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# The Limnology and Sport Fish Populations of Three Lakes Located in the Deer Park, Avalon Peninsula, Newfoundland

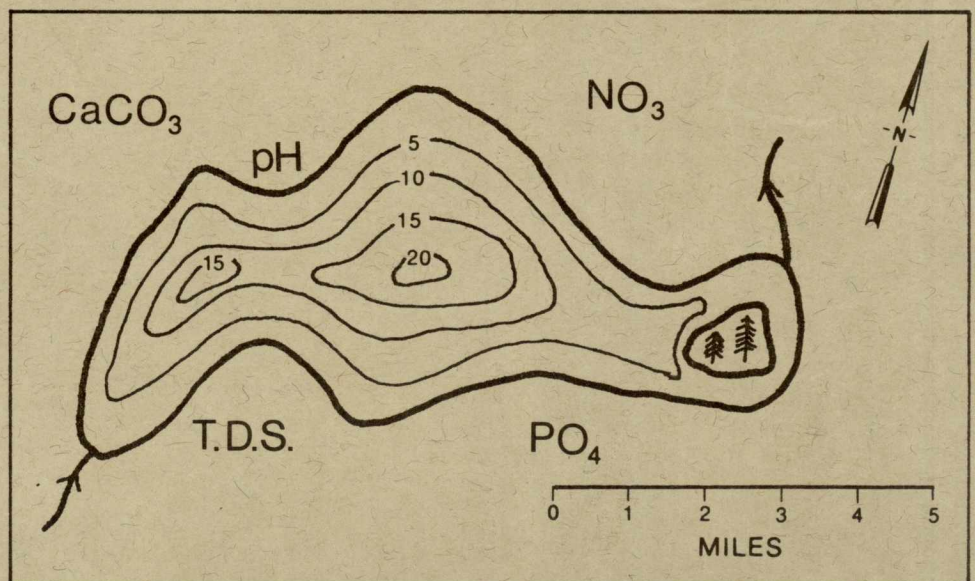
by

W. G. Whelan

R. J. Wiseman

Data Report Series No. NEW/D-75-5

Resource Development Branch  
Newfoundland Region



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DEPARTMENT OF THE ENVIRONMENT  
FISHERIES AND MARINE SERVICE  
NEWFOUNDLAND REGION

THE LIMNOLOGY AND SPORT FISH  
POPULATIONS OF THREE LAKES  
LOCATED IN THE DEER PARK,  
AVALON PENINSULA, NEWFOUNDLAND

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W.G. Whelan and R.J. Wiseman

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Resource Development Branch  
Newfoundland Region  
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1975

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Appreciation is also extended to A. Jamieson, Technician, Laboratory Services Unit who supervised and interpreted much of the water quality analysis.

## INTRODUCTION

This data report results from a continuing effort to inventory the existing recreational fishery resource in lakes and ponds on the Avalon Peninsula. The survey of the 3 lakes under review was undertaken during 1974. The objective of this inventory program, which began in 1969, is to document the existing recreational fishery resource of these lakes and to determine the potential of these resources for future development, enhancement, and expansion. Existing fishery resource inventories of 3 Avalon Peninsula lakes are dealt with in this report; it considers the limnology of these lakes in terms of morphometric, edaphic, and biotic characteristics, all of which have a bearing on lake productivity. It also considers the structure and parameters of the existing sport fish populations inhabiting these lakes. In addition, information on present lake use, both recreational and industrial, are included where appropriate. For the results of studies conducted prior to 1974, in relation to inventory work on Avalon Peninsula lakes, the reader is referred to "The Limnology and Sport Fish Populations of Selected Avalon Peninsula Lakes", Progress Report No. 100; and "The Limnology and Sport Fish Populations of 10 Avalon Peninsula Lakes", Data Report Series No. NEW/D-74-7, Resource Development Branch, St. John's.

This current study was part of a major long term program, initiated by the Resource Development Branch in late 1967, designed to evaluate the status of the recreational fishery in heavily-fished lakes and ponds on the Avalon Peninsula. The objectives of this program were to define annual production rate, harvest rate, and angling pressure for several

representative lakes, to inventory the overall resource in these lakes, and to design and implement development, management, enhancement, and rehabilitation plans for the resource.

The problem of overfishing of sport fish stocks in Avalon Peninsula lakes and ponds has become a reality in recent years due to the fact that approximately 40 percent of the province's human population is now located in this area. Increased resource accessibility, human population growth, and increased levels of affluence have been the major causes of overfishing of recreational fish stocks of this area.

A start has been made on alleviating this problem after several years of extensive inventory work, creel censuses, and population estimate studies. Lakes which recently have been heavily-fished are now having their sport fish populations rehabilitated through a program of forage fish introductions and redistribution of fishing effort, while new, previously unexploited stocks are being made available to anglers through a program of boat access development at relatively remote lakes. Long term planning is expected to incorporate the use of hatchery products as yet another solution to the overall problem.

## METHODS AND MATERIALS

Three lakes, ranging in size from approximately 136 acres to 641 acres, were studied as part of this survey. The location of the 3 lakes is indicated in Figure 1.

### A. LIMNOLOGY

Information on the physical and biotic characteristics of the drainage areas was obtained from aerial photographs and topographical maps of the Canadian Mines and Technical Survey Series. Geological data were obtained from map 1231A, Geology of the Island of Newfoundland, Geological Survey of Canada, Surveys and Mapping Branch, Department of Energy, Mines and Resources.

Depth and volume information was obtained for each lake by using a Ferrograph "Offshore 500" depth recorder on an outrigger-type transducer arm attached to the gunwhale of a 16'7" Boston Whaler boat, or a 14' aluminum boat. Other parameters were determined by methods outlined by Welch (1948) and taken directly from topographical maps.

Data on the chemical limnology of the lakes were obtained from surface water analysis. Water analysis was carried out by both the Inland Waters Directorate, Environment Management Service, Environment Canada, Moncton, New Brunswick, and by the Laboratory Services Unit of the Recreational Fisheries and Habitat Management Group, Resource Development Branch, St. John's.

The method of Ryder (1965) was used to calculate potential sports fish yield from each lake. Basically it involves combining the

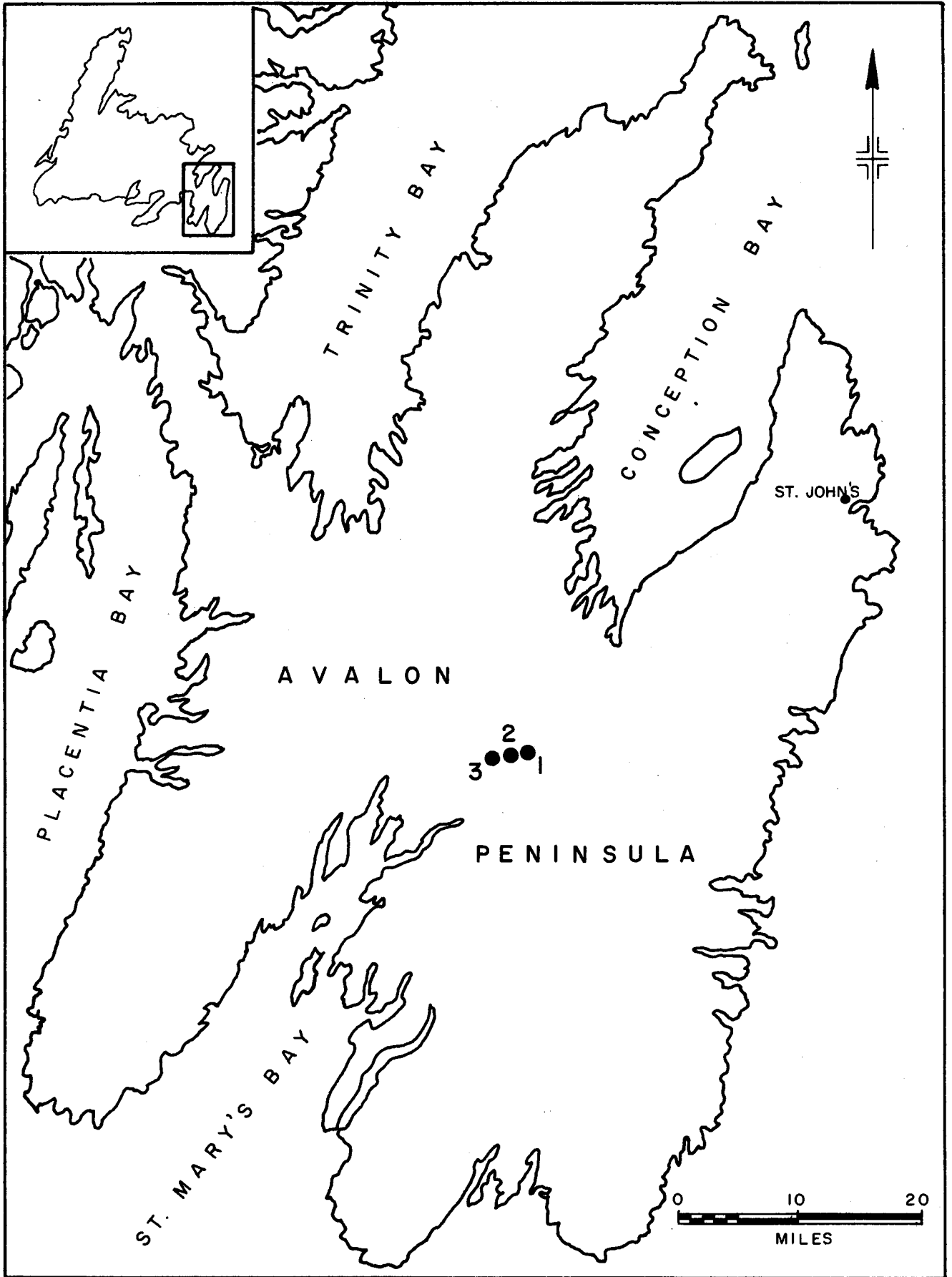


FIGURE 1.- LOCATION OF THE THREE AVALON PENINSULA LAKES SURVEYED- 1. HAWCOS POND; 2. OXLEYS POND; 3. GULL POND.

morphological characteristics of the lake (mean depth) with the edaphic features (total dissolved solids) and obtaining a morpho-edaphic index (TDS/mean depth), which in turn is highly correlated with the potential yield of fish. The relationship between potential yield and the morpho-edaphic index is described by the following equation:

$$Y = 2.094 X^{0.4661}$$

where Y = Potential fish yield (lbs./acre /year)

and X = morpho-edaphic index.

A rapid approximation can also be obtained by solving the equation,

$Y = 2\sqrt{X}$ . A graphical display of the equation is present in the Appendices (Fig. 1).

#### B. FISH POPULATIONS

Information on the fish populations of the lakes studied was collected by gill-netting and/or live-trapping. Quantitative data (species composition, age-size distributions, growth rate and food habits) were collected through use of both sampling gear-types. Gill-netting generally consisted of fishing one or more gangs of multifilament nylon gill nets, each composed of three nets with stretched mesh size 1-1/2", 2", and 3" overnight. Each net measured 50 yards in length and was six feet deep. Overnight net sets were made at selected sites to cover most of the different areas of the ponds. Live-trapping consisted of one or more lake trap nets of 3/4" knitted nylon stretched mesh tended from a "Boston Whaler" boat.

Qualitative data on the fish populations inhabiting each lake were obtained by (1) measuring, to the nearest millimeter, the fork length

of each fish captured; (2) taking a small sample of scales from each fish; and (3) sacrificing a small sub-sample (usually around 50) for food analysis.

The age of the individual fish was obtained by viewing the scales, mounted wet in a Petri dish, using a Bausch and Lomb microprojector. The scale image was projected onto a sheet of white paper and an outline of each scale, with its focus and annuli, was traced on the paper. Growth data were obtained by using the method of back-calculation. The Monastyrsky method of back-calculation was chosen for brook trout.

The study of the food habits of the sport fishes was carried out using a simple qualitative analysis sub-sampling the total catches of fish. The entire stomach from the lower esophagus to the pyloric sphincter was removed and cut open. The invertebrate food organisms present were simply classified as "invertebrates". Fish and any unusual vertebrate food items were identified more specifically.

## RESULTS AND DISCUSSIONS

The nature of this data report is basically an inventory of the present recreational fishery resource of 3 Avalon Peninsula lakes and for this reason the results of the study are presented as simply and straightforward as possible, and discussions are kept to a minimum.

In this report we will be considering the limnology and ecology of each of the 3 lakes separately. We will be looking at the physical and chemical limnology and how each affects the productivity of the lake. We will be attempting to answer such questions as what fish species are present? What is the species composition? What is the age and size composition of the sport fish populations? What creel limit should be applied on each lake? How fast are the fish growing in each lake? Are they growing faster or slower than other populations? What are the sport fish foraging on?

HAWCO'S POND

A. Limnology

1. Location

Hawco's Pond is situated at 47°18' North Latitude and 53°30' West Longitude. It lies approximately 40 miles southwest of the city of St. John's, in the area known as the Deer Park. This area is located off the Salmonier Line, about 7 miles from the junction with the Trans-Canada Highway. Hawco's Pond has an elevation of approximately 440 feet.

2. Uses.

a. Industrial. At the present time the waters of Hawco's Pond have no industrial use. Although during the early 1920's to the early 1950's, its waters were dammed and used extensively to float saw logs out from the surrounding countryside to access roads for further transportation to mills.

b. Recreational. At present, Hawco's Pond experiences a moderate fishing pressure on its resident brook trout population. In addition to angling, other recreational activities include a small amount of boating and camping, a moderate amount of waterfowl and rabbit hunting, and some grouse and ptarmigan hunting is conducted in proximity to Hawco's Pond. There is a moderate summer cabin development on the lake consisting of approximately 30 units.

3. Characteristics of the Drainage Area.

Hawco's Pond empties into St. Mary's Bay via Oxley's Pond, Black River Pond, Black River, and Salmonier River. The drainage area of the

lake occupies 5.0 sq.mi; of the total drainage area of Hawco's Pond, 1.6 sq.mi. are in standing water. Two major and one minor systems contribute their drainage to Hawco's Pond.

The drainage area lies at an altitude ranging from approximately 440 to 525 feet above sea level. The terrain is almost entirely a climax forest of fir, birch, and spruce; only very small areas of marsh and barrenland are encountered within the drainage area. Historically, there has been considerable logging activity within the drainage area, but presently there is only a very light seasonal operation being carried out. Located within the drainage area is a substantial summer cabin development consisting of approximately 35 units.

Geologically, the drainage area lies in a region of Precambrian sedimentary and volcanic rocks. Most of the strata in the area are of sedimentary origin and have been classified as belonging to the Conception Group. The drainage basin contains Hadrynian siltstone, conglomerate, slate, greywacke, and minor volcanic rocks (Geological Survey of Canada, Map 1231A, 1967).

#### 4. Physical and Chemical Environment

a. Morphometry. A bathymetric map of Hawco's Pond is presented in Figure 1. The morphometric data are given in Table I.

Table I. Morphometry of Hawco's Pond

Area including islands, 657.8 acres	Area excluding islands, 641.9 acres
263.1 ha	256.8 ha
Maximum length, 3.5 mi.	Maximum effective length, 1.1 mi.
5.6 km.	1.7 km.



BATHYMETRIC MAP OF HAWCOS POND

Table I. (cont'd.)

Maximum width, 0.6 mi.	Maximum effective width, 0.6 mi.
0.9 km.	0.9 km.
Mean width, 0.3 mi.	Volume $3.17 \times 10^8$ cu.ft.
0.5 km.	$8.99 \times 10^6$ cu.m.
Maximum depth, 37.5 ft.	Mean depth, 11.3 ft.
11.4 m.	3.4 m.
Mean depth - maximum depth ratio = 0.30	Volume development = 0.90
Perimeter, including islands 16.3 mi.	Perimeter excluding islands 14.0 mi.
26.2 km.	22.5 km.
Shore development, including islands 4.55	Shore development, excluding islands 3.89
Direction of Major Axes SSW-NNE	

Depth (ft.)	Area (ft. ) <sup>2</sup>	Area (acres)	%
0- 5	8,450,204.4	193.9	30.2
5-10	6,167,224.8	141.6	22.1
10-15	4,828,190.4	110.8	17.3
15-20	3,808,015.2	87.4	13.6
20-25	2,339,607.6	53.7	8.4
25-30	1,476,248.4	33.9	5.3
30-35	766,656.0	18.8	2.9
Over 35	81,928.0	1.8	0.3
Total	$2.80 \times 10^7$	641.9	

Hawco's Pond is fairly irregular in shape; the shore development index equals 4.55. For the most part the shores of the lake are moderately sloped. The mean depth is 11.3 ft. (3.4 m) while the maximum depth is 37.5 ft. (11.4 m). Approximately 83.2 percent of the lake area is included in the 0-20 ft. range of depth (generally considered to be the range of depth where the vast majority of production occurs in a lake). Hawco's Pond would appear then, at least in terms of its morphometry, to be a fairly productive body of water.

b. Surface Water Chemistry. The analysis of the surface water of Hawco's Pond appears in Table II. Like all natural waters in eastern Newfoundland, the waters of Hawco's Pond are very soft, and characterized by low alkalinity, hardness, and mineral content. The degree of mineralization (or TDS) of this lake is somewhat lower than the average for lakes in this geographic area (Avalon Peninsula lakes average about 34 ppm.).

Table II. Analysis of surface water of Hawco's Pond (samples collected May, 1974).

	Range	Mean
Alkalinity as CaCO <sub>3</sub>	1.0 - 2.8 ppm.	1.9 ppm.
Total hardness as CaCO <sub>3</sub>	4.1 - 6.0 ppm.	5.2 ppm.
pH	5.0 - 5.9	5.9
Color (Hazen units)	-	5.
Turbidity (JTU)	0.6 - 1.8	1.1
Sp. Conductance, micromhos at 25°C	26.0 -34.9	28.4
Total dissolved solids	26.7-34.9 ppm.	28.5 ppm.

Table II. (cont,d.)

	Range	Mean
Calcium (Ca)	0.8 - 1.0 ppm.	0.9 ppm.
Magnesium (Mg)	0.6 - 0.6 ppm.	0.6 ppm.
Manganese (Mn)	-	0.01 ppm.
Potassium (K)	-	0.3 ppm.
Sodium (Na)	3.6 - 3.7 ppm.	3.6 ppm.
Sulphate (SO <sub>4</sub> )	-	2.0 ppm.
Chloride (Cl)	5.0 - 6.5 ppm.	5.9 ppm.
Bicarbonate (HCO <sub>3</sub> )	1.2 - 2.4 ppm.	1.6 ppm.
Total phosphorus (P)	-	0.05 ppm.
Nitrogen (Nitrate) (N)	0.03- 0.04 ppm.	0.04 ppm.
Silica (SiO <sub>2</sub> )	0.2 - 0.5 ppm.	3.5 ppm.

c. Morphoedaphic Index and Lake Productivity. Hawco's Pond has a mean depth of 11.3 ft. and a mean total dissolved solids level of 28.5 ppm. which, using the method of Ryder (1965), gives a morphoedaphic index of 2.52, or a potential fish yield of 3.18 pounds per acre per year. This is slightly lower than the average productivity of Avalon Peninsula lakes which is approximately 3.3 pounds per acre annually. The maximum sustainable yield of sport fish from 642-acre Hawco's Pond is 2,041 pounds annually.

B. Fish Species Present

Four fish species are found in Hawco's Pond and its drainage system. Only one of the species is of definite recreational fishing

value and that is the eastern brook trout, Salvelinus fontinalis (Mitchill), 1815. The landlocked American smelt, Osmerus mordax (Mitchill) 1815, in both its dwarf and giant race forms, is present in the lake in very large numbers. The small race is a very important forage food fish for the lake's brook trout population and extensive studies are now on-going into its ecology. The giant race form, which may reach over 11 inches in length, could provide some sport fishing opportunity, however. A second forage food species inhabiting the lake is the threespine stickleback, Gasterosteus aculeatus Linnaeus 1758. The fourth fish species occurring in Hawco's Pond is the American eel, Anguilla rostrata (LeSueur) 1817.

C. Age and Size Composition of the Sport Species

With the exception of some very limited smelt angling activities, brook trout are the only real sport fish present in the lake.

1. Brook Trout

The largest and oldest brook trout observed during the survey had a fork length of 44.2 cm. and was VI<sup>+</sup> years of age.

The age-length distribution of the brook trout sampled at Hawco's Pond during May, 1974, is given in Table III.

2. Landlocked Smelt

Both the small and giant races of landlocked smelt are found in Hawco's Pond. The two races were arbitrarily separated on the basis of size composition. The small race smelt ranged from 8.1 to 12.5 cm. fork length and were I<sup>+</sup>, II<sup>+</sup>, and III<sup>+</sup> years of age. Their very small size negates their value as a sport fish. The giant race fish, however,

Table III. Age-length distribution of brook trout taken in trap-nets and gillnets during May, 1974, in Hawco's Pond, (percentages in parentheses).

Fork length (cm.) (class mark)	Age (years)						Totals
	I <sup>+</sup>	II <sup>+</sup>	III <sup>+</sup>	IV <sup>+</sup>	V <sup>+</sup>	VI <sup>+</sup>	
8.55	5(100.0)	-	-	-	-	-	5( 1.7)
10.55	37( 88.2)	5( 11.8)	-	-	-	-	42(14.0)
12.55	33( 88.9)	4( 11.1)	-	-	-	-	37(12.3)
14.55	-	18(100.0)	-	-	-	-	18( 6.0)
16.55	-	31(100.0)	-	-	-	-	31(10.3)
18.55	-	31( 80.0)	8(20.0)	-	-	-	39(13.0)
20.55	-	12( 34.5)	23(65.5)	-	-	-	35(11.5)
22.55	-	4( 13.3)	26(86.7)	-	-	-	30(10.0)
24.55	-	1( 5.3)	15(78.9)	2(10.5)	1( 5.3)	-	19( 6.3)
26.55	-	-	2(66.7)	1(33.3)	-	-	3( 1.0)
28.55	-	-	6(75.0)	2(25.0)	-	-	8( 2.7)
30.55	-	-	5(45.5)	5(45.5)	1( 9.0)	-	11( 3.7)
32.55	-	-	-	3(75.0)	1(25.0)	-	4( 1.3)
34.55	-	-	1(12.5)	8(87.5)	-	-	9( 3.0)
36.55	-	-	-	-	-	5(100.0)	5( 1.7)
38.55	-	-	1(50.0)	-	1(50.0)	-	2( 0.7)
40.55	-	-	-	-	-	1(100.0)	1( 0.3)
42.55	-	-	-	-	-	1(100.0)	1( 0.3)
44.55	-	-	-	-	-	1(100.0)	1( 0.3)
Total	75	106	87	21	4	8	301

have some attractiveness as a recreational fish. Fish of this form were between 11.2 and 27.5 cm. fork length, and were ages II<sup>+</sup> to V<sup>+</sup>.

D. Growth Rate of the Sport Species

1. Brook Trout

The principle of back-calculation (Monastyrsky method) was applied to determine the rate of growth of Hawco's Pond brook trout. From paired observations of fish length and scale length, a log-log regression was calculated; the equation for scale length on fish length is as follows:

$$\text{Log } L_f = 1.0992 \text{ Log } L_s + 0.8671$$

or

$$L_f = 7.364 L_s^{1.0992}$$

The growth rate of the lake's brook trout population is given in Table IV.

Table IV. The average scale length for each year of life and the corresponding calculated fish lengths.

Annulus	I	II	III	IV	V	VI
Scale length (X43)	1.0	1.9	2.5	3.0	3.6	4.5
Fish fork length (cm.)	5.8	13.2	18.7	23.6	29.7	39.4
Fish fork length (in.)	2.3	5.2	7.4	9.3	11.7	15.5

The growth rate of Hawco's Pond brook trout is significantly faster than that demonstrated by the average Avalon Peninsula population (Table 2 Appendices).

## 2. Landlocked Smelt

The Lee method of back-calculation was used to determine the rate of growth for small race smelt. From paired data on fish length and scale length, a least squares regression was calculated and is as follows:

$$L = 0.67 L_s + 5.12$$

f

Unfortunately, small numbers of giant race fish, only, were captured and this did not permit calculation of a growth rate for this form.

The growth rate of the lake's small race form, however, is presented in Table V. Generally speaking, smelt studies conducted elsewhere on the Avalon Peninsula indicate the giant race form not only attain greater maximum sizes but also grow much faster than the small race form. (Bruce, 1975). The small race smelt in Hawco's Pond tend to grow somewhat faster than the average small race smelt population on the Avalon Peninsula (Table 3, Appendices).

Table V. The average scale length for each year of life and the corresponding calculated fish lengths of Hawco's Pond small race smelt.

Annulus	I	II	III
Scale length (X43)	3.78	5.86	7.13
Fish fork length (cm.)	7.6	9.0	9.9
Fish fork length (in.)	3.0	3.6	3.9

E. Food Habits of the Sport Species

Table VI presents the results of the analysis of the food habits of 103 brook trout taken in Hawco's Pond during May, 1974.

Table VI. The food habits of Hawco's Pond brook trout expressed as frequency of occurrence (percentages in parentheses).

Fork length (cm) (Class Mark)	Empty	Stomach Contents						Unidentified fish remains
		Benthic and/or Terr. Invert.	Benthic and/or Terr. Invert. and Sticklebacks	Benthic and/or Terr. Invert. and Smelt	Sticklebacks	Smelt	Smelt and Sticklebacks	
16.55	1	4(100.0)	-	-	-	-	-	-
18.55	-	6(100.0)	-	-	-	-	-	-
20.55	1	9( 69.2)	1( 7.7)	-	2( 15.4)	1( 7.7)	-	-
22.55	2	11( 64.7)	2(11.8)	-	2( 11.8)	2(11.8)	-	-
24.55	2	10( 62.5)	1( 6.25)	1(6.25)	1( 6.25)	3(18.8)	-	-
26.55	-	1( 50.0)	1(50.0)	-	-	-	-	-
28.55	-	2( 28.6)	-	-	2( 28.6)	2(28.6)	1(14.3)	-
30.55	3	1( 12.5)	1(12.5)	-	5( 62.5)	1(12.5)	-	-
32.55	1	-	-	-	2( 66.7)	-	-	-
34.55	-	-	-	-	4( 50.0)	3(37.5)	1(12.5)	-
36.55	-	-	-	-	2( 40.0)	1(20.0)	1(20.0)	1(20.0)
38.55	-	-	-	1(50.0)	1( 50.0)	-	-	-
40.55	-	-	-	-	1(100.0)	-	-	-
42.55	-	-	-	-	1(100.0)	-	-	-
44.55	1	-	-	-	-	-	-	-
Total	11	44	6	2	23	13	3	1

Generally, it would appear that the smaller brook trout in Hawco's Pond are primarily insectivorous while the larger individuals tend to include fish in their diet, foraging on smelt and sticklebacks.

OXLEY'S, POND

A. Limnology

1. Location

Oxley's Pond is situated at 47°16' North Latitude and 53°30' West Longitude. It lies approximately 40 miles southwest of the city of St. John's, in the area known as the Deer Park, located off the Salmonier Line about 7 miles from the junction with the Trans-Canada Highway. Oxley's Pond has an elevation of approximately 435 feet.

2. Uses

a. Industrial. At the present time the waters of Oxley's Pond have no industrial use. Although during the early 1920's to the early 1950's its waters were dammed and used to provide water for driving logs and operating saw mills that were located on the drainage system below Oxley's Pond. A large percent of the immediate drainage area of Oxley's Pond has had the timber removed and is now being farmed or is being used as cattle pasture land, by the Salmonier Minimum Security Prison Camp. The prison was first established in the early 1940's, and is continually being enlarged and improved.

b. Recreational. At present Oxley's Pond experiences a moderate fishing pressure on its resident brook trout population. In addition to angling, other recreational activities include a small amount of boating, and camping. A small amount of waterfowl, rabbit, and grouse hunting is conducted in proximity to Oxley's Pond. There is a small summer cabin development on the lake consisting of approximately 10 cabins. A large part of the area around Oxley's Pond is owned and

fenced by the Salmonier Prison Camp and is a restricted area for the public.

### 3. Characteristics of the Drainage Area.

Oxley's Pond empties into St. Mary's Bay via Gull Pond, Black River Pond, Black River, and Salmonier River. The drainage area of the lake occupies 5.6 sq.miles. Of this total drainage area, 1.8 sq.mi. are in standing water. Hawco's Pond and its drainage systems contribute to Oxley's Pond.

The drainage area lies at an altitude ranging from approximately 435 to 525 feet above sea level. The terrain consists of a climax forest of fir, birch, and spruce, and also small areas of cultivated farm land, marsh and barrenland are located within the drainage area. Historically, there has been considerable logging activity within the drainage area, but presently there is only a very light seasonal operation being carried out. Located within the drainage area is a substantial summer cabin development consisting of approximately 70 units.

Geologically, the drainage area lies in a region of Precambrian sedimentary and volcanic rocks. Most of the strata in the area are of sedimentary origin and have been classified as belonging to the Conception Group. The drainage basin contains Hadrynian siltstone, conglomerate, slate, greywacke, and minor volcanic rocks (Geological Survey of Canada, Map 1231A, 1967).

### 4. Physical and Chemical Environment

a. Morphometry. A bathymetric map of Oxley's Pond is presented in Figure 1. The morphometric data are given in Table I.

Table I. Morphometry of Oxley's Pond

Area including islands	139.5 acres	Area excluding islands	137.8 acres
	56.3 ha.		55.8 ha.
Maximum length,	0.8 mi.	Maximum effective length	0.6 mi.
	1.3 km.		1.0 km.
Maximum width	0.5 mi.	Maximum effective width	0.4 mi.
	0.8 km.		0.6 km.
Mean width	0.3 mi.	Volume	$1.17 \times 10^8$ cu.ft.
	0.5 km.		$3.31 \times 10^6$ cu.m.
Maximum depth	78 ft.	Mean depth	19.5 ft.
	23.8 m.		5.9 m.
Mean depth-Maximum depth ratio	0.25	Volume development	0.75
Perimeter, including islands	3.3 mi.	Perimeter, excluding islands	2.9 mi.
	5.4 km.		4.7 km.
Shore development including islands	2.02	Shore development excluding islands	1.77
Direction of Major Axes	SSW-NNE		

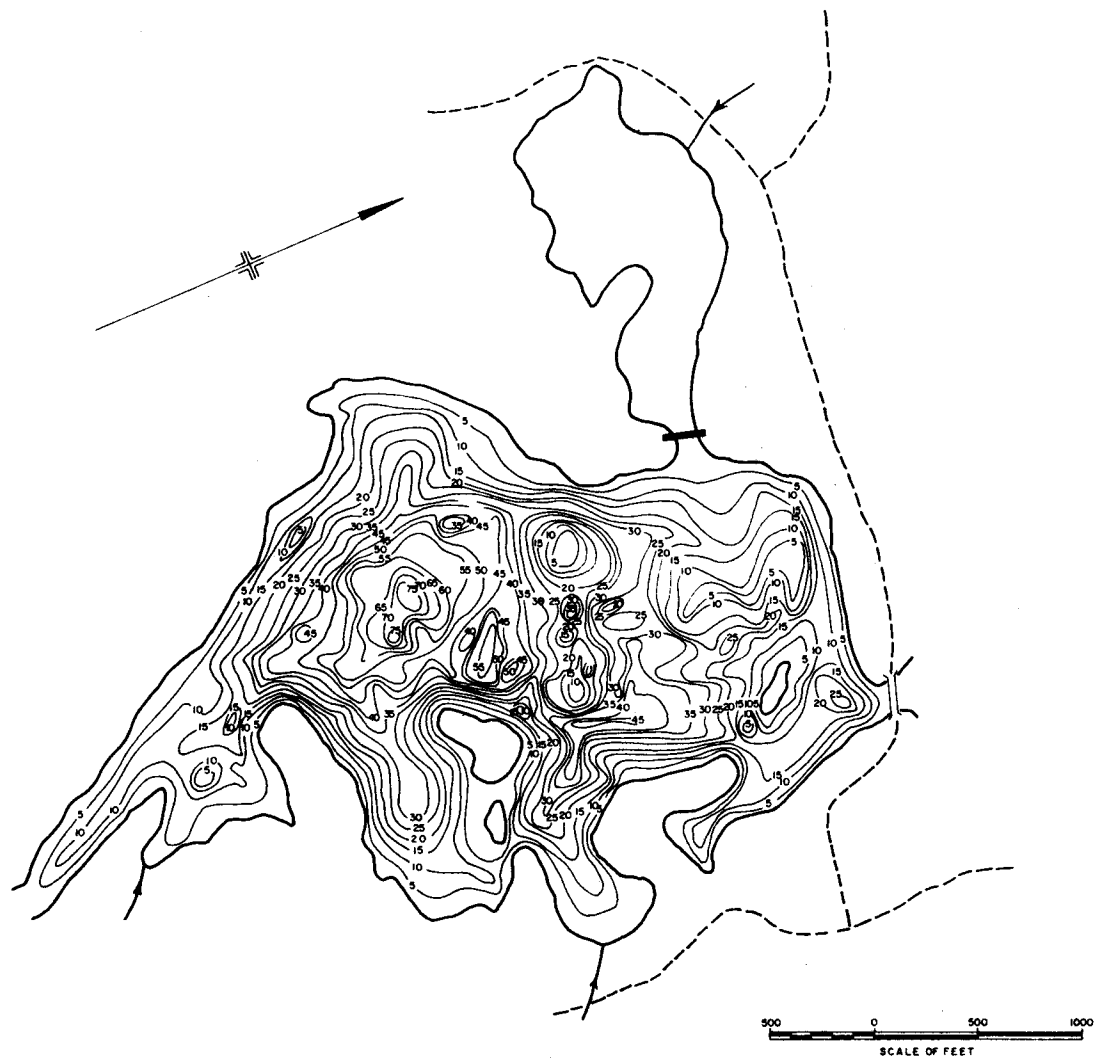
Depth (ft.)	Area (ft. <sup>2</sup> )	Area (acres)	%
0- 5	1,088,564.4	25.0	18.1
5-10	1,038,470.4	23.8	17.3
10-15	831,996.0	19.1	13.9
15-20	709,156.8	16.3	11.8
20-25	361,403.6	8.3	6.0
25-30	783,766.8	18.0	13.1
30-35	156,753.4	3.6	2.6

Table I. (cont'd.)

Depth (ft.)	Area (ft. <sup>2</sup> )	Area (acres)	%
35-40	237,402.0	5.5	4.0
40-45	222,156.0	5.1	3.7
45-50	165,092.4	3.8	2.8
50-55	133,729.4	3.1	2.2
55-60	117,612.0	2.7	2.0
60-65	73,616.4	1.7	1.2
65-70	38,332.8	.9	0.6
70-75	25,700.4	.6	0.4
Over 75	14,374.8	.3	0.2
Total	6.00 x 10 <sup>6</sup>	137.8	

Oxley's Pond is fairly regular in shape, the development index equals 2.02. For the most part, the shores of the lake are fairly moderately sloped. The mean depth is 19.5 ft. (5.9 m), while the maximum depth is 78.0 ft. (23.8 m). Approximately 61 percent of the lake area is included in the 0-20 feet range of depth (generally considered to be the range of depth where the vast majority of production occurs in a lake). Oxley's Pond would not appear then, at least in terms of its morphometry, to be an overly productive body of water.

b. Surface Water Chemistry. The analysis of the surface water of



BATHYMETRIC MAP OF OXLEYS POND

Oxley's Pond appears in Table II. Like all natural waters in eastern Newfoundland, the waters of Oxley's Pond are very soft, and characterized by low alkalinity, hardness, and mineral content. However, the degree of mineralization (or TDS) of this lake is slightly lower than the average for lakes in this geographic area (Avalon Peninsula lakes average about 34 ppm.).

Table II. Analysis of surface water of Oxley's Pond (samples collected May, 1974).

	Range	Mean
Alkalinity as CaCO <sub>3</sub>	1.03 - 3.6 ppm.	2.0 ppm.
Total hardness as CaCO <sub>3</sub>	4.7 - 6.0 ppm.	5.4 ppm.
pH	5.0 - 6.3	5.6
Color (Hazen units)	5.0 - 10.0	6.7
Turbidity (JTU)	-	1.5
Sp. Conductance, micromhos at 25°C	27.0 - 35.4	29.4
Total dissolved solids	28.9 - 35.7 ppm.	31.0 ppm.
Calcium (Ca)	0.9 - 1.2 ppm.	1.0 ppm.
Magnesium (Mg)	-	0.06 ppm.
Manganese (Mn)	-	0.01 ppm.
Potassium (K)	-	0.3 ppm.
Sodium (Na)	3.6 - 3.7 ppm.	3.6 ppm.
Sulphate (SO <sub>4</sub> )	-	2.0 ppm.
Chloride (Cl)	5.5 - 6.0 ppm.	5.8 ppm.
Bicarbonate (HCO <sub>3</sub> )	1.2 - 3.7 ppm.	2.4 ppm.

Table II. (cont'd.)

	Range	Mean
Total Phosphorus (P)	-	0.005 ppm.
Nitrogen (Nitrate) (N)	0.04 - 0.05 ppm.	0.05 ppm.
Silica (SiO <sub>2</sub> )	0.3 - 0.4 ppm.	0.4 ppm.

c. Morphoedaphic Index and Lake Productivity. Oxley's Pond has a mean depth of 19.5 ft. (5.9 m) and a mean total dissolved solids level of 31.0 ppm. which, using the method of Ryder (1965), gives a morphoedaphic index of 1.59, or a potential fish yield of 2.52 pounds per acre per year. This is lower than the average production of Avalon Peninsula lakes which is approximately 3.3 pounds per acre annually. The maximum sustainable yield of sport fish from 138-acre Oxley's Pond is 348 pounds annually.

B. Fish Species Present

Four fish species are to be found in Oxley's Pond and its drainage system. Only one of the species is recorded as being of recreational fishing value and that is the eastern brook trout, Salvelinus fontinalis (Mitchill) 1815. The landlocked American smelt, Osmerus mordax (Mitchill) 1815, in both its dwarf and giant race forms is present in the lake in large numbers. The dwarf form of the species is a very important forage food fish for the lake's brook trout population and the giant race probably provides some limited sport fishing opportunity. A second forage food species inhabiting the

lake is the threespine stickleback, Gasterostous aculeatus Linneaus 1758. The fourth fish species occurring in Oxley's Pond is the American eel, Anguilla rostrata (LeSueur) 1817.

C. Age and Size Composition of the Sport Species

With the exception of some very limited smelt angling activities, brook trout are the only real sport fish present in the lake.

1. Brook Trout.

The largest and oldest brook trout observed during the survey had a fork length of 35.5 cm and was V<sup>+</sup> years of age.

The age length distribution of the brook trout sampled at Oxley's Pond during June 1974 is given in Table III.

Table III. Age length distribution of brook trout taken in trap-nets and gillnets during June, 1974, in Oxley's Pond, (percentages in parentheses).

Fork length (cm) (Class Mark)	Age (years)					Totals
	I <sup>+</sup>	II <sup>+</sup>	III <sup>+</sup>	IV <sup>+</sup>	V <sup>+</sup>	
10.55	2(40.0)	3(60.0)	-	-	-	5( 7.0)
12.55	5(31.3)	11(68.7)	-	-	-	16(22.5)
14.55	2(13.3)	13(86.7)	-	-	-	15(21.1)
16.55	-	-	1(100.0)	-	-	1( 1.4)
18.55	-	-	1(100.0)	-	-	1( 1.4)
20.55	-	-	6(100.0)	-	-	6( 8.5)
22.55	-	-	7(100.0)	-	-	7( 9.9)
24.55	-	-	8( 88.9)	1(11.1)	-	9(12.7)

Table III. (cont'd.)

Fork length (cm) (Class Mark)	Age (years)					Totals
	I <sup>+</sup>	II <sup>+</sup>	III <sup>+</sup>	IV <sup>+</sup>	V <sup>+</sup>	
26.55	-	-	1( 20.0)	4(80.0)	-	5( 7.0)
28.55	-	-	1(100.0)	-	-	1( 1.4)
30.55	-	-	-	2(100.0)	-	2( 2.8)
32.55	-	-	-	1(100.0)	-	1( 1.4)
34.55	-	-	-	-	2(100.0)	2( 2.8)
Totals	9	27	25	8	2	71

2. Landlocked Smelt

Like Hawco's Pond, small race smelt predominate in number, and rarely exceed 12 cm. fork length. The large race fish, however, may exceed 27 cm. in fork length. The oldest small race fish are III<sup>+</sup> years old, while large or giant race fish reach V<sup>+</sup> years of age.

D. Growth Rate of the Sport Species

1. Brook Trout

The principle of back-calculation (Monastrysky method) was applied to determine the rate of growth of Oxley's Pond brook trout. From paired observations of fish length and scale length a log-log regression was calculated; the equation for scale length, on fish length is as follows:

$$\text{Log } L_f = 1.0606 \text{ Log } L_s + 0.8560$$

$$L_f = 7.178 L_s^{1.0606}$$

Table IV shows the average scale length for each year of life and the corresponding calculated fish lengths.

Table IV. The growth rate of Oxley's Pond brook trout (fork length in cm. and in.)

Annulus	I	II	II	IV	V
Scale length (X43)	0.8	1.3	2.1	2.7	3.4
Fish fork length (cm.)	5.7	9.5	15.8	20.6	26.3
Fish fork length (in.)	2.2	3.7	6.2	8.1	10.4

The growth rate of Oxley's Pond brook trout is generally somewhat slower than that demonstrated by the average Avalon Peninsula population (Table 2, Appendices).

## 2. Landlocked Smelt.

The growth rate of smelt (both races) in Oxley's Pond is considered to be similar to that demonstrated by Hawco's Pond fish. Only a small sample was obtained and calculation of growth rate was impractical.

## E. Food Habits of the Sport Species

Table V presents the results of the analysis of the food habits of 30 brook trout taken in Oxley's Pond during June, 1974.

Table V. The food habits of Oxley's Pond brook trout expressed as frequency of occurrence (percentages in parentheses).

Fork length (cm.) (Class Mark)	Empty	Stomach Contents			
		Benthic and/or Terr. Invert.	Benthic and/or Terr. Invert. and Sticklebacks	Sticklebacks	Smelt
20.55	-	2( 50.0)	-	2(50.0)	-
22.55	1	5(100.0)	-	-	-
24.55	5	3( 75.0)	-	1( 25.0)	-
26.55	-	3( 60.0)	-	1( 30.0)	1( 20.0)
28.55	1	-	-	-	-
30.55	-	-	-	-	2(100.0)
32.55	-	1(100.0)	-	-	-
34.55	-	-	1(50.0)	-	1( 50.0)
<b>Total</b>	<b>7</b>	<b>14</b>	<b>1</b>	<b>4</b>	<b>4</b>

Generally, it would appear that the smaller brook trout in Oxley's Pond are primarily insectivorous while the larger individuals tend to include fish in their diet, foraging on smelt and sticklebacks.

GULL POND

A. Limnology

1. Location

Gull Pond is situated 47°15' North Latitude and 53°30' West Longitude. It lies approximately 40 miles southwest of the city of St. John's, in the area known as the Deer Park. This area is located off the Salmonier Line about 7 miles from the junction with the Trans-Canada Highway. Gull Pond has an elevation of approximately 430 feet.

2. Uses

a. Industrial: At the present time the waters of Gull Pond have no industrial use. Although during the early 1920's to the early 1950's its waters were used for driving logs, and operating sawmills that were located downstream of Gull Pond. A small percent of the immediate Gull Pond drainage area has had the timber removed and is now being farmed (crops and pasture land) by the Salmonier Minimum Security Prison, which was first established in the area in the early 1940's and is continually being expanded.

b. Recreational: At present, Gull Pond experiences a moderate fishing pressure on its resident brook trout population. In addition to angling, other recreational activities include a fair amount of boating and camping. A small amount of waterfowl, rabbit, and some grouse hunting, is conducted in proximity to Gull Pond. There is a very large summer cabin development on the lake's surrounding shoreline, consisting of approximately 70 units. There is only a very small portion of Gull Pond's shoreline area that is not accessible

by road and is not receiving recreational use.

### 3. Characteristics of the Drainage Area

Gull Pond empties into St. Mary's Bay via Black River Pond, Black River and Salmonier River. The drainage area of the lake occupies 9.9 sq.miles; of the total drainage area of Gull Pond, 3.0 sq.mi. are in standing water. Hawco's Pond, Oxley's Pond, and their drainage systems contribute drainage to Gull Pond. The drainage area lies at an altitude ranging from approximately 430 to 525 feet above sea level. The terrain consists of a climax forest of fir, birch, and spruce; small areas of cultivated farm-land, marsh, and barrenland are also located within the drainage area. Historically, there has been considerable logging activity within the drainage area, but presently there is only a very light seasonal operation being carried out. Located within the drainage area is a substantial summer cabin development consisting of approximately 130 units.

Geologically, the drainage area lies in a region of Precambrian sedimentary and volcanic rocks. Most of the strata in the area are of sedimentary origin and have been classified as belonging to the Conception Group. The drainage basin contains Hadrynian siltstone, conglomerate, slate, greywacke, and minor volcanic rocks (Geological Survey of Canada, Map 1231A, 1967).

### 4. Physical and Chemical Environment

a. Morphometry: A bathymetric map of Gull Pond is presented in Figure 1; the morphometric data are given in Table I.

Table I. Morphometry of Gull Pond.

Area including islands (acres)	503.4	Area excluding islands (acres)	495.1
	(ha) 201.4		(ha) 198.0
Maximum length (mi.)	2.5	Maximum effective length (mi.)	1.1
	(km.) 4.0		(km.) 1.7
Mean width (mi.)	1.0	Maximum effective width (mi.)	1.0
	(km.) 1.5		(km.) 1.5
Mean width (mi.)	0.3	Volume (cu.ft.)	$2.98 \times 10^8$
	(km.) 0.5		(cu.m.) $8.43 \times 10^6$
Maximum depth (ft.)	60.0	Mean depth (ft.)	13.8
	(m.) 18.3		(m.) 4.21
Mean depth-Maximum depth ratio	0.23	Volume development	0.69
Perimeter, including islands (mi.)	18.3	Perimeter, excluding islands (mi.)	17.4
	(km.) 29.4		(km.) 28.0
Shore development, including islands	5.87	Shore development, excluding islands	5.58
Direction of Major Axes SSW-NNE			

Depth (ft.)	Area (ft. <sup>2</sup> )	Area (acres)	%
0- 5	5,356,573.2	122.97	24.8
5-10	5,302,588.8	121.73	24.6
10-15	2,676,762.0	61.95	12.4
15-20	2,498,166.0	57.37	11.6
20-25	1,740,222.0	39.95	7.6
25-30	2,175,368.4	49.94	10.1
30-35	9,222,600.8	21.18	4.3

Table I. (cont's.)

Depth (ft.)	Area (ft. <sup>2</sup> )	Area (acres)	%
35-40	515,750.4	11.84	2.4
40-45	325,828.8	7.48	1.5
45-50	95,832.0	2.20	0.60
50-55	8,712.0	0.20	0.10
55-60	1,742.0	0.40	0.008
Total	2.16 x 10 <sup>7</sup>	495.1	

Gull Pond is fairly irregular in shape; the shore development index equals 5.87. For the most part, the shores of the lake are moderately sloped. The mean depth is 13.8 ft. (4.21 m), while the maximum depth is 60.0 ft. (18.3 m). Approximately 73 percent of the lake area is included in the 0-20 feet range of depth (generally considered to be the range of depth where the vast majority of production occurs in a lake). Gull Pond would appear then, at least in terms of its morphometry, to be a fairly productive body of water.

b. Surface Water Chemistry: The analysis of the surface water of Gull Pond appears in Table II. Like all natural waters in eastern Newfoundland, the waters of Gull Pond are very soft, and characterized by low alkalinity, hardness, and mineral content. The degree of mineralization (or TDS) of this lake is somewhat lower than the average for lakes in this geographic area. (Avalon Peninsula lakes average approximately 34 ppm.).



BATHYMETRIC MAP OF GULL POND

Table II. Analysis of surface water of Gull Pond (samples collected May, 1974).

	Range	Mean
Alkalinity as CaCO <sub>3</sub>		
Total hardness as CaCO <sub>3</sub>	5.0 - 6.0 ppm.	5.6 ppm.
pH	6.0 - 6.3	6.1
Color (Hazen units)	5.0 - 10.0	8.3
Turbidity (JTU)	1.5 - 1.7	1.6
Sp. Conductance, micromhos at 25°C	28.0 - 32.6	29.8
Total dissolved solids	29.4 - 34.3 ppm.	31.4 ppm.
Calcium (Ca)	1.0 - 1.2 ppm.	1.1 ppm.
Magnesium (Mg)	0.6 - 0.7 ppm.	0.6 ppm.
Manganese (Mn)	0.01 - 0.02 ppm.	0.01 ppm.
Potassium (K)	-	0.4 ppm.
Sodium (Na)	3.6 - 4.0 ppm.	3.8 ppm.
Sulphate (SO <sub>4</sub> )	-	2.0 ppm.
Chloride (Cl)	5.5 - 6.4 ppm.	6.1 ppm.
Bicarbonate (HCO <sub>3</sub> )	-	2.4 ppm.
Total phosphorus (P)	-	0.005 ppm.
Nitrogen (Nitrate) (N)	0.04 - 0.14 ppm.	0.08 ppm.
Silica (SiO <sub>2</sub> )	-	0.2 ppm.

c. Morphoedaphic Index and Lake Productivity: Gull Pond has a mean depth of 13.8 feet and a mean total dissolved solids level of

31.4 ppm. which, using the method of Ryder (1965), gives a morphoedaphic index of 2.28. This is translated into a potential fish yield of 3.02 pounds per acre per year. This is slightly lower than the average production of Avalon Peninsula lakes which is approximately 3.3 pounds per acre annually. The maximum sustainable yield of sport fish from 495-acre Gull Pond is 1,495 pounds, annually.

B. Fish Species Present

Four fish species are to be found in Gull Pond and its drainage system. Only one of the species is of proven recreational fishing value and that is the eastern brook trout, Salvelinus fontinalis (Mitchill) 1815. The landlocked American smelt, Osmerus mordax (Mitchill) 1815, in both its dwarf and giant race forms, is present in this lake in large numbers, as it is in the other two lakes of the Deer Park (Hawco's and Oxley's). This species is a very important forage food fish for the lake's brook trout populations, and probably provides some limited angling opportunity. A second forage food species inhabiting the lake is the threespine stickleback, Gasterosteus aculeatus (Linnaeus) 1758. The fourth fish species occurring in Gull Pond is the American eel, Anguilla rostrata (LeSueur) 1817.

C. Age and Size Composition of the Sport Species

1. Brook Trout

Brook trout are possibly the only real sport fish present in the lake. The largest and oldest trout observed during the survey had a

fork length of 42.3 cm. and was VI<sup>+</sup> years of age.

The age-length distribution of the brook trout sampled at Gull Pond during July 1974 is given in Table III.

Table III. Age length distribution of brook trout taken in trap-nets and gillnets during July, 1974, in Gull Pond, (percentages in parentheses).

Fork Length (cm.) (Class mark)	Age (years)						Totals
	I <sup>+</sup>	II <sup>+</sup>	III <sup>+</sup>	IV <sup>+</sup>	V <sup>+</sup>	VI <sup>+</sup>	
9.55	15(100.0)	-	-	-	-	-	15( 6.0)
11.55	12( 18.2)	53(81.2)	-	-	-	-	65(25.9)
13.55	-	-	14( 33.3)	-	-	-	44(17.5)
15.55	-	-	11(100.0)	-	-	-	11( 4.4)
17.55	-	1( 5.9)	21( 94.1)	-	-	-	22( 8.8)
19.55	-	-	20(100.0)	-	-	-	20( 8.0)
21.55	-	-	28(100.0)	-	-	-	28(11.2)
23.55	-	-	12( 68.8)	6( 31.2)	-	-	18( 7.2)
25.55	-	-	6( 62.5)	3( 37.5)	-	-	9( 3.6)
27.55	-	-	-	3(100.0)	-	-	3( 1.3)
29.55	-	-	-	4(100.0)	-	-	4( 1.6)
31.55	-	-	-	4(100.0)	-	-	4( 1.6)
33.55	-	-	-	-	1(100.0)	-	1( 0.4)
35.55	-	-	-	-	-	-	-
37.55	-	-	-	-	1( 50.0)	1( 50.0)	2( 0.8)
39.55	-	-	-	-	-	3(100.0)	3( 1.2)
41.55	-	-	-	-	-	2(100.0)	2( 0.8)
Total	27	84	112	20	2	6	251

2. Landlocked Smelt

As was the case for Oxley's Pond, only a small sample of smelt was obtained from Gull Pond, and this negated the calculation of age-size compositions. However, it is reasonable to assume that the population structure is similar to that found in Hawco's Pond, i.e. small race smelt reach about 12 cm. fork length at an age of III<sup>+</sup> years and large race smelt attain a length of about 27 cm. at age V<sup>+</sup>.

D. Growth Rate of the Sport Species

1. Brook Trout

The principle of back-calculation (Monastrysky method) was applied to determine the rate of growth of Gull Pond brook trout. From paired observations of fish length and scale length, a log-log regression was calculated. The equation for scale length on fish length is as follows:

$$\text{Log } L_f = 1.2966 \text{ Log } L_s + 0.7529$$

or  
1.0992

$$L_f = 7.364 L_s$$

Table IV shows the average scale length for each year of life and the corresponding calculated fish lengths.

Table IV. Actual scale length and calculated fish length at annulus formation of Gull Pond brook trout.

Annulus	I	II	III	IV	V	VI
Scale length (X43)	0.8	1.3	2.1	2.7	3.0	3.8
Fish fork length (cm.)	4.2	8.0	14.8	20.5	23.5	32.0
Fish fork length (in.)	1.6	3.1	5.8	8.1	9.3	12.6

The growth rate of Gull Pond brook trout is generally somewhat slower than that demonstrated by the average Avalon Peninsula population (Table 2, Appendices).

2. Landlocked Smelt

Only a very small sample of smelt was collected at Gull Pond and as a result a growth rate could not be calculated. However, it is probably safe to assume that it is similar to that calculated for Hawco's Pond fish (both small and large races).

E. Food Habits of the Sport Species

Table V presents the results of the analysis of the food habits of 70 brook trout taken in Gull Pond during July, 1974.

Table V. The food habits of Gull Pond brook trout expressed as frequency of occurrence (percentages in parentheses).

Fork length (cm.) (Class) mark)	Stomach Contents							
	Empty	Benthic and /or Terr. Invert.	Benthic and/or Terr. Invert. and Stickle-backs	Benthic and/or Terr. Invert. and Smelt	Stickle-backs	Smelt	Smelt and Stickle-backs	Other*
11.55	-	1(100.0)	-	-	-	-	-	-
13.55	-	-	-	-	-	-	-	-
15.55	-	-	-	-	-	-	-	-
17.55	-	1(100.0)	-	-	-	-	-	-
19.55	-	5( 83.3)	-	-	1(16.7)	-	-	-
21.55	7	5( 38.5)	1(7.7)	-	6(46.2)	1( 7.7)	-	-
23.55	3	5( 38.5)	-	1(7.7)	5(38.5)	2(15.4)	-	-

Table V. (cont'd.)

Fork length (cm.) (Class mark)	Empty	Benthic and/or Terr. Invert.	Benthic and/or Terr. Invert. and Sticklebacks	Benthic and/or Terr. Invert. and Smelt	Sticklebacks	Smelt	Smelt and Sticklebacks	Other*
25.55	4	1(33.3)	-	-	2(66.7)	-	-	-
27.55	-	-	-	-	2(66.7)	-	-	1(33.3)
29.55	-	1(25.0)	-	-	3(75.0)	-	-	-
31.55	2	1(50.0)	-	-	1(50.0)	-	-	-
33.55	-	-	-	-	-	-	-	-
35.55	-	-	-	-	-	-	-	-
37.55	1	-	-	-	-	1(100.0)	-	-
39.55	2	-	-	-	-	-	1(100.0)	-
41.55	2	-	-	-	-	-	-	-
<b>Total</b>	<b>22</b>	<b>21</b>	<b>1</b>	<b>1</b>	<b>20</b>	<b>4</b>	<b>1</b>	

\* Invertebrates and shrews.

Generally, it would appear that the smaller brook trout in Gull Pond are primarily insectivorous while the larger individuals tend to include fish in their diet, foraging on smelt and sticklebacks.

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**APPENDICES**

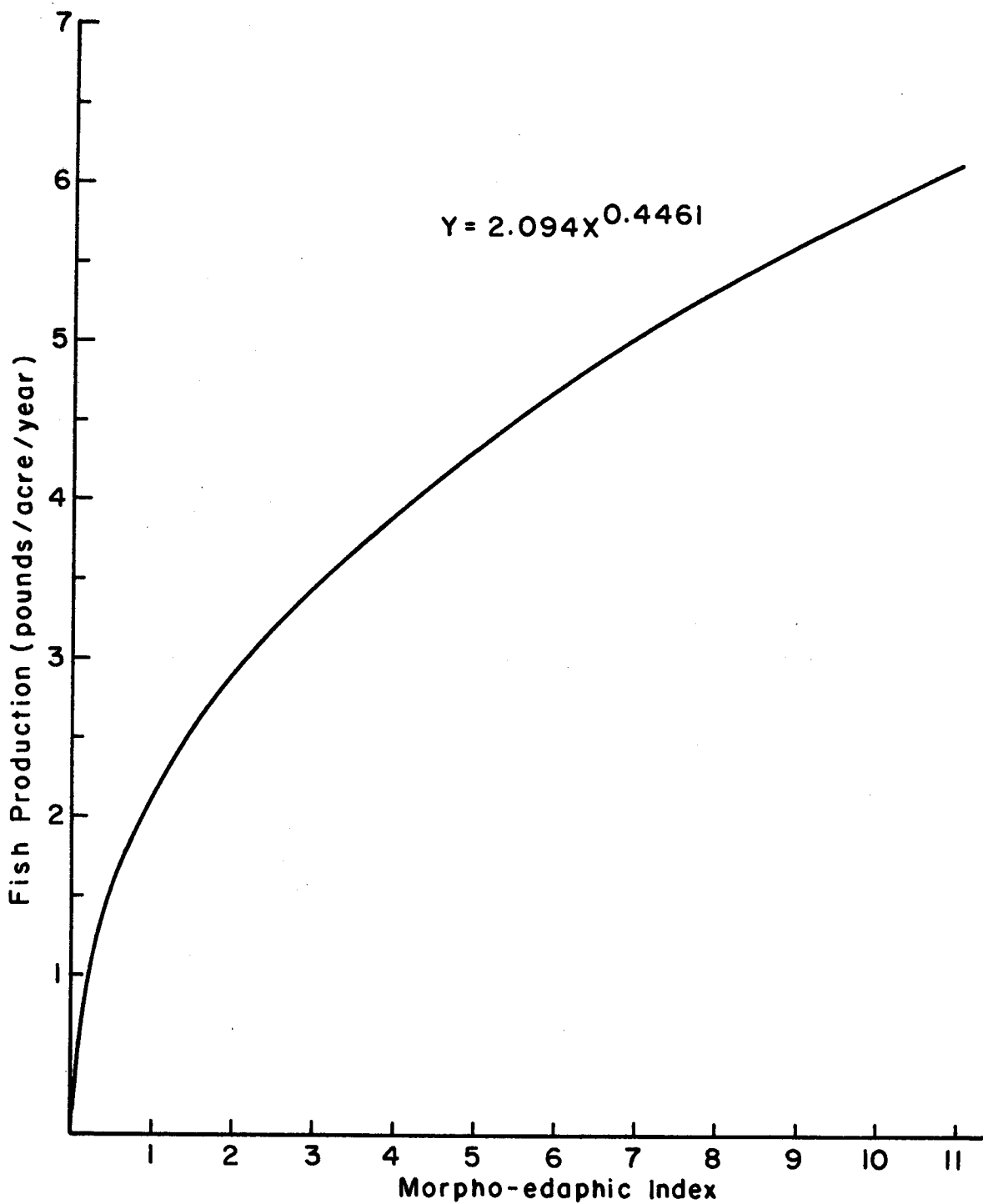


Figure 1. The Relationship between the Morpho-edaphic Index and Potential Fish Yield in North-temperate Lakes (from Ryder, 1965)

Table 1. Morphometric, edaphic, and potential fish production (yield) data for selected Avalon Peninsula lakes.

Lake	Mean depth (ft.)	T.D.S.	<u>T.D.S.</u> Mean depth	Potential yield (lb./acre/yr.)	Lake area (acres)	Potential yield (lb./yr.)
Petty Hr. Long Pond	21.3	33.8	1.59	2.52	428	1,079
Thomas Pond	13.3	27.0	2.03	2.85	255	727
Paddys Pond	10.4	28.7	2.71	3.29	526	1,731
Gull Pond	14.0	38.9	2.77	3.33	140	466
Loon and Little Soldiers Pond	14.2	26.0	1.83	2.71	167	453
Soldiers Pond	8.8	22.6	2.57	3.21	334	1,072
Finnies Pond	12.5	23.7	1.90	2.76	384	1,060
Five Mile Pond West	7.6	26.4	3.47	3.73	213	795
Big Triangle Pond	9.1	32.7	3.59	3.79	119	451
Southern Peak Pond	13.6	32.4	2.38	3.09	193	596
Southwest Pond	14.8	31.6	2.14	2.93	353	1,034
Harbour Main Pond	10.8	30.8	2.85	3.38	500	1,688
Nine Is. Pond South	11.1	29.1	2.62	3.24	203	658
Middle Gull Pond	33.8	25.2	0.75	1.73	757	1,310
Grand Pond	12.7	33.7	2.65	3.26	450	1,467
Snows Pond	9.9	27.5	2.78	3.33	1,251	4,166
Colliers Big Pond	8.5	37.0	4.35	4.17	157	655
Nine Island Pond	20.2	31.3	1.55	2.49	401	998
Goose Pond	9.6	35.2	3.67	3.83	318	1,218
Ocean Pond	15.0	31.6	2.04	2.86	815	2,331
Dildo Pond	32.7	29.1	0.89	1.87	970	1,814

Table 1. (cont'd.)

Lake	Mean depth (ft.)	T.D.S.	<u>T.D.S.</u> Mean depth	Potential yield (lb./acre/yr.)	Lake area (acres)	Potential yield (lb./yr.)
Hogans Pond	16.0	37.3	2.32	3.05	147	448
Torbaymans Pond	3.4	33.8	9.94	6.30	12	76
Four Mile Pond	11.0	35.6	2.33	3.05	97	296
Split Rock Pond	7.3	46.5	6.37	5.05	118	596
Peak Pond	14.9	41.8	2.81	3.35	209	700
Black River Pond	20.5	33.2	1.62	2.55	268	683
Big Bad Pond	14.4	30.5	2.12	2.91	268	780
Hodgewater Pond	7.6	32.8	4.32	4.15	231	959
Spread Eagle Peak Pond	4.2	29.7	7.07	5.32	135	718
Clarks Pond	18.8	71.4	3.80	3.90	55	215
Larkins Pond	16.6	73.3	4.42	4.20	61	270
Hawco's Pond	11.3	29.5	2.52	3.17	642	2,035
Gull Pond	13.8	31.4	2.28	3.02	495	1,495
Oxley's Pond	19.5	31.0	1.59	2.52	138	348
Mean		33.8	2.99	3.34		

Table 2. Back-calculated growth in fork length (cm.) for brook trout in selected Avalon Peninsula lakes.

Lake	I	II	III	IV	V	VI	VII	VIII
Paddys Pond	4.5	9.6	15.2	20.2	24.3	28.5	-	-
Thomas Pond	5.5	10.8	16.4	20.9	24.9	28.2	31.4	-
Petty Hr. Lond Pond	5.1	9.9	15.5	21.3	25.8	30.8	33.1	35.5
Windsor Lake	5.8	11.3	16.6	20.5	24.3	-	-	-
Big Triangle Pond	5.1	11.3	17.2	23.2	28.5	-	-	-
Angle Pond	7.9	14.8	20.0	26.0	32.2	-	-	-
Harveys Pond	7.1	11.7	15.8	19.8	24.0	-	-	-
Donneys Pond	5.9	10.2	14.4	18.1	22.9	-	-	-
Petty Hr. Rocky Pond	6.0	10.3	14.7	18.7	23.9	-	-	-
Stephens Pond	5.0	10.5	15.6	22.5	26.5	-	-	-
Shag Pond	5.2	11.0	15.4	-	-	-	-	-
Snows Pond	4.5	9.1	14.1	19.3	25.1	30.8	35.3	-
Southwest Pond	4.7	8.3	13.1	17.3	22.1	28.2	-	-
Middle Gull Pond	6.2	11.3	15.3	19.7	23.4	28.3	33.6	38.0
Colliers Big Pond	5.6	11.8	18.3	23.7	31.2	-	-	-
Goose Pond	7.1	13.5	18.5	22.6	27.5	-	-	-
Grand Pond	5.9	12.7	20.4	27.7	34.4	38.4	-	-
Gull Pond	6.6	11.9	16.3	21.5	24.5	28.4	-	-
Loon & Little Soldiers Pond	5.9	10.2	14.5	18.5	23.5	32.0	-	-
Soldiers Pond	5.3	9.7	14.0	18.2	22.0	-	-	-
Finnies Pond	6.2	11.2	15.2	19.6	23.7	28.6	-	-
Southern Peak Pond	5.0	11.0	17.5	22.9	28.4	-	-	-

Table 2. (cont'd.)

Lake	I	II	III	IV	V	VI	VII	VIII
Nine Is. Pond South	4.3	9.7	15.8	21.1	26.0	31.8	-	-
Five Mile Pond West	5.6	11.1	15.7	19.7	24.9	-	-	-
Nine Island Pond	5.2	11.7	18.9	24.6	31.2	35.5	-	-
Roundabout Pond	6.3	12.6	18.7	24.5	30.3	-	-	-
Topsail Pond	5.0	9.9	15.0	20.0	-	-	-	-
Bay Bulls Long Pond	5.0	11.2	17.2	23.0	28.4	-	-	-
Harbour Main Pond	4.0	8.6	13.4	18.3	23.6	29.5	-	-
Torbaymans Pond	5.4	9.3	14.0	20.4	-	-	-	-
Four Mile Pond	5.0	9.6	15.5	20.8	24.9	-	-	-
Peak Pond	7.6	11.4	17.2	22.1	30.0	-	-	-
Clarks Pond	6.0	12.7	16.9	22.9	32.8	-	-	-
Hodgewater Pond	4.9	10.5	15.0	23.6	-	-	-	-
Spread Eagle Peak Pond	4.3	9.9	16.4	23.0	27.3	-	-	-
Big Bad Pond	5.2	11.2	17.3	22.6	29.5	-	-	-
Black River Pond	5.4	11.1	16.9	22.4	25.8	31.5	41.4	-
Larkins Pond	5.8	11.9	16.0	22.2	30.1	-	-	-
Hawco's Pond	5.8	13.2	18.7	23.6	29.7	39.4	-	-
Gull Pond	4.2	8.0	14.8	20.5	23.5	32.0	-	-
Oxley's Pond	5.7	9.5	15.8	20.6	26.3	-	-	-
Mean (cm.)	5.5	10.9	16.2	21.4	26.7	31.4	35.0	36.8
Mean (in.)	2.2	4.3	6.4	8.4	10.5	12.4	13.8	14.5

Table 3. Back-calculated growth in fork length (cm.) for landlocked smelt in selected Avalon Peninsula lakes. (Adapted from Bruce, 1975).

Lake	I	II	III	IV	V
Larkins Pond	6.7	9.0	9.5	-	-
Clarks Pond	6.7	9.0	9.7	-	-
Black River Pond	7.1	9.0	9.9	-	-
Nine Island Pond South	7.0	8.2	-	-	-
Hawco's Pond	7.6	9.0	9.9	-	-
Mean (cm.)	7.0	8.8	9.8	-	-
(in.)	2.8	3.5	3.9	-	-
*Black River Pond	7.2	12.9	17.1	20.8	23.0

\* Giant race fish.