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RESOURCE DEVELOPMENT BRANCH

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Interim Report on Medway River Survey

by

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INTERIM REPORT

ON

MEDWAY RIVER SURVEY

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1. Introduction

Lack of detailed topographic and hydrographic data on many river systems in the Maritimes Area have limited the analysis and application of stream improvement in many instances. To further the knowledge of these river systems, a bio-engineering survey program was started in July, 1965. The surveys were designed to record all physical features along the river system and relate the potential producing areas. The information gained from the survey will be useful to develop means to protect the migration of salmon, to evaluate the present stream characteristics, and will help point up the conditions which require immediate study.

The Medway River on the south coast of Nova Scotia was chosen as the site for the initial survey. This report is a brief review of the results obtained from the survey. A complete detailed report is being prepared.

2. Geography

The Medway River empties into the sea on the south coast of Nova Scotia about sixty-five miles southwest of Halifax. Head of tide extends to Mill Village about three-quarters of a mile above the highway bridge on route three. The general direction of flow is south-easterly, most of the river lies in Queens and Lunenburg Counties with headwaters extending into Annapolis County. The system originates at Lake Alma on the main branch and at Skull Bog Lake on the Pleasant River tributary.

The main branch drops 350 feet in the 25 miles from Lake Alma to Ponhook Lake and another 226 feet in the 15 miles to head of tide at Mill Village for an average gradient of 14.4 feet per mile. The Pleasant River tributary drops 430 feet in the 33 miles from ~~Lake Alma~~ Snow Bog Lake to the confluence with the main branch for an average gradient of 13 feet per mile.

Many small streams joint the main branch and the Pleasant River tributary at various points along their course. Many of these smaller streams deplete their natural water storage areas during the summer months.

The entire Medway River system has a drainage area of 546 square miles, most of the headwaters area is under forest and the downstream areas are mixed forest and farm land. The drainage area above Ponhook Lake is almost equally divided between the main branch and the Pleasant River tributary. Storage dams, owned by the Bowaters Mersey Paper Company of Liverpool, are located on most of the headwater lakes on the main branch. These dams are without fishways and are in excess of ten feet in height. A hydro electric generating plant at the outlet of McGowan Lake is operated by the Nova Scotia Power Commission, fishway facilities are provided at this location.

Two natural barriers exist on the Pleasant River tributary approximately eight miles upstream from Malaga Lake. The barriers are formed by rock outcrop and are ten feet in height. Storage dams on Malaga and Black Rattle Lakes were constructed by the Department during 1950 and were originally intended for stabilizing summer water levels.

3. Geology

The area is a plain of low relief sloping to the southeast. Along the coast there is a belt approximately three miles wide in which the soil is scarce and bedrock outcrops over extensive areas. Inland bedrock is largely concealed by a thick covering of drift and the central areas of the river system are characterized by the presence of symmetrical hills or drumlins. These drumlins are elliptical in plan, from one quarter to one mile long, and up to 200 feet high. Their longer axes follow a north westerly direction, the shape of many of the lakes and the course of the river are due in part to these drumlins.

Rock outcrops are prominent throughout the riverbed between the head of tide and Ponhook Lake. Many of these extend across the stream causing a series of falls and rapids. The presence of sand and gravel in the riverbed was evident only in two locations in this area.

4. Climatology

Precipitation normals for the Medway River area are derived from representative stations at Big Falls and New Grafton, Queens County. The rainfall is almost equally divided throughout the year with the high at 5.86 inches in November and the low at 3.61 inches in July. The normal annual precipitation as recorded for a 30 year period is 57.71 inches which constitutes 51.40 inches rainfall and 63.1 inches snowfall.

The average daily temperature is below the freezing point during the months December to March inclusive. The normal daily temperatures as recorded for a 30 year period are as follows: mean daily maximum 55.5°F.; mean daily minimum 34.8°F.; and the average daily temperature 45.2°F.

5. Hydrology

Stream gauging and metering operations have been conducted on the Medway River at Charleston and Harmony Mills since 1915. The hydrometric records are presently being compiled to illustrate, graphically, the stream-flow characteristics. Stream flow data for a 30 year period prior to October 1960 were completed at the time of this report, some of these values are as follows:

Average discharge	- 1,460 c.f.s.
Extreme daily maximum	- 22,600 c.f.s.
Extreme daily minimum	- 6.4 c.f.s.
Annual runoff:- Average depth on drainage area	- 35.2 inches
Average minimum discharge	- 790 c.f.s.
Average minimum discharge from June to November inclusive	- 370 c.f.s.
Average maximum discharge	- 5,100 c.f.s.

The characteristics of flow in the Medway River generally show that a relatively small amount of the water is derived from groundwater. During the summer months, runoff is irregular and natural storage areas are lowered considerably.

During extended dry periods, the available amounts of surface water are seriously curtailed and discharge falls below 100 cubic feet per second. This condition occurs at the rate of one in every four years.

Flood conditions, which usually occur during January, have become most evident during the past fourteen years when discharge has exceeded 9,000 cubic feet per second. During this period flood conditions have occurred at the rate of one in every three years. It is conceived that the deterioration of storage dams and extensive logging operations have lessened the retention capacity of the headwaters area.

6. Observations

During the survey an observation site was selected at a natural spawning area four miles below Bangs Falls. Stream gauging and metering operations were carried out and the related stream areas measured to determine the increase in area respective to the increase in discharge. The readings were taken along the river for a distance of 500 feet on a gradient of .0025 feet. Some of the stream area - discharge quantities are as follows:

Date	Discharge	Stream Area
August 17, 1965	10 c.f.s.	46,000 sq.ft.
October 21, 1965	134 c.f.s.	66,000 sq.ft.
December 7, 1965	650 c.f.s.	72,000 sq.ft.

Water levels had increased six inches to October 21 as compared to an additional two feet to December 7. Most of the gravel riffle areas were covered by water to a depth of at least six inches on October 21.

Deficient rainfall throughout the summer season in 1965 resulted in a record of low water levels on the Medway system. During the low water period, which extended from May until mid-October, salmon were unable to move upstream and were sustained in the tidal water below Mill Village. In an effort to establish the minimum flow, at which salmon are able to migrate from tidal water to Ponhook Lake, the river was carefully monitored for increase in flow. On October 18 the Nova Scotia Power Commission commenced operations of their hydro electric generating plant at Harmony Mills, releasing existing stored water. The salmon entered the river at discharge recorded at 101 cubic feet per second and were also seen at various points below Ponhook Lake.

The increase in discharge, effected by the release of the stored water, was recorded at point of release and head of tide as follows:

	Discharge (in c.f.s.)	
Date	Harmony Mills	Charleston
October 18	281	101
19	294	112
20	262	121
21	211	134
22	176	148
23	122	175
24	16	193

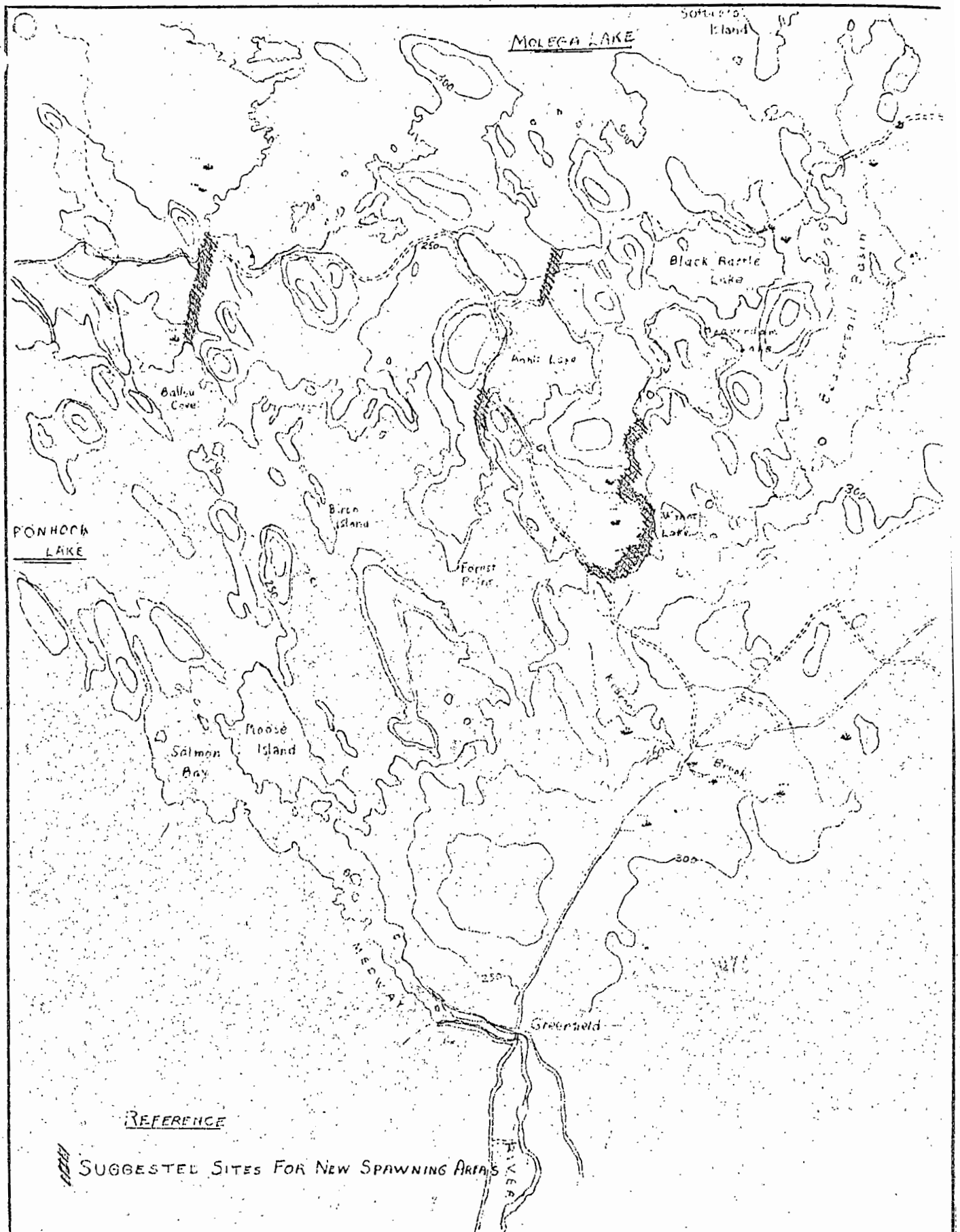
The hydro plant ceased operations on October 24 due to the depletion of stored water in McGowan Lake.

7. Recommendations

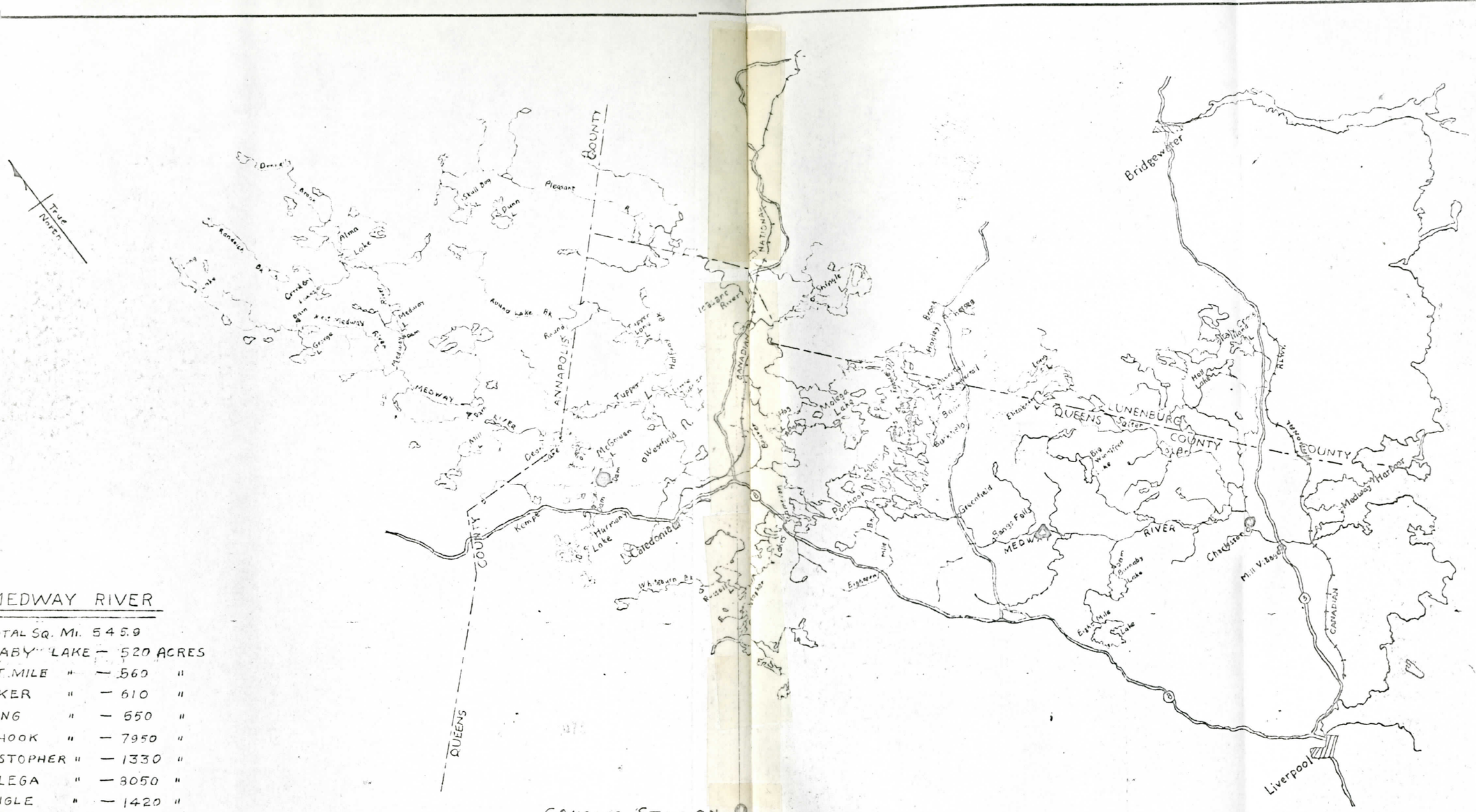
Pending biological assessment of stream areas above Ponhook and Malaga Lakes, it would appear at this time that flow-regulation from the headwaters would not be beneficial. In addition, the lakes that could be used as reservoirs are widespread and would require numerous control installations.

Further investigations should be conducted in the areas between Malaga and Ponhook Lakes with a view to providing new spawning areas and flow-regulating works. There are two outlets from Malaga Lake. These sites could be used to establish flow control over spawning areas, flood diversion, and maintain minimum discharge of 100 cubic feet per second below Ponhook Lake. Malaga Lake has an area of 8050 acres and a present reservoir capacity of 32,000 acre-feet.

The falls and rapids in the river between Ponhook Lake and head of tide do not obstruct the upstream migration of salmon during stream flows in excess of 100 cubic feet per second. Stream clearance work is not necessary providing the discharge does not fall below this point.



DRAWN: B.F.H.	DEPARTMENT OF FISHERIES, CANADA	DATE: Jan. 31, 66
CHECK: GEJ	MEDWAY RIVER N.S.	SCALE: 1:50,000
APPROVED:		DWG. NO.: M-E-468



MEDWAY RIVER

TOTAL SQ. MI. 545.9

BURNABY	LAKE	520 ACRES
EIGHT MILE	"	560 "
CROOKER	"	610 "
LONG	"	550 "
PONHOOK	"	7950 "
CHRISTOPHER	"	1330 "
MOLEGA	"	3050 "
SHINGLE	"	1420 "
TUPPER	"	1000 "
HARMONY	"	600 "
McGOWAN	"	1330 "
ALMA	"	580 "

DRAWN: B.F.H.	DEPARTMENT OF FISHERIES, CANADA	DATE: Jan 12 66
CHECK: [illegible]	MEDWAY RIVER SYSTEM NOVA SCOTIA	SCALE: 1"=4 Miles
APPROVED: D.C. Riley		DWG. No.: M-F-467

M-F-467