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1974

# River Investigations on the Southwest Coast of Insular Newfoundland

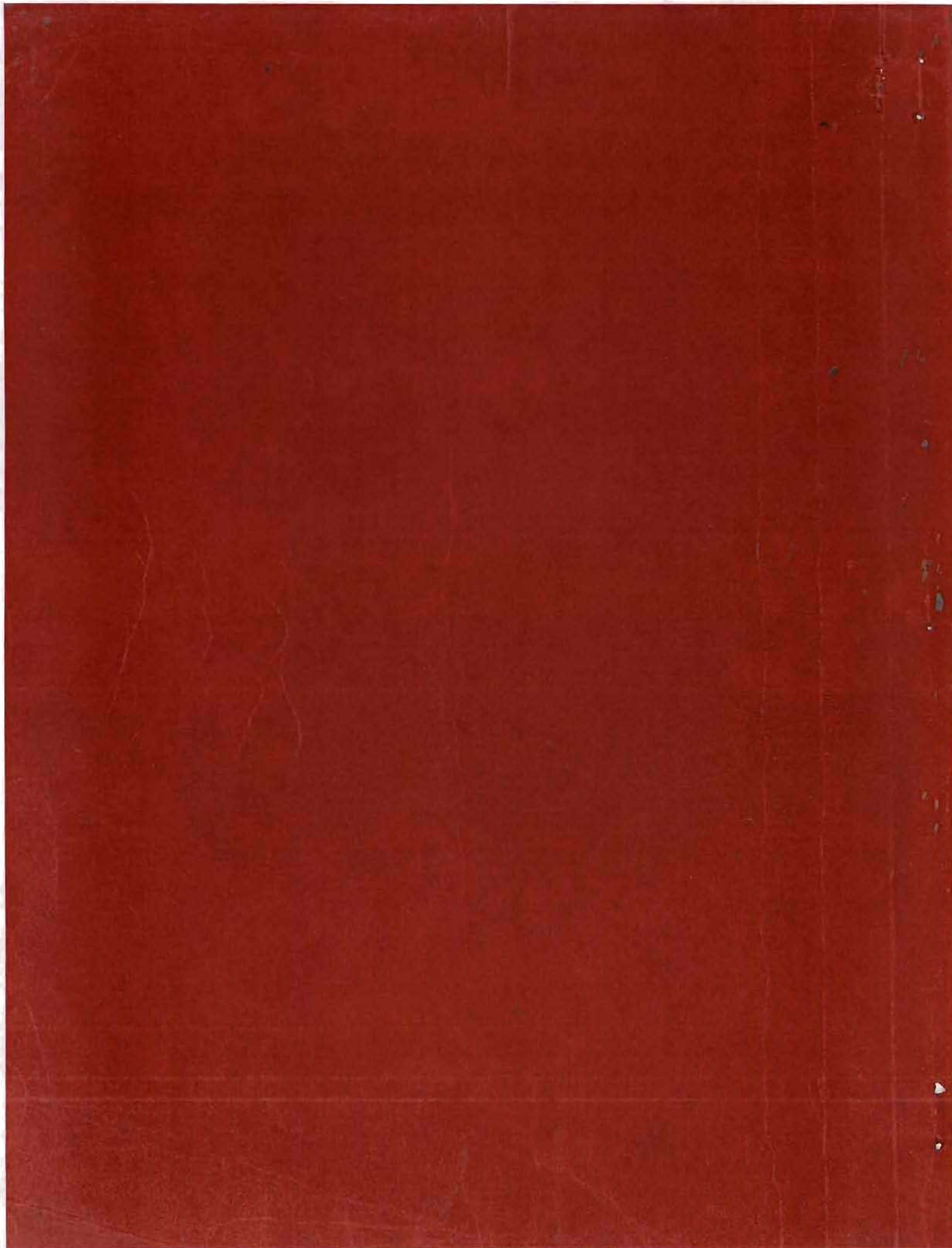
by

T.R. Porter, R.B. Moores and G.R. Traverse

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Resource Development Branch  
Newfoundland Region





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RIVER INVESTIGATIONS ON THE  
SOUTHWEST COAST OF INSULAR NEWFOUNDLAND

by

T.R. PORTER R.B. MOORES and G.R. TRAVERSE

Resource Development Branch  
Fisheries and Marine Service  
Department of the Environment

February 1974



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## INTRODUCTION

The maximum sustained yield of Atlantic salmon is not sufficient to support the increasing demand created by the recreational and commercial fisheries. One of the primary factors restricting the enhancement of salmon in Newfoundland is the limited rearing capacity of streams. Several management programs have been undertaken by the Resource Development Branch to increase production of salmon. One of these, is to increase the natural rearing capabilities of rivers by (1) easing fish-passage at partial and complete barriers to upstream salmon migration; (2) developing stocks of salmon in previously unused sections of rivers. Due to the increase fishing pressure it has become necessary to impose restrictions on commercial and recreational exploitation. In 1968 a project was initiated to survey all major river systems on insular Newfoundland. The objectives were (1) to determine the potential salmon production for all river systems (2) to identify areas where it would be feasible to enhance salmon production using stream remedial and stocking techniques (3) to identify streams where salmon populations were endangered and to recommend corrective measures.

This report is an inventory of eleven streams on the southwest coast (Fig. 1), surveyed during July and September, 1973. Recommendation for stream clearance work and the imposition of quotas on these rivers are also included.

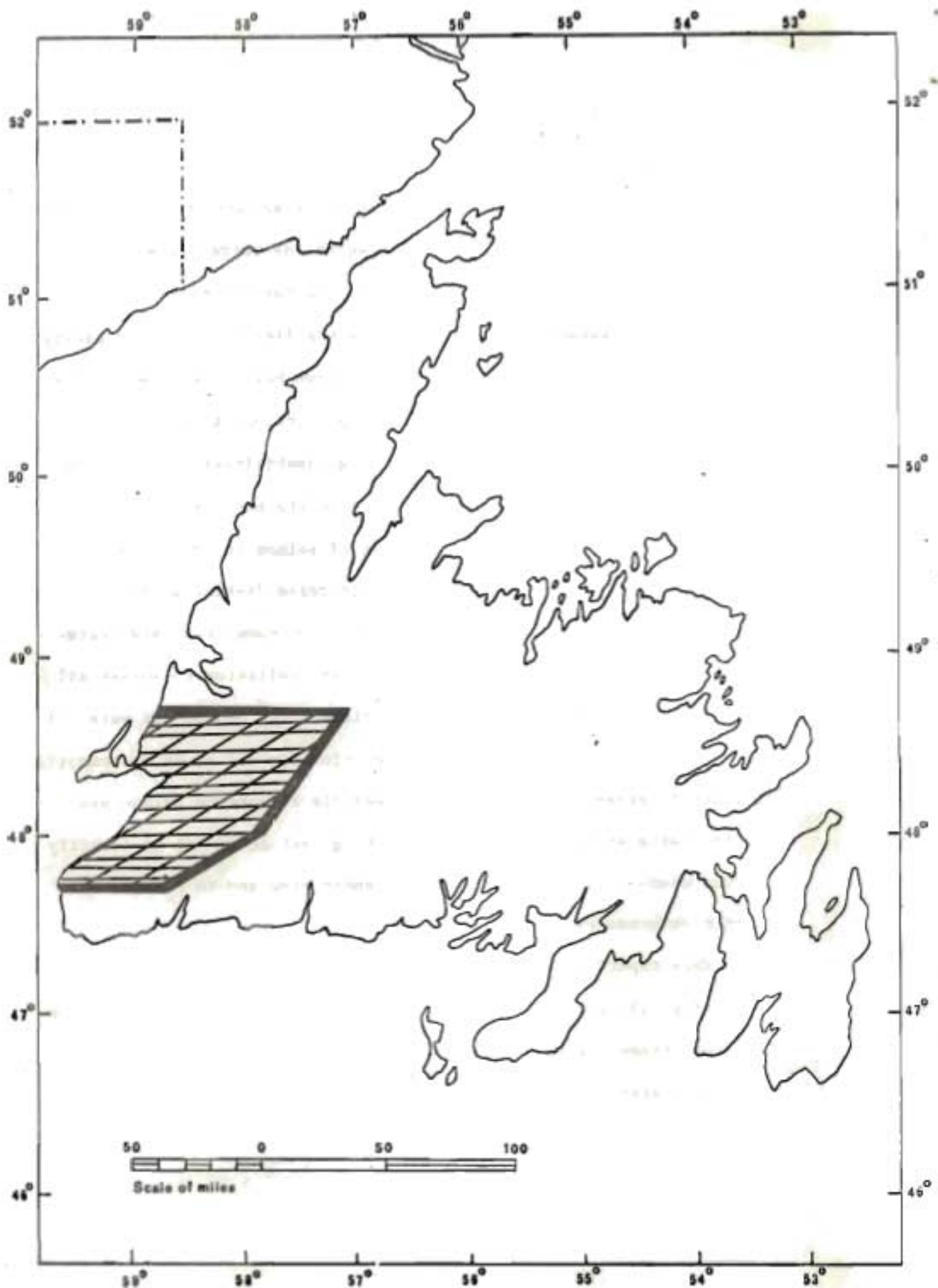


Fig. 1. Map of Newfoundland showing area surveyed.

## MATERIALS AND METHODS

A detailed description of the materials and methods used in the stream surveys are described by Riche (1972). Generally, all tributaries were surveyed except intermittent streams and those less than 10 feet in width. Data collected included description of watershed, bottom composition and an evaluation of obstructions that restrict salmon passage.

For each river system, estimates were calculated for potential salmon rearing capabilities, adult production, contribution to the commercial and recreational fisheries and the number of salmon required to seed the river. Only areas of riverbed covered with water at the time of the survey were included in estimates of rearing and spawning areas. Substrate suitable for spawning was considered suitable for parr rearing.

Production estimates used to determine maximum allowable recreational harvest were based on a seeding rate of 100 eggs per rearing unit (100 yds<sup>2</sup>) to produce 1.75 smolt per unit, a sea survival of 12% and a 40% commercial harvest. The number of salmon required to seed the river was subtracted from the escapement to the river; thus, providing an estimate of the maximum allowable catch by the recreational fishery in order to maintain a maximum sustained yield. This estimate was compared to the annual creel census data collected by the Conservation and Protection Branch of the Fisheries and Marine Service. The weights of salmon recorded in the creel census are estimates only.

RESULTS

W-40-83

HIGHLAND RIVER

Location: 48°11'38"N, 58°53'40"W, St. George's Bay.

Map Reference: St. Fintan's 12B/2 W,E  
Grandy's Lake 10°/15E

GENERAL DESCRIPTION

Drainage Area: 70.7 miles<sup>2</sup> (183.1 km<sup>2</sup>)      Mean Width of      3.1 miles  
Drainage Area:      (5.0 km)

Axial Length: 18.0 miles (29.0 km)

Max. Basin Relief: 1,800 ft. (548.6 metres)

Length of Main Stem: 21.7 miles (34.9 km)<sup>1</sup>      Basin Perimeter: 51.0 miles  
(82.1 km)

Number of Major Tributaries: 4

Total Length of Tributaries: 28.4 miles (45.7)<sup>1</sup>

Area of Lakes (>1 mile<sup>2</sup>): Nil

Highland River (Fig. 2.) begins in the southern part of the Long Range Mountains, flows in a westerly direction and enters St. George's Bay 1.5 miles southwest of St. David's. The river is wide and shallow and subject to extreme fluctuations in discharge. The river bank is low and densely forested to the stream's edge with spruce, balsam fir and alders (Fig. 3.). Extensive logging operations were carried out in the entire watershed area but a strip of forest was left unharvested along the river bank (Fig. 3).

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<sup>1</sup>Measurements include standing water.

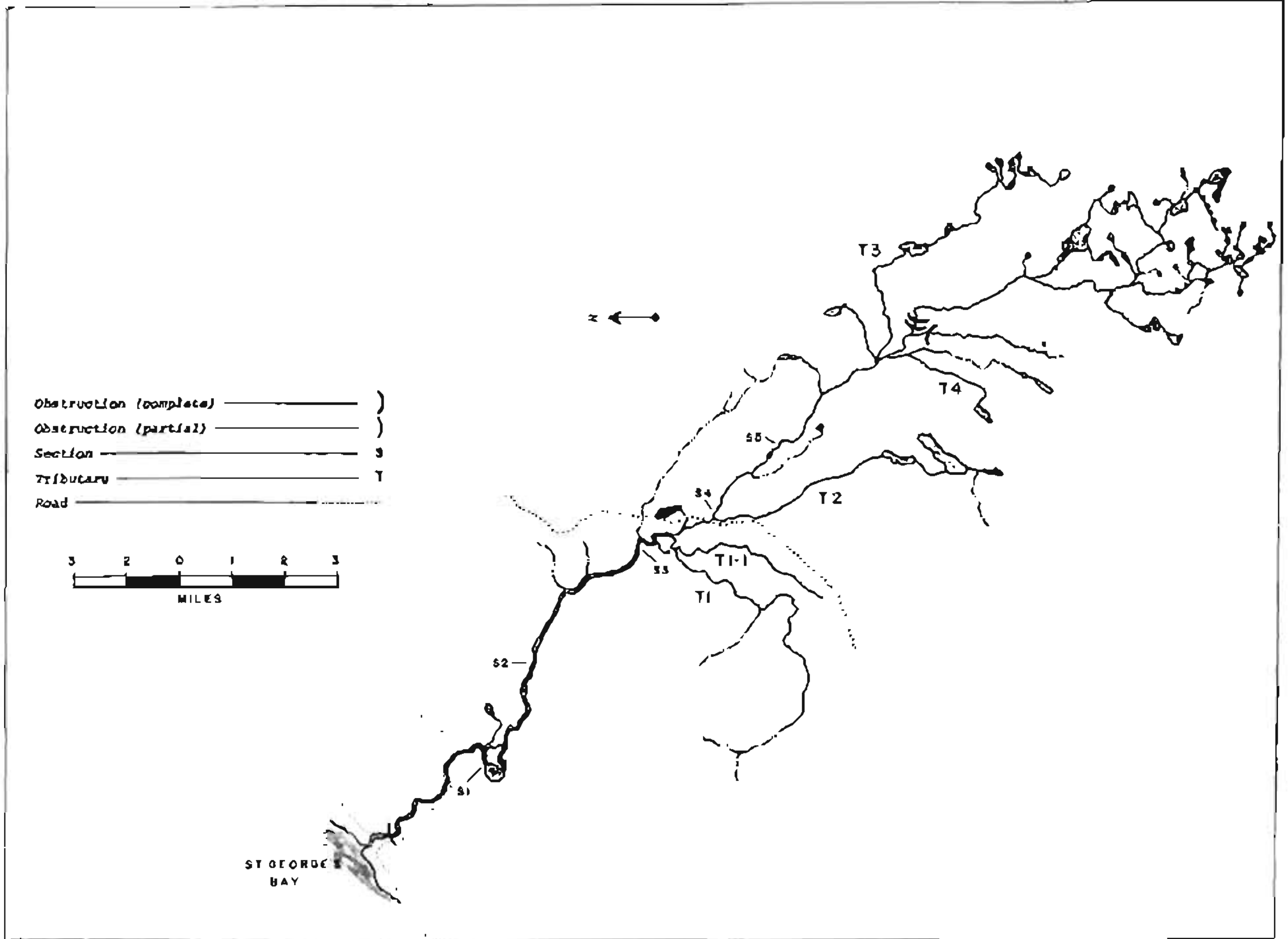


Fig. 2. Highland River system showing obstruction locations. Lines from section number indicate end of section.

Fish Populations

Escapement of Atlantic salmon into Highland River commences in late June and reaches a peak in late July. It is easily accessible to anglers via woods roads and the Trans-Canada Highway.

Angling pressure has decreased sharply since 1969; but fish per rod day has remained relatively stable. The mean recorded Atlantic salmon angling catch for Highland River, 1964 to 1973 is 58 (Table 1). However, the creel census is estimated to be only 75-80 percent accurate (J. Marshall, personal communication). A more realistic mean angling catch would be 74 fish per year. Although the annual catch is small Highland River is noted for its large fish and many years produces the largest salmon angled on the Island.

Table 1. Atlantic salmon angling catch, Highland River, 1964-1973 inclusive.

	Total catch	Mean catch per year	Total weight (lb)	Mean weight per fish (lb)
Grilse	360	36	1,387	3.9
Salmon	221	22	2,124	9.6
Total	581	58	3,511	6.0

OBSTRUCTIONS

There is one partial obstruction and two complete obstructions located on the main stem of Highland River. Obstruction #1, at mile 0.5 from the mouth is a 2-3 foot bedrock ledge (Fig. 6.). Fish "hold-up"

below this obstruction at low discharge. Minor blasting would eliminate the difficulty.

Obstruction #2, at mile 14.6 from the mouth, is 15 feet high at a 45-50° angle. It is a complete barrier to upstream fish migration as discharge over the falls is minimal (Fig. 7).

Obstruction #3, located just upstream from obstruction #2 is 25 feet high and consists of an 8 foot vertical drop and a 15-18 foot drop at a 45° angle (Fig. 8). This obstruction is complete at all water levels.

There are no obstructions on the major tributaries of Highland River.

#### BOTTOM COMPOSITION

The river upstream from obstruction #3 was not surveyed and only rearing area below obstruction #2 is included in this report (Tables 2 and 3).

Approximately 100 percent of Highland River is potential parr rearing habitat and approximately one percent suitable for spawning. The main spawning areas appears to be in the vicinity of the Trans-Canada Highway crossing and upstream from the first pond on the main stem.

#### POTENTIAL POPULATION ESTIMATES

It is estimated that Highland River system has the potential to produce 6,000 to 12,000 smolt and an adult sea survival of 600 to 1,800 salmon per year (Table 4). The angling data (Table 1) indicates the

Table 2 . Bottom composition of main stem of Highland River accessible to anadromous fish

Section	Location (miles)	Length (yds)	Mean Width (yds)	Bottom Type	Total Units	Rearing		Spawning		Comments
						%	Units	%	Units	
1	0 to 3.4	6,000	24	boulder/rubble	1,440	99	1,426	-	-	Falls at mile 0.
2	3.4 to 5.5	3,700	20	rubble/gravel	740	100	740	40	296	
3	5.5 to 7.9	4,300	20	rubble/gravel	860	100	860	20	173	
4	7.9 to 9.7	3,200	14	rubble/boulder/gravel	448	100	448	20	90	
5	9.7 to 11.4	3,000	14	rubble/boulder/gravel	420	100	420	5	21	
6	11.4 to 14.6	5,700	10	boulder/rubble	570	100	570	-	-	Falls at mile 14.6
Total		25,900			4,476	100	4,464	1	580	

Table 3. Bottom composition of tributaries of Highland River accessible to anadromous fish.

Tributary	Location (miles)	Length (yds)	Mean Width (yds)	Bottom Type	Total Units	Rearing		Spawning		Comments
						%	Units	%	Units	
T1	0 to 5.1	9,000	7	rubble/boulder	630	100	630	2	13	
T1-1	0 to 2.8	5,000	3	rubble/boulder	150	100	150	2	3	
T2	0 to 3.0	5,200	5	boulder/rubble/gravel	260	100	260	5	13	
T3	0 to 4.0	7,000	5	boulder/rubble/gravel	350	100	350	-	-	
T4	0 to 2.0	3,500	3	rubble/boulder	105	100	105	-	-	
Total		29,700			1,495	100	1,495	2	29	

escapement of salmon to the river is considerably less than the apparent potential population. This is attributed to insufficient suitable spawning gravel.

Table 4. Estimated Atlantic salmon smolt production and adult sea survival of Highland River. Area enclosed includes most accepted values for production.

If smolt production per 100 yds <sup>2</sup> is:		1	2	3
Smolt produced		5,957	11,914	17,871
Adult return if sea survival is:	5%	298	596	894
	10%	596	1,191	1,787
	15%	894	1,787	2,681
	20%	1,191	2,381	3,574
	25%	1,489	2,979	4,468

PHOTOS ON FILE

<u>Description</u>	<u>Figure Number</u>	<u>File Number</u>
Obstruction #1 (print)	-	194
Obstruction #2 (print)	7	194
Bottom Composition (print)	4	194
Timber Harvesting (print)	-	194
Spawning Area (print)	-	194

SUMMARY AND CONCLUSIONS

One partial and two complete obstructions are located on the main stem of Highland River. The partial obstruction requires blasting to confine water at low discharge. The two complete obstructions require

no further investigation as insufficient rearing area exists upstream from the falls.

Highland River contains a total of 5,957 accessible rearing units which have the potential to produce 600 to 1,800 adults per year (Table 5).

Table 5. Summary of bottom composition of Highland River and tributaries accessible and inaccessible to anadromous fish.

Units	Accessible	Inaccessible	Total
Total system	5,971	Not surveyed	-
Rearing units	5,957	-	-
Spawning units	621	-	-

Highland River does not appear to be overfished. However the angling data indicates that this stream is under-utilized by Atlantic salmon.

#### RECOMMENDATIONS

1. Remedial work to be carried out on obstruction #1 in 1974.
2. Highland River be closed to the recreational fishery for 5 years. Followed by an annual quota of 100 salmon.
3. Road construction and logging operations in the vicinity of Highland River should follow the guidelines outlined by the Water Resources Group, Resource Development Branch. (See summary of this report).

Fig. 3. Parr-rearing area, lower reaches, Highland River.

Fig. 4. Rearing area, middle reaches, Highland River.

Fig. 5. Rearing area, upper reaches, Highland River.

Fig. 6. Obstruction #1 at mile 0.5 from the mouth, Highland River.

Fig. 7. Obstruction #2 at mile 14.6 from mouth, Highland River.

Fig. 8. Obstruction #3 at mile 14.6 from mouth, Highland River.



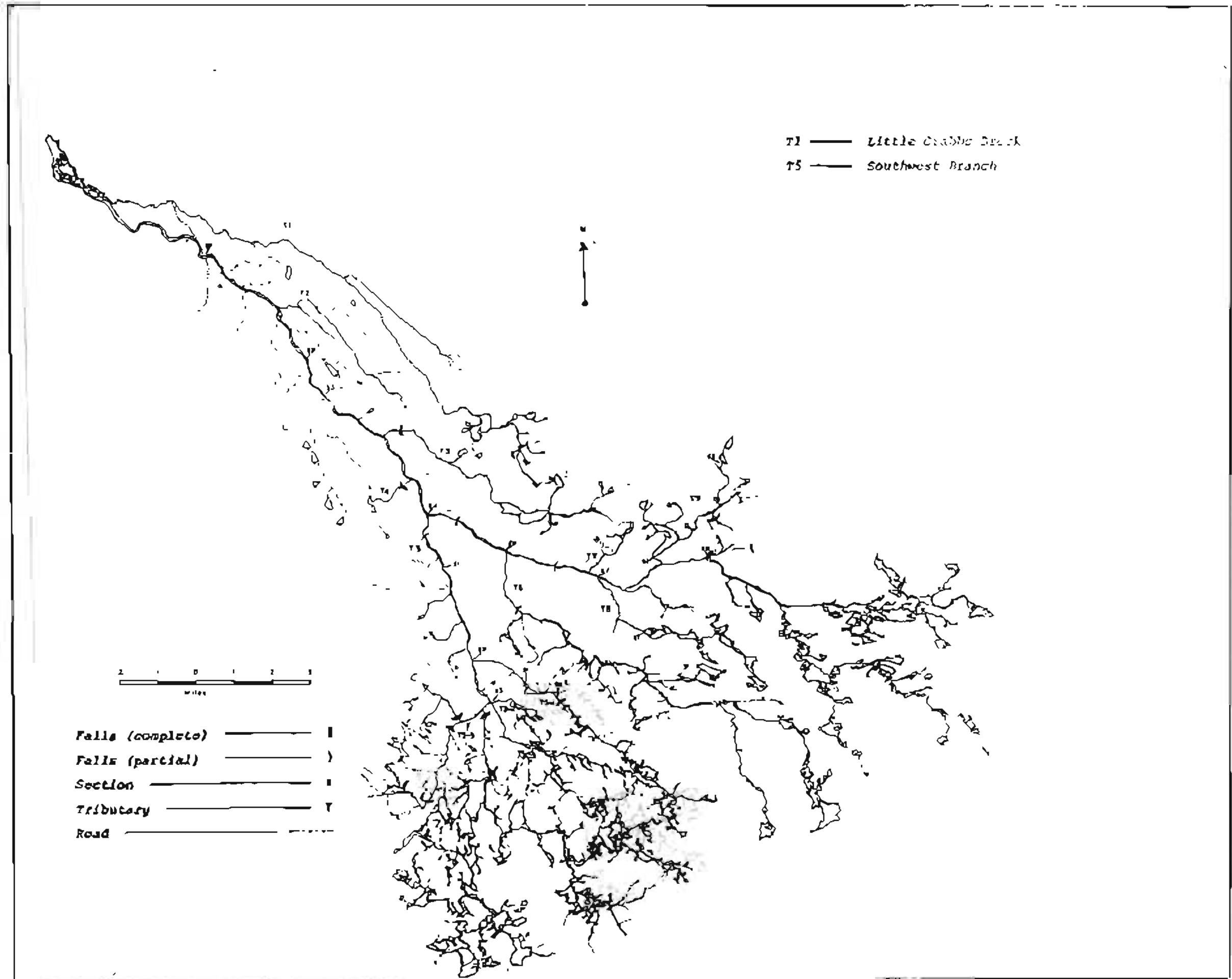


Fig. 9 . Crabbe River system showing obstruction locations. Line from section number indicates end of section

Two major tributaries T1 (Little Crabbs Brook) and T5 have considerable amounts of rearing/spawning area that is well-shaded from the densely forested banks (Fig. 12).

### Fish Populations

Escapement of Atlantic salmon usually begins in late May or early June. Angling is carried out mainly in the lower and middle reaches resulting from the easy access via woods roads and the Trans-Canada Highway.

The mean recorded salmon angling catch for Crabbs River, 1963 to 1973 is 644 (Table 6). However, the creel census is estimated to be 75 percent accurate (J. Marshall, personal communications). A more realistic mean angling catch would be 857 fish per year.

Table 6. Atlantic salmon angling catch, Crabbs River, 1964-1973 inclusive.

	Total catch	Mean catch per year	Total weight (lb)	Mean weight per fish (lb)
Grilse	4,602	460	16,815	3.7
Salmon	1,844	184	14,911	8.1
Total	6,446	644	31,726	4.9

Angling pressure on Crabbs River has remained relatively stable over the past ten years while the angling catch has shown a slight downward trend.

#### OBSTRUCTIONS

The main stem of Crabbs River has three complete obstructions and two partial obstructions. Obstruction #1, at mile 17.9 from the mouth, is a series of falls ranging from 4 to 8 feet in height (Fig. 13) these falls appear passable; however, minor blasting and channelling would reduce "hold-up" of salmon below the obstruction.

Obstruction #2, mile 20.6 from the mouth, is a 3 to 4 foot high ledge that requires minor blasting to confine water at low discharge. Salmon would have difficulty in surmounting the ledge at low discharge.

Obstructions #3, 4 and 5 are complete barriers to salmon migration. They are all located within 200 yards of mile 24.9 from the mouth. The first is a 50 foot vertical falls, the second is a falls 30 feet high at an angle of 75-80° and the third is a 20 foot vertical falls (Figs. 14, 15 and 16). There is insufficient rearing habitat above these falls to warrant further investigations.

Tributary #5 has a partial obstruction located at mile 0.5 from the mouth. It is a falls 10 feet high and requires investigation at ground level to determine remedial work requirements. Many

of the other tributaries of Crabbs River are blocked by high impassable falls (Table 7 ) but the rearing habitat upstream from the falls is not sufficient to justify remedial work.

Table 7 . Obstructions on tributaries of Crabbs River

Tributary	Type of Obstruction	Description	Location (miles from mouth)	Barriers to fish passage
T3	Falls	Height 15'	0.4	Complete
T4	Falls	Height 30'	0.2	Complete
T5	Falls	Height 10'	0.5	Partial
T5-1	Falls	Height 15'	2.1	Complete
T5-3	Falls	Height 100'	1.3	Complete
T5-4	Falls	Height 50-75'	0.3	Complete
T6	Falls(2)	Height 30'	1.6	Complete

#### BOTTOM COMPOSITION

The main stem of Crabbs River was not surveyed upstream from the three complete obstructions at mile 24.9. Large areas of suitable rearing habitat are located on the main stem and tributaries below mile 24.9 (Tables 8 and 9).

#### POTENTIAL POPULATION ESTIMATES

It is estimated that Crabbs River system has the potential to produce a total of 22,000 to 44,000 smolt and an adult sea survival of 2,200 to 6,600 salmon (Table 10).

Table 8 . Bottom composition of main stem of Crabbs River accessible to anadromous fish

Section	Location (miles)	Length (yds)	Mean Width (yds)	Bottom Type	Total Units	Rearing		Spawning		Comments
						%	Units	%	Units	
1	0 to 6.0	10,500	50	boulder/rubble/ gravel	5,250	100	5,250	10	525	
2	6 to 11.6	9,800	42	rubble/boulder	4,116	100	4,116	5	206	
3	11.6 to 12.7	2,000	34	boulder/rubble	680	100	680	-	-	
4	12.7 to 17.1	7,700	42	rubble/boulder	3,234	100	3,234	-	-	
5	17.1 to 17.9	1,400	17	bedrock/boulder	238	50	119	-	-	falls at mile 17.9
6	17.9 to 19.3	2,400	34	boulder/rubble	816	100	816	-	-	
7	19.3 to 21.7	4,200	20	boulder/rubble	840	100	840	5	42	falls at mile 20.6
8	21.7 to 24.9	5,600	14	boulder/rubble	784	100	784	-	-	falls at 24.9
<b>Total</b>		<b>43,600</b>			<b>15,958</b>	<b>99</b>	<b>15,839</b>	<b>5</b>	<b>773</b>	

Table 9 . Bottom composition of tributaries of Crabbs River accessible to anadromous fish.

Tributary	Location (miles)	Length (yds)	Mean Width (yds)	Bottom Type	Total Units	Rearing		Spawning		Comments
						%	Units	%	Units	
T1	0 to 15.9	28,400	7	rubble/boulder/ gravel	1,988	100	1,988	20	397	
T2	0 to 4.5	8,000	4	rubble/boulder	320	100	320	-		Estimated, no survey
T3-S1	0 to 0.4	700	9	rubble/boulder	63	100	63	2	1	falls at 0.4 mile
T5-S1	0 to 1.4	2,400	34	rubble/gravel	816	100	816	30	245	falls at 0.5 mile
T5-S2	1.4 to 4.1	4,800	20	boulder/rubble	960	100	960	-	-	
T5-S3	4.1 to 5.3	2,100	25	rubble/gravel	525	100	525	20	105	
T5-1-S1	0 to 1.6	2,800	12	boulder/rubble	336	100	336	-	-	
T5-1-S2	1.6 to 2.1	800	5	boulder/rubble	40	100	40	-	-	falls at mile 2.1
T5-2	0 to 0.5	800	10	boulder/rubble	80	100	80	-	-	
T5-3	0 to 1.3	2,200	14	boulder/rubble	308	100	308	-	-	falls at mile 1.3
T6-S1	0 to 1.6	2,800	14	boulder/rubble	392	100	392	2	8	two falls at mile 1.6
T7-S1	0 to 1.3	2,200	4	boulder/rubble	88	100	88	-	-	
T8-S1	0 to 2.2	3,900	7	boulder/rubble/gravel	273	100	273	10	27	
T9-S1	0 to 0.2	400	4	boulder/rubble	16	100	16	-	-	
Total		62,300			6,205	100	6,205	13	783	

PHOTOS ON FILE

<u>Description</u>	<u>Figure No.</u>	<u>File No.</u>
Obstruction #1 (print)	-	1119
Obstruction #1 (falls #3) (print) -		1119
Rearing Area (print)	11	1119
Near Mouth (print)	-	1119
Rearing Area (T5) (print)	12	1119

Table 10. Estimated Atlantic salmon smolt production and adult sea survival of Crabbs River. Area enclosed includes most accepted values for production.

If smolt production per 100 yds <sup>2</sup> is:		1	2	3
Smolt produced		22,044	44,088	66,132
Adult return if sea survival is:	5%	1,102	2,204	3,307
	10%	2,204	4,409	6,613
	15%	3,307	6,613	9,920
	20%	4,409	8,818	13,264
	25%	5,511	11,022	16,533

SUMMARY

Five obstructions are located on the main stem of Crabbs River. Two partial obstructions require minor blasting and channelling to improve upstream fish migration. The three complete obstructions require no further investigation. Partial obstruction on tributary #5 requires attention but obstructions on all other tributaries have insufficient rearing habitat upstream to warrant any consideration.

Crabbs River system contains 22,044 rearing units, which have the potential to produce 2,200 to 6,600 adult salmon per year.

(Table 11).

Table 11 . Summary of accessible and inaccessible spawning and rearing habitat of Crabbs River system ,

Units	Accessible	Inaccessible	Total
Total system	22,163	-	-
Rearing Units	22,044	-	-
Spawning Units	1,556	-	-

Crabbs River provides approximately 857 fish to the sports creel each year. It is suspected that this catch is too high. Further restrictions are necessary to prevent a decline in the fish population.

#### RECOMMENDATIONS

1. Remedial work to be carried out at partial obstructions #1 and #2.
2. An angling quota of 600 salmon be enforced on Crabbs River system.
3. Strict surveillance should be maintained on all development or logging in the area. Guidelines provided by the Water Resource Group (included in Summary of this report) should be followed.

Fig. 10. Rearing area, lower reaches, Crabbs River.

Fig. 11. Typical rearing area, middle reaches, Crabbs River.

Fig.12 . Rearing area, tributary #5, Crabbs River.

Fig. 13. Partial obstruction #1, Crabbs River, gorge section,  
at mile 17.9

Fig. 14. Obstruction #3, at mile 24.9, Crabbs River.

Fig.15. Obstruction #4, at mile 24.9, Crabbs River.

Fig.16. Obstruction #3 and #4, at mile 24.9, Crabbs River.

BARACHOIS BROOK

W-40-90

Location: 48°15'17"N, 58°49'07"W, St. George's Bay  
Map Reference: St. Fintans 12B/2 W,E  
Dashwoods Pond 12B/1W

GENERAL DESCRIPTION

Drainage Area: 93.0 miles<sup>2</sup> (240.8 km<sup>2</sup>)      Mean Width of 3.8 miles  
Drainage Area: (6.1 km)  
Axial Length: 25.4 miles (40.9 km)  
Max. Basin Relief: 2,000 ft. (609.6 m)      Basin Perimeter: 70.3 miles  
(113.1 km)  
Length of Main Stem: 29.3 miles (47.1 km)<sup>1</sup>  
Number of Major Tributaries: 9  
Total Length of Tributaries: 50.3 (80.9 km)<sup>1</sup>  
Area of Lakes (>1 mile<sup>2</sup>): Nil

Barachois Brook (Fig. 17) flows northwest from the Long Range Mountains entering St. George's Bay near the community of Cartyville.

Due to the small quantity of standing water, extreme fluctuations in discharge are evident on the river similar to many other rivers in the area. Except for several areas in the lower reaches which have been cleared for farming (Fig. 18) the river bank is forested to the stream's edge with white birch, spruce, balsam fir and alders (Fig. 19). Extensive harvesting of timber is carried out in the middle reaches (Fig. 19).

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<sup>1</sup>Measurements include standing water.

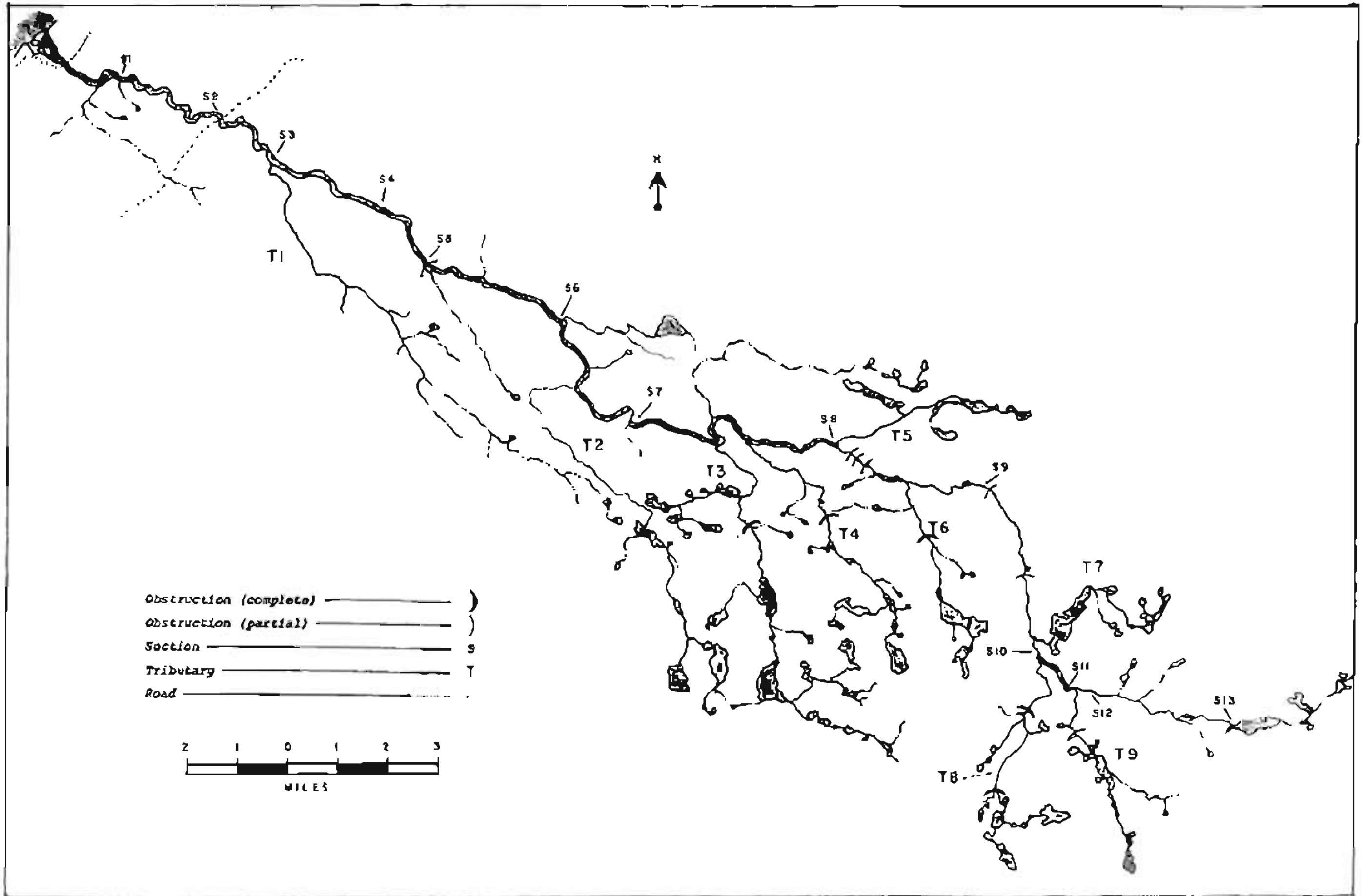


Fig. 17. Barabois Brook system showing obstruction locations. Line from section number indicates end of section.

Fish Populations

Escapement of Atlantic salmon into Barachois Brook usually begins in late May. The river is accessible to anglers for most of its length via woods road and the Trans-Canada Highway.

The mean recorded salmon angling catch for Barachois Brook, 1964 to 1973 inclusive, is 595 (Table 12); however, the creel census is estimated to be only 75 percent accurate (J. Marshall, personal communications). Therefore, 793 fish per year would be a more realistic mean angling catch.

Table 12. Atlantic salmon angling catch, Barachois Brook, 1964-1973 inclusive.

	Total catch	Mean catch per year	Total weight (lb)	Mean weight per fish. (lb)
Grilse	4,834	483	15,863	3.3
Salmon	1,121	112	7,860	7.0
Total	5,955	595	23,723	4.0

OBSTRUCTIONS

The main stem of Barachois Brook has six falls all of which are partial obstructions and delay upstream fish migration at various water levels (Table 13).

Obstruction #1 is a three to four foot ledge which extends the total width of the stream. Water is spread evenly across the top causing a "hold up" of salmon during periods of low and medium flows. Minor blasting is required to confine the flow (Fig. 20).

Obstruction #2 is a series of three falls 50 feet apart. The furthest downstream falls does not appear to impede salmon migration. The middle falls has an overhanging ledge that requires blasting. The furthest upstream of the three falls requires remedial work to remove protruding bedrock and to improve channel.

At obstruction #3 the water spreads thinly over the falls. Blasting is required to channelize the flow.

Obstruction #4 is a complete barrier to salmon passage during periods of low water. Remedial work is required to remove bedrock outcrop and to channel water at top of the falls (Fig. 21).

Obstruction #5 requires removal of overhanging lip.

Obstruction #6 requires further investigation on foot to determine remedial work required.

Several tributaries of Barachois Brook are blocked by impassable falls (Table 14). The rearing habitat upstream is insufficient to justify remedial work.

Table 13. Obstructions on the main stem of Barachois Brook.

Obstruction Number	Type of Obstruction	Description	Location (miles from mouth)	Barrier to fish passage
1	falls	3-4' vertical ledge	9.0	"hold up" at low discharge
2	falls	3 drops, spaced 50' Height 3' at angle 45° Height 6-7' vertical Height 6' at angle 55°	18.5	"hold up" at all discharges
3	falls	Height 7-8' at angle 80° over 15' length	18.7	"hold up" at medium and low discharges
4	falls	Height 6-7' at angle 80° over 10-15' length	19.0	Complete at low discharge. "Hold up" at all other flows.
5	falls	Height 5' vertical	21.1	"hold up" at low discharge.
6	falls	Height 8-10' vertical	23.0	"hold up" all discharges.

Table 14. Obstruction on tributaries of Barachois Brook

Tributary	Type of Obstruction	Description	Location (miles from mouth)	Barrier to fish passage
T3	Falls	Height 40'	1.9	Complete
T4	Falls	Height 30'	2.0	Complete
T6	Falls	Height 20'-30'	1.0	Complete
T8	Falls	Height 20'	1.2	Complete
T9	Falls	Three drops Height 4'-8'	1.0	Partial

### BOTTOM COMPOSITION

This survey was carried out in July 1973 at which time the river was a medium discharge. The river bed was estimated to be 20 percent dry. This area was not included in calculation of rearing potential (Tables 15 and 16).

### POTENTIAL POPULATION ESTIMATES

It is estimated that Barachois Brook has the potential to produce 10,000 to 20,000 smolt and an adult sea survival of 1,000 to 3,000 salmon per year (Table 17).

### PHOTOS ON FILE

<u>Description</u>	<u>Figure Number</u>	<u>File Number</u>
Fry Rearing Area (slide)		1225B
Obstruction #1 (print)		873
Lower Reaches (print)		873
Middle Reaches (print)		873

Table 15. Bottom composition of main stem of Barabois Brook accessible to anadromous fish

Section	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
1	0 to 2.0	3,500	34	rubble/gravel/boulder	1,190	100	1,190	30	357	
2	2.0 to 4.4	4,200	20	rubble/boulder	840	100	840	5	42	
3	4.4 to 5.8	2,500	19	rubble/boulder	475	100	475	-	-	
4	5.8 to 7.8	3,500	19	boulder/rubble	665	100	665	2	13	
5	7.8 to 9.2	2,400	20	boulder/rubble	480	98	470	-	-	falls at mile 9.0
6	9.2 to 11.8	4,600	20	rubble/boulder	920	95	874	30	262	
7	11.8 to 14.6	4,900	17	rubble/boulder/gravel	833	70	583	5	29	
8	14.6 to 18.7	7,300	14	rubble/gravel/boulder	1,022	100	1,022	40	408	
9	18.7 to 21.5	4,900	14	rubble/gravel	686	100	686	30	205	falls at mile 18.5 falls at 18.7 m. falls at 19.0 m.
10	21.5 to 24.5	5,300	13	boulder/rubble	689	100	689	-	-	falls at 21.1 m. falls at 23.0 m.
12	24.5 to 24.8	600	8	rubble/boulder	48	100	48	25	12	
13	24.8 to 27.2	4,200	8	boulder/rubble	336	100	336	-	-	
Total		47,900			8,184	96	7,878	16	1,328	

Table 16. Bottom composition of tributaries of Barachois Brook accessible to anadromous fish

Tributary	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
T1	0 to 4.8	8,400	6	boulder/rubble/gravel	504	100	504	5	25	
T2	0 to 6.4	11,300	5	boulder/rubble	565	100	565	-	-	
T3	0 to 1.9	3,400	7	rubble/gravel	238	100	238	20	48	falls at mile 1.9
T4	0 to 2.0	3,500	3	rubble/gravel	105	100	105	10	11	falls at mile 2.0
T5	0 to 1.8	3,200	5	boulder/rubble	160	100	160	-	-	
T6	0 to 1.0	1,700	9	rubble/boulder/gravel	153	100	153	5	8	falls at mile 1.0
T7	0 to 0.5	800	5	rubble/boulder	40	100	40	-	-	
T8	0 to 1.2	2,100	3	rubble/boulder/sand	63	100	63	30	19	falls at mile 1.2
T9	0 to 1.2	2,100	7	boulder/rubble	147	100	147	-	-	
<b>Total</b>		<b>33,500</b>			<b>1,975</b>	<b>100</b>	<b>1,975</b>		<b>111</b>	

### SUMMARY

Six partial obstructions are located on the main stem of Barachois Brook. Although all appear to be passable, they present serious difficulty to salmon migration at periods of low discharge.

Barachois Brook system contains 10,042 rearing units (Table 18) which has the potential to produce 1,000 to 3,000 Atlantic salmon per year.

Barachois Brook provides approximately 800 fish to the sport creel each year. There has been a slight increase in angling pressure over the past nine years. However, the angling catch has shown a gradual downward trend. A comparison of rearing potential and angling catch shows that restrictions are necessary on the angling catch to prevent a decline in fish stocks.

### RECOMMENDATIONS

1. Remedial work to be carried out on obstructions #1, #2, #3, #4, and #5. Blasting and/or channel required at all obstructions. Further investigations should be carried out at obstruction #6 to determine extent of obstruction to fish migration.
2. An angling quota of 600 salmon be enforced on Barachois Brook system.

Table 17. Estimated Atlantic salmon smolt production and adult sea survival of accessible areas of Barachois Brook. Area enclosed includes most accepted values for production.

If smolt production		1	2	3
per 100 yds <sup>2</sup> is:		10,042	20,084	30,126
Smolt produced				
Adult return if sea survival is:	5%	502	1,004	1,506
	10%	1,004	2,008	3,013
	15%	1,506	3,013	4,519
	20%	2,008	4,017	6,025
	25%	2,511	5,021	7,532

Table 18. Summary of bottom composition of Barachois Brook and tributaries accessible to anadromous fish.

Units	Accessible	Inaccessible	Total
Total system	10,348	-	10,348
Rearing	10,042	-	10,042
Spawning	1,448	-	1,448

3. Strict surveillance be maintained on the extensive logging operations and any other developments in the area. Guidelines provided by Water Resources Group (included in Summary of this report) should be followed.

Fig. 13. Partial obstruction #1, Crabbs River, gorge section,  
at mile 17.9

Fig. 14. Obstruction #3, at mile 24.9, Crabbs River

Fig.18 . Typical rearing area, lower reaches, Barachois Brook.

Fig.19. Rearing area, middle reaches, Barachois Brook.

Fig.20. Obstruction #1 at mile 9.0 from the mouth, Barachois Brook.

Fig.21. Obstruction #4, at mile 19.0 from the mouth, Barachois Brook.

Fig. 22. Mouth of Barachois Brook (upstream view).

ROBINSONS RIVER

W-40-92

Location: 48°14'55"N, 58°49'07"W St. George's Bay

Map Reference: St. Fintan's 12B/2 W,E  
Dashwood Pond 12B/1 W,E

GENERAL DESCRIPTION

Drainage Area: 169.5 miles<sup>2</sup> (439.0 km<sup>2</sup>) Mean Width of 48.0 miles  
Drainage Area: (77.2 km)

Axial Length: 31.7 miles (51.0 km)

Max. Basin Relief: 2,050 ft. (624.8 meters) Basin Perimeter: 90.0 miles  
(144.9 km)

Length of Main Stem: 38.9 miles (62.6 km)<sup>1</sup>

Number of Major Tributaries: 14

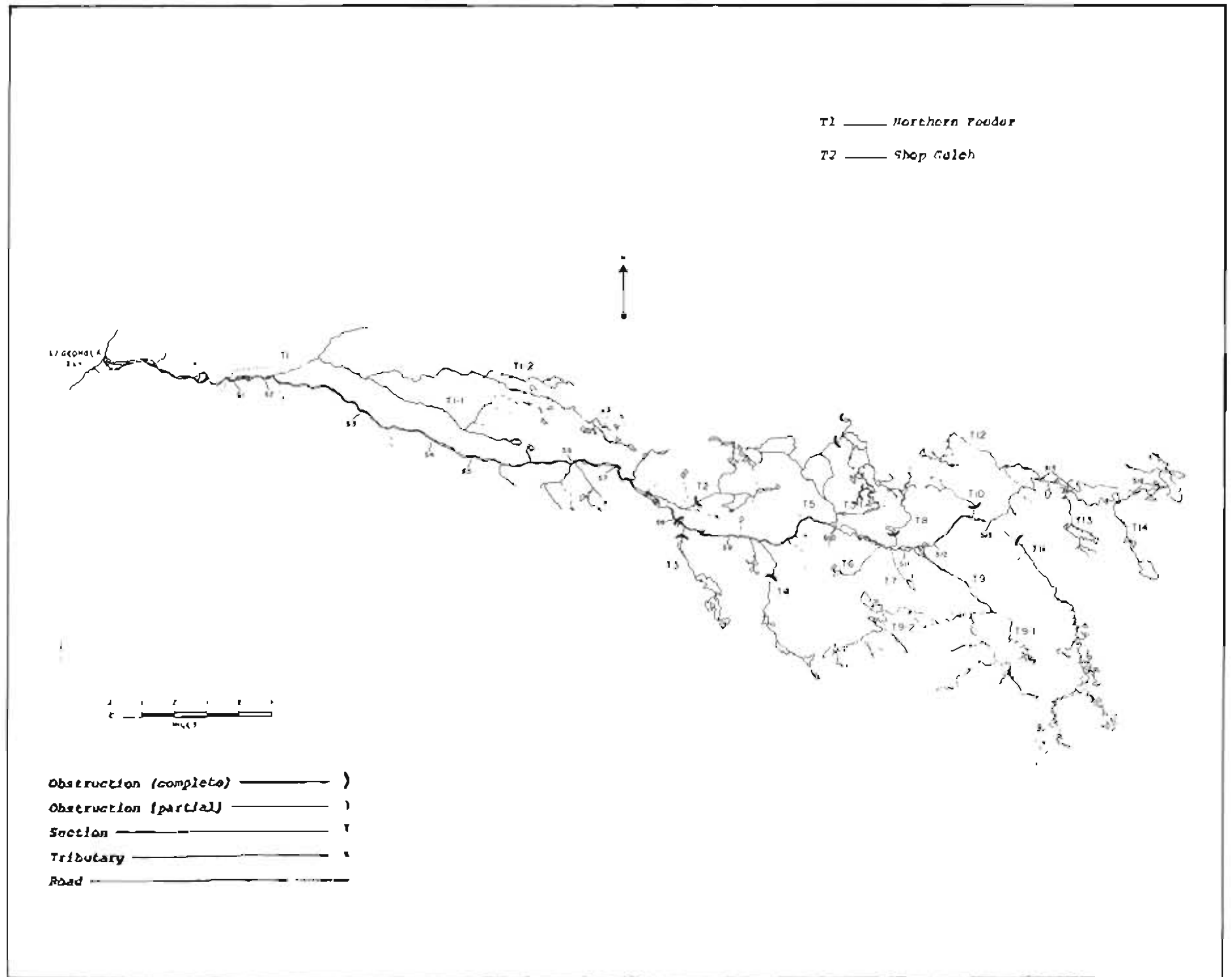
Total Length of Tributaries: 122.8 miles (197.7 km)

Area of Lakes (>1 mile<sup>2</sup>): Nil

Robinsons River (Fig. 23) originates in the Long Range Mountains and flows into St. George's Bay near the community of Robinsons. Typical of several rivers in the area, it is subject to extreme fluctuations in discharge due to small quantity of standing water in its system. When the survey was carried out in July, approximately 80 percent of the riverbed was covered with water. The lower and middle reaches are gently sloped and forested to the river's edge with spruce, balsam fir and alders (Fig. 24), which provides shade to potential rearing areas. The upper reaches of the drainage area are relatively barren.

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<sup>1</sup>Measurements include standing water



Fish Populations

Escapement of Atlantic salmon into Robinsons River usually begins in late May or early June and reaches a peak about mid-July. It is a popular river for salmon fishing because of its many good pools and easy access via Trans-Canada Highway and numerous woods roads.

The mean recorded salmon angling catch for Robinsons River, 1963 to 1973 is 801 (Table 19). however, this creel census is estimated to be 75 percent accurate (J. Marshall, personal communications). A more realistic mean angling catch would be 1,068 fish per year. The angling catch has drastically decreased since 1965 from about 0.8 fish per rod day to about 0.4 fish per rod day.

Table 19. Atlantic salmon angling catch, Robinsons River, 1964 - 1973 inclusive.

	Total catch	Mean catch per year	Total weight,(lb)	Mean weight per fish (lb)
Grilse	6,733	673	22,800	3.4
Salmon	1,279	128	10,254	8.0
Total	8,012	801	33,054	4.1

OBSTRUCTIONS

The main stem of Robinsons River has one complete obstruction and two partial obstructions. Obstruction #1, at mile 19.1 from the

mouth is a falls 30-35 feet high; 55-60 feet long at a 60° angle (Fig. 25). This falls is a complete obstruction at all water levels and appears to require the construction of a fishway to render it passable to salmon migrants. A preliminary engineering survey was carried out on this obstruction in 1968.

Obstruction #2, approximately 100 yards upstream from obstruction #1 consists of three vertical drops of 6, 7 and 4 feet respectively. (Fig. 26). All three falls appear passable at all water levels but the two lower drops require blasting to remove overhanging ledges.

Obstruction #3, at mile 19.8 from the mouth is a vertical falls approximately 10 feet high (Fig. 27). This obstruction appears passable from the air but required further investigation from the ground for a more accurate assessment.

Several tributaries of Robinsons River are blocked by high impassable falls (Table 20). The rearing habitat above these obstructions is not sufficient to justify remedial work.

Table 20. Obstructions on tributaries of Robinsons River

Tributary	Type of Obstruction	Description	Location (miles from mouth)	Barrier to fish passage
T2	falls	height 40'	1.4	complete
T3	falls	height 50'	0.2	complete
T4	falls	height 30'	1.4	complete
T5	falls	height 50'	3.5	complete
T8	falls	height > 15'	0.9	complete
T10	falls	height > 15'	0.5	complete
T11	falls	height > 15'	1.0	complete

#### BOTTOM COMPOSITION

Robinsons River system contains large areas of riverbed suitable for rearing salmon parr (Tables 21, 22, 23, and 24). The river system is subject to extreme fluctuations in discharge and during low water levels approximately 20 percent of the riverbed is dry. Those areas have not been included in the estimation of rearing units.

#### POTENTIAL POPULATION ESTIMATES

It is estimated that the accessible area of Robinsons River system has the potential to produce a total of 16, 100 to 32,300 smolt and an adult sea survival of 1,600 to 4,800 salmon (Table 25).

It is estimated that the inaccessible areas of Robinsons River system, excluding areas above total obstruction on tributaries, has the potential to produce a total of 9,809 to 19,618 smolt and an adult sea survival of 981 to 2,943 salmon (Table 26).

#### PHOTOS ON FILE

<u>Description</u>	<u>Figure No.</u>	<u>File No.</u>
Tributary (2 slides)	-	159
Tributary Falls (slide)	-	160
Obstructions #1, #2, #3 (8 slides)	-	161
Rapids, Falls, etc. (6 slides)	-	162
Obstructions #1, #2, #3 (3 slides)	-	995
Rearing Area (slide)	24	995
Obstructions #1, #2 (6 prints)	-	876

Table 21. Bottom composition of main stem of Robinsons River accessible to anadromous fish

Section	Location (miles)	Length (yds)	Mean Width (yds)	Bottom Type	Total Units	Rearing		Spawning		Comments
						%	Units	%	Units	
1	0 to 4.0	7,000	60	rubble/gravel/boulder	4,200	100	4,200	10	420	
2	4.0 to 5.1	2,000	35	rubble/gravel	700	100	700	30	210	
3	5.1 to 8.4	6,000	30	rubble/boulder	1,800	100	1,800	-	-	
4	8.4 to 10.7	4,000	90	boulder/rubble	3,600	100	3,600	5	180	
5	10.7 to 12.1	2,500	35	gravel/rubble	875	100	875	60	525	
6	12.1 to 15.7	5,500	25	rubble/boulder	1,375	100	1,375	10	138	
7	15.7 to 16.3	2,500	35	gravel/steadies	875	50	438	20	175	
8	16.3 to 19.1	5,000	40	gravel/rubble	2,000	100	2,000	50	1,000	Falls at Mile 19.1
Total		34,500			15,425	97	14,988	17	2,648	

Table 23 . Bottom composition of main stem of Robinsons River inaccessible to anadromous fish.

Section	Location (miles)	Length (yds)	Mean Width (yds)	Bottom Type	Total Units	Rearing		Spawning		Comments
						%	Units	%	Units	
9	19.1 to 21.1	3,500	27	boulder/rubble/bedrock	945	95	898	-	-	Falls at mile 19.1
10	21.1 to 25.1	7,000	40	rubble/gravel	2,800	100	2,800	30	560	Falls at mile 19.8
11	25.1 to 27.4	3,000	40	steadies	1,200	-	-	-	-	
12	27.4 to 28.3	1,500	33	gravel/rubble	495	100	495	90	446	
13	28.3 to 30.3	3,500	27	boulder/rubble	945	100	945	-	-	
14	30.3 to 32.7	8,000	17	boulder/rubble	510	100	510	-	-	
15	32.7 to 33.6	1,500	17	boulder/rubble	255	100	255	-	-	
16	35.4 to 36.3	1,500	10	boulder/rubble	150	100	150	-	-	
<b>Total</b>		<b>29,500</b>			<b>7,300</b>	<b>83</b>	<b>6,053</b>	<b>14</b>	<b>1,006</b>	

Table 22. Bottom composition of tributaries of Robinsons River accessible to anadromous fish

Tributary	Location (miles)	Length (yds)	Mean Width (yds)	Bottom Type	Total Units	Rearing		Spawning		Comments
						%	Units	%	Units	
T1-S1	0 to 3.1	5,500	8	rubble/boulder/gravel	440	100	440	5	22	
T1-S2	3.1 to 7.1	7,000	5	rubble/gravel/boulder	350	100	350	5	18	
T1-S3	7.1 to 10.8	6,500	2	rubble/gravel/boulder	130	100	130	-	-	
T1-1-S1	0 to 3.4	6,000	3	boulder/rubble	180	100	180	50	90	
T1-1-S2	3.4 to 5.4	3,500	2	steadies	70	-	-	-	-	
T2	0 to 1.4	2,500	5	rubble/boulder/gravel	50	100	50	10	5	Falls at mile 1.4
Total		31,000			1,220	94	1,150	11	135	

Table 24. Bottom composition of tributaries of Robinsons River inaccessible to anadromous fish.

Tributary	Location (miles)	Length (yds)	Mean Width (yds)	Bottom Type	Total Units	Rearing		Spawning		Comments
						%	Units	%	Units	
T3-S1	0 to 0.2	300	7	boulder/rubble	21	100	21	-	-	falls-mile 0.2
T4-S1	0 to 1.4	2,500	15	rubble/gravel/boulder	375	100	375	30	113	
T5-S1	0 to 1.1	2,000	10	boulder/rubble	200	100	200	-	-	
T5-S2	2.4 to 3.5	2,000	8	boulder/rubble	160	100	160	-	-	falls-mile 3.5
T5-1	0 to 0.9	1,500	2	boulder/rubble	30	100	30	-	-	
T5-2	0 to 0.9	1,500	8	rubble/boulder	120	100	120	-	-	
T6	0 to 1.5	2,700	15	steadies	405	-	-	-	-	
T7	0 to 1.1	2,000	15	steadies	300	-	-	-	-	
T8-S1	0 to 0.9	1,500	7	boulder/rubble	105	100	105	-	-	
T9-S1	0 to 5.0	8,800	15	boulder/rubble	1,320	100	1,320	-	-	
T9-S2	5 to 7.0	3,500	13	rubble/boulder	455	100	455	5	23	
T9-1	0 to 1.1	2,000	5	boulder/rubble	100	100	100	-	-	
T9-2	0 to 1.4	2,500	7	boulder/rubble	175	100	175	-	-	
T10-S1	0 to 0.5	800	5	boulder/rubble	40	100	40	-	-	falls-mile 0.5
T11-S1	0 to 1.0	1,800	8	boulder/rubble	144	100	144	-	-	falls-mile 1.2
T12-S1	0 to 1.1	2,000	5	boulder/rubble/gravel	100	100	100	10	10	
T12-S2	1.1 to 3.1	3,500	5	boulder/rubble	175	100	175	-	-	
T13-S1	0 to 1.1	2,000	5	rubble/boulder	100	100	100	-	-	
T14-S1	0 to 1.9	3,400	4	boulder/rubble	136	100	136	-	-	
Total		46,300			4,461	84	3,756	33	146	

Table 25. Estimated Atlantic salmon smolt production and adult sea survival of accessible areas of Robinsons River. Area enclosed includes most accepted values for production.

If smolt production				
per 100 yds <sup>2</sup> is:				
Smolt produced		1	2	3
		16,138	32,276	48,414
Adult return if sea survival is:	5%	807	1,614	2,421
	10%	1,614	3,228	4,841
	15%	2,421	4,841	7,262
	20%	3,228	6,455	9,683
	25%	4,038	8,069	12,104

Table 26. Estimated Atlantic salmon smolt production and adult sea survival of inaccessible areas of Robinsons River. Area enclosed includes most accepted values of production.

If smolt production				
per 100 yd <sup>2</sup> is:				
Smolt produced		1	2	3
		9,809	19,618	29,427
Adult return if sea survival is:	5%	490	981	1,471
	10%	981	1,962	2,943
	15%	1,471	2,943	4,414
	20%	1,962	3,924	5,885
	25%	2,452	4,905	7,357

SUMMARY AND CONCLUSION

One complete and two partial obstructions are located on the main stem of Robinsons River. There is no further investigation required at partial obstructions until engineering survey is carried out on the complete obstructions. Fish passage on several of the tributaries is blocked by complete obstructions.

Robinsons River system contains 16,138 accessible and 9,809 inaccessible rearing units (Table 27). The potential adult productions are 1,614 to 4,841 and 981 to 2,943 respectively.

Table 27. Summary of accessible and inaccessible rearing and spawning habitat of Robinsons River.

Units	Accessible	Inaccessible	Total
Total system	16,645	11,761	28,406
Rearing	16,138	9,809	25,947
Spawning	2,783	1,039	3,822

The estimated mean annual angling catch in Robinsons River is 1,280 salmon. It has also been noted that the angling success has decreased in the past five years. It is evident, from comparisons of angling catch and potential production, that the salmon in Robinsons River are over-exploited. The sport fishery harvest should not be more than 700 salmon.

RECOMMENDATIONS

1. Fishway be constructed at obstruction #1.
2. If obstruction #1 is made passable to salmon then remedial work should be carried out at obstruction #2. Investigations at ground level would also be required at obstruction #3 to determine the extent that fish passage is blocked.
3. Angler harvest on Robinsons River be restricted to a quota of 700 salmon.
4. Strict surveillance should be maintained on all development and logging in the drainage basin. Guidelines provided by Water Resources Group of Resource Development Branch should be adhered to (see Summary of this report).

Fig. 24. Typical section of rearing area, Robinsons River.

Fig. 25. Obstructions #1, Robinsons River, 19.1 miles from mouth.

Fig. 26. Obstruction #2, Robinsons River, 100 yards above  
obstruction #1.

Fig. 27 . Obstruction #3,Robinsons River, 19.8 miles from  
the mouth.

Fig. 28. Spawning area below obstruction #1, Robinsons River.

JOURNOIS BROOK

W-40-99

Location: 48°21'20"N, 58°41'18"W St. George's Bay  
Map Reference: Main Gut 12B/8W  
Flat Bay 12B/7E

GENERAL DESCRIPTION

Drainage Area: 24.9 miles<sup>2</sup> (64.5 km<sup>2</sup>) Mean width of 1.2 miles  
Drainage Area: (1.9 km)  
Axial Length: 12.1 miles (19.5 km)  
Max. Basin Relief: 1,250 ft. (381.0 m) Basin Perimeter: 28.1 miles  
(45.2 km)  
Length of Main Stem: 11.0 miles (17.7 km)<sup>1</sup>  
Number of Major Tributaries: Nil  
Total Length of Tributaries: Nil  
Area of Lakes (> 1 mile<sup>2</sup>): Nil

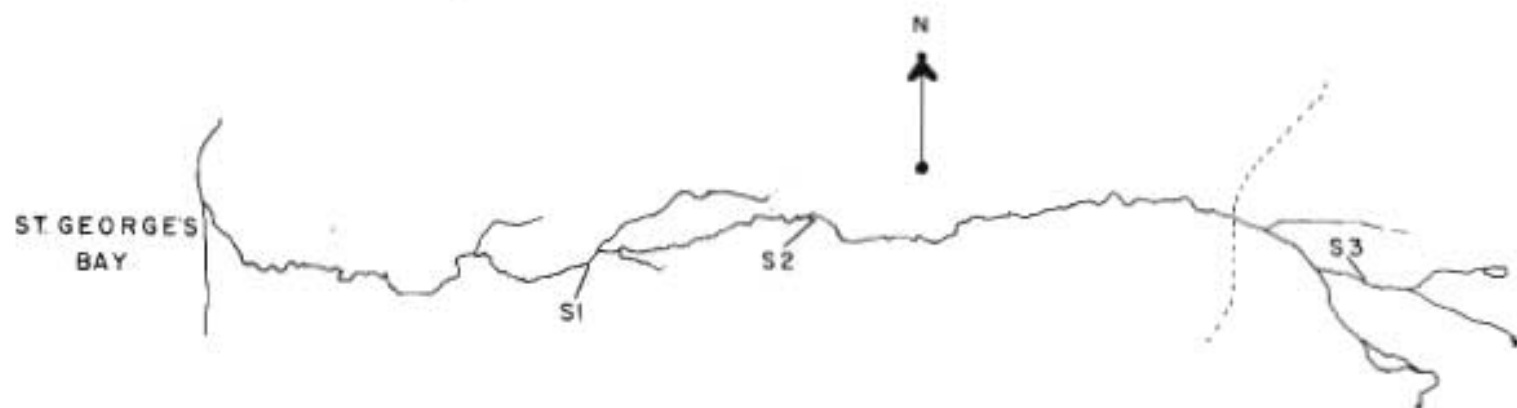
Journois Brook (Fig. 29) flows west from the base of the Long Range Mountains and flows into the east side of St. George's Bay. This small brook flows through low bog land and has a narrow strip of white birch, spruce and alders along its riverbank (Fig. 30). The tributaries are short and dry during most of the year.

Fish Population

There are no angling data available for Journois Brook. The stream appears to be capable of supporting a large brook trout population. Apparently Atlantic salmon do not utilize Journois Brook.

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<sup>1</sup>Measurements include standing water.



- Falls (complete) ————— )
- Falls (partial) ————— )
- Section ————— S
- Tributary ————— T
- Road ————— - - - - -

Fig. 29. Journois Brook system. Line from section number indicates end of section.

### OBSTRUCTIONS

Journois Brook has no obstructions.

### BOTTOM COMPOSITION

The total area of Journois Brook (1,042 units) is potential rearing area for Atlantic salmon (Table 28). The strip of spruce and alder at the stream's edge provides excellent shade to potential rearing habitat

### POTENTIAL POPULATION ESTIMATES

Journois Brook has the potential to produce 1,042 to 2,084 smolt resulting in a possible 104 to 312 adult salmon (Table 29).

### PHOTOS ON FILE

<u>Description</u>	<u>Figure No.</u>	<u>File No.</u>
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### SUMMARY AND CONCLUSIONS

Journois Brook has no obstructions. It has 1,042 accessible parr rearing units having the potential to produce 100-300 adult

Table 28. Bottom composition of main stem of Journois Brook accessible to anadromous fish.

Section	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
1	0 to 3.4	5,900	9	gravel/rubble	531	100	531	70	372	
2	3.4 to 5.4	3,500	5	rubble/gravel/boulder	175	100	175	40	70	
3	5.4 to 10.2	8,400	4	rubble/boulder/gravel	336	100	336	20	67	
Total		17,800			1,042	100	1,042	49	509	

Atlantic salmon per year. However, there is no evidence of a salmon population in this brook.

Table 29. Estimated Atlantic salmon smolt production and adult sea survival of accessible are of Journois Brook. Area enclosed includes most accepted values of production.

If smolt production per 100 yds. <sup>2</sup> is:		1	2	3
Smolt produced		1,042	2,084	3,126
Adult return if sea survival is:	5%	52	104	156
	10%	104	208	313
	15%	156	312	469
	20%	208	417	625
	25%	261	521	782

#### RECOMMENDATIONS

1. Development and logging operations in the area should conform to the guidelines provided by the Water Resources Group of the Resource Development Branch (see Summary of this report).

Fig. 30. Typical shaded spawning area, middle reaches, Journois Brook.

Fig. 31 Rearing area, middle reaches, Journois Brook.

FLAT BAY BROOK

W-41-108

Location: 48°24'00"N, 58°33'32"W Flat Bay, St. George's Bay

Map Reference: Flat Bay 12B/7E  
 Main Gut 12B/8 W,E  
 Puddle Pond 12A/5 W  
 Dashwood Pond 12B/1 E  
 King George IV Lake 12A/4 W

GENERAL DESCRIPTION

Drainage Basin: 245.4 miles<sup>2</sup> (635.5 km<sup>2</sup>) Mean width of 6.9 miles  
 Drainage Area: (11.1 km)

Axial Length: 32.5 miles (52.3 km)

Max. Basin Relief: 1,950 ft. (594.4 m) Basin Perimeter: 104.7 miles  
 (168.5 km)

Length of Main Stem: 33.9 miles (54.5 km)<sup>1</sup>

Number of Major Tributaries: 9

Total Length of Tributaries: 149.5 miles (240.5 km)<sup>1</sup>

Area of Lakes (> 1 mile<sup>2</sup>): Dennis Pond L1 1.1 miles<sup>2</sup> (704.0 acres)  
 Long Pond L2 1.0 miles<sup>2</sup> (640.0 acres)  
 Cross Pond L3 1.1 miles<sup>2</sup> (704.0 acres)  
 L4 1.0 miles<sup>2</sup> (640.0 acres)

Flat Bay Brook (Fig. 32) flows west from the Long Range Mountains entering Flat Bay in the east side of St. George's Bay. The river is wide and shallow for most of its length with low or gently sloped banks (Figs. 33 and 34).

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<sup>1</sup>Measurements include standing water

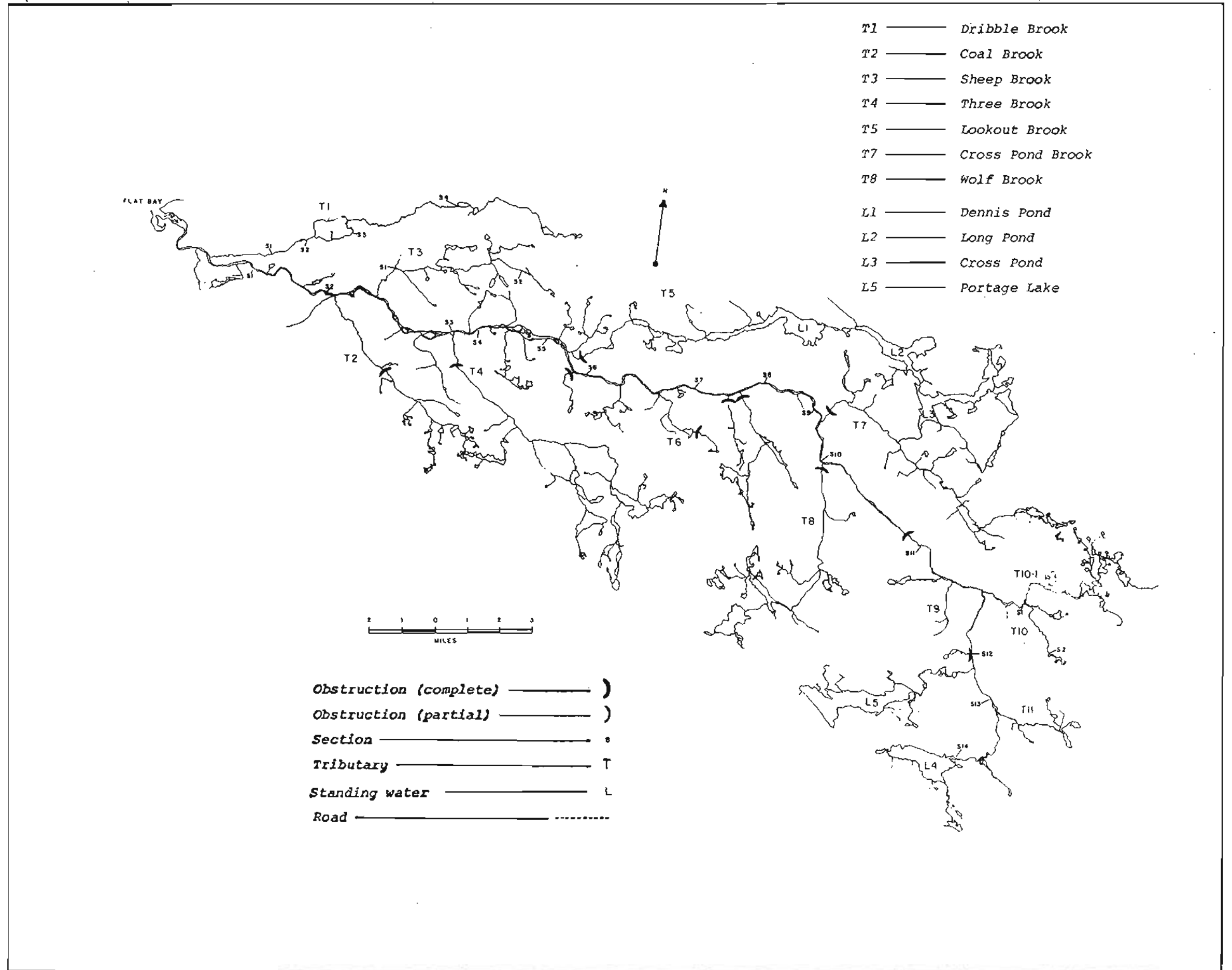


Fig. 32. Flat Bay Brook system showing obstruction locations. Line from section number indicates end of section.

Fish Population

Flat Bay Brook is accessible to anglers for about half its length via a power company road and the Trans-Canada Highway. The remainder is accessible only by foot or aircraft. The river has been subject to a mean angling pressure of 1,896 rod days since 1963 and since that time the angling catch has decreased from 1.3 fish per rod day to 0.4 fish per rod day in 1973.

The mean recorded salmon catch, 1963-1973 is 1,161 (Table 30); however, the creel census is estimated to be only 80 percent accurate (J. Marshall, personal communication). A more realistic mean angling catch would be 1,451 fish per year.

Table 30. Atlantic salmon angling catch, Flat Bay Brook, 1963-1973 inclusive.

	Total catch	Mean catch per year	Total weight (lb)	Mean weight per fish (lb)
Grilse	11,830	1,076	42,178	3.6
Salmon	940	85	7,764	8.3
Total	12,770	1,161	49,942	3.9

OBSTRUCTIONS

Flat Bay Brook has one obstruction on the main stem. It is a complete obstruction, located in a two mile long gorge approximately

28.0 miles from the mouth and consists of two sections of dry river-bed where the water either flows underground or through broken rock (Fig. 35). Further investigation is required as this obstruction was viewed from the air only.

The river is very shallow for much of its length and at periods of low discharge migrating fish are delayed at various locations throughout the system.

A number of tributaries are blocked by impassable falls (Table 31) but insufficient rearing habitat exist upstream to warrant further consideration.

Table 31. Obstructions on tributaries of Flat Bay Brook.

Tributary	Type of Obstruction	Description (height)	Location miles from mouth	Barrier to fish passage
T2	Falls	40-50'	2.8	Complete
T3	Falls (2)	8-10'	1.1	Passable
T4	Falls	20'	1.0	Complete
T5	Falls	-	near mouth	Complete
T7	Falls	50'	0.4	Complete
T8	Falls	20'	near mouth	Complete

Table 32. Bottom composition of main stem of Flat Bay Brook accessible to anadromous fish.

Section	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
1	0 to 4.4.	7,700	50	boulder/rubble	3,850	100	3,850	2	77	
2	4.4 to 6.9	4,400	37	boulder/rubble	1,700	100	1,700	-	-	
3	6.9 to 11.3	7,700	58	gravel/sand	4,466	20	893	20	893	
4	11.3 to 11.9	1,000	50	steadies	500	-	-	-	-	
5	11.9 to 14.3	4,200	75	gravel/sand	3,150	90	2,835	90	2,552	
6	14.3 to 16.1	3,100	50	boulder/rubble	1,550	100	1,550	-	-	
7	16.1 to 19.8	6,500	42	rubble/boulder	2,730	100	2,730	5	136	
8	19.8 to 20.8	1,800	30	boulder/rubble	540	100	540	5	27	
9	20.8 to 22.6	3,200	40	rubble/gravel	1,280	100	1,280	40	512	
10	22.6 to 24.4	3,100	30	rubble/boulder	930	100	930	15	140	
11	24.2 to 27.4	5,600	17	boulder	952	100	952	-	-	Dry riverbed at mile 28.0
<b>Total</b>		<b>48,300</b>			<b>21,648</b>	<b>80</b>	<b>17,260</b>	<b>20</b>	<b>4,337</b>	

#### BOTTOM COMPOSITION

Flat Bay Brook was surveyed in July; the river was at medium discharge. It is possible that during low discharge, portions of the rearing habitat included in the potential estimates (Tables 32, 33, 34 and 35) are dry.

Flat Bay Brook has 17,260 rearing units and 4,337 spawning units (Table 32). Accessible tributaries have 1,893 potential rearing units (Table 33). Inaccessible areas of Flat Bay Brook have approximately 1,848 rearing units (Table 34). Tributaries inaccessible to Atlantic salmon contain 689 rearing units but no significant spawning areas (Table 35).

#### POTENTIAL POPULATION ESTIMATES

It is estimated that the accessible area of Flat Bay Brook has the potential to annually produce a total of 19,000 to 38,000 Atlantic salmon smolt, resulting in an expected 1,900 - 5,700 adults returning to the fishery (Table 36).

It is estimated that the inaccessible areas of Flat Bay Brook have the potential to produce 2,500 to 5,000 Atlantic salmon smolt and an adult sea survival of 250 to 760 fish per year (Table 37).

Table 34. Bottom composition of main stem of Flat Bay Brook inaccessible to anadromous fish.

Section	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
12	28.0 to 32.3	7,700	14	boulder/rubble	1,078	100	1,078	10	108	
13	32.4 to 34.4	3,500	10	boulder	350	100	350	-	-	
14	34.4 to 36.8	4,200	10	boulder/rubble	420	100	420	1	4	
Total		15,400			1,848	100	1,848	6	112	

Table 33. Bottom composition of tributaries of Flat Bay Brook accessible to anadromous fish.

Tributary	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
T1-S1	0 to 2.0	3,500	10	rubble/boulder	350	100	350	2	7	
T1-S2	2.0 to 3.2	2,100	7	rubble/gravel/boulder	147	100	147	25	37	
T1-S3	3.2 to 4.8	2,800	8	rubble/boulder	224	100	224	5	11	
T1-S4	4.8 to 7.2	4,200	5	rubble/boulder/gravel	210	100	210	20	42	
T2	0 to 2.8	4,900	5	rubble/boulder/gravel	245	100	245	20	49	Falls at mile 2.8
T3-S1	2.8 to 4.0	2,100	5	rubble/gravel	105	100	105	10	11	
T3-S2	4.0 to 7.7	6,500	4	boulder/rubble	260	100	260	-	-	
T4	0 to 1.0	1,700	10	rubble/boulder	170	100	170	-	-	Falls at mile 1.0
T6	0 to 1.6	2,800	3	rubble/boulder	84	100	84	-	-	Falls at mile 1.6
T7	0 to 0.4	700	14	boulder/rubble	98	100	98	-	-	Falls at mile 0.4
Total		31,300			1,893	100	1,893	8	157	

Table 35. Bottom composition of tributaries of Flat Bay Brook inaccessible to anadromous fish.

Tributary	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
T9	0 to 1.9	3,400	3	boulder/rubble	102	100	102	-	-	
T10-S1	0 to 1.2	2,100	8	boulder/rubble	168	100	168	-	-	
T10-S2	1.2 to 2.4	2,100	3	boulder/rubble	63	100	63	-	-	
T10-1	0 to 1.1	2,000	5	boulder/rubble	100	100	100	-	-	
T11	0 to 1.8	3,200	8	boulder/rubble	256	100	256	-	-	
Total		12,800			689	100	689			

Table 36. Estimated Atlantic salmon smolt production and adult sea survival of accessible areas of Flat Bay Brook. Area enclosed includes most accepted values of production.

If smolt production				
per 100 yds. <sup>2</sup> is:				
<u>Smolt produced</u>				
		<u>1</u>	<u>2</u>	<u>3</u>
		19,153	38,306	57,459
Adult return if sea survival is:	5%	958	1,915	2,873
	10%	1,915	3,831	5,746
	15%	2,873	5,746	8,619
	20%	3,831	7,661	11,492
	25%	4,788	9,577	14,365

Table 37. Estimated Atlantic salmon smolt production and adult sea survival of inaccessible area of Flat Bay Brook. Area enclosed includes most accepted values of production.

If smolt production				
per 100 yds. <sup>2</sup> is:				
<u>Smolt produced</u>				
		<u>1</u>	<u>2</u>	<u>3</u>
		2,537	5,074	7,611
Adult return if sea survival is:	5%	127	254	381
	10%	254	507	761
	15%	381	761	1,141
	20%	507	1,015	1,522
	25%	634	1,269	1,903

PHOTOS ON FILE

<u>Description</u>	<u>Figure Number</u>	<u>File Number</u>
Rearing Area Upper reaches (print)	34	862
Spawning Area Middle reaches (print)	-	862
Rearing Area, Upper reaches (print)	-	862
Rearing/Spawning Area Lower reaches (print)	-	862

SUMMARY AND CONCLUSIONS

There is one complete obstruction on the main stem of Flat Bay Brook which requires an engineering survey. Fish passage in several tributaries is blocked by impassable falls.

Flat Bay Brook system contains 19,000 accessible rearing units with the capacity to produce 1,900 to 5,700 Atlantic salmon adult per year and 2,500 inaccessible rearing units capable of producing 250 to 760 Atlantic salmon adults each year (Table 38).

Table 38. Summary of accessible and inaccessible rearing and spawning habitat of Flat Bay Brook.

<u>Units</u>	<u>Accessible</u>	<u>Inaccessible</u>	<u>Total</u>
Total system	23,541	2,537	26,078
Rearing	19,153	2,537	21,690
Spawning	4,494	112	4,606

The estimated mean annual angling catch for Flat Bay Brook is 1,451 Atlantic salmon. It has also been noted that the angling catch per unit effort has decreased by 66 percent since 1963. It appears that this brook is over exploited and requires a reduction in harvest.

#### RECOMMENDATIONS

1. Engineering survey to be undertaken to determine remedial work required at complete obstruction. If extensive work is required remedial work should be given low priority.
2. Angler harvest on Flat Bay Brook be limited to a quota of 1,000 salmon per year.
3. Strict surveillance should be maintained on all development and logging in the area. Guidelines provided by Water Resources Group of Resource Development Branch should be adhered to. (See Summary of this report).

Fig. 33. Spawning/rearing area, middle reaches, Flat Bay Brook.

Fig. 34. Rearing habitat, upper reaches, Flat Bay Brook.

Fig. 35. Complete obstruction #1, at mile 28.0 from mouth,  
Flat Bay Brook (section of 2 mile gorge)

Fig. 36. Rearing habitat, approximately 1.5 miles upstream  
from mouth, Flat Bay Brook.

LITTLE BARACHOIS BROOK

W-41-111

Location: 48°26'40"N, 58°26'30"W Flat Bay, St. George's Bay  
Map Reference: Main Gut 12B/8 W,E  
Puddle Pond 12A/5 W

GENERAL DESCRIPTION

Drainage Area: 136.8 miles<sup>2</sup> (354.3 km<sup>2</sup>)      Mean width of 3.6 miles  
Axial Length: 34.1 miles (54.9 km)              Drainage Area: (5.8 km)  
Max. Basin Relief: 1,900 ft. (579.1 m)      Basin Perimeter: 95.4 miles  
Length of Main Stem: 49.1 miles (79 km)<sup>1</sup>              (153.5 km)  
Number of Major Tributaries: 5  
Total Length of Tributaries: 70.6 miles (113.6 km)<sup>1</sup>  
Area of Lakes (>1 mile<sup>2</sup>): Nil

Little Barachois Brook (Fig. 37) flows southwest from the Long Range Mountains and enters St. George's Bay near the community of St. George's.

The riverbank of the lower and middle reaches is flat and densely forested with white birch, spruce, balsam fir and alders to the stream's edge (Figs. 38 and 39). This forest cover provides excellent shade to potential rearing areas. The dense forest cover extends into the upper reaches with the riverbank becoming steep and the stream extremely narrow. Logging operations are carried out on some sections of the watershed, and some timber has been removed from the riverbank.

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<sup>1</sup>Measurements include standing water

Fish Populations

Fish species found in Little Barachois Brook include salmon and brook trout. Angling is generally confined from the mouth to the middle reaches. A provincial park is located in the middle reaches and intense angling pressure occurs during the upstream salmon migration in mid-July.

The mean recorded annual angling catch for Little Barachois Brook is 196 (Table 39), however this creel census is estimated to be only 65 percent accurate (J. Marshall, personal communication). A more realistic mean angling catch would be 300 fish per year. The angling catch per rod day has remained relatively stable over the past eleven years.

Table 39. Atlantic salmon angling catch, Little Barachois Brook 1963-1973 inclusive.

	Total catch	Mean catch per year	Total weight (lb)	Mean weight per fish (lb)
Grilse	2,015	183	6,872	3.4
Salmon	143	13	1,189	8.3
Total	2,158	196	8,061	3.7

OBSTRUCTIONS

Little Barachois Brook has four partial obstructions and one complete obstruction (obstruction #3) on the main stem.

Obstruction #1, at mile 19.5 from the mouth consists of two falls with overall height of 11-12'. The lower falls is 6 feet high at a 55° angle and the upper falls is 5-6 feet vertical. There is a large pool between the two falls (Fig. 40). Blasting to remove an overhanging ledge and several rock outcrops would improve fish passage.

Obstruction #2, at mile 24.6 from the mouth is a 5 foot vertical drop. It is a "hold-up" to migrating fish at low discharge and requires blasting to confine water (Fig. 41).

Obstruction #3, at mile 26.7 from the mouth, is 40 feet high over two 20 foot vertical drops (Fig. 42). It is impractical to construct fish passage facilities at this obstruction because of the high cost of fishways and the limited rearing potential upstream from the falls.

Obstruction #4 and #5 are 7 and 8 foot vertical drops located at mile 27.5 and mile 28.5 from the mouth respectively. They are located above the complete obstruction #3 and require no further investigation with regard to remedial work.

Seven of the 12 tributaries of Little Barachois have obstructions which are complete barriers to salmon migration (Table 40). Five of these are less than one mile from the confluence of the tributary and Little Barachois Brook. Tributaries #4, 6, 7 and 8 were dry or intermittent at the time of survey.

Table 4Q Obstruction on tributaries of Little Barachois Brook.

Tributary	Type of Obstruction	Description	Location (miles from mouth)	Barrier to fish passage
T2	Falls	Height 50'-75'	3.9	Complete
T3	Falls	Height 15'	1.8	Complete
T5	Falls	Height 50'	near mouth	Complete
T9	Falls	Height 50'	0.8	Complete
T10	Falls	Height > 15'	near mouth	Complete
T11	Falls	Height > 15'	near mouth	Complete
T12	Falls	Height 20'	near mouth	Complete

#### BOTTOM COMPOSITION

Little Barachois Brook was surveyed in July during which time 15 percent of the riverbed was dry. This area was not included in the units estimated to be suitable area rearing salmon parr. Total accessible and inaccessible rearing units are 8,498 and 1,627 units respectively (Tables 41, 42, 43, and 44).

#### POTENTIAL POPULATION ESTIMATES

It is estimated that the accessible area of Little Barachois Brook has the potential to annually produce 8,500 to 17,000 Atlantic salmon smolt. Assuming 10 to 15 percent sea survival, adult production before entry to the fishery would be 850 to 2,550 salmon per year (Tables 45).

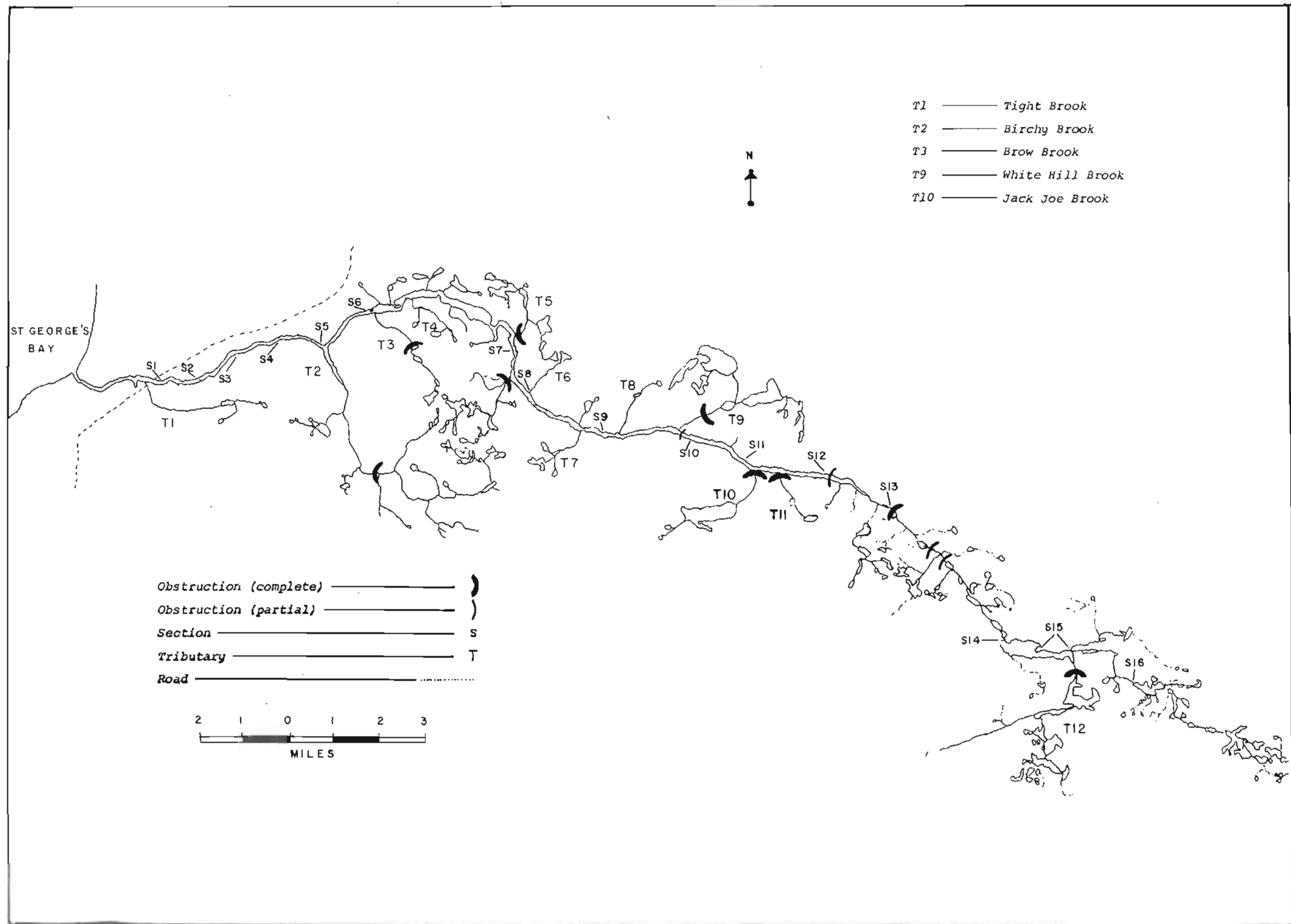


Fig. 37. Little Barchois Brook system showing obstruction locations. Line from section number indicates end of section.

Table 41. Bottom composition of main stem of Little Barachois Brook accessible to anadromous fish.

Section	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
1	0 to 2.4	4,200	17	gravel/rubble	714	100	714	70	500	
2	2.4 to 3.6	2,100	17	gravel/rubble	357	100	357	70	250	
3	3.6 to 4.4	1,400	14	rubble/gravel	196	100	196	30	59	
4	4.4 to 5.6	2,100	14	steady	294	-	-	-	-	
5	5.6 to 7.4	3,100	17	gravel/rubble	527	100	527	60	316	
6	7.4 to 8.6	2,100	27	rubble/boulder	567	100	567	-	-	
7	12.8 to 14.2	2,500	34	gravel/rubble	850	100	850	60	510	
8	14.2 to 15.5	2,300	20	rubble/boulder	460	100	460	-	-	
9	15.5 to 17.9	4,200	22	gravel/rubble/boulder	924	100	924	40	370	
10	17.9 to 20.5	4,500	20	boulder/rubble/gravel	900	100	900	10	90	falls at mile 19.5
11	20.5 to 21.7	2,100	17	steadies	357	-	-	-	-	
12	21.9 to 24.5	4,900	24	gravel/rubble/boulder	1,176	100	1,176	50	588	falls at mile 24.6
13	24.5 to 26.7	3,700	17	boulder/rubble	629	100	629	-	-	falls at mile 26.7
Total		39,200			7,951	92	7,300	34	2,683	

Table 42. Bottom composition of tributaries of Little Barabois Brook, accessible to anadromous fish.

Tributary	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
1	0 to 3.6	6,300	3	boulder/rubble	189	100	189	-	-	
2-S1	0 to 1.8	3,200	14	rubble/boulder	448	100	448	5	22	
2-S2	1.8 to 3.1	2,300	10	boulder/rubble	230	100	230	-	-	
2-S3	3.1 to 3.9	1,400	10	rubble/gravel	140	100	140	30	42	falls at mile 3.9
3	0 to 1.8	3,100	3	boulder/rubble	93	100	93	-	-	falls at mile 1.8
9	0 to 0.8	1,400	7	rubble/boulder	98	100	98	-	-	falls at mile 0.8
Total		17,700			1,198	100	1,198	5	64	

Table 43. Bottom composition of main stem Little Barachois Brook inaccessible to anadromous fish.

Section	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
14	26.7 to 30.7	7,000	14	boulder/rubble	980	100	980	-	-	falls at mile 27.5 and mile 28.5
15	30.7 to 31.6	1,500	14	boulder/rubble	210	100	210	-	-	
16	31.6 to 34.0	4,200	7	boulder/rubble	294	100	294	-	-	
Total		12,700			1,484	100	1,484			

Table 44. Bottom composition of tributaries of Little Barachois Brook inaccessible to anadromous fish.

Tributary	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
12	0 to 0.6	1,100	13	boulder/rubble	143	100	143	-	-	falls at 0.6
Total		1,100			143	100	143			

The inaccessible areas of Little Barachois Brook has the potential to produce 1,600 to 3,200 Atlantic salmon smolt and an adult sea survival of 160 to 500 salmon per year (Table 46).

#### PHOTOS ON FILE

<u>Description</u>	<u>Figure No.</u>	<u>File No.</u>
Obstruction #1 (slide)	40	1
Obstruction #1 (print)	40	858
Rearing habitat (print)	-	858
Spawning habitat (print)	-	858

#### SUMMARY AND CONCLUSIONS

There are four partial and one complete obstruction on the main stem of Little Barachois Brook. Obstructions #1 and #2 are downstream from the complete obstruction and require remedial work. Remedial work is not necessary in the tributaries due to small amount of suitable rearing area above the obstructions.

Little Barachois Brook has 8,500 accessible rearing units and 1,627 inaccessible units (Table 47). The potential Atlantic salmon production is 850 to 2,550 and 160 to 500 respectively. The Atlantic salmon in Little Barachois Brook is presently being harvested at maximum sustained yield. An increase in exploitation would be detrimental to the salmon population.

Table 45. Estimated Atlantic salmon smolt production and adult sea survival of accessible areas of Little Barachois Brook. Enclosed area includes most accepted production estimates.

If smolt production per				
100 yds. <sup>2</sup> is:		1	2	3
Smolt produced		8,498	16,996	25,494
Adult return if sea survival is:	5%	425	850	1,275
	10%	850	1,700	2,550
	15%	1,275	2,550	3,824
	20%	1,700	3,399	5,099
	25%	2,125	4,259	6,374

Table 46. Estimated Atlantic salmon smolt production and adult sea survival of inaccessible areas of Little Barachois Brook. Enclosed area includes most accepted production estimates.

If smolt production per				
100 yds. <sup>2</sup> is:		1	2	3
Smolt produced		1,627	3,254	4,881
Adult return if sea survival is:	5%	81	163	244
	10%	163	325	488
	15%	244	488	732
	20%	325	651	976
	25%	407	813	1,220

Table 47. Summary of accessible and inaccessible rearing and spawning habitat of Little Barachois Brook.

	Accessible units	Inaccessible units	Total
Total system	9,149	1,627	10,776
Rearing	8,498	1,627	10,125
Spawning	2,747	-	2,747

#### RECOMMENDATIONS

1. An angling quota of 300 salmon per year be enforced on Little Barachois River.
2. A close check on the creel census should be maintained if a decrease in fish population becomes evident further restrictions may be necessary.
3. Remedial work to be carried out on obstruction #1 and #2 in 1974. Salmon delayed at these obstructions are very vulnerable to illegal exploitation.
4. Development and logging operations should conform with guidelines provided by the Water Resources Group of Resource Development Branch.  
(see Summary of this report).

Fig. 38. Rearing habitat, lower reaches, Little Barachois Brook.

Fig. 39. Rearing habitat, middle reaches, Little Barachois Brook.

Fig.40. Obstruction #1, at mile 19.0 from mouth, Little Barachois Brook.

Fig.41. Obstruction #2, at mile 24.0 from mouth, Little Barachois Brook.

Fig.42. Obstruction #3, at mile 26.0 from mouth, Little Barachois Brook.

Fig.43. Spawning/rearing area, downstream from Trans-Canada Highway, Little Barachois Brook.

SOUTHWEST BROOK AND BOTTOM BROOK

W-41-115

Location: 48°30'45"N, 58°16'28"W Main Gut (St. George's Bay)

Map Reference: Harry's River 12B/9 W,E  
 Little Grand Lake 12A/12 W,E  
 Paddle Pond 12A/5 W,E  
 Main Gut 12B/8 E

GENERAL DESCRIPTION

Drainage Area: 314.2 miles<sup>2</sup> (813.8 km<sup>2</sup>) Mean width of 5.9 miles<sup>2</sup>  
 Drainage Area: (9.5 km)  
 Axial Length: 33.0 miles (53.2 km)

Max. Basin Relief: 2,057 ft. (627.0 m) Basin Perimeter: 110.0 miles  
 (177.0 km)

Southwest Brook

Length of Main Stem: 43.9 miles (70.6 km)<sup>1</sup>

Number of Major Tributaries: 10

Total Length of Tributaries: 145.0 miles (233.3 km)<sup>1</sup>

Area of Lakes ( 1 mile<sup>2</sup>): L-1 2.4 miles<sup>2</sup> (1,536 acres)  
 L-2 1.4 miles<sup>2</sup> ( 896 acres)  
 L-3 2.2 miles<sup>2</sup> (1,408 acres)  
 L-4 1.0 miles<sup>2</sup> ( 640 acres)  
 L-5 3.8 miles<sup>2</sup> (2,432 acres)

Bottom Brook

Length of Main stem: 23.4 miles (37.7 km)<sup>1</sup>

Number of Major Tributaries: 9

<sup>1</sup>Measurements include standing water

Total Length of Tributaries: 97.5 miles (156.9 km)<sup>1</sup>

Area of Lakes (> 1 mile<sup>2</sup>): Nil

Southwest and Bottom Brooks (Fig. 44) flows into St. George's Bay. During the construction of the Trans-Canada Highway, 1958, Bottom Brook was diverted into Southwest Brook which previously was a separate river system.

Southwest Brook system contains a large amount of standing water; therefore, is not subject to the extreme fluctuations in discharge evident in many of the other streams in the area. Throughout the lower and middle sections of both brooks the banks are gently sloped and densely forested at the stream's edge with spruce and balsam fir (Figs. 45, 46, 47 and 48).

#### Fish Populations

Escapement of salmon into Southwest and Bottom Brooks usually begins in early May. Woods roads provide access to the lower and middle sections of both brooks. Anglers frequently fly to the headwaters and fish below the partial obstructions.

The mean recorded salmon angling catch for Southwest and Bottom Brooks, 1963 to 1973 is 855 (Table 48); however, the creel census is estimated to be 80 percent accurate (J. Marshall, personal communications). A more realistic mean angling catch would be 1,069 fish per year.

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<sup>1</sup>Measurements include standing water

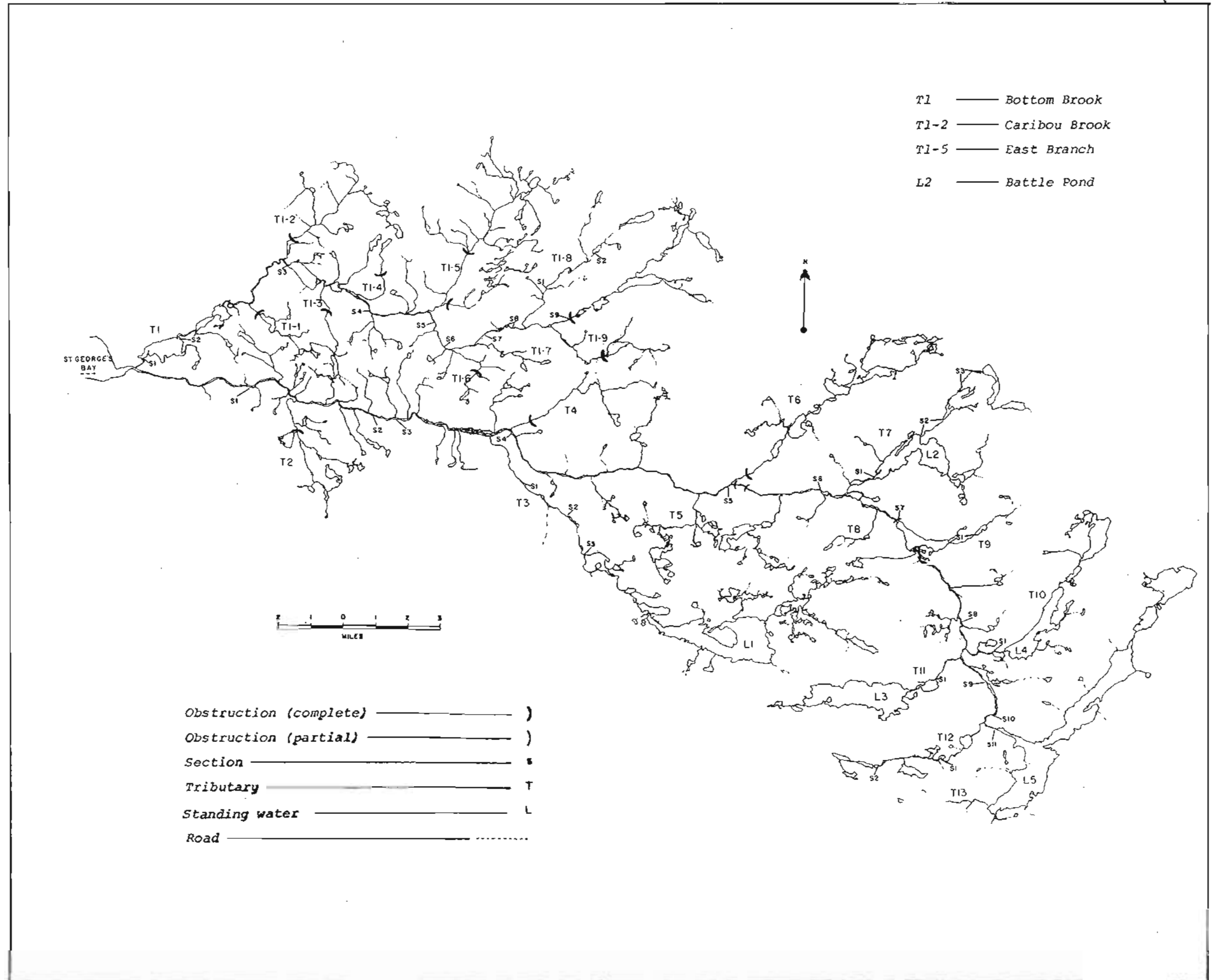


Fig. 44. Southwest Brook and Bottom Brook systems showing obstruction locations. Line from section number indicates end of section.

Table 48. Atlantic salmon angling catch, Southwest Brook and Bottom Brook, 1963-1973 inclusive.

	Total catch	Mean Catch per year	Total weight (lb)	Mean weight per fish (lb)
Grilse	7,491	681	26,585	3.5
Salmon	1,914	174	14,278	7.5
Total	9,405	855	40,863	4.3

#### OBSTRUCTIONS

##### Southwest Brook

Three partial obstructions (no complete obstructions) were located on the main stem of Southwest Brook. Obstruction #1, at mile 20.7 from the mouth, is a falls 8 feet high at a 45° angle (Fig. 49). During low discharge the water spreads thinly across the falls, resulting in salmon holding-up below the falls. Blasting a channel to confine water is required.

Obstruction #2, approximately 500 feet upstream from obstruction #1, is approximately 20 feet high at 50° angle over a length of 40 to 50 feet (Fig. 50). Fish passage is extremely difficult at all water levels. At the time of the survey, 100-200 salmon were observed below the falls. Fish were seen jumping at the left side (facing downstream) of the falls, none were successful. This is a very popular fishing location for anglers. Consequently, it is important to ease fish passage

in an effort to reduce illegal exploitation and over-harvest. This obstruction also has the potential to injure fish attempting to jump over the falls.

Obstruction #3, at mile 25.8 from the mouth (0.5 miles downstream from Silver Pond), is a wide shallow area consisting of tightly packed boulders. This is a partial barrier to salmon at low water levels (Fig. 51 ). Bulldozing or channelizing by blasting is required to improve this obstruction.

Many of the tributaries of Southwest Brook are blocked by high impassable falls (Table 49 ). The rearing habitat upstream from the falls is not sufficient to justify remedial work.

#### Bottom Brook

One complete obstruction was located on the main stem of Bottom Brook at mile 16. It is a falls approximately 30-40 feet high divided into two section each 15-20 feet high (Fig. 52 ). There is insufficient rearing habitat above the falls to warrant further investigations.

Many tributaries of Bottom Brook also contain waterfalls that are complete barriers to salmon migration (Table 50 ). Remedial work is not recommended due to the small amount of rearing habitat above the obstructions.

Table 49 . Obstructions on tributaries of Southwest Brook.

Tributary	Type of Obstruction	Description	Location (miles)	Barrier to fish passage
T-2	Falls	Height 70'	1.2	Complete
T-4	Falls	Height 70'	0.8	Complete
T-6	Falls	Height 70'	0.4	Complete

Table 50 . Obstructions on tributaries of Bottom Brook.

Tributary	Type of Obstruction	Description	Location (miles from mouth)	Barrier to fish passage
T-1-1	Falls	Height 100'	0.4	Complete
T-1-2	Falls	Height 40'	0.8	Complete
T-1-3	Falls	Height 30'	1.0	Complete
T-1-4	Falls	Height 20'	1.4	Complete
T-1-5	Falls	Height 30'	2.2	Complete
T-1-6	Falls	Height 50'	1.3	Complete
T-1-9	Falls	Height 15'	2.1	Complete

### BOTTOM COMPOSITION

Southwest Brook and Bottom Brook system contain exceptionally large areas of river bed suitable for rearing salmon parr (Tables 51, 52, 53 and 54). The main stem of Bottom Brook was not surveyed upstream from the complete obstructions near the headwaters due to insufficient amount of rearing area.

### POTENTIAL POPULATION ESTIMATES

It is estimated that Southwest Brook and Bottom Brook systems have the potential to produce a combined total of 22,700 to 45,500 smolt and an adult sea survival of 2,200 to 6,800 salmon (Table 55).

### PHOTOS ON FILE

<u>Description</u>	<u>Fig. No.</u>	<u>File No.</u>
<u>Southwest Brook</u>		
Falls #1 (slide)	49	1388
Falls #1 (print)	49	200
Falls #2 (slide)	50	1388
Falls #2 (print)	50	200
Spawning Area (print)	46	200
Spawning Area (slide)	46	1388
Rearing Area (print)	-	200
Obstruction #3 (slide)	51	1388
Obstruction #3 (print)	51	200

Table 51. Bottom composition of main stem, Southwest Brook.

Section	Location (miles)	Length (yds.)	Mean Width (yds.)	Bottom Type	Total Units	Rearing		Spawning <sup>2</sup>		Comments
						%	Units	%	Units	
1	0 to 4.2	7,500	34	boulder/rubble	2,550	100	2,550	-	-	
2	4.2 to 8.4	7,500	27	gravel/rubble	2,025	100	2,025	70	1,418	
3	8.4 to 9.5	2,000	20	steadies	400	-	-	-	-	
4	9.5 to 13.0	6,100	42	gravel/sand/rubble	2,562	80	2,050	70	1,793	
5	13.0 to 20.7	13,500	20	boulder/rubble	2,700	100	2,700	-	-	Falls at mile 20.7
6	20.7 to 23.5	4,900	20	boulder/rubble	980	100	980	15	147	Falls at mile 21.1
7	23.5 to 26.0	4,400	34	boulder/rubble	1,500	100	1,500	-	-	
8	27.0 to 29.5	4,400	20	rubble/gravel	880	100	880	40	352	
9	29.5 to 31.9	4,200	20	rubble/boulder	840	100	840	-	-	
10	31.9 to 32.9	1,800	34	steadies	612	-	-	-	-	
11	32.9 to 33.5	1,100	14	boulder/rubble	154	100	154	-	-	
Total		57,400			15,203	97	14,691	649	3,710	

<sup>2</sup>Spawning units are also included as rearing units

Table 52. Bottom composition of tributaries of Southwest Brook accessible to anadromous fish.

Tributary	Location (miles)	Length (yds.)	Mean Width (yds.)	Bottom Type	Total Units	Rearing		Spawning		Comments
						%	Units	%	Units	
T-2	0 to 1.2	2,100	7	rubble/gravel	147	100	147	10	15	Falls at mile 1.2
T-3-S-1	0 to 1.8	3,100	10	rubble/gravel	310	100	310	40	124	
T-3-S-2	1.8 to 3.7	3,400	10	rubble/gravel/ boulder	340	100	340	30	102	
T-3-S-3	3.7 to 4.7	1,700	10	rubble/boulder	170	100	170	-	-	
T-4	0 to 0.8	1,400	10	rubble/gravel	140	100	140	30	42	Falls at mile 0.8
T-6	0 to 0.4	700	14	boulder/rubble	98	100	98	-	-	Falls at mile 0.4
T-7-S-1	0 to 1.1	2,000	14	boulder/rubble	280	100	280	-	-	
T-7-S-2	1.1 to 2.1	1,700	10	boulder/rubble	170	100	170	-	-	
T-7-S-3	2.1 to 3.1	1,700	8	boulder/rubble	136	100	136	-	-	
T-9	0 to 0.8	1,400	2	rubble/boulder	28	100	28	-	-	
T-10	0 to 0.9	1,500	14	boulder/rubble	210	100	210	-	-	
T-11	0 to 1.1	2,000	14	boulder/rubble	280	100	280	-	-	
T-12-S-1	0 to 1.3	2,300	7	steadies	161	-	-	-	-	
T-12-S-2	1.3 to 3.3	3,500	6	steadies	210	-	-	-	-	
T-13-S-1	0 to 0.4	700	3	boulder/rubble	21	100	21	-	-	
T-13-S-2	0.4 to 2.4	3,500	3	steadies	105	-	-	-	-	
Total		32,700			2,806	83	2,330	10	283	

Table 53. Bottom composition of main stem Bottom Brook accessible to anadromous fish.

Tributary	Location (miles)	Length (yds.)	Mean Width (yds.)	Bottom Type	Total Units	Rearing		Spawning		Comments
						%	Units	%	Units	
T-1-S-1	0 to 0.4	700	17	boulder/rubble	119	100	119	-	-	
T-1-S-2	1.8 to 2.4	1,000	22	steadies	220	-	-	-	-	
T-1-S-3	3.5 to 6.3	5,000	17	steadies/rubble/ boulder	850	30	255	-	-	
T-1-S-4	7.3 to 9.3	3,500	34	gravel/rubble	1,190	100	1,190	80	952	
T-1-S-5	9.3 to 11.4	3,700	27	boulder/rubble	1,000	100	1,000	-	-	
T-1-S-6	11.4 to 12.4	1,800	17	boulder/rubble	306	100	306	-	-	
T-1-S-7	12.4 to 13.8	2,400	14	boulder/rubble	336	100	336	-	-	
T-1-S-8	13.8 to 14.7	1,500	10	steadies	150	-	-	-	-	
T-1-S-9	14.7 to 16.0	2,300	10	boulder/rubble	230	100	230	5	12	Falls at mile 16
Total		21,900			4,401	78	3,436	22	964	

Table 54. Bottom composition of tributaries of Bottom Brook, accessible to anadromous fish.

Tributary	Location (mile)	Length (yds.)	Mean Width (yds.)	Bottom Type	Total Units	Rearing		Spawning		Comment
						%	Units	%	Units	
T-1-1	0 to 0.4	700	5	rubble/boulder	35	100	35	-	-	Falls at mile 0.4
T-1-2	0 to 0.8	1,400	8	rubble/boulder	112	100	112	10	12	Falls at mile 0.8
T-1-3	0 to 1.0	1,700	8	rubble/boulder	136	100	136	-	-	Falls at mile 1.0
T-1-4	0 to 1.4	2,400	7	rubble/boulder	168	100	168	-	-	Falls at mile 1.4
T-1-5	0 to 2.2	3,900	14	boulder/rubble	546	100	546	-	-	Falls at mile 2.2
T-1-6	0 to 1.3	2,300	8	boulder/rubble	184	100	184	-	-	Falls at mile 1.3
T-1-7	0 to 1.6	2,800	7	boulder/rubble	196	100	196	-	-	
T-1-8-S-1	0 to 1.8	3,100	10	boulder/rubble/gravel	310	100	310	10	31	
T-1-8-S-2	1.8 to 4.2	4,200	8	boulder/rubble	336	100	336	-	-	
T-1-9	0 to 2.1	3,700	6	boulder/rubble	222	100	222	-	-	Falls at mile 2.1
Total		26,200			2,245	100	2,245	2	43	

<u>Description</u>	<u>Fig. No.</u>	<u>File No.</u>
<u>Bottom Brook</u>		
Section 3 (print)	-	200
Section 4: Spawning Area (print)	48	200
Section 5: Rearing Area (print)	47	200
Falls #1 (print)	45	200
Channel Construction (2 prints)	-	200

Table 55. Estimated Atlantic salmon smolt production and adult sea survival of Southwest Brook and Bottom Brook. Area enclosed includes most accepted values for production.

If smolt production				
per 100 yds. <sup>2</sup> is:				
Smolt produced	<u>1</u>	<u>2</u>	<u>2</u>	
	22,702	45,404	68,106	
Adult return if sea survival is:	5%	1,135	2,270	3,405
	10%	2,270	4,540	6,811
	15%	3,405	6,811	10,216
	20%	4,540	9,080	13,621
	25%	5,676	11,351	17,026

#### SUMMARY AND CONCLUSIONS

Three partial obstructions were located on the main stem of Southwest Brook. Two of these are major barriers to salmon migrations and require immediate attention. There are no complete obstructions on the main stem of Southwest Brook. Bottom Brook has one complete obstruction

near its headwaters. Many of the tributaries of both brooks contain complete obstructions.

Southwest Brook and Bottom Brook systems contain a total of 22,700 rearing units (Table 56) which have the potential to produce 2,200 to 6,800 adults.

Table 56. Summary of bottom composition of Southwest Brook and Bottom Brook and tributaries accessible to anadromous fish.

Section	Total Units	Rearing Units	Spawning Units
Southwest Brook (main stem)	15,203	14,691	3,710
Southwest Brook (tributaries)	2,806	2,330	283
Bottom Brook (main stem)	4,401	3,436	964
Bottom Brook (tributaries)	2,245	2,245	43
Total	24,655	22,702	5,000

These river systems are very important to the recreational fisheries, providing approximately 1,100 fish to the sports creel each year.

RECOMMENDATIONS

1. Engineering surveys be undertaken on Southwest Brook in 1974 to determine the feasibility of remedial work on obstructions #1, #2 and #3.
2. If remedial work is feasible it should be given top priority.
3. Strict surveillance should be maintained on all development or logging in the area. Guidelines provided by the Water Resource Group (included in Summary of this report) should be followed. In the event that easily eroded material is used for road construction in the vicinity of streams then rip-rapping with rocks or logs should be required as a precaution against silting of streams.
4. Recreational fishery be restricted to an annual quota of 1,000 fish.

Fig.45. Rearing area, typical of lower reaches, Southwest Brook.

Fig. 46. Spawning/rearing area, middle reaches, Southwest Brook.

Fig. 47. Typical section of rearing area, main stem, Bottom Brook.

Fig. 48. Typical section of spawning area, main stem, Bottom Brook.

Fig. 49. Obstruction #1 at mile 20.7 from mouth, Southwest Brook.

Fig. 50. Obstruction #2, 500 feet above obstruction #1, Southwest Brook.

Fig. 51. Obstruction #3, Southwest Brook, 1/2 mile below  
Silver Pond.

Fig. 52. Obstruction #1, Bottom Brook, 16.0 miles from the mouth.

HARRY'S RIVER

W-41-120

Location: 48°30'45"N, 58°25'00"W Main Gut (St. George's Bay)  
Map Reference: Harry's River 12B/9 W,E  
Serpentine 12B/16 W,E  
Corner Brook 12A/13 W

GENERAL DESCRIPTION

Drainage Basin: 315.0 miles<sup>2</sup> (815.9 km<sup>2</sup>) Mean width of 7.4 miles  
Drainage Area: (11.9 km)  
Axial Length: 36.4 miles (58.6 km)  
Max. Basin Relief: 1,957 ft. (596.6 m) Basin Perimeter: 113.2 miles  
(182.1 km)  
Length of Main Stem: 43.8 miles (70.5 km)<sup>1</sup>  
Number of Major Tributaries: 14  
Total Length of Tributaries: 350.0 miles (563.2 km)<sup>1</sup>  
Area of Lakes (>1 mile<sup>2</sup>): L1 1.0 miles<sup>2</sup> (640.0 acres)  
L2 6.1 miles<sup>2</sup> (3,904.0 acres)  
L3 1.5 miles<sup>2</sup> (960.0 acres)  
L4 2.6 miles<sup>2</sup> (1,664.0 acres)

Harry's River (Fig. 53) flows into St. George's Bay near the community of Stephenville Crossing. Although the river contains a considerable amount of standing water extreme fluctuations in discharge is evident. The lower and middle reaches flow through marshy lowlands (Fig. 54). The upper reaches are generally densely forested with balsam fir, spruce and white birch (Fig. 55).

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<sup>1</sup>Measurements include standing water

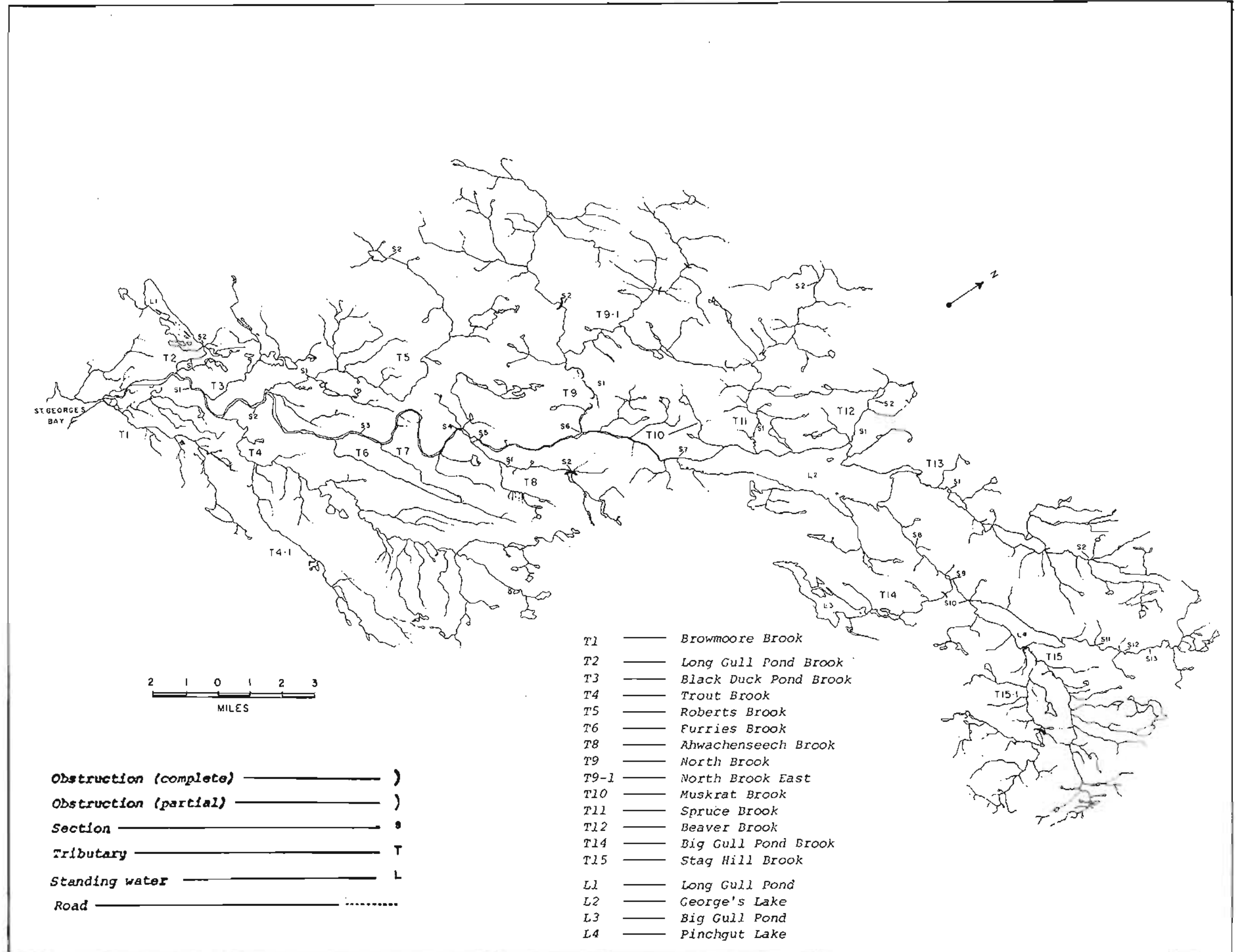


Fig. 53. Harry's River system showing stream obstruction locations. Line from section number indicates end of section.

Fish Populations

This river supports populations of Atlantic salmon, ouananiche, brook trout, Arctic char, American eels, smelt and sea trout. (Seabrook 1962; Downer, 1968).

Escapement of Atlantic salmon into Harry's River usually begins in late June and reaches a peak by mid-July. The river is accessible to anglers for most of its length via woods road and Trans-Canada Highway.

The angling catch data for all sections of Harry's River has been combined and presented as one total (Table 57). The mean recorded angling catch for Harry's River, 1963-1973 is 1,560 (Table 57); however, the creel census is estimated to be only 65-70 percent accurate (J. Marshall, personal communication). A more realistic mean angling catch would be 2,300 adults per year.

Table 57. Atlantic salmon angling catch, Harry's River, 1963-1973 inclusive.

	Total catch	Mean catch per year	Total weight (lb)	Mean weight per fish (lb)
Grilse	14,788	1,344	51,599	3.5
Salmon	2,376	216	20,924	8.8
Total	17,164	1,560	72,523	4.2

The angling catch per rod day has decreased by about 43 percent in the past 11 years. Catch per rod day in 1963 was 0.7 fish; whereas in 1973 it was only 0.4 fish.

Downer (1968) estimated the escapement of salmon into Harry's River in 1967 to be 2,002  $\pm$  500.

### OBSTRUCTIONS

There are no obstructions to anadromous fish on the main stem of Harry's River. Several tributaries have obstructions; however, remedial work is recommended only on tributary #14 (Table 58). Remedial work would consist of blasting two overhanging ledges.

Table 58. Obstructions on tributaries of Harry's River.

Tributary	Type of obstruction	Description (height)	Location (miles from mouth)	Barrier to fish passage
T8	Dam		3.2	Complete
T9	Falls	30' - 40'	4.7	Complete
T9-1	Falls	8'	4.1	Partial
T9-1	Falls	8' - 10'	5.1	Partial
T14	Falls	5' - 8'	1.0	Partial
T15-1	Falls	15' - 20'	2.4	Complete

#### BOTTOM COMPOSITION

Harry's River has a large concentration of "spawning gravel" in the lower reaches; however, it appears, from results of several surveys, that it is not utilized by Atlantic salmon to any great extent. The areas of riverbed in the upper reaches and tributaries appear to provide suitable conditions for egg disposition.

The main stem of Harry's River (including Pinchgut Brook) has an estimated 20,250 potential rearing units and 5,250 spawning units for Atlantic salmon (Table 59). Fourteen tributaries have an estimated 11,552 potential rearing units and 2,082 spawning units (Table 60). Downer (1968) estimated approximately 40,000 rearing units accessible to Atlantic salmon. The variation in the two estimates is attributed to the two methods in surveying.

#### POTENTIAL POPULATION ESTIMATES

It is estimated that the Harry's River system has the potential to produce a total of 31,600 to 63,100 smolt. The adult sea survival is estimated to be 3,200 to 9,500 salmon (Table 61). Downer (1968) calculated a smolt production to be 80,000 and escapement of adults to the river to be 3,200. This indicates that Harry's River is producing at 3/4 its potential.

Table 59. Bottom composition of main stem of Harry's River accessible to anadromous fish.

Section	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
1	0 to 4.1	7,300	58	gravel/rubble	4,234	100	4,234	70	2,964	
2	4.1 to 6.9	4,900	50	rubble/boulder/gravel	2,450	100	2,450	25	613	
3	6.9 to 11.2	7,600	50	rubble/gravel/boulder	3,800	100	3,800	30	1,140	
4	11.2 to 16.3	8,900	42	rubble/boulder	3,738	100	3,738	5	187	
5	16.3 to 17.1	1,400	50	rubble/gravel	700	100	700	30	210	
6	17.1 to 20.4	5,800	42	boulder/rubble	2,436	100	2,436	1	24	
7	20.4 to 23.7	5,800	27	boulder/rubble	1,566	100	1,566	-	-	
8	30.1 to 32.2	3,700	13	rubble/boulder/gravel	481	100	481	10	48	
9	32.2 to 33.2	1,800	10	rubble/gravel	180	100	180	30	54	
10	33.2 to 36.6	2,300	10	rubble/boulder	230	100	230	-	-	
11	39.6 to 40.6	2,100	5	boulder/rubble	105	100	105	5	5	
12	40.6 to 41.7	2,000	5	boulder/rubble	100	100	100	5	5	
13	41.7 to 42.5	1,400	5	steady	70	-	-	-	-	
Total		55,000			20,090	99.6	20,020	26	5,250	

Table 60. Cont'd.

Tributary	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
Brought Forward		124,300			10,629		10,198		1,827	
T13-S3	2.1 to 5.3	5,600	5	boulder/rubble	280	100	280	5	14	
T13-1		3,800	5	boulder/rubble	190	100	190	5	10	
T14	0 to 2.4	4,200	7	rubble/boulder	294	100	294	10	29	falls at mile 1.0
T15-S1	0 to 1.7	3,000	7	gravel/rubble	210	100	210	60	126	
T15-S2	1.7 to 6.0	7,600	5	rubble/boulder/gravel	380	100	380	20	76	
Total		148,500			11,983	96	11,552	17	2,082	

Table 60. Bottom composition of tributaries of Harry's River accessible to anadromous fish.

Tributary	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
F1	0 to 4.9	8,600	3	rubble/boulder	258	100	258	5	13	
F2-S1	0 to 0.7	1,300	3	rubble/boulder	39	100	39	-	-	
F2-S2	0.7 to 1.4	1,300	3	steadies	39	-	-	-	-	
F3	0 to 2.4	4,200	7	rubble/gravel	294	100	294	40	118	
F4	0 to 16.5	29,000	10	rubble/gravel/boulder	2,900	100	2,900	30	870	
F4-1	0.6 to 4.3	8,400	10	rubble/boulder/gravel	840	100	840	30	252	
F5-S1	0 to 1.6	2,800	13	rubble/boulder	364	100	364	10	36	
F5-S2	0 to 9.7	17,000	8	rubble/boulder	1,360	100	1,360	15	204	
F6	0 to 3.2	5,600	3	rubble/boulder	168	100	168	-	-	
F8-S1	0 to 1.1	2,000	5	rubble/gravel	100	100	100	30	30	
F8-S2	1.1 to 3.2	3,700	5	steadies	185	-	-	-	-	dam at mile 3.2
F9-S1	0 to 1.8	3,100	23	rubble/gravel/boulder	713	100	713	20	143	
F9-S2	1.8 to 4.7	5,100	20	boulder/rubble	1,020	100	1,020	-	-	falls at mile 4.7
F9-1	0 to 5.1	9,000	10	boulder/rubble	900	100	900	-	-	falls at mile 4.1 and 5.1
F10	0 to 1.9	3,400	3	steadies	102	-	-	-	-	
F11-S1	0 to 1.3	2,300	7	gravel/rubble	161	100	161	70	113	
F11-S2	1.3 to 7.4	10,700	7	rubble/boulder	749	100	749	5	37	
F12-S1	0 to 0.6	1,000	5	rubble/boulder	50	100	50	-	-	
F12-S2	0.6 to 1.8	2,100	5	steadies	105	-	-	-	-	
F13-S1	0 to 1.3	2,300	8	rubble/boulder/rubble	184	100	184	5	9	
F13-S2	1.3 to 2.1	1,400	7	boulder/rubble	98	100	98	2	2	
Sub-total		124,300			10,629		10,198		1,827	

Table 61. Estimated Atlantic salmon smolt production and adult sea survival of accessible areas of Harry's River. Area enclosed includes most accepted values for production.

If smolt production					
per 100 yds. <sup>2</sup> is:					
Smolt produced		1	1.75	2	3
		31,572	63,144	94,716	
Adult return if sea survival is:	5%	1,579	3,157	4,736	
	10%	3,157	6,314	9,472	
	15%	4,736	9,472	14,207	
	20%	6,314	12,628	18,943	
	25%	7,893	15,786	23,679	

PHOTOS ON FILE

<u>Description</u>	<u>Fig. No.</u>	<u>File No.</u>
Dam (Pinchgut Lake) (print)	-	2
Log Dam (Stag Hill Brook) (print)	-	123
Log Jam (Stag Hill Brook) (print)	-	124
Log Jam (Harry's River) (print)	-	125
Dam (Gull Pond) (print)	-	191
Gull Pond Brook (print)	-	192
Obstruction (Beaver Pond Brook) (print)	-	193
Main Stem (print)	-	857
Main Stem (print)	56	857
Tributary #4 (print)	57	857
Pinchgut Dam Fishway (slide)	-	472
Remedial Work (slide)	-	964
River Photos (4 slides)	-	969

### SUMMARY AND CONCLUSIONS

There are no obstructions on the main stem of Harry's River. Tributary #14 has a partial obstruction which requires remedial work. Several other tributaries are blocked by impassable falls.

Harry's River system contains 31,572 accessible rearing units (Table 62) with a potential adult production of 3,200 to 9,500 fish per year.

Table 62. Summary of accessible rearing and spawning habitat of Harry's River.

Units	Accessible	Inaccessible	Total
Total system	32,073	-	32,073
Rearing	31,572	-	31,572
Spawning	7,332	-	7,332

Harry's River system provides approximately 2,000 fish to the sport creel each year. A decline in the catch percent effort is evident. It appears that the population of Harry's River is endangered and should be more closely managed.

### RECOMMENDATIONS

1. Remedial work should be carried out at partial obstruction on tributary #14. However, this should be low priority due to the small amount of rearing area affected.

2. Sports harvest should be restricted to 1,500 fish.
3. Strict surveillance should be maintained on all development and logging in the drainage area. Guidelines provided by Water Resources Group of Resource Development Branch should be adhered to. (See Summary of this report).

Fig.54. Rearing/spawning area, middle reaches of Harry's River.

Fig.55. Rearing area approximately 5 miles downstream from  
George's Lake, Harry's River.

Fig. 56. Spawning gravel, typical of the 1st three sections of Harry's River.

Fig. 57. Typical bottom composition, tributary #4, Harry's River.

ROMAINES BROOK

W-41-130

Location: 48°33'05"N, 58°40'25"W St. George's Bay

Map Reference: Harry's River 12B/9 W  
Stephenville 12B/10 E

GENERAL DESCRIPTION

Drainage Area: 38.0 miles<sup>2</sup> (98.4 km<sup>2</sup>)      Mean width of 2.9 miles  
Drainage Basin: (4.8 km)  
Axial Length: 16.1 miles (25.9 km)  
Max. Basin Relief: 1,801 ft. (548.9 m)      Basin Perimeter: 38.0 miles  
(61.1 km)  
Length of Main Stem: 18.6 miles (29.9 km)<sup>1</sup>  
Number of Major Tributaries: 2  
Total Length of Tributaries: 17.1 miles (27.5 km)<sup>1</sup>  
Area of Lakes (>1 mile<sup>2</sup>): Nil

Romaines Brook (Fig. 58) originates on the Lewis Hills, flows southward and enters St. George's Bay west of the community of Kippens. The stream has no standing water on its system and is subject to extreme fluctuations in discharge. The riverbank is flat with dense growth of alders inter-mixed with white birch and balsam fir (Fig. 59).

Fish Populations

Romaines Brook is not a scheduled Atlantic salmon stream. There is no angling data available but it is believed to support a small population of salmon. Brook trout appears to be the major fish species present.

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<sup>1</sup>Measurements include standing water

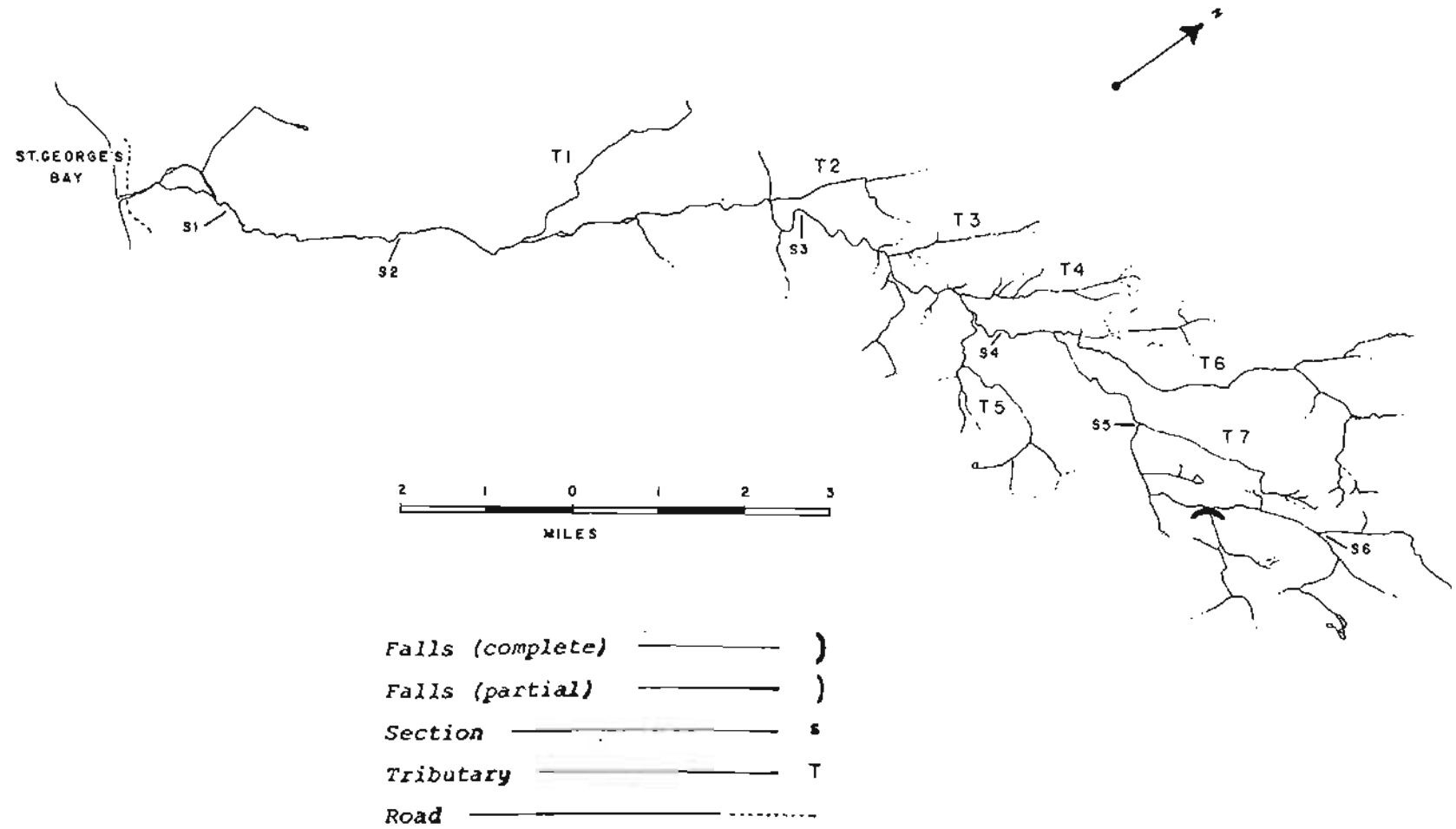


Fig. 58. Romaines Brook system. Line from section number indicates end of section.

### OBSTRUCTIONS

There are no major obstructions on the main stem of Romaines Brook; however, at low discharge more than 40 percent of the riverbed is dry. This would cause delays in migration in many sections of the brook due to shallow water.

### BOTTOM COMPOSITION

This stream was surveyed in July, at which time 40-50 percent of the riverbed was dry. This area was not used in area of spawning and rearing habitat. The main stem contains 2,752 rearing units (Table 63). The only two significant tributaries contained 238 rearing units (Table 64).

### POTENTIAL POPULATION ESTIMATES

Romaines Brook has the potential to annually produce 3,000 to 6,000 smolt resulting in an expected 300 to 900 adult salmon (Table 65).

### PHOTOS ON FILE

<u>Description</u>	<u>Figure Number</u>	<u>File Number</u>
River mouth (slide)	-	4
Lower reaches (print)	-	859
Middle reaches (print)	-	859

Table 63. Bottom composition of main stem of Romaines Brook accessible to anadromous fish.

Section	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
1	0 to 1.6	2,800	14	gravel	392	100	392	100	392	
2	1.6 to 3.8	3,900	10	rubble/gravel	390	100	390	30	117	
3	3.8 to 9.0	9,200	10	rubble/gravel/boulder	920	100	920	30	276	
4	9.0 to 12.2	5,600	10	boulder/rubble/gravel	560	100	560	15	84	
5	12.2 to 14.2	3,500	7	rubble/gravel	245	100	245	20	49	
6	14.2 to 17.0	4,900	5	boulder/rubble	245	100	245	-	-	
Total		29,900			2,752	100	2,752	33	918	

Table 64. Bottom composition of tributaries of Romaines Brook accessible to anadromous fish.

Tributary	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
T5	0 to 0.8	1,400	3	rubble/boulder	42	100	42	-	-	
T6	0 to 2.8	4,900	4	rubble/boulder	196	100	196	-	-	
Total		6,300			238	100	238			

Table 65. Estimated Atlantic salmon smolt production and adult sea survival of accessible areas of Romaines Brook. Area enclosed includes most accepted values of production.

If smolt production per 100 yds <sup>2</sup> is:		1	2	3
Smolt produced		2,990	5,980	8,970
	5%	150	299	449
	10%	299	598	897
	15%	449	897	1,346
	20%	598	1,196	1,794
	25%	748	1,495	2,243
Adult return if sea survival is:				

#### SUMMARY AND CONCLUSIONS

There are no obstructions on the main stem of Romaines Brook but low discharge may retard upstream fish migration due to shallow water in many areas.

The stream has 3,000 rearing units with the potential to produce 300 to 900 Atlantic salmon per year.

Although Romaines Brook has the potential to produce salmon, conditions such as low discharge may be preventing significant build-up in population size.

RECOMMENDATIONS

1. Development and logging operations should conform to the guidelines provided by Water Resources Group of the Resource Development Branch. (See Summary of this report).

Fig.59. Rearing habitat, middle reaches, Romaines Brook.

Fig.60. Spawning gravel at mile 0.5 from mouth, Romaines Brook.

Fig.61. Rearing habitat, lower reaches, Romaines Brook

FOX ISLAND RIVER

W-43-192

Location: 48°41'30"N, 58°40'14"W North of East Bay,  
Port au Port Bay.  
Map Reference: Stephenville 12B/10E  
Harry's River 12B/9W  
Serpentine 12B/16W

GENERAL DESCRIPTION

Drainage Area: 75.0 miles<sup>2</sup> (194.3 km<sup>2</sup>) Mean width of 3.6 miles  
Drainage Basin: (5.8 km)  
Axial Length: 18.9 miles (30.4 km)  
Max. Basin Relief: 2,672 ft. (814.4 m) Basin Perimeter: 47.0 miles  
(75.6 km)  
Length of Main Stem: 22.7 miles (36.5 km)<sup>1</sup>  
Number of Major Tributaries: 5  
Total Length of Tributaries 75.9 miles (122.1 km)<sup>1</sup>  
Area of Lakes (>1 mile<sup>2</sup>): Nil

Fox Island River (Fig. 62) originates in the Lewis Hills, flows southwest and enters Port au Port Bay north of East Bay. The river has only a small quantity of standing water and is probably subject to extreme fluctuation in discharge. The river banks are steep and densely forested in the lower reaches (Fig. 63) but toward the headwaters they become gently sloped and barren (Fig. 64).

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<sup>1</sup>Measurements include standing water

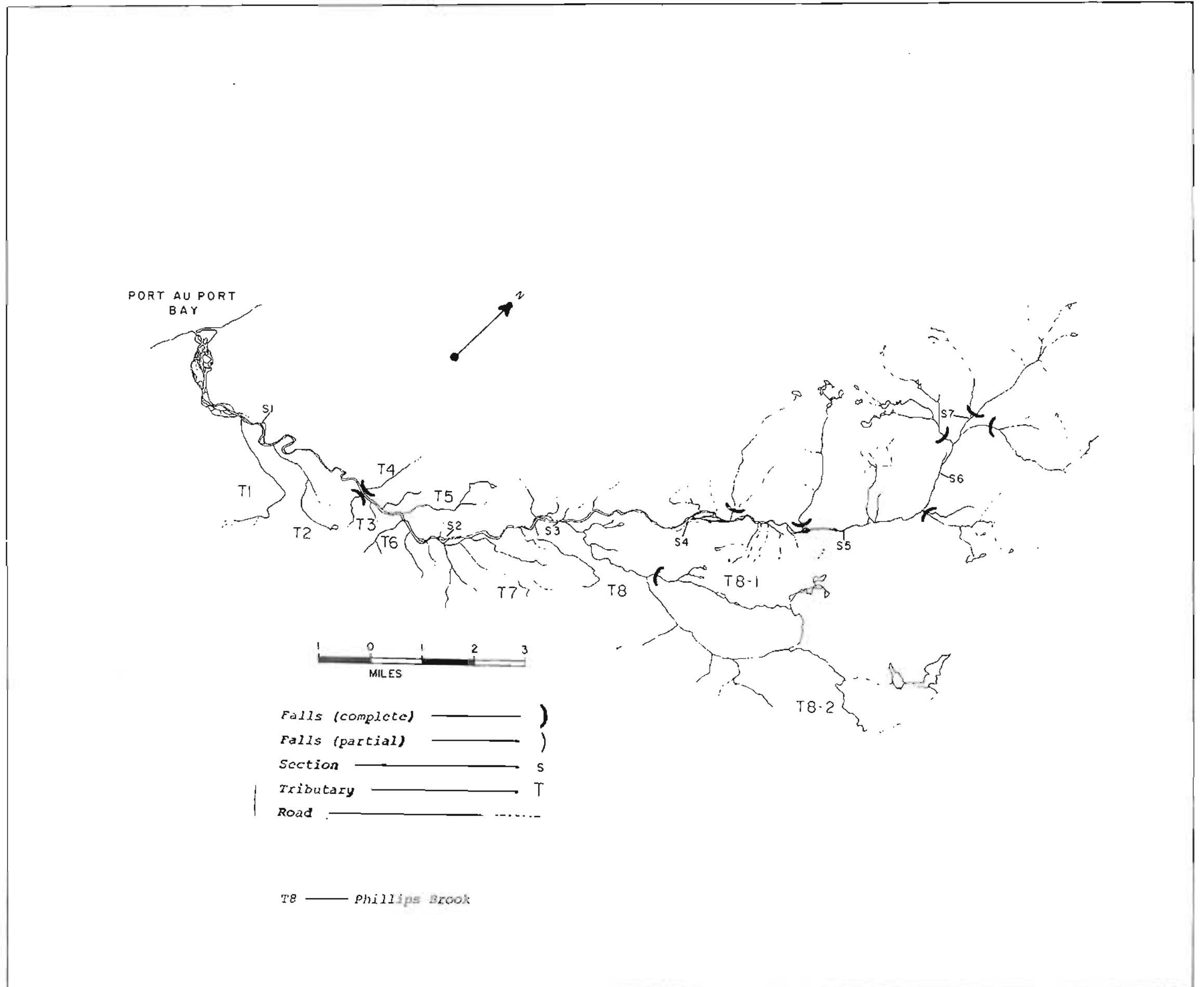


Fig. 67. Fox Island River system showing obstruction locations. Line from section number indicates end of section.

Fish Populations

Fox Island River supports populations of Atlantic salmon and brook trout. The escapement of adult salmon into the river usually begins in late June.

The river is accessible to anglers throughout the middle and lower reaches via a local road and an abandoned mine road.

The mean annual Atlantic salmon angling catch for Fox Island River 1963 to 1973 is 78 (Table 66). However, the creel census is estimated to be only 70 percent accurate (J. Marshall, personal communication).

Table 66 Atlantic salmon angling catch, Fox Island River, 1963-1973 inclusive.

	Total catch	Mean catch per year	Total weight	Mean weight per fish (lb)
Grilse	624	57	2,465	4.0
Salmon	230	21	2,109	9.2
Total	854	78	4,574	5.4

Therefore, a more realistic mean angling catch would be 111 fish per year. Angling data suggests a relatively small escapement of salmon occurs in Fox Island River. It also indicates a serious decline in population since 1963. In 1963 the catch per rod day was 0.75 fish; whereas, in 1973 it was only 0.25 fish.

#### OBSTRUCTIONS

There is one complete obstruction on the main stem of Fox Island River. It is a high falls approximately 18 miles from the mouth. Since only a short section of river was upstream from the falls the survey was discontinued.

Many tributaries flow over high cliffs and have insufficient rearing habitat upstream to justify remedial work. Five major tributaries have no obstructions.

#### BOTTOM COMPOSITION

Main stem of Fox Island River contains an area of 6,874 units, of which, 97 percent (6,650) is suitable for rearing parr and 27 percent is suitable for spawning (Table 67). The five major tributaries contain 1,195 parr rearing units (Table 68).

#### POTENTIAL POPULATION ESTIMATES

It is estimated that Fox Island River has the potential to produce 8,000 to 16,000 Atlantic salmon smolt. Assuming at 10-15 percent sea survival adult production before entry to the fishery would be 800 to 2,400 salmon (Table 69).

Table 67. Bottom composition of main stem of Fox Island River accessible to anadromous fish.

Section	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
1	0 to 2.3	4,000	33	gravel/rubble	1,320	100	1,320	60	792	
2	2.3 to 7.4	9,000	27	boulder/rubble/bedrock	2,430	99	2,406	-	-	
3	7.4 to 10.0	4,500	22	rubble/boulder/gravel	990	100	990	20	198	
4	10.0 to 12.4	4,200	17	boulder/rubble/gravel	714	100	714	2	143	
5	12.4 to 15.2	5,000	20	gravel/rubble/sand	1,000	80	800	70	700	
6	15.2 to 17.2	3,500	8	boulder/rubble	280	100	280	-	-	
7	17.2 to 18.3	2,000	7	rubble/boulder/gravel	140	100	140	30	42	Falls at mile 18.3
Total		32,000			6,874	97	6,650	27	1,875	

Table 68. Bottom composition of tributaries of Fox Island River accessible to anadromous fish.

Tributary	Location (miles)	Length (yds)	Mean width (yds)	Bottom Type	Total units	Rearing		Spawning		Comments
						%	Units	%	Units	
T1	0 to 2.8	5,000	3	rubble/gravel/boulder	150	100	150	10	15	
T5	0 to 2.0	3,500	3	rubble/boulder/gravel	105	100	105	10	11	
T6	0 to 1.1	2,000	2	boulder/rubble	40	100	40	5	2	
T7	0 to 1.4	2,500	3	boulder/rubble	75	100	75	10	8	
T8-S1	0 to 1.1	2,000	10	boulder/rubble/gravel	200	100	200	5	10	
T8-S2	1.1 to 3.9	5,000	8	boulder/rubble	400	100	400	-	-	
T8-S3	3.9 to 5.3	2,500	5	boulder/rubble	125	100	125	-	-	
T8-1	0 to 1.1	2,000	5	rubble/boulder/gravel	100	100	100	5	6	
T8-2	0 to 2.8	5,000	6	steadies	300	-	-	-	-	
<b>Total</b>		<b>29,500</b>			<b>1,495</b>	<b>80</b>	<b>1,195</b>	<b>3</b>	<b>51</b>	

Table 69. Estimated Atlantic salmon smolt production and adult sea survival of accessible areas of Fox Island River. Area enclosed includes most accepted values for production estimates.

If smolt production per 100 yds. <sup>2</sup> is:		1	2	3
Smolt produced		7,845	15,690	23,535
Adult return if sea survival is:	5%	392	785	1,177
	10%	785	1,569	2,354
	15%	1,177	2,354	3,530
	20%	1,569	3,138	4,705
	25%	1,961	3,923	5,881

PHOTOS ON FILE

<u>Description</u>	<u>Figure Number</u>	<u>File Number</u>
River mouth (print)	66	855
Lower reaches (print)	-	855
Middle reaches (print)	-	855
Upper reaches (print)	64	855

SUMMARY

There is one complete obstruction on the main stem of Fox Island River. It is located near the headwaters and there is insufficient rearing potential above to warrant further investigation. Many of the tributaries are blocked by impassable falls.

Fox Island River system contains 7,845 rearing units (Table 70), which have the potential to produce 800 to 2,400 Atlantic adult salmon per year.

Table 70. Summary of accessible and inaccessible spawning and rearing habitat of Fox Island River system.

Units	Accessible	Inaccessible	Total
Total system	8,368	-	8,368
Rearing units	7,845	-	7,845
Spawning units	1,926	-	1,926

This river does not appear to be producing to its maximum potential. Using current production figures of 1.75 smolt per unit, 12 percent sea survival, and 40 percent commercial harvest there should be approximately 300 adults available to the sport fisheries. However, the sport harvest has been considerably less than this. Angling data indicates a serious decline in the salmon population. This is not attributed to the angling exploitation.

#### RECOMMENDATIONS

1. Investigations should be undertaken to determine reasons for the decline in the Atlantic salmon population. Emphasis should be placed on the commercial fisheries in Port au Port Bay to

determine if the Fox Island River stock is being over-exploited.

2. Fox Island River should be closed to sport fisheries for 5 years in an effort to increase the population. Followed by an annual quota of 100 salmon.

Fig.63. Rearing area, lower reaches, Fox Island River.

Fig.64. Headwaters region, Fox Island River.

Fig.65. Spawning gravel, middle reaches, Fox Island River

Fig.66. Mouth of Fox Island River.

## SUMMARY

The rivers surveyed originate in mountainous terrain. The banks in the upper reaches are steep and often sparsely vegetated. The lower reaches have moderately sloping banks and flow through wide flat valleys, heavily forested with some farmland interspersed.

Major obstructions were found on the main stem of several rivers examined, remedial work was recommended if the rearing potential upstream justified the required work. Many tributaries, particularly those near the headwaters of the main stem, have obstructions which are impassable to migrating salmon.

Potential parr rearing area was found in 78 to 100% of the area of each river accessible to anadromous Atlantic salmon. A summary of parr rearing area, estimated potential smolt production and adult return is given in Table 71. The total rearing area for the 11 rivers (drainage area 1,695 miles<sup>2</sup>) is 152,900 units equivalent to 90 units per mile<sup>2</sup>. The estimated potential smolt production, used 1.75 smolt per unit, is 267,575. Adult return to the fishery, using 12% sea survival, is 32,109 salmon.

Crabbs River, Robinsons River, Southwest and Bottom Brooks, Harry's River and Flat Bay Brook are over-exploited by the recreational fishery. The catch is greater than the estimated allowable catch (to maintain a maximum sustained yield). The annual catch and the catch per unit effort (per rod day) has decreased over the past 10 years.

The recreational harvest of salmon in Barachois Brook has been higher than the estimated maximum allowable catch; however the annual catch has remained relatively constant and the catch per unit of effort has decreased over a 10 year period. The annual catch of salmon in Highland River, Little Barachois Brook and Fox Island River is lower than the estimated allowable catch, indicating a low production in these rivers. The annual catch and the catch per unit effort has sharply declined in Fox Island River and Highlands River. Unless exploitation is curbed these stocks are destined for extinction. Little Barachois Brook has received increased pressure; but, the annual catch has remained stable. This suggests that the annual catch is presently at maximum level.

Table 71. Summary of the accessible and inaccessible rearing units, estimated potential smolt production and adult return for each river surveyed. Calculations based on 1.75 smolt per unit and 12% sea survival.

	Accessible	Inaccessible
Highland River		
Rearing units	6,000	-
Smolt production	10,500	-
Adult return	1,260	-
Crabbes River		
Rearing units	22,000	-
Smolt production	38,500	-
Adult return	4,620	-
Barachois Brook		
Rearing units	10,000	-
Smolt production	17,500	-
Adult return	2,100	-
Robinsons River		
Rearing units	16,100	11,700
Smolt production	28,175	20,475
Adult return	3,381	2,457

Table 71 cont'd.

	Accessible	Inaccessible
Journois Brook <sup>1</sup>		
Rearing units	1,000	-
Smolt production	1,750	-
Adult return	210	-
Flat Bay Brook		
Rearing units	19,200	2,500
Smolt production	33,600	4,375
Adult return	4,032	525
Little Barachois Brook		
Rearing units	8,500	1,600
Smolt production	14,875	2,800
Adult return	1,785	336
Southwest and Bottom Brooks		
Rearing units	27,700	-
Smolt production	48,475	-
Adult return	5,817	-

<sup>1</sup>No known salmon run

Table 71 cont'd.

	Accessible	Inaccessible
Harry's River		
Rearing units	31,600	-
Smolt production	55,300	-
Adult return	6,636	-
Romaines Brook <sup>1</sup>		
Rearing units	3,000	-
Smolt production	5,250	-
Adult return	630	-
Fox Island River		
Rearing units	7,800	-
Smolt production	13,650	-
Adult return	1,638	-

<sup>1</sup>No known salmon run

RECOMMENDATIONS

The recommendations can be divided into three categories. Each being designed to preserve or enhance the salmon populations in each river and harvest at a maximum sustained yield.

A. Development of the salmon resource by:

- 1) Stream remedial work on one obstruction on Highland River two on Crabbs River and five obstructions on Barachois Brook.
- 2) Engineering investigations to determine the feasibility of constructing a fishway at an obstruction on Robinsons River. If a fishway is constructed, remedial work will be necessary on an obstruction further upstream.
- 3) Engineering investigations are required to determine the feasibility of remedial work on one obstruction on Flat Bay Brook, two on Little Barachois Brook, three on Southwest and Bottom Brooks and one obstruction on Harry's River.

B. Management: A quota system on each river is recommended to preserve and enhance present populations levels of Atlantic salmon.

- 1) Annual quotas for the recreational fishery.  
Highlands River.....closed for 5 years  
then open with quota of 100 fish.  
Crabbs River..... 600 fish.

Barachois Brook.....	600
Robinsons River.....	700
Flat Bay Brook.....	1,000
Little Barachois Brook.....	300
Southwest and Bottom Brooks.....	1000
Harry's River.....	1500
Fox Island River.....	closed for 5 years

then open with quota of 100 fish

- 2) Recreational fishing for Atlantic salmon between Cape Anguille and Cape St. George should be restricted to the period May 24 to August 31.
- 3) Recreational fishing for Atlantic salmon north of Cape St. George should be restricted to the period June 20 to August 31.

C. Road Construction and Industrial Development:

- 1) All road construction, logging operations and other development activities should conform to the guidelines provided by the Water Resources Group. A copy of the guidelines follows the recommendations section.

HABITAT PROTECTION: RECOMMENDED GUIDELINES FOR  
CONSTRUCTION AND FORESTRY  
by  
WATER RESOURCES GROUP, RESOURCE DEVELOPMENT

It must be remembered that the following are general guidelines designed to minimize environmental disturbances and not hard and fast rules for construction and logging. The guidelines are not designed to meet every situation and as such may require modifications depending on the operation involved and its geographic location.

Road Construction

Road Location

- 1.(1)-1 The road must be located to ensure that vegetation is not removed or disturbed between the construction activity area and any body of water either standing or river. In areas of low relief (flat land or slopes less than 12°) a minimum of 75 ft. of undisturbed vegetation must be maintained and on slopes greater than 12° a minimum of 150 ft. of undisturbed vegetation.

Right of Way

- 1.(2)-1 When cutting right-of-ways tree tops or slash must not be permitted to enter water either standing or river.
- 1.(2)-2 Vegetation must not be stripped completely to stream crossing areas. Ground vegetation should remain undisturbed within 100 ft. of the stream. Avoid the use of heavy equipment in these areas until the start of actual construction.

- 1.(3)-3 Drainage ditches or push lanes are not to be pushed to ponds or streams. Vegetation cover should be maintained to permit settling of silt prior to its reaching streams or ponds.

#### Cut & Fill Operations

- 1.(3)-1 Do not back fill into ponds or streams.
- 1.(3)-2 Gravel fill is not to be removed from either stream bed or bank.
- 1.(3)-3 Borrow pits must be located so as to maintain a minimum of 300 ft. between it and any water body. The increased distance is due to the greater extent of exposed soil.
- 1.(3)-4 Slopes resulting from cut and fill operations in the vicinity of streams and ponds must be stabilized.

#### Stream Crossings with Heavy Equipment

- 1.(4)-1 Minimize the use of heavy equipment in stream.
- 1.(4)-2 In crossing streams with heavy equipment use the same place for crossing each time.
- 1.(4)-3 At least 8 inches of water is to be maintained over the crossing at all times.
- 1.(4)-4 When construction has been completed the crossing area must be put back to its original condition.

Installation of Culverts

- 1.(5)-1 Maximum desirable slope of culverts should comply with the following: culverts 50 ft. or less 5%; culverts 50-100 ft. 3%; culverts 100 and greater 1.5%.
- 1.(5)-2 Culverts should be installed on a uniform slope, preferably following the existing gradient of the stream, and set 6-12 inches into the stream bed.
- 1.(5)-3 The stream bed at the outlet area should be lined with coarse material to prevent erosion and consequent free fall.
- 1.(5)-4 Water velocity not greater than 4 ft./sec. in culverts under 80 feet in length, and not greater than 3 feet/sec. in culverts over 80 feet in length.
- 1.(5)-5 Culverts must be designed to carry the maximum instantaneous discharge as calculated for each stream.
- 1.(5)-6 Slopes resulting from cut and fill operations should be stabilized to prevent erosion and consequent siltation of the stream.
- 1.(5)-7 All construction debris must be removed from the culvert area, to a point above high water, to prevent its return to the stream and consequent probable clogging of the culvert.
- 1.(5)-8 Culverts should be checked frequently and cleaned of debris if required.
- 1.(5)-9 Construction activity must be confined to immediate area of the culvert. Streams cannot be channelized without prior approval.

Construction of Bridges

- 1.(6)-1 Not more than 1/3 of the stream width shall be blocked at one time.
- 1.(6)-2 Excavation for the piers, footings, and abutments should be conducted in such a manner as to keep the work area separated from the flowing stream. A cofferdam may be used to separate the work area from the flowing stream but is to be limited to one side of the river at a time. Excavated materials shall not be allowed to enter the stream. Care must be taken during removal of cofferdams to prevent cofferdam material from washing into the stream. Ensure that excavations are filled to prevent fish being trapped during low stages.
- 1.(6)-3 Extreme care must be taken to see that no fresh cement, lime, or concrete is allowed to fall into or enter the flowing stream.
- 1.(6)-4 Creosote treated lumber or materials shall be completely dry before use in and near the water.
- 1.(6)-5 All construction debris shall be removed from the stream and adjacent stream area and be disposed of, burned, or placed in a manner where it cannot be washed back into the stream by high water. Excavated materials not used shall be placed away from the immediate area so heavy rains or high stream flow will not return it to the stream.

- 1.(6)-6 All work operations shall be conducted in a manner to cause a minimum of siltation and disturbance to the adjacent and downstream areas.
- 1.(6)-7 Minimize the use of heavy equipment in stream bed.
- 1.(6)-8 Slopes resulting from cut and fill operations should be grassed and stabilized as soon as possible to prevent erosion and subsequent siltation of the stream.

#### Stream Channelization

- 2.(1)-1 Stream channelization cannot take place without prior approval of the Department of Fisheries. If and when approval is granted the following are recommended:
  - 2.(1)-2 The minimum amount of 'improvement' work be done.
  - 2.(1)-3 A minimum amount of stream side vegetation be removed.
  - 2.(1)-4 The stream channel is to be left in as natural condition as possible.
  - 2.(1)-5 Ensure there are no obstructions to fish passage.

#### Stream Diversion

- 2.(2)-1 The stream is not to be blocked off during the work period.
- 2.(2)-2 The existing channels are to be left untouched until the new channel is completed.
- 2.(2)-3 The new channel should be excavated in the dry working from the downstream end.

- 2.(2)-4 The upstream end of the old channel must be closed off with non-porous and non-erodible materials.
- 2.(2)-5 If a tributary stream enters the old channel within the diversion area, channelization of the old channel may be necessary to provide suitable hydraulic conditions.
- 2.(2)-6 All debris removed from and adjacent to the new stream channel shall be disposed of, burned, or placed sufficiently away from the stream banks so that high water will not return it to the flowing stream. If the debris or excavated material is to be used to fill the old channel, the materials may be stored near the area of use, but not in the water.
- 2.(2)-7 Work operations shall be carried out at all times so as to cause a minimum of disturbance and siltation to the stream.
- 2.(2)-8 Diversions shall be planned so as not to interfere with or destroy eggs which have been spawned or fry that are emerging from the gravel.
- 2.(2)-9 The old stream channel must be checked immediately after diversion to ensure that no fish are stranded. Any stranded fish must be transferred to the new channel.

Dams

- 3.1 The construction of dams may not take place without prior approval of the Fisheries Service since it is imperative that fish populations be assessed and considered prior to construction.
- 3.2 Where fish migration will be inhibited provision for fish passage facilities may be required. The design of which must be approved by Fisheries personnel.
- 3.3 Provision must be made for sufficient quantities of water passing over the dams and through the fish way, so as not to inhibit the passage of fish, after completion.
- 3.4 During construction provision must also be made for fish passage, that is, the entire width of stream can not be obstructed at one time. It is preferable that the portion containing the fish passage facility be complete and the fishway operational prior to completion of the remaining sections.
- 3.5 The dam should be located so as to provide minimum disturbance of spawning gravels.
- 3.6 Materials for earth dams cannot be excavated from stream bed or bank.
- 3.7 Care must be taken to prevent the excessive silting of the downstream area, during construction.

Note: The recommendation contained in Section 1.5 bridges, are also applicable in this case.

WATER AND SEWER

Installation of Pipe

- 4.(1)-1 Stream beds or banks cannot be excavated for laying of pipe, etc., without prior approval from the Fisheries Service. Keep working as far as possible away from streams and ponds thus reducing siltation.
- 4.(1)-2 When crossing streams excavation should be minimal, thus reducing disruption of spawning gravels and downstream siltation. Ensure that gravel mounds are removed that may become obstructions at low water levels.
- 4.(2)-1 Dams for water supply projects will comply with those recommendations as outlined in Section 3.

Intake Screens

- 4.(3)-1 Acceptable screening shall consist of two screens at least two inches apart.
- 4.(3)-2 The outer screen shall have not less than two meshes per inch. (Suggested size - 2 mesh, .105 diameter wire).
- 4.(3)-3 The inner screen shall have not less than 4 meshes per inch. (Suggested size - 4 mesh, .072 diameter wire).
- 4.(3)-4 The openings in the inner screen shall be not more than 0.25 inches square.
- 4.(3)-5 The open areas of the outer screen shall be not less than the open area of the inner screen.

- 4.(3)-6 An area of 10 square feet of screen shall be provided for each cubic foot per second (375 Imperial gallons per minute) of water pumped.
- 4.(3)-7 Screen panels or frames shall be suitably mounted with openings around the panels not larger than 0.25 inches.
- 4.(3)-8 The screen shall be easily accessible for cleaning and shall be cleared of debris at regular intervals.
- 4.(3)-9 Maximum velocity of water through screens 0.75 feet per second.

Screens with the above specifications are applicable to relatively small diversions including pump intakes. Large diversions usually present difficult cleaning problems and will generally require special consideration, perhaps involving a self-cleaning type screen.

#### Forest Operations

- 5.(1) The construction of forest access roads, see recommendations as outlined in Section 1.
- 5.(2) The construction of logging dams, see recommendations as outlined in Section 3.

#### Logging Operations

- 5.(3)-1 A vegetation buffer zone of at least 150 ft. must be maintained between cutting operations and streams.
- 5.(3)-2 Tops and slash must not be permitted to enter streams and ponds.

- 5.(3)-3 Streamside landing should be avoided.
- 5.(3)-4 The rise of streams for transportation of wood should be avoided.

Skidding Operations

- 5.(4)-1 Skid road should be avoided on steep slopes, however, if necessary, they should follow the contour of the slope thus reducing erosion.
- 5.(4)-2 Stream beds even dry ones must not be used for skidding logs.

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