has been a succession of complaints and inquiries concerning the effectiveness of existing fishery protective works on the Tusket River system. The need for a by-pass facility to remove juvenile fish from the power house intakes has been expressed repeatedly; the most recent inquiry was directed to the Halifax Regional Office and the Minister from Mr. Fraser Mooney, member of the Provincial Legislature for the Yarmouth district.

Historically the Tusket River supported a good size salmon and gaspereau population prior to the construction of the Tusket Falls hydro development in 1929. Since the construction of hydro facilities including ancillary storage structures, the average annual salmon catch to the anglers has ranged from a high of 111 in 1940 to a low of 25 during the late 60's. Recent angling catches were taken from the estuary area below the Tusket Falls generating station. Records indicate that a significant return of gaspereau has been maintained in the system in recent years but a continual problem of juvenile and spawned gaspereau being trapped above the power house intakes or killed during their passage through the turbines prevails. Other species found less plentiful in the system include speckled trout, striped bass, yellow and white perch.

A report prepared by biologist K. E. Smith in 1962 indicates the Tusket system is capable of supporting atleast

2000 adult salmon annually. This estimate is based on the available spawning and nursery areas at the time of the survey. There has been no significant change in the water course since the biological survey was conducted. There are no major sources of industrial pollution within the watershed.

### EXISTING OBSTRUCTIONS AND FISHERY PROTECTIVE WORKS

In 1929 the Nova Scotia Power Commission constructed a diversion dam on the main river channel and a bypass canal leading to a second dam and power house approximately 2800 feet down river from the diversion dam. A fishway was provided initially at the diversion dam and power house dam as requested by the Department. No provisions were made at the diversion dam or power house dam for passage of juvenile or spawned fish other than through the respective fishways or over the spill section of the diversion dam. A storage dam on the outlet of Carleton Lake was re-built in 1963, although provisions were made at that time for incorporating a fishway into the new structure. Construction of the fishway has never been carried out.

There are other small storage dams located on the upper reaches of the watershed that are not equipped with fish passage facilities. The amount of productive salmon habitat denied because of the storage structures is minimal. However, a significant reduction in gaspereau and trout habitat areas can be directly attributed to the lack of fishery protective works at the Carleton Lake dam. The location of the Tusket Falls powerhouse and ancillary storage structures on the system are shown on the attached watershed map (Fig. 1).

### COMMITMENTS TO DATE

Initially the Nova Scotia Power Commission provided a fishway at the diversion dam and power house dam. It was discovered that the latter fishway structure was not constructed in accordance with approved drawings. The structure

was re-built by the Commission in 1931 to conform with the Department's approved design. This structure was subsequently abandoned and the existing fishway was constructed in 1949 by the Department. The reasons for abandoning the original fishway at the power house are not too clear but mention was made several times in the correspondence that fish were unable to locate and negotiate this facility. Only minor modifications were necessary to the original fishway provided at the diversion dam and these were carried out by the Commission. Maintenance work on the power house dam fishway and the diversion dam fishway was and continues to be the responsibility of the Commission.

Considerable correspondence is on file concerning the responsibility for providing fishery protective works at the Carleton Lake dam. This storage structure was re-built in 1963 and provisions made at that time for inclusion of a fishway. Previous to this considerable controversy occurred with respect to the cost of constructing and modifying the fishway structure in the old dam. A decision was made at the time to provide for an opening in the new dam on the outlet of Carleton Lake and the cost of providing this requirement was borne by the Department. The final responsibility for constructing the fishway itself was never resolved and currently no escapement is possible into the Carleton system. There are no downstream protective measures on the Tuskett system to facilitate escapement of juvenile or spawned fish other than by descending the diversion dam spill section and fishway or the power house dam fishway. Since the power house dam has no spill section and the existing fishway is located several hundred feet away from the turbine intakes, downstream escapement through the powerhouse fishway is ineffective.

CURRENT PLANS FOR IMPROVING FISH  
PASSAGE ON THE TUSKET RIVER SYSTEM.

Current plans to improve fish passage on the Tuskett River system involve major improvements to the adult facility at the powerhouse dam and provisions for bypassing juvenile and spent fish away from the turbine intakes.

The existing adult facility consisting of a pool and weir fishway requires major repair work on the baffles and provisions for better regulation of flows through the fishway to compensate for headpond fluctuations. In addition,

major improvements to the lower portion of the facility are recommended to provide better attraction features at the tailrace entrance. The improvements involve constructing additional baffles to provide a more continuous positive attraction to induce fish to enter the facility under varying tailrace levels. The cost of providing the necessary improvements is estimated to run in the neighborhood of \$25,000. This estimate is based on the assumption that no unusual soil conditions will be encountered during construction.

Maintenance work on the upper portion of the power house fishway is currently under way and is the responsibility of the Commission.

Juvenile facilities are considered an integral part of any restoration program for the river system. Such facility could provide an exit route for young and spent salmon and gaspereau as well as other anadromous species.

Originally the Tuskat Falls hydro installation was designed to house four separate hydraulic turbines although the fourth unit has never been installed. Recent information supplied by the Commission indicates that their long range plans do not include any additional expansion at the Tuskat Falls installation. This unused portion of the power house intake structure could be utilized to attract and remove juvenile and any spawned fish away from the adjacent turbine intakes and flumed to the tailrace area. Sufficient space is available within the power house to construct a flume for the purpose of bypassing fish directly to the tailrace. The estimated cost of this bypass facility is approximately \$5500. A problem could arise with regard to the loss of water for hydro generation during low flow periods. It is estimated that a large percentage of the juvenile escapement will coincide with periods of spillage in which case water is not at a premium and compensation could not be justified. The bypass facility has been designed to use from 13-20 cfs. depending on the headpond elevation.

#### CONCLUSIONS AND RECOMMENDATIONS

Based on the estimated potential of the Tuskat River, serious consideration should be given to initiating a restoration program as quickly as resources permit. Technical and biological problems associated with fish passage at

hydro developments involving a diversion structure are vexing but the chances of succeeding in resolving a long standing juvenile escapement problem on the Musket River system is reasonably good because of the built-in features at the existing hydro installation.

Records indicate that statutory requirements have been satisfied by the owners as far as adult facilities are concerned and consequently very little leeway is left to induce the owners to carry out further construction for the benefit of fisheries. Since the existing adult facility is the third installation constructed at the power house site and the cost of providing this facility was borne by the Department, any expenditures incurred for additional improvements would have to be assumed by the Department.

The records do not specify any specific flows that must be provided by the owners for juvenile passage. This requirement could be specified under Section 20, sub-section 8 which would require the owners to construct the necessary bypass facility as well as provide sufficient flows to permit effective operation of the facility.

It is recommended that a meeting be set up with the Commission to review the current situation on the Tusket River and establish firm agreements on the timing and responsibility for constructing the proposed improvements to the adult facility and installation of juvenile protective works. We should insist that the Commission proceed within the next six weeks at their own cost with the construction of a juvenile bypass facility. We would be prepared to initiate a modest evaluation program on the new facility during the month of June this year.

With regard to the proposed improvements to the adult facility, the Commission could be approached with the proposal of carrying out the required work with their own forces for a fixed cost. With the Commission's firm price for doing the work the Department would then be in a position to decide whether funds could be provided within the Branch to proceed with the improvements during the 1972-73 fiscal year. Failing this it is suggested that the funds for carrying out the improvement work be included in a future submission under the Labour Incentive Program.

Attached are copies of engineering drawings showing the proposed improvements to the adult facility and juvenile

protective works for the Tuskat Falls installation. Also attached is a recent report prepared by Biologist Curtis MacLeod relating to the fishery potential and problems on the Tuskat River system.

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Encls.

D. C. Riley