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MPO Pêches de l'Atlantique
Document de recherche 95/15

Mainland Gulf Nova Scotia
Atlantic salmon (Salmo salar) Stock Status, 1994

by

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¹This series documents the scientific basic for the evaluation of fisheries resources in Atlantic Canada. As such, it addresses the issues of the day in the time frames required and the documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

Research documents are produced in the official language in which they are provided to the secretariat.

¹La présente série documente les bases scientifiques des évaluations des ressources halieutiques sur la côte Atlantique du Canada. Elle traite des problèmes courants selon les échéanciers dictés. Les documents qu'elle contient ne doivent pas être considérés comme des énoncés définitifs sur les sujets traités, mais plutôt comme des rapports d'étape sur les études en cours.

Les documents de recherche sont publiés dans la langue officielle utilisée dans le manuscrit envoyé au secrétariat.

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ABSTRACT

Estimated returns to all three main rivers of Gulf Nova Scotia, East River Pictou, West River Antigonish, and River Philip were 44% to 74% less in 1994 than the 1989 to 1993 mean values for small and large salmon. Spawning escapements indicate that spawning targets were met for large salmon on West River Antigonish, but not East River Pictou and River Philip. Small salmon requirements were met for River Philip and West River Antigonish but not on East River Pictou. A total of 226 salmon were released from the Pictou Landing First Nation food fishery trapnet on East River Pictou, a large proportion of these after the angling season. Given the expected trapnet efficiency (maximum 17% on the Margaree River) and the large portion that were counted after the angling season, the spawning escapement estimate for East River Pictou must be considered a minimum estimate and it is likely that requirements were met in 1994.

Average returns are the only method of forecasting for these rivers. The average return values for the last five years indicate that requirements will likely be met on the three main rivers of the area.

Two user groups harvested salmon from this area in 1994, First Nation food fisheries and the recreational angling fishery. Total harvests by First Nations were 20 small salmon and 211 large salmon. Small salmon angling was down in every river in Gulf Nova Scotia by 5% to 83% compared to 1993. Large salmon hook and releases were down 12% to 88% compared to 1993.

RÉSUMÉ

Les remontées estimées de petits et de gros saumons de 1994 des trois principales rivières de la côte de la Nouvelle-Écosse donnant sur le Golfe, à savoir la Pictou est, l'Antigonish ouest et la Philip, ont été de 44 % à 74 % inférieures aux moyennes de la période 1989 à 1993. Les échappées de géniteurs montrent que les objectifs de frai ont été atteints pour les gros saumons dans l'Antigonish ouest mais non dans la Pictou est et la Philip. Les objectifs en petits saumons ont été atteints dans la Philip et la Antigonish ouest, mais non dans la Pictou est. Au total, 226 saumons ont été libérés après avoir été capturés dans la pêcherie fixe de la Première nation de Pictou Landing, située sur la Pictou est, et une grande partie l'ont été après la saison de pêche à la ligne. Étant donné l'efficacité prévue de la pêcherie fixe (maximum de 17 % sur la rivière Margaree) et la proportion élevée de saumons dénombrés après la saison de pêche à la ligne, l'échappée de géniteurs estimée pour la Pictou est doit être considérée une valeur minimum et il est probable que les besoins de géniteurs ont été satisfaits en 1994.

Les remontées moyennes sont les seules prévisions dont nous disposons pour ces rivières. Les remontées moyennes des cinq dernières années portent à croire que les besoins seront satisfaits dans les trois principales rivières de cette région.

Il y a eu deux types de pêche du saumon dans cette région en 1994: une pêche d'alimentation faite par les Premières nations et une pêche récréative à la ligne. La récolte totale des Premières nations a été de 20 petits saumons et de 211 gros saumons. Comparativement à 1993, la pêche à la ligne des petits saumons a été à la baisse de 5 % à 83 % dans toutes les rivières de la Nouvelle-Écosse se jetant dans le Golfe tandis que la pêche à la ligne par capture et remise à l'eau de gros saumons a diminué de 12 % à 88 %.

SUMMARY SHEET

STOCK: River Philip (SFA 18)
TARGET: 2.3 million eggs (358 large, 75 small salmon)

Year	1989	1990	1991	1992	1993	1994	MIN ²	MAX ²	MEAN ²
Angling harvest¹									
Large ⁴	407	191	421	322	338	184	184	421	336
Small	114	155	164	179	167	88	76	179	156
Native harvest									
Large	-	-	-	-	50	15	-	-	-
Small	-	-	-	-	0	9	-	-	-
Total returns									
Large	566	279	578	461	474	281	279	578	472
small	254	362	360	398	373	198	169	398	349
Spawning escapement									
Large	561	276	573	457	469	264	264	573	467
Small	187	268	262	292	276	137	124	292	257
% of Egg target met (large)									
	157	77	160	128	131	74	44	160	131
¹ All angling catches are NS license stub estimates. Large salmon angling catch for 1986 to present is hook-and-release estimates. ² Min, Max are for 1986 to 1994. Mean for 1989 to 1993.									

Description of fisheries: Harvests occurred in recreational and First Nation fisheries. A food fishery agreement was signed with Millbrook First Nation. Harvest under this agreement was 9 small salmon and 15 large salmon. Recreational catches on River Philip were about half the mean and 1993 values in 1994.

Target: Based on 2.4 eggs/m².

Fishery Data: Depends on voluntary sampling in First Nation fishery and angler logbooks. Catch rates in angler logbooks show declines in small salmon abundance but increases in large salmon. A Food fishery trapnet on River Philip operated for three weeks but showed greatest catches on Oct. 28 with very few salmon being caught after the angling season.

Research Data: No research data was collected in 1994. Electrofishing surveys are scheduled for 1995.

Estimation of stock parameters: Returns are calculated using fall fishery exploitation rates from the Margaree River and License Stub return estimates of small and large salmon catches.

Assessment results: Spawning escapement estimates were below target for large salmon but not for small salmon.

Ecological considerations: Water temperatures at River Philip recording site did not rise above 21 degrees in 1994 and were much cooler than sites on East River Pictou and West River Antigonish.

Future prospects: Average returns indicate that target spawners are likely to be met in 1995.

Management considerations: Low water conditions may have caused escapement to be underestimated in 1994 because of poor angling conditions.

SUMMARY SHEET

STOCK: East River (Pictou Co.) (SFA 18)
TARGET: 1.8 million eggs (281 large, 59 small salmon)

Year	1989	1990	1991	1992	1993	1994	MIN ²	MAX ²	MEAN ²
Angling harvest¹									
Large	670	299	440	371	221	89	89	670	400
Small	87	109	121	111	56	24	24	129	97
Native harvest									
Large	-	-	-	-	139	141			
Small	-	-	-	-	-	5			
Total returns									
Large	942	407	619	523	456	265	265	942	589
small	196	247	270	251	127	60	60	303	218
Spawning escapement									
Large	933	403	614	519	313	123	123	933	556
Small	143	182	200	184	92	41	41	223	160
% of Egg target met (large)									
	332	143	219	185	111	44	44	332	198
¹ All angling catches are NS license stub estimates. Large salmon angling catch for 1986 to present is hook-and-release estimates. ² Min, Max are for 1986 to 1994. Mean for 1989 to 1993.									

Description of fisheries: Harvests occurred in recreational and First Nation fisheries. A food fishery agreement was signed with Pictou Landing First Nation. Harvests under this agreement occurred on East River Pictou, West River Pictou, Merigomish Harbour, and River John by trapnets, gillnets, and angling. Recreational catches on East River Pictou were about 70% of the mean and 1993 values in 1994.

Target: Based on 2.4 eggs/m².

Fishery Data: Depends on voluntary sampling in First Nation fishery and angler logbooks. Catch rates in angler logbooks show declines in small salmon abundance but increases in large salmon. A Food fishery trapnet on East River Pictou operated from September 27 to November 5. A total of 146 fish were harvested from the trapnet with 273 fish released. A total of 78 fish entered the trapnet after the angling season.

Research Data: Juvenile surveys by electrofishing indicated parr levels above 27 parr/100 m² and fry levels above 34 fry/100 m².

Estimation of stock parameters: Returns are calculated using fall fishery exploitation rates from the Margaree River and License Stub return estimates of small and large salmon catches.

Assessment results: Spawning escapement estimates were below target for both large and small salmon.

Ecological considerations: Water temperatures at East River Pictou recording site were above 20 degrees for the months of July and August in 1994. Water temperatures were much higher in 1994 than 1993.

Future prospects: Average returns indicate that target spawners are likely to be met in 1995.

Management considerations: Low water conditions may have caused escapement to be underestimated in 1994 because of poor angling conditions.

STOCK: West River (Antigonish Co.) (SFA 18)
TARGET: 0.4 million eggs (113 large, 0 small salmon)

Year	1989	1990	1991	1992	1993	1994	MIN ²	MAX ²	MEAN ²
Angling harvest¹									
Large	218	200	294	277	248	131	126	476	247
Small	90	152	65	136	66	46	46	152	102
Native harvest									
Large	-	-	-	-	-	-	-	-	-
Small	-	-	-	-	-	-	-	-	-
Total returns									
Large	316	284	414	398	339	181	175	649	350
small	200	342	146	312	148	105	105	342	230
Spawning escapement									
Large	314	281	410	395	335	180	173	645	347
Small	147	253	108	233	108	77	77	253	170
% of Egg target met (large)									
	278	249	363	350	296	159	153	571	307
¹ All angling catches are NS license stub estimates. Large salmon angling catch for 1986 to present is hook-and-release estimates. ² Min, Max are for 1986 to 1994. Mean for 1989 to 1993.									

Description of fisheries: Harvests occurred in recreational fisheries. No food fishery agreements were signed with First Nations for fishing on West River Antigonish. Recreational catches on West River Antigonish were about 50% of the mean and 1993 values in 1994.

Target: Based on 2.4 eggs/m².

Fishery Data: Depends on voluntary angler logbooks. Catch rates in angler logbooks show increases in small salmon abundance but decreases in large salmon.

Research Data: Juvenile surveys by electrofishing indicated parr levels above 71 parr/100 m² and fry levels above 238 fry/100 m².

Estimation of stock parameters: Returns are calculated using fall fishery exploitation rates from the Margaree River and License Stub return estimates of small and large salmon catches.

Assessment results: Spawning escapement estimates were above targets for both large and small salmon.

Ecological considerations: Water temperatures at West River Antigonish recording site were above 20 degrees for the months of July and August in 1994.

Future prospects: Average returns indicate that target spawners are likely to be met in 1995.

Management considerations: Low water conditions may have caused escapement to be underestimated in 1994 because of poor angling conditions.

INTRODUCTION

This document concentrates primarily on the three principle rivers in Gulf Nova Scotia, East River, Pictou; West River, Antigonish; and River Philip. Total returns and spawning escapements for these rivers are estimated using angling statistics and assumed exploitation rates. In 1994, lower than average water levels and higher than average water temperatures may have delayed fish entry into the river, thus lowering angling exploitation rate. Catch rates from logbook anglers and juvenile data are used as additional indices of abundance in determining the status of these stocks. On East River, Pictou Landing First Nation food fishery trapnet catches and releases of salmon are used to evaluate the potential bias in returns estimated using angling catch and a range of exploitation rates to estimate returns and spawning escapement.

Angling statistics for other smaller rivers of Gulf Nova Scotia are also reported. Previous assessments include Chaput and Jones (1991, 1994).

DESCRIPTION OF FISHERIES

In 1994, salmon from these rivers were harvested in First Nation food fisheries and recreational angling fisheries.

Food fishery agreements were signed with two First Nations, Pictou Landing and Millbrook. Allocations and gear restrictions were specific to each river and First Nation (Table 1).

Total harvests by First Nations in Gulf Nova Scotia rivers were 20 small and 211 large salmon (Table 2). Pictou Landing First Nation harvested 9 small salmon and 137 large salmon from a trapnet located in tidal water on the East River, Pictou in 1994. Total catch of small and large salmon was 420 and a total of 47 small salmon and 226 large salmon were released from the trapnet (Table 3).

Millbrook First Nation harvested 4 small salmon and 10 large salmon (Table 2) and released 4 large salmon from a trapnet on River Philip in 1994 (Table 4).

Small salmon angling catch was down on every river in Gulf Nova Scotia by 5% to 83% in 1994 compared to 1993 (Table 5). Large salmon hook and releases were down on every river by 12% to 88% (Table 5). Total catch of small salmon on Gulf Nova Scotia rivers was 226 compared to 421 in 1993. Large salmon hook and releases were 569 in 1994 compared to 1213 in 1993 (Table 5).

The estimated large salmon unreported catch was similar to the hook and release values in the recreational fishery as 465 large salmon were estimated to have been taken illegally (Table 6) compared to 569 hook and released in the recreational fishery (Table 5).

TARGET

Target spawning requirements have been determined for these rivers by Chaput and Jones (1994) using average biological characteristics and 2.4 eggs/m^2 (Tables 7, 8). Spawning requirements for these rivers range from 0 to 75 small salmon and 18 to 358 large salmon (Table 9).

FISHERY DATA

Daily trap records kept by Pictou Landing First Nation and Millbrook First Nation provide information on run-timing to East River, Pictou and River Philip. Most of the small and large salmon entered the East River, Pictou from Oct. 18 to Nov. 4. Catches in the trapnet after the angling season were as high as many days during the season (Fig. 1). This pattern indicates that at least some fish came into the river after angling was finished and that returns based on angling catches would be a minimum estimate.

The trapnet on the River Philip operated for only three weeks but the greatest catch of large salmon occurred on Oct. 28. Very few salmon were caught after the angling season and before the trapnet was removed on Nov. 16 (Fig. 2). This pattern indicates that few fish entered the river after the angling season and the estimate of returns based on angling catch would be more representative of returns than on East River, Pictou.

A voluntary angling logbook program provides information on catch per unit

effort (CPUE) for the three main rivers of the area. Logbook angler CPUE indicates greater abundance than do STUB returns for East River, Pictou; River Philip and West River, Antigonish for both small and large salmon (Table 10).

RESEARCH DATA

Juvenile surveys by electrofishing were done on Afton, Pomquet, West River Antigonish, Barneys, East River Pictou, French, and Sutherlands Rivers in 1994 (Table 11). Parr densities at the sites fished generally indicate well utilized habitat with PHS values above 20% at half the sites (Table 11).

ESTIMATION OF STOCK PARAMETERS

Returns were estimated using the method derived by Chaput and Jones (1994). Fall fishery exploitation rates from the Margaree were used to estimate returns from angling catches with an adjustment made for license stub misreporting (Claytor and O'Neil 1990). The estimation procedure used a bootstrap technique that selected exploitation and adjustment rates from uniform distributions (Chaput and Jones 1994). Escapements were estimated by subtracting angling catch from the returns.

The potential bias in the return estimates for these stocks was evaluated by comparing returns estimated for the Margaree River by independent methods to those that would have been obtained using STUB returns for the Margaree River and average exploitation rates.

ASSESSMENT RESULTS

Estimated returns to all rivers were 44% to 74% less in 1994 than the 1989 to 1993 mean values for small and large salmon (Table 12). Spawning escapement estimates were similarly below mean values (Table 13). These escapement estimates indicate that spawning targets were met for large salmon on West River, Antigonish; but not on River Philip or East River, Pictou (Table 13). Small salmon requirements were met for River Philip and West River, Antigonish; but not on East River Pictou.

The escapement estimate for East River Pictou was 123 large salmon, yet the Pictou Landing First Nation released 226 salmon from the trapnet (Table 3) Thus, it is likely that spawning requirements were met on East River Pictou in 1994. Even if many of these fish were circulating in the estuary, the estimate of 123 salmon spawning must be a minimum. One reason for this conclusion is that observed trapnet efficiencies in other rivers (maximum 17% on the Margaree River in a similar situation) indicate that many fish are likely to have passed the net on the way to freshwater and not have been counted. A second reason is that many fish were counted in the trapnet after the angling season and would not have been included in the return estimate based on angling catches.

Comparison of the method using STUB angling catches to estimate returns to the Margaree River compared to Margaree return estimates obtained by independent methods indicates a trend toward under-estimating returns in recent years (90-94) (Fig. 3).

ECOLOGICAL CONSIDERATIONS

Water temperatures were recorded in 1994 using HOBO thermometers in River Philip, Beaver River (tributary of West River, Antigonish), and West River, Antigonish. A Ryan tempmentor was used in East River Pictou to record water temperatures from 1991 - 1994. River Philip and Beaver River were the coolest sites with mean temperatures never rising above 21 and 23 degrees, respectively. West River and East River had mean temperatures above 26 degrees during the latter part of July (Fig. 4).

Temperature has also been monitored on East River, Pictou since 1991. These data indicate that water temperatures in 1994 were well above those of previous years. The previously recorded maximum was in 1991 when the mean daily temperature reached 24.4 degrees (Fig. 5).

During October when most of the fish would be returning to these rivers, temperature differences among the rivers lessened (Fig. 4) and differences between 1994 and previous years were slight (Fig. 5). Thus, temperature probably did not influence fall returns to these rivers.

FORECAST / PROSPECTS

Average returns are the only method of forecasting for these rivers. The average return values for the last five years from the three main Gulf Nova Scotia rivers indicate that target spawners are likely to be met in 1995 (Table 14).

MANAGEMENT CONSIDERATIONS

These stocks are healthy in that spawning requirements have been met in recent years on each of the major rivers. Returns in 1994 were probably underestimated because of poor angling conditions and late returns to rivers.

RESEARCH RECOMMENDATIONS

1. Discharge should be included in future assessments.
2. Re-evaluate the adjustment factor used to make STUB returns comparable to DFO catch data.
3. Logbook analysis could be made better by selecting consistent anglers.
4. Examine relationship between CPUE and returns in more detail. Regressions of Logbook CPUE and estimated returns should be forced through the origin.

ACKNOWLEDGEMENTS

We thank Pictou Landing and Millbrook First Nations for operating the trapnets on the East River, Pictou Co. and the River Philip, respectively and the collection of relevant data; and Shane O'Neil and Deborah Stewart for the collation of angling statistics for all the Mainland Gulf Shore N.S. rivers. The authors thank Dave Moore and Gary Atkinson for many useful comments.

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**Gulf Mainland Nova Scotia
Salmon and Striped Bass
Stock Status Workshop**

Dec. 13, 1994

Nova Scotia Museum of Industry
Stellarton, Nova Scotia

Participants:

Michael McAdam	Atlantic Salmon Federation
Ross Claytor	DFO - Science
Paul LeBlanc	DFO - Science
Peter Alex	Habitat Unlimited
David Austin	DFO - Wallace
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Bob Bouchie	Pictou County Rivers Assoc.
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Jack MacLean	Pictou County Rivers Assoc.
Lester Ward	Pictou County Rivers Assoc.
Parker Wong	Pictou County Rivers Assoc.
Abel Bernard	West Pictou Wildlife Assoc.
Alvin Cresine	West Pictou Wildlife Assoc.

SALMON

Landings:

- It was thought that the final angling estimates would be somewhat higher than the preliminary estimate of 59 large salmon

Data:

- The efforts by the Pictou Landing Band to voluntarily carlin tag all fish that were not kept and maintain daily trap records was acknowledged and appreciated.
- It was recognized that the trap was for food fishery purposes and that

- all scientific information collected at the trap was at the discretion of the Pictou Landing Band.
- Data collected at the trapnet could provide additional information that would be useful for assessing the Pictou River Stock. This information includes carlin tagging fish to assess multiple recaptures in the trap and estimating population size from tags returned by the angling fishery and biological sampling that would be useful for determining the age structure and sex ratio of the stock.
 - It was suggested that for next year, if it was not possible for a DFO technician to participate full time in the project that additional training could be provided to assist in tagging and maintaining trapnet records
 - Habitat surveys were conducted at the upper end of East River Pictou to Springville. This information should be provided for the assessment.
 - Similar surveys have been done on River Philip and should also be obtained.
 - Water quality surveys have been done for East and Middle Rivers and should be tabled at the next workshop.
 - The Atlantic Salmon Federation can make an electrofishing unit available to the local associations to increase juvenile surveys and DFO will train members next year during the usual DFO juvenile surveys.
 - The East River Fish kill of parr occurred on July 25, before juvenile surveys on the river.
 - Few juveniles were observed on South River this year and it was suggested to include this river in the survey next year.

STRIPED BASS

Management Issues:

- There were concerns that the proposed new size limit of 68 cm would eliminate the fishery .
- Spawning has not been observed in mainland Gulf Nova Scotia rivers and it is unlikely these rivers support their own populations
- Provincial catch statistics for striped bass are currently being summarized by Ron Gray
- There was concern that the current regulations were not enforced and that people were keeping more than the daily limit of 3
- It was recommended that the current regulations be maintained.

**Minutes of Peer Review
Diadromous Stocks
February 7-10, 1995**

Review Committee:

Chadwick, Mike (Chair), Chief, Marine and Anadromous Fish Division, Gulf Region

1. Caron, François, Biologiste, Ministère de l'Environnement et de la faune, Direction de la faune et des habitats, 150, boul. René-Lévesque Est, Québec, Québec
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3. Clay, Doug, Canadian Heritage, Fundy National Park, Alma, NB
4. Cunjak, Rick, Research Scientist, Habitat Ecology Section, Environmental Studies, DFO, Gulf Region
5. Davis, Anthony, Professor, Department of Sociology and Anthropology, St. Francis Xavier University, Antigonish, NS
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9. O'Neil, Shane, Biologist, Freshwater and Anadromous Division, DFO, S-F Region
10. Simon, Vincent, Chief, Big Cove First Nation, Big Cove, NB
11. Wheaton, Fred, New Brunswick Wildlife Federation, Moncton, NB
12. Whoriskey, Fred, Atlantic Salmon Federation, St. Andrews, NB

A. Gulf Nova Scotia salmon

1. Description of fishery
 - (a) Describe how estimates of illegal fishing were obtained. These values should reflect their accuracy.
 - (b) This document is easily read and could be a good example for other assessment documents.
 - (c) Include the fact that First Nations did not attend science workshop.
2. Target
 - (a)
3. Inputs
 - (a) Check values in Table 14.
 - (b)
4. Model
 - (a) Low discharge in 1994 may have affected catch rates.
5. Synopsis
 - (a) Escapement should include losses due to poaching.
 - (b) Examine relationship between CPUE and returns in more detail. The logbook data are better records of catch rate than licence stubs and could be used to estimate abundance in the assessment.
6. Research recommendations
 - (a) Discharge should be included in future assessments.
 - (b) It would be useful to re-evaluate the adjustment factor used to make stub returns comparable to DFO catch data.
 - (c) Logbook data could be improved by selecting consistent anglers.
 - (d) It should be stated clearly that the exploitation rate method underestimated returns in 1994. It should also be mentioned that

- escapements could have exceeded requirements in 1994.
- (e) The traps could be used for mark-recapture estimates.
 - (f) Bootstrap techniques used on these rivers could be tested at Margaree River, where returns are known.
7. Other issues
- (a) The role of precocious parr in spawning requirements needs to be understood.

Participants

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Table 1. Summary of the First Nation salmon allocations, gear type, and seasons for Millbrook and Pictou Landing, 1994.

First Nation	Location	Allocation		Gear Type	Season
		Small	Large		
Millbrook	River Philip	90	50	Trapnet, Angling*, Snare and Spear	Sept. 1 - Nov. 15
	Wallace	15	25	Trapnet, Angling*, Snare and Spear	Sept. 1 - Nov. 15
	Waugh	8	12	Trapnet, Angling*, Snare and Spear	Sept. 1 - Nov. 15
Pictou Landing	East River, Pictou Co.	35	140	Angling and Trapnet	Sept 1 - Nov. 30
	West River, Pictou Co.	8	16	Angling, Snare and Spear	Sept 1 - Nov. 30
	Merigomish Harbour	10	30	Angling, Snare, Spear and Gillnet	Sept 1 - Nov. 30
	River John, Pictou Co.	10	24 **	Angling, Snare and Spear	Sept 1 - Nov. 30
	John Bay (River John Harbour)			Angling, Snare, Spear and Gillnet	Sept 1 - Nov. 30
Total		176	297		

* Angling by means of spinning gear, includes jigging and fly fishing.

** Total allocation for both River John and John Bay.

Table 2. First Nation harvests by the Pictou Landing and Millbrook on Mainland Gulf Shore Nova Scotia rivers provided by First Nation guardians, 1994. Weight is in kilograms.

<i>First Nation</i>	<i>Location:</i>	<i>Gear</i>	<i>Small</i>		<i>Large</i>	
			<i>No.</i>	<i>Wt.</i>	<i>No.</i>	<i>Wt.</i>
<i>Pictou Landing</i>						
	East River (Pictou)	Trapnet	5	10	141	776
	West River (Pictou)	Angling	0	0	8	36
	Merigomish Hbr.	Gillnet	6	10	30	135
	River John	Angling	0	0	17	77
<i>Millbrook</i>						
	River Philip	Angling	5	9	5	22
		Trapnet	4	7	10	43
	Total:		20	35	211	1088

Table 3. Pictou Landing First Nation salmon catches from the trapnet located on East River Pictou, 1994. Information are based on scale envelopes and field book data provided by the Pictou Landing First Nation trapnet fishers.

Month	Day	Harvested		Released		Tagged & Released		Mortalities		Daily Total
		Small	Large	Small	Large	Small	Large	Small	Large	
Sept.	27	Trap set at 19:15.								
	28	0	0	0	0	0	0	0	0	0
	29	0	2	0	0	0	0	0	0	2
	30	0	2	0	0	0	0	0	0	2
Oct.	1	0	1	0	0	0	0	0	0	1
	2	1	5	1	0	0	0	0	0	7
	3	0	1	0	0	0	0	0	0	1
	4	1	3	0	0	0	1	0	0	5
	5	0	1	0	0	0	1	0	0	2
	6	1	5	0	0	2	3	0	0	11
	7	3	8	0	0	1	5	0	0	17
	8	2	3	0	0	2	6	0	0	13
	9	0	0	4	26	0	0	0	0	30
	10	0	0	2	10	0	0	0	1	13
	11	0	0	1	8	0	0	0	0	9
	12	0	4	3	4	0	0	0	0	11
	13	0	5	0	0	0	0	0	0	5
	14	0	2	0	0	0	0	0	0	2
	15	*	*	*	*	*	*	*	*	0
	16	0	6	0	8	0	0	0	0	14
	17	*	*	*	*	*	*	*	*	0
	18	0	12	3	18	0	3	0	0	36
	19	0	5	2	8	0	6	0	0	21
	20	0	4	0	0	3	8	0	0	15
	21	0	6	5	0	0	9	0	0	20
	22	0	9	6	12	0	0	0	0	27
	23	*	*	*	*	*	*	*	*	0
	24	0	14	6	6	0	8	0	0	34
	25	0	2	5	10	0	2	0	0	19
	26	*	*	*	*	*	*	*	*	0
	27	*	*	*	*	*	*	*	*	0
	28	1	12	1	9	0	2	0	0	25
	29	*	*	*	*	*	*	*	*	0
	30	*	*	*	*	*	*	*	*	0
	31	0	6	0	8	0	17	0	0	31
Nov.	1	*	*	*	*	*	*	*	*	0
	2	0	12	0	10	0	10	0	0	32
	3	*	*	*	*	*	*	*	*	0
	4	0	7	0	8	0	0	0	0	15
	5	Trap removed.								
Totals:		9	137	39	145	8	81	0	1	420

* - Trap not fished.

- Note that 3 female and 2 male large salmon were given to the Rivers Association on Oct. 28.

- Oct. 9-11 released catches were proportioned into 13% small and 87% large.

Table 4. Millbrook First Nation salmon catches from the trapnet located on River Phillip, 1994. Information are based on scale envelopes and field book data provided by the Millbrook First Nation trapnet fishers.

Month	Day	Harvested		Released		Tagged & Released		Mortalities		Daily Total
		Small	Large	Small	Large	Small	Large	Small	Large	
Oct.	25	Trap set at 11:15.								
	26	1	1	0	2	0	0	0	0	4
	27	2	1	0	0	0	0	0	0	3
	28	0	5	0	1	0	0	0	0	6
	29	1	0	0	1	0	0	0	0	2
	30	*	*	*	*	*	*	*	*	0
	31	*	*	*	*	*	*	*	*	0
Nov.	1	0	1	0	0	0	0	0	0	1
	2	0	0	0	0	0	0	0	0	0
	3	*	*	*	*	*	*	*	*	0
	4	*	*	*	*	*	*	*	*	0
	5	0	1	0	0	0	0	0	1	2
	6	*	*	*	*	*	*	*	*	0
	7	0	0	0	0	0	0	0	0	0
	8	*	*	*	*	*	*	*	*	0
	9	*	*	*	*	*	*	*	*	0
	10	*	*	*	*	*	*	*	*	0
	11	0	0	0	0	0	0	0	0	0
	12	0	0	0	0	0	0	0	1	1
	13	0	1	0	0	0	0	0	0	1
	14	0	0	0	0	0	0	0	0	0
	15	0	0	0	0	0	0	0	0	0
	16	Trap removed								
Totals:		4	10	0	4	0	0	0	2	20

* - Trap not fished.

- Note that from Nov. 8 - 10 washout.

Table 5. Annual summaries of catch and effort for Mainland Gulf Shore N.S. rivers from 1984-94 using license stub returns. Mean = (1989 to 1993). The 1994 data are preliminary.

Year	River	No. Angler	Small		Large		Unk. Obs.	Total		Rods		CPUE	% Large		
			Obs.	Est.	Obs.	Est.		Obs.	Est.	Obs.	Est.				
East: Pictou Co.															
1984		70	14	14	39	40	0	53	54	423	474	0.125	73.6		
1985		63	38	40	153	162	1	192	203	373	398	0.515	80.1		
1986		152	84	89	582	620	0	666	709	1094	1151	0.609	87.4		
1987		202	80	83	377	389	0	457	472	1214	1286	0.376	82.5		
1988		200	110	129	360	422	0	470	551	1072	1300	0.438	76.6		
1989		240	72	87	554	670	0	626	757	1365	1705	0.459	88.5		
1990		223	86	109	237	299	0	323	408	1069	1394	0.302	73.4		
1991		232	94	121	343	440	0	437	561	1152	1526	0.379	78.5		
1992		162	88	111	295	371	0	383	482	745	967	0.514	77.0		
1993		228	54	56	215	221	0	269	277	950	1083	0.283	79.9		
1994		102	18	24	68	89	0	86	113	457	619	0.188	79.1		
	+/- 1993		-55%	-67%	-57%	-68%	-60%			-68%	-59%	-52%	-43%	-34%	-1%
	+/- Mean		-53%	-77%	-75%	-79%	-78%			-79%	-77%	-57%	-54%	-51%	-0%
River John															
1984		5	1	1	0	0	0	1	1	20	22	0.050	0.0		
1985		6	2	2	55	58	0	57	60	55	59	1.036	96.5		
1986		21	29	30	146	154	0	175	184	179	188	0.978	83.4		
1987		47	24	25	69	70	0	93	95	224	237	0.415	74.2		
1988		47	44	52	101	118	0	145	170	211	256	0.687	69.7		
1989		59	15	18	82	99	0	97	117	214	267	0.453	84.5		
1990		47	49	62	33	42	0	82	104	232	303	0.353	40.2		
1991		36	28	36	66	85	0	94	121	151	200	0.623	70.2		
1992		42	12	15	55	69	0	67	84	128	166	0.523	82.1		
1993		62	20	22	66	73	0	86	95	209	238	0.411	76.7		
1994		20	11	14	30	39	0	41	54	143	194	0.287	73.2		
	+/- 1993		-68%	-45%	-36%	-55%	-47%			-52%	-43%	-32%	-18%	-30%	-5%
	+/- Mean		-59%	-56%	-54%	-50%	-47%			-52%	-48%	-23%	-17%	-39%	3%
River Phillip															
1984		53	24	25	57	60	0	81	85	275	308	0.295	70.4		
1985		60	11	12	65	69	0	76	81	291	311	0.261	85.5		
1986		103	107	111	325	338	0	432	449	608	640	0.711	75.2		
1987		160	71	76	317	337	0	388	413	1055	1118	0.368	81.7		
1988		167	144	169	280	328	0	424	497	1012	1227	0.419	66.0		
1989		144	94	114	336	407	0	430	520	999	1248	0.430	78.1		
1990		147	123	155	151	191	0	274	346	873	1139	0.314	55.1		
1991		166	128	164	329	421	0	456	585	1112	1473	0.410	72.0		
1992		175	142	179	256	322	0	398	500	934	1213	0.426	64.3		
1993		262	151	167	305	337	0	456	504	1499	1708	0.304	66.9		
1994		152	67	88	140	184	0	207	271	890	1205	0.233	67.6		
	+/- 1993		-42%	-56%	-47%	-54%	-45%			-55%	-46%	-41%	-29%	-23%	1%
	+/- Mean		-15%	-47%	-44%	-49%	-45%			-49%	-45%	-18%	-11%	-38%	0%
Wallace															
1984		25	1	1	4	4	0	5	5	48	54	0.104	80.0		
1985		28	5	5	16	17	0	21	22	80	85	0.263	76.2		
1986		71	16	16	113	115	0	129	131	222	234	0.581	87.6		
1987		79	11	11	48	50	0	59	61	269	285	0.219	81.4		
1988		81	14	16	28	33	0	42	49	243	295	0.173	66.7		
1989		67	10	12	27	33	0	37	45	191	239	0.194	73.0		
1990		54	11	14	23	29	0	34	43	198	258	0.172	67.6		
1991		104	31	40	69	89	0	100	128	302	400	0.331	69.0		
1992		104	23	29	67	84	0	90	113	327	425	0.275	74.4		
1993		214	31	35	98	109	0	129	144	757	863	0.170	76.0		
1994		101	15	20	41	54	0	56	73	324	439	0.173	73.2		
	+/- 1993		-53%	-52%	-43%	-58%	-50%			-57%	-49%	-57%	-49%	2%	-4%
	+/- Mean		-7%	-29%	-23%	-28%	-22%			-28%	-23%	-9%	0%	-24%	2%

Table 5. Continued ...

Year	River	No. Angler	Small		Large		Unk. Obs.	Total		Rods		CPUE	% Large	
			Obs.	Est.	Obs.	Est.		Obs.	Est.	Obs.	Est.			
Waugh														
1984		3	0	0	0	0	0	0	7	8	0.000	.		
1985		4	0	0	1	1	0	1	5	5	0.200	100.0		
1986		15	9	10	27	29	0	36	32	34	1.125	75.0		
1987		23	0	0	7	7	0	7	45	48	0.156	100.0		
1988		21	8	9	19	22	0	27	65	79	0.415	70.4		
1989		24	4	5	4	5	0	8	74	92	0.108	50.0		
1990		17	14	18	14	18	0	28	75	98	0.373	50.0		
1991		41	15	19	83	106	0	98	204	270	0.480	84.7		
1992		27	11	14	15	19	0	26	94	122	0.277	57.7		
1993		49	17	19	38	43	0	55	180	205	0.306	69.1		
1994		16	14	18	29	38	0	43	55	74	0.782	67.4		
	+/- 1993		-67%	-18%	-5%	-24%	-12%		-22%	-10%	-69%	-64%	156%	-2%
	+/- Mean		-49%	15%	20%	-6%	-1%		0%	5%	-56%	-53%	153%	8%
West: Antigonish Co.														
1984		20	17	17	2	2	0	19	96	107	0.198	10.5		
1985		33	32	34	115	122	0	147	211	225	0.697	78.2		
1986		72	116	126	438	476	0	554	699	741	1.112	79.1		
1987		117	80	84	188	198	0	268	377	457	0.383	70.1		
1988		89	57	67	107	126	0	164	420	525	0.435	65.2		
1989		99	74	90	180	218	0	254	536	699	0.605	70.9		
1990		126	120	152	158	200	0	278	699	732	0.519	56.8		
1991		132	51	65	229	294	0	280	576	748	0.506	81.8		
1992		144	108	136	220	277	0	328	814	928	0.569	67.1		
1993		173	62	66	235	248	0	297	570	772	0.365	79.1		
1994		148	35	46	100	131	0	135	177	215	0.237	74.1		
	+/- 1993		-14%	-44%	-30%	-57%	-47%		-55%	-44%	-30%	-17%	-35%	-6%
	+/- Mean		10%	-58%	-55%	-51%	-47%		-53%	-49%	-2%	6%	-54%	4%
West: Pictou Co.														
1984		1	0	0	0	0	0	0	1	1	0.000	.		
1985		8	2	2	4	4	0	6	29	31	0.207	66.7		
1986		12	4	4	4	4	0	8	36	38	0.222	50.0		
1987		45	14	15	25	26	0	39	233	247	0.167	64.1		
1988		49	21	25	37	43	0	58	257	312	0.226	63.8		
1989		60	12	15	50	60	0	62	340	425	0.182	80.6		
1990		51	27	34	30	38	0	57	193	252	0.295	52.6		
1991		91	35	45	118	151	0	153	484	641	0.316	77.1		
1992		89	25	31	100	126	0	125	317	412	0.394	80.0		
1993		134	37	41	151	167	0	188	543	619	0.346	80.3		
1994		49	5	7	15	20	0	20	159	215	0.126	75.0		
	+/- 1993		-63%	-86%	-83%	-90%	-88%		-89%	-88%	-71%	-65%	-64%	-7%
	+/- Mean		-42%	-82%	-79%	-83%	-82%		-83%	-82%	-58%	-54%	-59%	1%
Other Rivers														
1984		2	0	0	0	0	0	0	5	5	0.000	.		
1985		9	0	0	4	4	0	4	14	14	0.286	100.0		
1986		14	6	6	7	7	0	13	30	31	0.433	53.8		
1987		22	12	12	16	17	0	28	69	72	0.406	57.1		
1988		12	2	2	8	9	0	10	36	43	0.278	80.0		
1989		12	16	19	3	3	0	19	43	53	0.442	15.8		
1990		18	11	14	10	12	0	21	50	64	0.420	47.6		
1991		28	8	10	16	20	0	24	76	102	0.316	66.7		
1992		22	18	23	14	17	0	32	122	158	0.262	43.8		
1993		47	15	15	14	15	0	29	129	147	0.225	48.3		
1994		21	7	9	11	14	0	18	112	162	0.161	61.1		
	+/- 1993		-55%	-53%	-40%	-21%	-7%		-38%	-20%	-13%	10%	-28%	27%
	+/- Mean		-17%	-49%	-44%	-4%	4%		-28%	-19%	33%	55%	-52%	37%

Table 5. Continued ...

Year	River	No. Angler	Small		Large		Unk. Obs.	Total		Rods		CPUE	% Large	
			Obs.	Est.	Obs.	Est.		Obs.	Est.	Obs.	Est.			
<i>Mainland N.S. Totals:</i>														
1984		179	57	58	102	106	0	159	164	875	979	0.182	64.2	
1985		211	90	95	413	437	1	504	533	1058	1128	0.476	82.1	
1986		460	371	392	1642	1743	0	2013	2135	2699	2840	0.746	81.6	
1987		695	292	306	1047	1094	0	1339	1400	3808	4034	0.352	78.2	
1988		666	400	469	940	1101	0	1340	1570	3273	3969	0.409	70.1	
1989		705	297	360	1236	1495	0	1533	1853	3646	4554	0.420	80.6	
1990		683	441	558	656	829	0	1097	1385	3226	4207	0.340	59.8	
1991		830	390	500	1253	1606	0	1642	2106	4034	5344	0.407	76.3	
1992		765	427	538	1022	1285	0	1449	1822	3243	4211	0.447	70.5	
1993		1169	387	421	1122	1213	0	1509	1634	5081	5791	0.297	74.4	
1994		609	172	226	434	569	0	606	794	2710	3680	0.224	71.6	
	+/- 1993		-48%	-56%	-46%	-61%	-53%		-60%	-51%	-47%	-36%	-25%	-4%
	+/- Mean		-27%	-56%	-52%	-59%	-56%		-58%	-55%	-30%	-24%	-41%	-1%

* - "Other Rivers" includes Barney's, French, Middle: Pictou Co., Pomquet, Pugwash, Shinimikas, South, Sutherland, Tidnish, Tracadie, and Wright.

Table 6. In-river and salt water unreported catch estimates for Mainland Gulf Shore N.S. rivers provided by DFO fisheries officers, 1994. Weight is in kilograms.

<i>Location:</i>	<i>Small</i>		<i>Large</i>		<i>Total</i>
	<i>No.</i>	<i>Wt.</i>	<i>No.</i>	<i>Wt.</i>	<i>No.</i>
<i>Pictou Co:</i>					
East River	6	10	54	243	60
MacLellans Brk	2	3	18	81	20
River John	5	8	45	203	50
Barney's	3	5	27	122	30
French	2	3	18	81	20
Sutherlands	1	2	9	41	10
West River	3	5	27	122	30
Sub-total	22		198		220
<i>Cumberland Co:</i>					
River Philip	7	11	63	284	70
Shinimikas	4	6	36	162	40
Wallace	4	6	32	144	35
Pugwash	2	3	18	81	20
Tidnish	1	2	5	23	5
Sub-total	18		154		170
<i>Colchester Co:</i>					
Waugh	2	3	18	81	20
French	2	3	18	81	20
Sub-total	4		36		40
<i>Antigonish Co:</i>					
Pomquet	2	3	18	81	20
Tracadie	2	3	18	81	20
South	1	2	9	41	10
Afton	2	3	14	63	15
West River	2	3	18	81	20
Sub-total	9		77		85
Total:	53	85	465	2093	515

-Estimates were usually given in total salmon and proportioned into small and large, based on 90% large.

-Small average weight = 1.6 kilograms.

-Large average weight = 4.5 kilograms.

Table 7. Habitat areas and egg requirements for some of the Mainland Gulf Shore N. S. rivers.

River	Reference River *	Drainage Area (km²)	Habitat Area (m²)	Egg Requirements
River Philip	River Philip	650	962,000	2.31 million
East: Pictou Co.	River Philip	500	755,000	1.81 million
Sutherlands River	River Philip	45	66,600	0.16 million
Barneys River	River Philip	131	193,880	0.47 million
French River	River Philip	110	162,800	0.39 million
West: Antigonish Co.	South River	325	154,400	0.37 million
South River	South River	200	95,000	0.23 million
Pomquet River	South River	147	70,000	0.17 million
Afton River	South River	50	23,800	0.06 million

* The surveyed river used to calculate habitat area.

Table 8. Estimation of spawner requirements for East River (Pictou) and South River.

EAST RIVER PICTOU			
Habitat area (sq.m.)		755,000	
Optimal Egg Deposition (2.4 eggs/sq.m.)		2.4	
Total Egg Requirements		1,812,000	
Biological Characteristics			
Fecundity		1,764	eggs/kg
Small salmon	% female	5	
	mean wt. (kg)	1.7	
Large salmon	% female	60	
	mean wt. (kg)	6.1	
Eggs per small salmon spawner	=	eggs/kg * mean wt(kg) * % female	
	=	1764 * 1.7 * 5%	
	=	150	
Eggs per large salmon spawner	=	1764 * 6.1 * 60%	
	=	6,456	
Required number of large salmon	=	281	---->> 168 female 112 male
Deficit males	=	56	
Small spawners to obtain deficit males	=	56 / 0.95	
	=	59	
Spawning Requirements:	Large	281	
	Small	59	
SOUTH RIVER			
Habitat area (sq.m.)		95,000	
Optimal Egg Deposition (2.4 eggs/sq.m.)		2.4	
Total Egg Requirements		228,000	
Biological Characteristics			
Fecundity		1,764	eggs/kg
Small salmon	% female	3	
	mean wt. (kg)	1.3	
Large salmon	% female	50	
	mean wt. (kg)	3.7	
Eggs per small salmon spawner	=	eggs/kg * mean wt(kg) * % female	
	=	1764 * 1.3 * 3%	
	=	69	
Eggs per large salmon spawner	=	1764 * 3.7 * 50%	
	=	3,263	
Required number of large salmon	=	70	---->> 35 female 35 male
Deficit males	=	0	
Spawning Requirements:	Large	70	
	Small	0	

Table 9. Summary of spawner requirements for some of the Mainland Gulf Shore Nova Scotia rivers.

<i>River</i>	<i>Reference River *</i>	<i>Number of Salmon Required</i>	
		<i>Small</i>	<i>Large</i>
East: Pictou Co.	East River Pictou	59	281
River Philip	East River Pictou	75	358
Sutherlands River	East River Pictou	5	25
Barneys River	East River Pictou	15	73
French River	East River Pictou	13	60
South River	South River	0	70
West: Antigonish Co.	South River	0	113
Pomquet River	South River	0	52
Afton River	South River	0	18

* The biological characteristic data from this river were used to calculate requirements.

Table 10. Annual summaries of catch per unit effort for 3 Index Gulf N.S. rivers using license stub returns and logbooks. Mean = (1989 to 1993). 1994 results are preliminary.

Year	River	CPUE				CATCH					
		Small Salmon		Large Salmon		Logbook			License Stubs		
		Log	Stub	Log	Stub	Small	Large	Rods	Small	Large	Rods
East: Pictou Co.											
1984			0.030		0.084				14	40	474
1985			0.101		0.407				40	162	398
1986			0.077		0.539				89	620	1151
1987			0.065		0.302				83	389	1286
1988			0.099		0.325				129	422	1300
1989		0.026	0.051	0.338	0.393	5	66	195	87	670	1705
1990		0.127	0.078	0.355	0.214	14	39	110	109	299	1394
1991		0.066	0.079	0.209	0.288	6	19	91	121	440	1526
1992		0.106	0.115	0.545	0.384	7	36	66	111	371	967
1993		0.087	0.052	0.145	0.204	6	10	69	56	221	1083
1994		0.067	0.039	0.167	0.144	2	5	30	24	89	619
	+/- 1993	-23%	-25%	15%	-30%	-67%	-50%	-57%	-57%	-60%	-43%
	+/- Mean	-19%	-48%	-48%	-52%	-74%	-85%	-72%	-75%	-78%	-54%
River Philip											
1984			0.081		0.195				25	60	308
1985			0.039		0.222				12	69	311
1986			0.173		0.528				111	338	640
1987			0.068		0.301				76	337	1118
1988			0.138		0.267				169	328	1227
1989		0.079	0.091	0.400	0.326	13	66	165	114	407	1248
1990		0.275	0.136	0.246	0.168	39	35	142	155	191	1139
1991		0.108	0.111	0.362	0.286	20	67	185	164	421	1473
1992		0.136	0.148	0.193	0.265	19	27	140	179	322	1213
1993		0.137	0.098	0.189	0.197	26	36	190	167	337	1708
1994		0.114	0.073	0.203	0.153	14	25	123	88	184	1205
	+/- 1993	-17%	-25%	7%	-23%	-46%	-31%	-35%	-47%	-45%	-29%
	+/- Mean	-22%	-37%	-27%	-39%	-40%	-46%	-25%	-44%	-45%	-11%
West: Antigonish Co.											
1984			0.159		0.019				17	2	107
1985			0.151		0.542				34	122	225
1986			0.240		0.908				126	476	524
1987			0.113		0.267				84	198	741
1988			0.147		0.276				67	126	457
1989		0.167	0.171	0.476	0.415	14	40	84	90	218	525
1990		0.322	0.217	0.322	0.286	38	38	118	152	200	699
1991		0.070	0.089	0.549	0.402	10	78	142	65	294	732
1992		0.171	0.182	0.358	0.370	21	44	123	136	277	748
1993		0.061	0.071	0.421	0.267	7	48	114	66	248	928
1994		0.078	0.060	0.186	0.170	10	24	129	46	131	772
	+/- 1993	26%	-16%	-56%	-37%	43%	-50%	13%	-30%	-47%	-17%
	+/- Mean	-51%	-59%	-56%	-51%	-44%	-52%	11%	-55%	-47%	6%

Table 11. Results of electrofishing surveys on Mainland Gulf Shore Nova Scotia rivers for 1994.

County	River	Site #	Area (m ²)	No. of * Sweeps	Life Stage	Sweep Catch	Total Estimate	Density (100 m ²)	Mean Lgth	PHS	
Antigonish County					Fry						
	Afton	1			5min	Fry	0	.	.	.	
	Afton	2			5min	Fry	78	.	5.9	.	
	Afton	3			5min	Fry	64	.	5.3	.	
	Pomquet	1			5min	Fry	64	.	5.5	.	
	Pomquet	2			5min	Fry	66	.	5.3	.	
	Pomquet	3			5min	Fry	78	.	4.9	.	
	Pomquet	4			5min	Fry	15	.	5.2	.	
	Pomquet	5			5min	Fry	36	.	5.1	.	
	Pomquet	6	152	3		Fry	1	1	0	5.7	
	West	2	120	4		Fry	242	285	238	4.9	
	West	4	115	4		Fry	296	315	275	4.5	
Pictou County											
	Barneys	1			5min	Fry	94	.	5.3	.	
	Barneys	3	158	3		Fry	216	238	151	5.6	
	Barneys	4			5min	Fry	30	.	6.0	.	
	East	3	160	3		Fry	53	55	34	4.7	
	East	4	129	3		Fry	191	218	169	4.7	
	East	5			5min	Fry	53	.	4.7	.	
	East	6			5min	Fry	22	.	4.9	.	
	East	7			5min	Fry	70	.	4.7	.	
	French	1			5min	Fry	28	.	5.7	.	
	French	2			5min	Fry	69	.	6.1	.	
	French	3	119	3		Fry	133	143	120	5.8	
	Sutherlands	1			5min	Fry	51	.	4.5	.	
	Sutherlands	3			5min	Fry	100	.	4.4	.	
Antigonish County					Parr						
	Afton	1			5min	Parr	0	.	.	.	
	Afton	2			5min	Parr	28	.	10.4	.	
	Afton	3			5min	Parr	21	.	9.8	.	
	Pomquet	1			5min	Parr	6	.	9.3	.	
	Pomquet	2			5min	Parr	6	.	10.2	.	
	Pomquet	3			5min	Parr	30	.	9.0	.	
	Pomquet	4			5min	Parr	19	.	8.6	.	
	Pomquet	5			5min	Parr	23	.	9.1	.	
	Pomquet	6	152	3		Parr	19	19	13	9.0	
	West	2	120	4		Parr	171	174	145	8.5	
	West	4	115	4		Parr	77	81	71	8.1	
Pictou County											
	Barneys	1			5min	Parr	66	.	8.7	.	
	Barneys	3	158	3		Parr	29	32	20	11.1	
	Barneys	4			5min	Parr	8	.	12.3	.	
	East	3	160	3		Parr	37	43	27	8.1	
	East	4	129	3		Parr	38	44	34	8.0	
	East	5			5min	Parr	23	.	7.9	.	
	East	6			5min	Parr	0	.	.	.	
	East	7			5min	Parr	26	.	8.5	.	
	French	1			5min	Parr	23	.	8.5	.	
	French	2			5min	Parr	8	.	9.8	.	
	French	3	119	3		Parr	47	48	40	9.5	
	Sutherlands	1			5min	Parr	42	.	8.4	.	
	Sutherlands	3			5min	Parr	27	.	7.7	.	

* 5min - Refers to a spot check for using approximately 300 seconds of shocking time.

Table 12. Total returns of large and small salmon to River Philip, East River (Pictou) and West River (Antigonish) for 1994.

River	Parameter	Returns	
		Large	Small
East: Pictou Co.	Estimate	265 (207 - 403)	60 (39 - 107)
	Average	611 (435 - 856)	232 (178 - 303)
	% Difference	-57 (0.0)	-74 (0.0)
River Philip	Estimate	281 (155 - 539)	198 (127 - 369)
	Average	500 (365 - 706)	380 (294 - 491)
	% Difference	-44 (0.08)	-48 (0.05)
West: Antigonish Co.	Estimate	181 (100 - 381)	105 (63 - 199)
	Average	378 (280 - 509)	247 (189 - 331)
	% Difference	-52 (0.07)	-57 (0.02)

- * - Estimate is number of returns to each river with 90% confidence interval in parentheses.
- * - Average is 5 year average (1989 - 1993) with 90% confidence interval in parentheses.
- * - % difference is ((estimate - average)/average).
- * - The probability that the estimate exceeds the average is in parentheses.

Table 13. Spawning escapement of large and small salmon to River Philip, East River (Pictou) and West River (Antigonish) for 1994.

Location	Parameter	Spawning Escapement	
		Large	Small
East: Pictou Co.	Target	281	59
	Estimate	123 (65 - 260)	41 (22 - 86)
	Average	606 (431 - 851)	176 (123 - 246)
	% Difference	-80 (0.0)	-77 (0.0)
River Philip	Target	358	75
	Estimate	264 (138 - 521)	137 (75 - 307)
	Average	496 (361 - 701)	289 (206 - 395)
	% Difference	-47 (0.08)	-53 (0.09)
West: Antigonish Co.	Target	113	0
	Estimate	180 (99 - 379)	77 (40 - 165)
	Average	375 (278 - 506)	188 (131 - 270)
	% Difference	-52 (0.07)	-59 (0.04)

- * - Estimate is escapement to each river with 90% confidence interval in parentheses.
- * - Average is 5 year average (1989 - 1993) with 90% confidence interval in parentheses.
- * - % difference is ((estimate - average)/average).
- * - The probability that the estimate exceeds the average is in parentheses.

Table 14. Estimated returns and escapements of large and small salmon for three Mainland Gulf Shore Nova Scotia rivers from 1985 to 1994.

Year	Large Salmon			Small Salmon		
	Returns	Escapement	% of Target	Returns	Escapement	% of Target
East: Pictou Co.						
1985	224	222	79%	88	64	108%
1986	855	847	301%	204	151	256%
1987	540	536	191%	195	147	249%
1988	585	579	206%	303	223	378%
1989	942	933	332%	196	143	242%
1990	407	403	143%	247	182	308%
1991	619	614	219%	270	200	339%
1992	523	519	185%	251	184	312%
1993	456	313	111%	127	92	156%
1994	265	123	44%	60	41	69%
Mean (89-93)	611	606	216%	232	176	298%
River Phillip						
1985	97	96	27%	27	20	27%
1986	465	460	128%	250	184	245%
1987	477	472	132%	169	124	165%
1988	458	452	126%	384	286	381%
1989	566	561	157%	254	187	249%
1990	279	276	77%	362	268	357%
1991	578	573	160%	360	262	349%
1992	461	457	128%	398	292	389%
1993	474	469	131%	373	276	368%
1994	281	264	74%	198	137	183%
Mean (89-93)	500	496	139%	380	289	385%
West: Antigonish Co.						
1985	174	172	152%	76	55	N/A
1986	649	645	571%	278	204	N/A
1987	279	277	245%	190	142	N/A
1988	175	173	153%	147	108	N/A
1989	316	314	278%	200	147	N/A
1990	284	281	249%	342	253	N/A
1991	414	410	363%	146	108	N/A
1992	398	395	350%	312	233	N/A
1993	339	335	296%	148	108	N/A
1994	181	180	159%	105	77	N/A
Mean (89-93)	378	375	332%	247	188	N/A

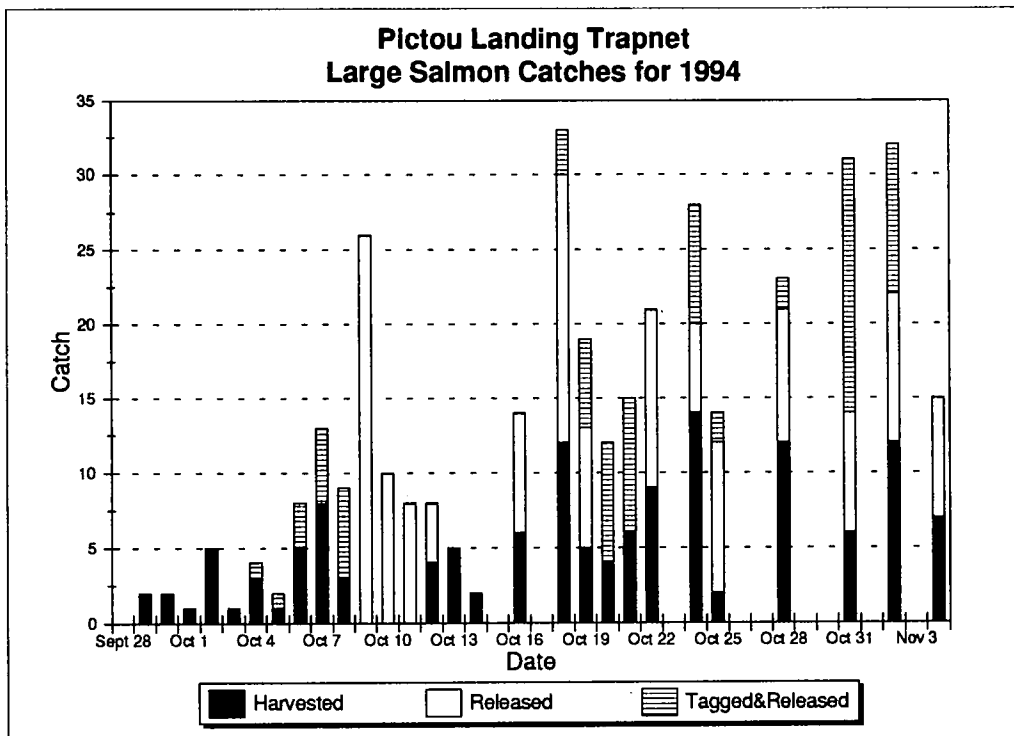
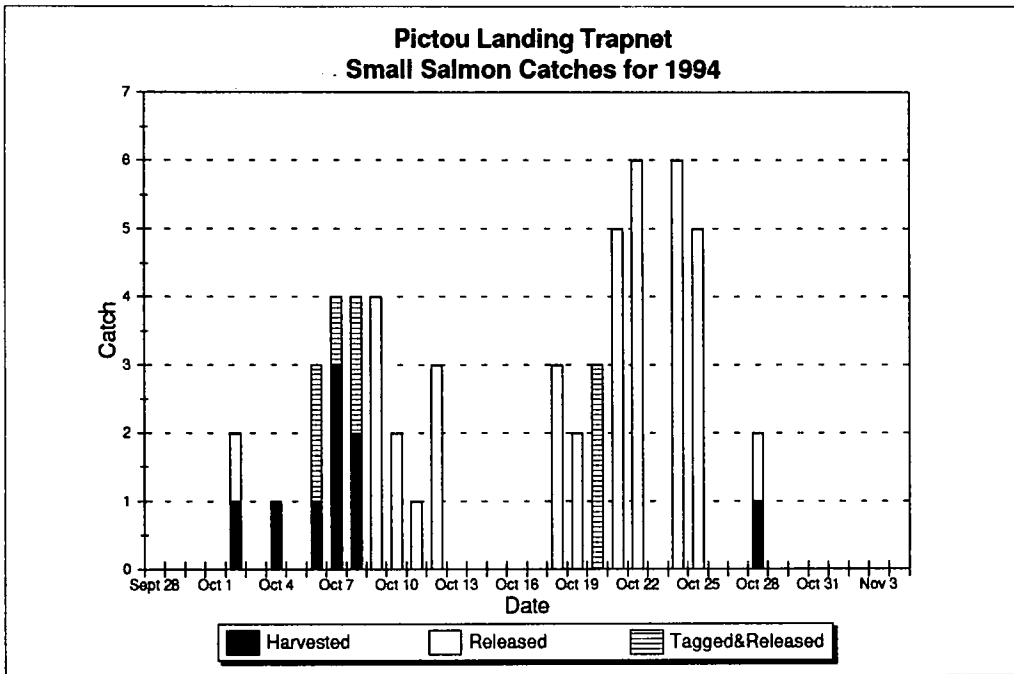


Figure 1. Daily salmon catches from the Pictou Landing First Nation trapnet located on East River, Pictou Co. during 1994.

-Note that the trap was not fished on Oct 15, 17, 23, 26, 27, 29, 30 and Nov 1 and 3.

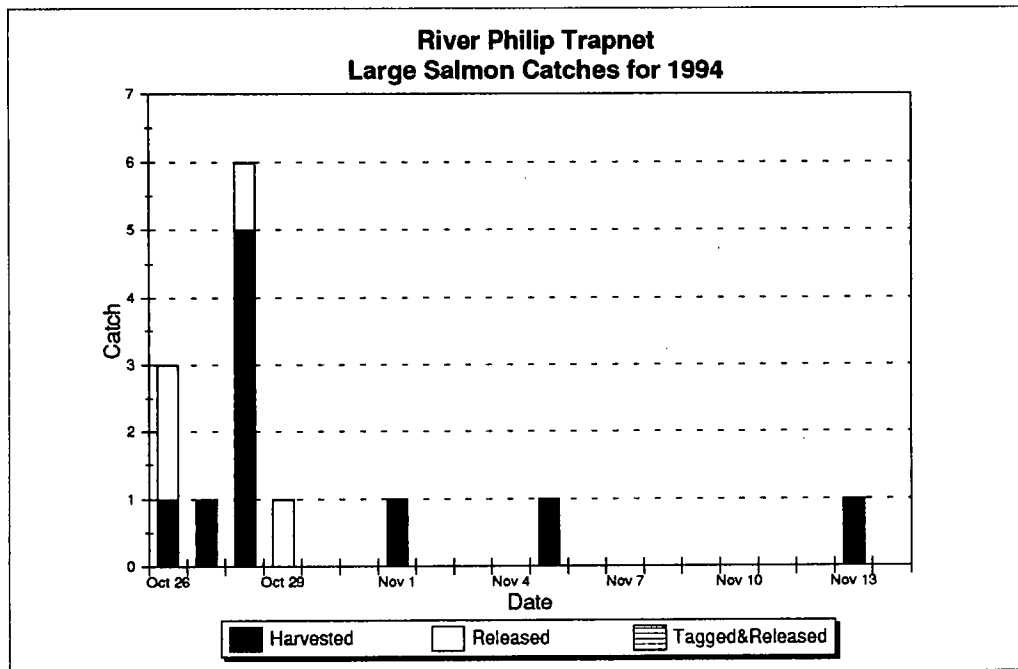
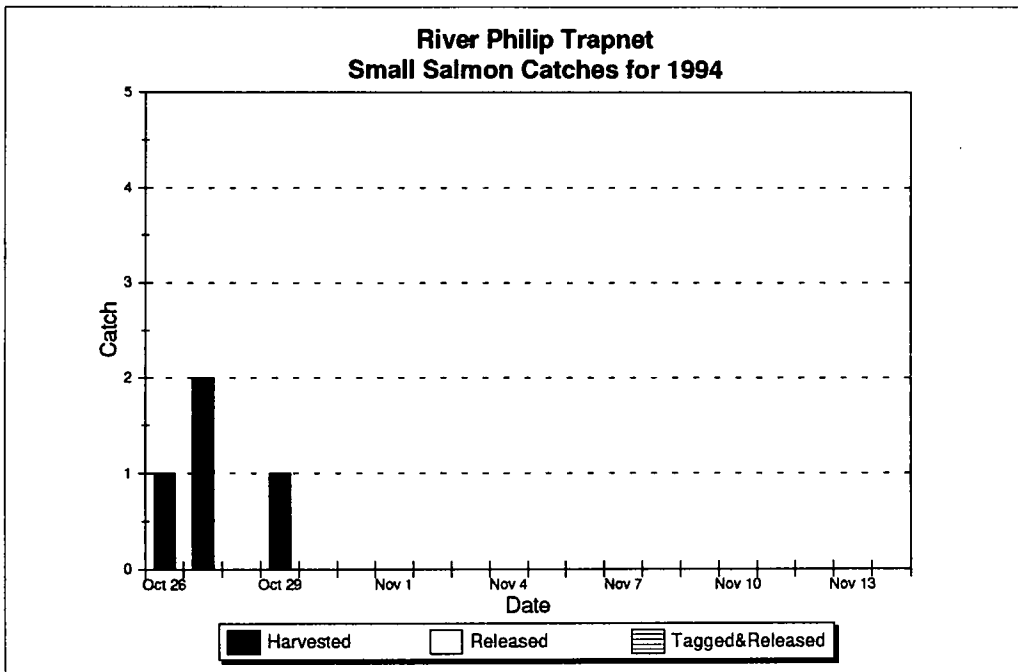


Figure 2 . Daily salmon catches from the Millbrook First Nation trapnet located on River Philip during 1994.

- Note that the trap was not fished on Oct 30, 31 and Nov 3, 4, 6, 8, and 9.

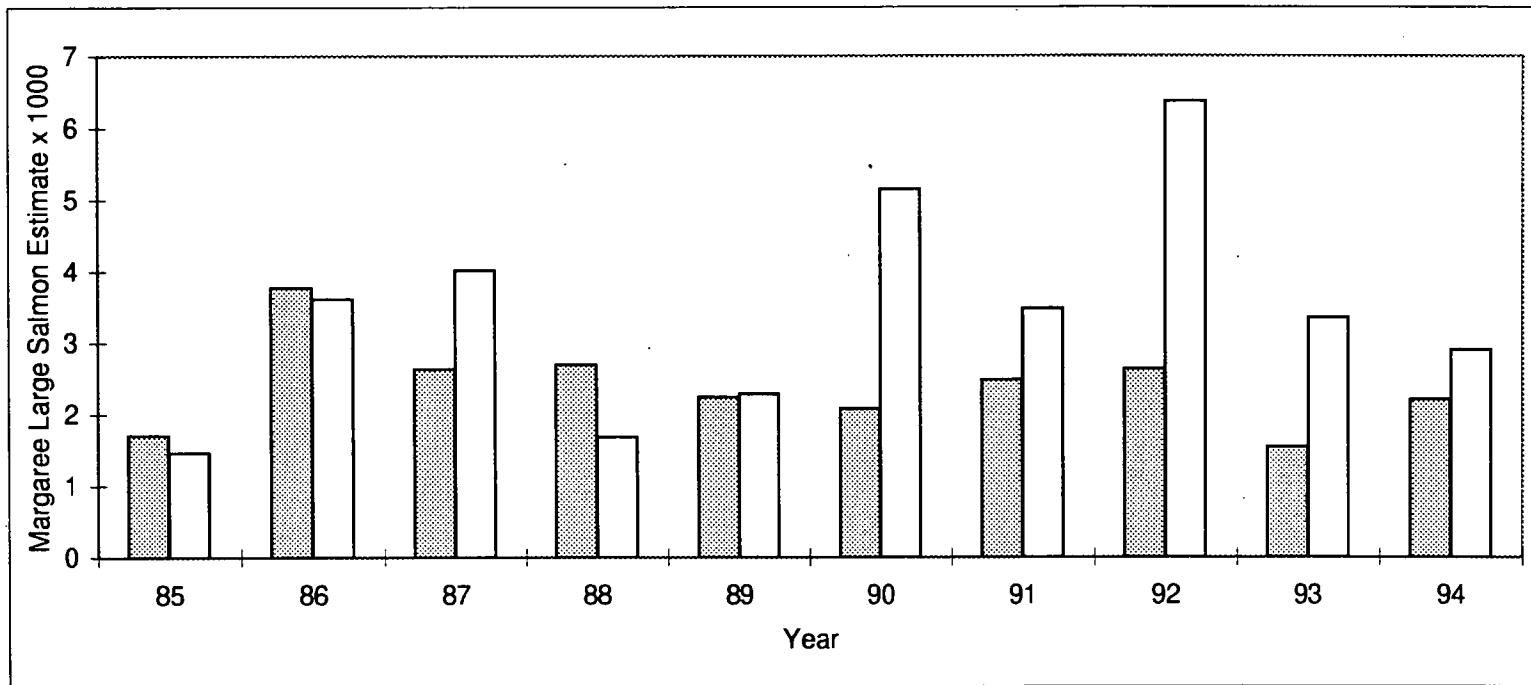


Fig. 3. Comparison of Margaree large salmon population estimates from mark-recapture techniques to those based on Nova Scotia license stub returns, average exploitation rates and adjustment factors as described in the text. The shaded bars are estimates from the license stubs and the open bars are mark-recapture

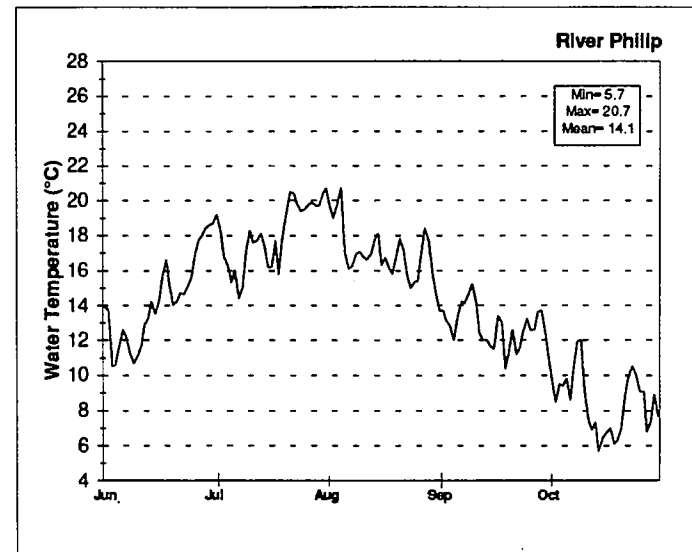
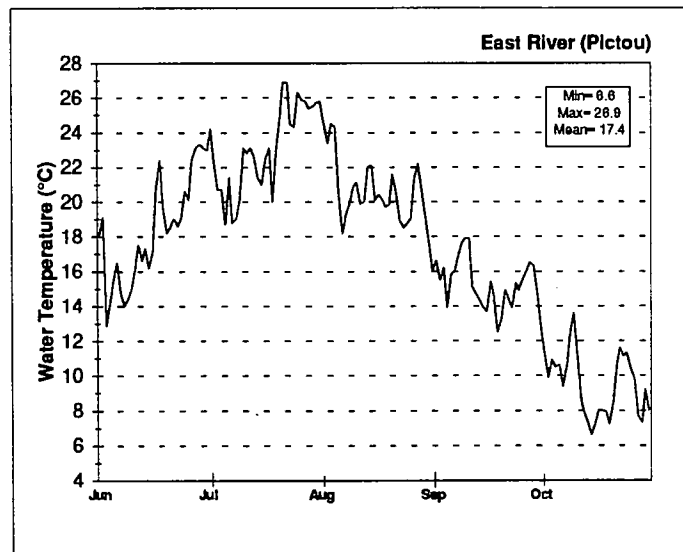
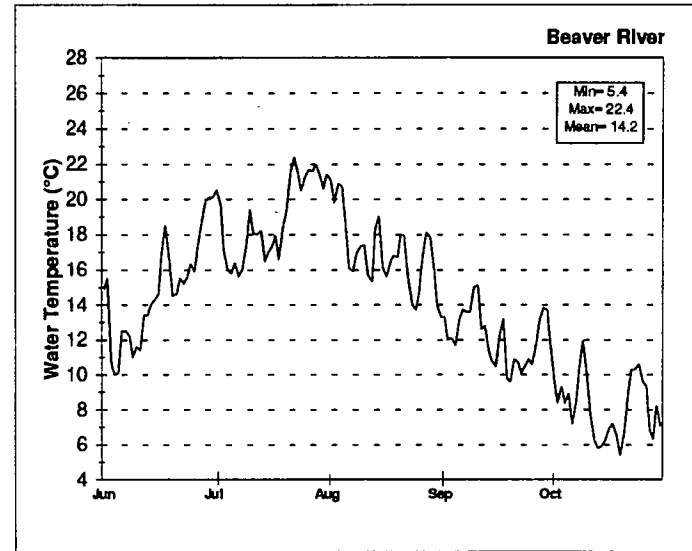
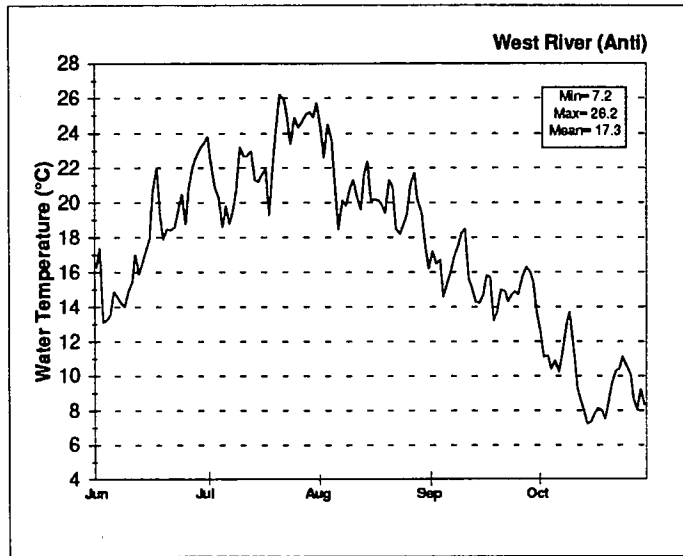


Figure 4. Mean daily water temperatures for West River (Antigonish Co.), Beaver River, East River (Pictou Co.), and River Phillip during 1994.

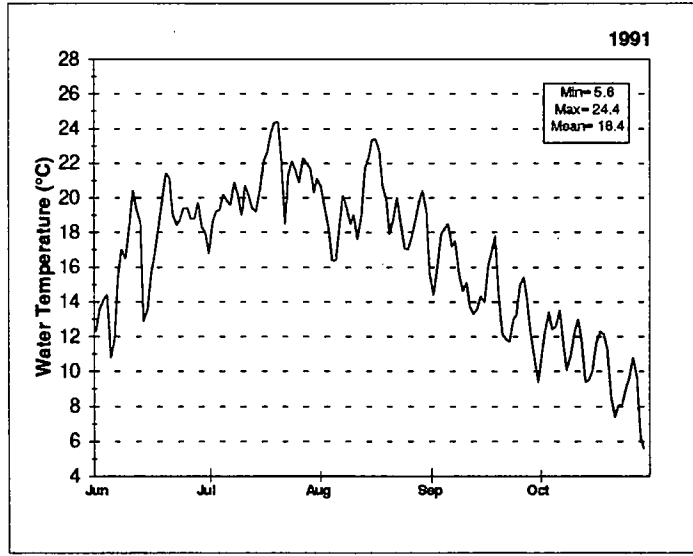
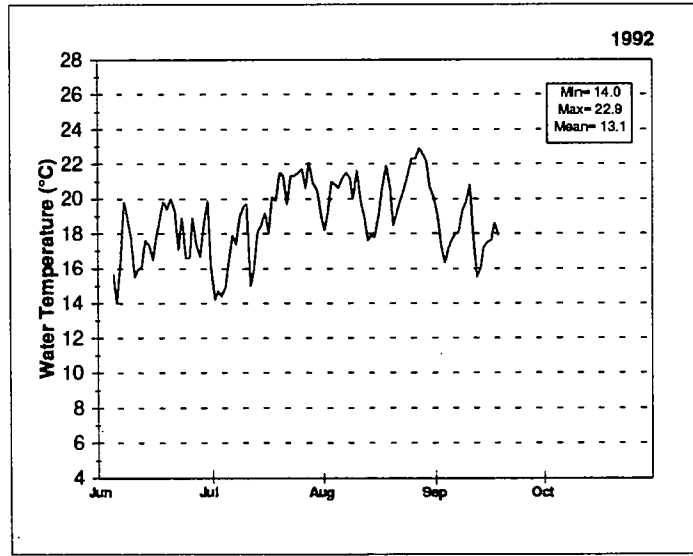
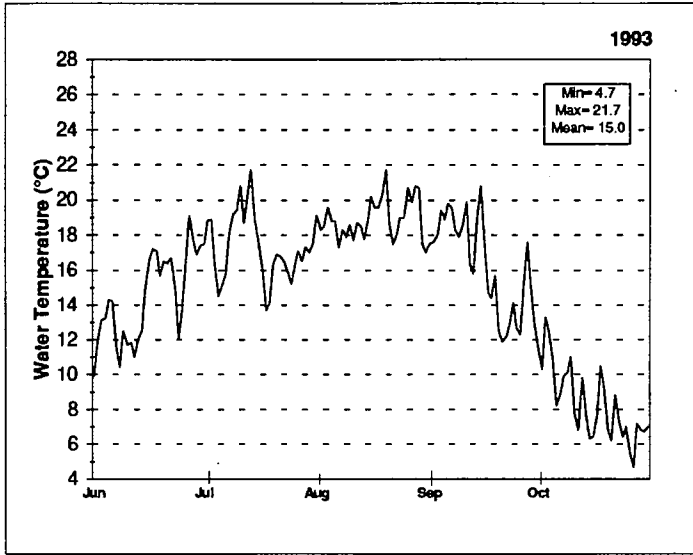
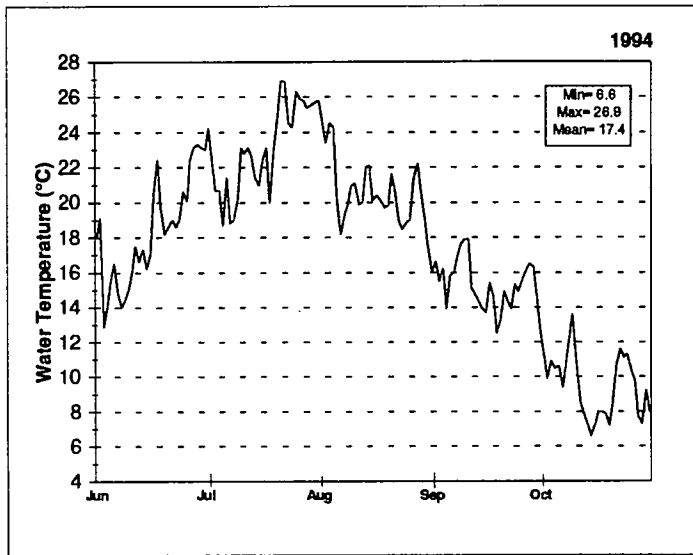


Figure 5. Mean daily water temperatures for East River, Pictou Co. from 1991 to 1994. In 1992 the ryan tempentor was removed on September 19.