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STATUS OF ATLANTIC SALMON IN THE NEPISIGUIT RIVER, NEW BRUNSWICK, 1994

by

A. Locke, F. Mowbray and R. Claytor
Department of Fisheries & Oceans
Science Branch, Gulf Region
P.O. Box 5030
Moncton, New Brunswick, E1C 9B6

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Abstract

Only 59% of the CAFSAC spawning target for Atlantic salmon in the Nepisiguit River was achieved in 1994. Large salmon spawning escapement (773), estimated from angling catch, barrier fence counts, and redd counts, was well below the requirement of 1363 fish. Small salmon spawning escapement (501) was also less than the requirement (690 fish).

The large salmon target has been met only twice since 1982, but the small salmon target has been met nine times out of 13 during this period.

Angling catches of small salmon (380 removed, 70 released) and large salmon (250 released) were the lowest recorded since 1985.

Pre-season forecasting based on a Ricker curve indicated that large salmon returns in 1995 will be similar to those in 1994, and consequently it is unlikely that large salmon requirements will be met in 1995.

Résumé

Seulement 59 % des besoins-cibles en géniteurs établis par le CSCPCA ont été atteints en 1994 en ce qui concerne le saumon de l'Atlantique de la rivière Nepisiguit. Les échappées de grands saumons reproducteurs (773), estimées d'après les prises des pêcheurs à la ligne, les résultats obtenus aux barrières de dénombrement et les dénombrements de nids de frai, étaient bien inférieures aux besoins, chiffrés à 1 363 poissons. Quant aux échappées de petits saumons reproducteurs (501), elles étaient aussi inférieures aux besoins (690 poissons).

La cible fixée pour les grands saumons n'a été atteinte que deux fois depuis 1982, tandis que celle des petits saumons l'a été neuf fois sur treize pendant la même période.

Les prises de petits saumons (380 retraits, 70 remises à l'eau) et de grands saumons (250 remises à l'eau) par les pêcheurs à la ligne étaient les plus basses depuis 1985.

Les prévisions de pré-saison fondées sur une courbe de Ricker révèlent que les remontées de grands saumons en 1995 seront comparables à celles de 1994. Par conséquent, il est peu vraisemblable que les besoins en grands saumons soient comblés pour 1995.

Summary Sheet

STOCK: Nepisiguit River, SFA 15
TARGET: 9.6 million eggs (1363 large salmon, 690 small salmon)
REARING AREA: 3,973,000 m^2, 30% of SFA 15, 4% of Gulf New Brunswick

	1989	1990	1991	1992	1993	1994	MIN	MAX	MEAN
Angling									
Large (Released)	490	300	300	270	258	250	60	600	374
Small (Retained)	600	500	700	800	470	380	229	1000	690
First Nation Harvest									
Large	n/a	n/a	n/a	n/a	50	0			
Small	n/a	n/a	n/a	n/a	200	120			
Spawning escapement									
Large	1239	1117	1026	336	925	773	109	2381	1083
Small	309	1593	2164	1092	836	501	309	2900	1316
Total returns									
Large	1568	1390	1290	642	1084	892	545	2700	1373
Small	968	2152	2930	1974	1511	1018	562	2930	2104
% egg target met	92	89	85	29	72	59	9	187	85

Landings: Small and large salmon angling catches were the lowest since 1985. Native harvest in 1994 was 120 small salmon.

Data and assessment: Salmon spawning escapement was estimated from returns to a counting fence in conjunction with harvest statistics. For the years 1990, 1991, 1993 and 1994 counting fence returns were estimated using the relationship between fence counts and angling catch above the fence. Spawning escapement below the fence was estimated using the distribution of spawning redds above and below the fence. Total returns below the fence were then calculated as the sum of spawning escapement plus removals.

State of the stock: The estimated spawning escapement of large salmon was 773 in 1994, well below requirements for the system. Small salmon spawning escapement of 501 was also below requirements for the first time in four years.

Forecast for 1993: A Ricker recruitment model indicates that returns of wild (i.e. non-adipose clipped) large salmon in 1995 will most likely be between 800 and 900 fish, with an 87% probability that returns will exceed the 1994 figure of 869 wild fish.

1 - Introduction

Atlantic salmon occur naturally in the lower 32 km of the Nepisiguit River and in its tributaries (Fig. 1). Stocking of juvenile salmon, initially to restore a population decimated by overfishing and a waste sulfide spill in 1969, commenced in 1974 and continues to supplement natural spawning.

This report documents the status of naturally spawning Nepisiguit River salmon, juvenile stocking, and juvenile salmon abundances in 1994. Most of the methodologies and types of data summarized are similar to those utilized by Locke et al. (1994) for 1982-1993 (barrier fence counts, estimates of angling catch, electrofishing surveys, stocking data). New methodologies for 1994 are (1) a preliminary year of trapnet operation for adult salmon stock estimation by mark-recapture methodologies and (2) angler data logbooks. Issues which are specific to this river system include: (1) the suitability of the CAFSAC egg deposition target given the apparently high predation of juvenile salmon by piscivorous birds, (2) whether juvenile salmon should be stocked in the Nepisiguit watershed above Grand Falls, which forms a natural barrier to salmon, and (3) enhancement of the early run by stocking.

In the terminology utilised herein, salmon are subdivided into two size classes: small and large. Small salmon are adults less than 63 cm in fork length (1SW, one sea-winter salmon or grilse). Large salmon are adults greater than or equal to 63 cm in fork length (MSW or multi-sea-winter salmon).

2 - Description of fisheries

Salmon fisheries in the Nepisiguit River usually include (1) recreational angling and (2) gill-netting or angling by members of the Pabineau First Nation. In 1994, the Pabineau band council purchased aquacultured salmon for consumption by band members. This successfully discouraged gill-netting of Nepisiguit salmon, and band members harvested small salmon by angling. Non-native anglers fished during the period June 1 to October 7. Anglers were obliged to release all large salmon back into the river. Catches of small salmon were restricted by seasonal and daily bag limits to eight and two fish, respectively.

3 - Target

The target egg deposition for the Nepisiguit River is **9.535×10^6 eggs (1,363 large, 690 small salmon)**. This estimate is based on the following;

- accessible rearing habitat = 3.973×10^6 m^2 (Anon. 1978)
- optimal egg deposition = 2.4 eggs$\cdot m^{-2}$ (Elson 1975)
- average fecundity of females = 1,760 eggs$\cdot kg^{-1}$ (Locke et al. 1994)

- proportion of females in large salmon population = 0.71 (Locke et al. 1994)
- mean weight of large salmon = 5.6 kg (weights estimated at fence)

According to the Ricker recruitment function published in the 1993 stock assessment, the CAFSAC target of 2.4 eggs·m^2 is suitable for this river. Recruits are maximized at 2.4 eggs·m^{-2} or less for total returns, large salmon, and small salmon returns (Fig. 10 in Locke et al. 1994).

4 - Fishery data

First Nation anglers retained 120 small salmon and 0 large salmon (B. Paul Jr., personal communication).

Angling catches estimated by the Nepisiguit Salmon Association in 1994 were 370 retained and 80 released small salmon, and 250 released large salmon (Table 1). Compared to the five-year mean of 767 small salmon and 284 large salmon, the 1994 angling catch of small and large salmon was down by 41% and 12%, respectively (Table 2, Fig. 2).

The 3700 rod-days angled in 1994 represented a fishing effort similar to the mean of 3820 rod-days. Most of the angling effort occurred in September (1600 of the total 3700 rod-days; Table 1). The 500 rod-days angled in October also represent a high level of angling effort considering that the season closed on October 7.

Catch per unit effort (CPUE) peaked in October at 0.33 (Table 1). Average CPUE for the full season was 0.19, 32% lower than the mean CPUE, 0.28.

Angling logbooks completed by thirteen anglers in the Nepisiguit Salmon Association showed a higher average CPUE (0.27, Table 3), due to the high success rate of one angler with a CPUE of 0.63. Excluding this individual, the mean CPUE was 0.16, similar to the 0.19 CPUE of the general public.

Logbook anglers fished twice as much in the waters below the fence as in the waters above the salmon counting fence (Table 3). CPUE below the fence, 0.29, was slightly higher than CPUE above the fence, 0.24.

Historic angling catches recorded by the Nepisiguit Salmon Club for the period 1931-1969 were provided by R. Baker. Catches in club waters averaged 71.1 small salmon and 16.8 large salmon during 1931-1968, and only 3 small and no large salmon were caught in 1969 (Fig. 3a). Catches of both small and large salmon significantly declined over the period 1931-1969 (significant ($P<0.05$) negative slopes were obtained by regression analyses of catch vs. year (A. Locke, unpub. data)). Weights of large salmon (Fig. 3b) did not significantly change over this time period ($P=0.009$, untransformed

weight; P=0.527, log-transformed weight). Small salmon weights (Fig. 3b) decreased over the period 1931-1969 (P=0.0001, log-transformed and untransformed weights). Catches have not been consistently recorded at the club in recent years, but the 1991 landings of 90 small and 27 large salmon were better than the 1931-1968 averages. Historically, salmon were not angled in the Nepisiguit River before July 5 and the mean date on which the first fish was caught in 1931-1969 was July 14. In 1991, the first fish was landed on June 22, approximately three weeks earlier than the historical average.

5 - Research data

5.1 - Juvenile stocking and broodstock collection

In 1994, the Charlo Salmonid Enhancement Centre released 168,000 unmarked feeding fry into the Nepisiguit River and its tributaries below Grand Falls (Mile 20 on Fig. 1) (Table 4).

The Nepisiguit Salmon Association operated incubation boxes at Grand Falls using eggs supplied by the Charlo SEC. In early June, 255,000 unmarked swim-up fry were distributed to the system (Table 4).

All broodstock used to produce eggs used in this stocking were collected from the Nepisiguit River the previous year. In 1994, 112 large and 15 small salmon were collected as broodstock for 1995 enhancement projects.

5.2 - Counting fence

A salmon counting fence was operated jointly by the Pabineau First Nation and Nepisiguit Salmon Association from June 29 to October 26, 1994 (Table 5). As in 1992 and 1993, the fence was located on the Pabineau reserve, 0.5 km below the mouth of the Pabineau River, just above Long Pool (Figure 1). The width of the river is 110 m at this site. This site differs from that used by the Nepisiguit Salmon Association before 1992, located 1 km below the current site.

Salmon captured at the fence during their upstream migration were counted, measured, a scale sample was collected and fish were externally sexed. The presence of adipose fin clips (indicating hatchery origin) or Carlin tags (in most cases, indicating that fish were tagged at the downriver assessment traps; see section 5.3) was noted. Salmon were released above the fence or retained as broodstock for the Charlo hatchery.

In total, 266 small salmon were counted at the fence, of which 24 were adipose fin-clipped (Table 6). In total, 233 large salmon were counted (6 fin-clipped).

Both small and large salmon reached the fence throughout the entire season (Figs. 3, 4). Small salmon returns were concentrated in August, whereas most large salmon returned in September and October (Figs. 3, 4). Adipose-clipped small salmon were observed only in the early part of the season (before the end of August; Fig. 3, Table 7). There was no obvious trend in the timing of adipose-clipped large salmon returns (Fig. 4, Table 7). Compared to previous years, the timing of small salmon returns was not typical (Fig. 5). The tendency of large salmon to return during the late run (after week 32) was typical of previous years (Fig. 6).

As in 1993, damaged (bent) conduit was observed during the fishing season and compromised the fishing efficiency of the fence during part of the season. As well, high water levels in spring resulted in the fence being installed later in the season than in most previous years. To compensate for these two problems in determining total returns to the fence, the number of salmon counted at the fence was adjusted by regression on the number of fish angled above the fence, as was done in 1993 (Locke et al. 1994). The adjusted returns to the fence were 577 small, and 652 large salmon (Table 6).

Fish which were measured and scale-sampled at the fence in 1994 had all smoltified after 2 years in fresh water (Table 8), according to ageing data provided by the Nepisiguit Salmon Association. Sea-ages of returning fish ranged from 1 to 4 years. A large proportion of 3 to 4 year old salmon were repeat spawners. The occurrence of adipose-clipped individuals among the fish included in this analysis was similar to that of all fish recorded at the fence, suggesting that the 121 fish which were measured and aged represent a reasonable cross-section of the population despite not having been randomly sampled.

Ageing data collected by the Nepisiguit Salmon Association since 1982 indicated that the majority of Nepisiguit salmon (92% of small salmon, 95% of large salmon) spent only two years in freshwater, although three individuals were found to have spent four years in fresh water (Table 9). Over the time period 1982-1994, small salmon (1 sea-winter) averaged approximately 54.5 cm in fork length, while large (multi-sea-winter) salmon averaged 74.7 to 118 cm in fork length, depending on age (Table 9).

The oldest salmon aged in 1982-1994 was ten years old (3 years as a juvenile in fresh water, plus 7 years at sea). The majority (64%) of large salmon, however, were only four years old (2 years in river, 2 years at sea) (Table 10). Few of these 2-SW salmon had previously spawned as grilse, but the majority of salmon returning in older age-classes had previously spawned (Table 10). Overall, 25.8% of large salmon had already spawned once in previous years, and an additional 3.9% had spawned twice (Table 10). Approximately 10% of large salmon sampled were evidently spawning at ages 1SW and 3SW and an additional 10% as 2SW and 4SW (Table 11). Approximately 5% were spawning at 2SW and 3SW. Among the salmon which were

returning to spawn a third time, the most common combinations of spawning ages were 1SW-3SW-4SW, 1SW-3SW-5SW, 2SW-4SW-5SW and 2SW-4SW-6SW. Proportions of adipose-clipped and wild individuals among the previous spawners were similar within year (Table 12). Previous spawners were most commonly observed during the period 1988-1992 (Table 12).

5.3 - Trapnets

As an initial step in the development of a mark-recapture based assessment program for salmon in the Nepisiguit River, two tagging traps were installed just downstream of the Highway 11 bridge. The trapnet project operated from July 17 to October 29, 1994, and three trap styles and locations were tried (Appendix 1).

In total, 73 small and 12 large salmon were caught in the traps. All salmon were released following collection of biological data (measurement of fork length, collection of a scale sample for ageing) and attachment of a numbered blue Carlin tag just anterior to the dorsal fin.

Four tagged small salmon were recaptured by anglers, and a fifth was recorded at the counting fence (Appendix 1).

Mark-recapture data for 1994 are not used in this stock assessment because early-season catches of salmon in the traps were negligible, numerous modifications were made to the traps during this first year of operation (changing their fishing efficiency during the season), and the numbers of tags applied and returned are insufficient for analysis.

5.4 - Redd counts

Redd counts conducted by the Nepisiguit Salmon Association were conducted in the Nepisiguit River both above and below the fence, for the first time since 1988 (Table 13). Similar proportions of redds were observed above the fence in 1994 (74%) and in 1982-1988 (70%), although the fence location differed during these two time periods. The total redd count of 2952 was 9% higher than the mean of 1983-1988 counts (2711.2 redds).

5.5 - Juvenile abundance

Estimates of juvenile abundance were obtained from electrofishing surveys by the Nepisiguit Salmon Association and Pabineau Band personnel at 12 sites in the Nepisiguit River, 3 sites in Gordon Meadow Brook, and 5 sites in the Pabineau River. Densities were estimated by removal from sites enclosed by nets. Juveniles were separated into age classes using fixed length cutoffs (0+ parr, ≤5.5 cm; 1+ parr, 5.6-10.5 cm; 2+ parr, ≥10.6 cm) rather than examination of length-frequency data. This may result

in some misclassification of parr into the wrong age-class (R. Pickard, pers. comm.).

Mean abundance of 0+ parr in 1994 was the highest recorded since 1982 (Fig. 8). With the exception of 1993 (following the very low returns of 1992, Table 14), 0+ parr abundances have been increasing since 1988. Mean abundance of 1+ parr was low relative to that of 1992 and 1993, reflecting the poor 1992 spawning escapement, but was similar to abundances in 1990-1991. Abundance of 2+ parr was similar to that of the previous three years.

6 - Estimation of stock parameters

Calculations of spawning escapement and returns were carried out by the methods used in the 1993 stock assessment (Locke et al. 1994), as follows:

(1) Spawning escapement above the fence

Spawners = salmon counted at fence (in 1994, this number was adjusted by regression, as described in section 5.2) - (broodstock removals + mortalities at fence + angling mortality + First Nation harvest)

(2) Spawning escapement below the fence

Spawners = (spawners above fence) x average (redd count below fence) / (redd count above fence)

(3) Returns below the fence

Returns = spawners + angling mortality + First Nation harvest + commercial harvest.

Notes:
(a) Angling mortality: The data collected by the Nepisiguit Salmon Association apply to the entire system, and do not separate above- and below-fence components. The average distribution of angling above (40.3%) and below (59.7%) the fence was calculated based on returns of scale samples by anglers (Table 10), which include information on the angling location. Angling mortality of released fish was calculated taking into account an assumed 3% hook-and-release mortality rate.

(b) Redd distributions above and below the fence: Relative numbers of redds above (69.5%) and below (30.5%) the fence (Table 14) were used to estimate the number of spawners below the fence, assuming that fish spawning in the two areas produce similar numbers of redds per fish. Absolute numbers of redds were not used to determine the total number of spawners since the area surveyed was not constant from year to year.

(c) Commercial and First Nations harvests: In 1994, there was no commercial salmon fishery in the Nepisiguit system. First Nations harvest was 120 small salmon.

(d) Effects of fence location: It is assumed that for assessment purposes the effects of the relocation of the counting fence by 1 km upriver of the original site are minimal. No attempt was made to adjust figures to account for the new location. All references to 'above' and 'below' the fence in years prior to 1992 refer to the original fence site. All references in 1992-1994 refer to the current fence site.

7 - Assessment results

7.1 - Abundance estimates

Returns of large salmon were estimated as 240 below the fence and 652 above the fence (Table 15). Returns of small salmon were estimated as 441 below the fence and 577 above the fence (Table 16).

Total returns were estimated as 892 large, and 1018 small salmon (Table 17). Spawning escapement was estimated to be 773 large, and 501 small salmon. Both values are less than the spawning escapement estimated in 1993 (Table 17, Fig. 9).

Based on this spawning escapement, 59% of the CAFSAC spawning requirement was met in 1994 (Table 18). In the past five years, between 29 and 92% of spawning requirements have been met (mean 73%). Spawning requirements have been exceeded only in 1987 and 1988 (Fig. 10).

Comparison of redd counts in 1983-1988 and 1994 to egg depositions calculated by the method outlined in section 6 showed good correspondence between these two means of estimating spawning escapement. A regression of calculated egg deposition (Table 14 values divided by spawning habitat to yield eggs$\cdot m^2$) on total redd counts above and below the fence (Table 13) was significant at $R^2 = 0.87$. The regression equation was:

EGGS = 0.119 REDDS.

The slope was significant at P=0.002. The regression was not forced through the origin, but the Y-intercept (-127.7) was not significant (P=0.09) and consequently has not been included in the equation shown above.

Mean annual abundances of 0+, 1+, and 2+ parr were regressed on estimated egg deposition in the appropriate spawning year, but none of these analyses were significant at P=0.05. Misclassification of parr by age-class may have been a problem in this analysis. As well, the inability to distinguish wild and stocked parr (adipose-clipped and unmarked parr were pooled in this

analysis because many hatchery-reared fish have not been marked before release) would obscure any relationship between egg deposition and wild parr abundance.

7.2 - Exploitation Rate

Angling exploitation rate of small salmon, calculated for the whole river, was 39% (Table 19). Exploitation rate calculated for the portion of the river above the counting fence was 28%. These exploitation rates are similar to those calculated for 1992 and 1993, but higher than most years in the previous decade.

7.3 - Comparison with Nepisiguit Salmon Association assessment

The results in section 7.1 indicate that 59% of spawning requirements were met in 1994 by an estimated egg deposition of 5.655×10^6 eggs. The returning stock was estimated at 892 large, and 984 small salmon.

A somewhat different view of the stock status is presented by R. Baker in an annual summary of the activities of the Nepisiguit Salmon Association. He estimates that 1558 large and 1324 small salmon returned to the river in 1994. He estimates that 9×10^6 eggs were deposited and that this fulfills approximately 70% of the "required spawning escapement for optimum returns" (based on 4.0 $eggs \cdot m^{-2}$).

Irrespective of which set of figures one accepts, both conclude that that the stock is below the target spawning escapement.

8 - Ecological considerations

8.1 - Species interactions

There are two species interactions which are of particular interest with respect to the Nepisiguit salmon population. The first interaction is that between Atlantic salmon and brook trout. Until 1985, salmon juveniles were stocked in the portion of the watershed above Grand Falls, an impassible barrier to upstream migration. Since 1986, juveniles have been stocked only in the part of the system naturally accessible to salmon. Many proponents of Nepisiguit salmon feel that salmon should be stocked above the falls, or that a fishway should be constructed in order to allow natural spawning by salmon in this area. Local trout anglers oppose this because of concerns about competition between juvenile salmon and trout which naturally occur in this area, the possibility of disease introduction with stocked fish, or the possibility that salmon stocking will attract large numbers of piscivorous birds to the upper river.

Predation by piscivorous birds, primarily mergansers, on juvenile salmon is a major concern of some anglers on the

Nepisiguit River. Merganser surveys conducted by the New Brunswick Department of Natural Resources and Energy in July and August 1994 counted 1.7 mergansers·river km. There were 45 birds on the below-falls portion of the river alone. Craig Wood of Noranda Research has proposed a five-year study to evaluate the effects on juvenile salmon populations of removing breeding pairs of mergansers from the lower section of the Nepisiguit River.

8.2 - Environmental conditions

Mean water level at the counting fence was high through the first month of fence operation (Fig. 11). By mid-September, water depth at the fence site had decreased from approximately 90 cm to approximately 50 cm.

High water levels and strong current in spring were responsible for late installation of the fence in both 1993 and 1994 (R. Baker, pers. comm.). It has been suggested that these conditions are specific to the current fence site, which is situated in a narrower part of the river than the site used before 1993. However, it is likely that water conditions in 1993 and 1994 were unusual. Precipitation and water discharge levels in the Restigouche River in the spring of 1993 and 1994 were substantially higher than the average (Locke et al. in preparation). There are no hydrographic stations currently operating on the Nepisiguit River with which to compare annual discharge data.

Mean water temperature at the counting fence, measured at approximately 8 A.M. daily, peaked in excess of 20 C in the last two weeks of July (Fig. 11). Temperature consistently declined after this period. The peak of small salmon arrivals at the fence occurred during the two weeks following maximum temperatures. No other relationships between salmon returns to the fence and temperature or water level are apparent.

9 - Forecasts

Two models utilized for pre-season forecasts of 1994 wild large salmon returns (a Ricker function and a probability distribution function model utilizing the eggs-to-large salmon recruits relationship) successfully predicted returns of about 800 unmarked fish (Fig. 13 in Locke et al. 1994). Actual estimated returns were 869 unmarked large salmon.

For 1995, the Ricker analysis predicts wild (i.e. unmarked) salmon returns will be between 800 and 900 fish (Fig. 12a). The probability of exceeding the 1994 wild salmon returns is about 87% (Fig. 12b).

10 - Management considerations

Target spawning escapement was not met in 1994. The CAFSAC spawning target appears to be appropriate for this river.

Almost eight million juveniles have been released to the Nepisiguit system in the past fourteen years. It is not possible to clearly evaluate the success of this stocking program in recent years because the majority of the released fish have not been marked.

In-season forecasting can be used to predict early (prior to week 34) returns beginning in week 30 (July 23), and total returns beginning in week 36 (Sept. 3; Locke et al. 1994).

11 - Research recommendations

1. Continue operation of the mark-recapture program using estuarine traps. This will permit estimation of the early run size and of the number of fish spawning below the fence. Trap operations should start in spring of 1995 in order to sample the entire run.

2. Continue operation of the counting fence at least for the 1995 season. This is essential in order to calibrate the results of the mark-recapture program with both the traps and the fence operational during one or more seasons. As well, the fence will serve as a recapture site for tags.

3. To aid in evaluation of the hatchery program, all released fish should be marked.

4. Use existing data to examine the effects of merganser predation on juvenile salmon survival rates. Reanalyse juvenile salmon size data collected during electrofishing surveys to assign ages based on length-frequency distributions rather than predetermined size classes. Use these data to examine rates of parr mortalities from 0+ to 1+ age classes, and compare to other rivers with lower merganser abundances.

12 - Acknowledgements

Much of the data used in this report was collected by the Nepisiguit Salmon Association and Pabineau First Nation. In particular, we thank R. Baker, president of the Nepisiguit Salmon Association.

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Table 1. Monthly angling catches of Atlantic salmon (kept and released) on the Nepisiguit River in 1994. Information furnished by the Nepisiguit Salmon Association.

	Small salmon		Large salmon		
Month	Kept	Released	Released	Rod-days	CPUE
June	15	0	50	300	0.22
July	75	10	50	800	0.17
August	35	5	30	500	0.14
Sept.	145	30	90	1600	0.17
Oct.	100	35	30	500	0.33
TOTAL	370	80	250	3700	0.19

Table 2. Angling catch in the Nepisiguit River, 1951-1994. Based on DFO (C&P) statistics in 1951-1983 and 1985, Nepisiguit Salmon Association statistics in 1984, 1986-1994.

(a) Data for bright and kelt fisheries, collected by DFO C&P, 1951-1983. All fish caught are assumed to have been killed.

	Bright Fish			Kelts			
Year	Small	Large	Total	Small	Large	Total	Total rod-days
1951	.	.	286	.	.	40	1776
1952	.	.	415	.	.	30	1765
1953	.	.	595	.	.	42	2035
1954	.	.	1255	.	.	42	1640
1955	.	.	783	.	.	148	2275
1956	.	.	389	.	.	117	1686
1957	.	.	590	.	.	135	3130
1958	.	.	963	.	.	85	3540
1959	.	.	376	.	.	85	2150
1960	.	.	193	.	.	50	905
1961	.	.	313	.	.	25	1360
1962	.	.	446	.	.	70	1570
1963	.	.	334	.	.	10	878
1964	.	.	232	.	.	213	557
1965	473	20	493	120	6	126	371
1966	407	38	445	.	.	354	818
1967	410	46	456	.	.	42	604
1968	189	5	194	.	.	55	551
1969	38	5	43	.	.	32	480
1970	2	0	2	.	.	0	97
1971	16	1	17	.	.	0	192
1972	16	10	26	.	.	0	165
1973	0	95	95	.	.	0	1000
1974	28	140	168	.	.	7	1227
1975	77	95	172	8	14	22	1457
1976	335	100	435	3	0	3	576
1977	28	38	66	0	0	0	678
1978	40	69	109	0	0	0	1215
1979	44	6	50	0	15	15	614
1980	135	103	238	.	.	.	1515
1981	130	179	309	46	62	108	1730
1982	130	187	317	25	30	55	1780
1983	117	176	293	.	.	.	1343

Table 2 (con't)

(b) Angling data collected by Nepisiguit Salmon Association (except 1985, which is based on DFO C&P data), showing removals and releases for the bright fishery.

Year	Removed		Released		Rod-days	Catch per rod-day
	Small	Large	Small	Large		
1984	600	0	150	150	3015	0.30
1985	229	0	--	--	1734	----
1986	800	0	400	500	3600	0.47
1987	800	0	550	500	4250	0.44
1988	1000	0	400	600	5000	0.40
1989	600	0	100	490	4000	0.30
1990	500	0	100	300	3400	0.26
1991	700	0	150	300	3700	0.31
1992	800	0	330	270	4700	0.30
1993	470	0	85	258	3300	0.25
1994	380	0	70	250	3700	0.19

Table 3. Angling records from logbooks distributed to Nepisiguit Salmon Association members, 1994. Numbers of landed fish only.

	Rod-days		Small salmon Retained		Small salmon Released		Large salmon released		Total catch		Catch/rod-day		Catch/rod-day
Angler	Above fence	Below fence	Above fence	Below fence	Above fence	Below fence	Above fence	Below fence	Above fence	Below fence	Above fence	Below fence	Whole river
1	5	6	1	1	0	0	0	0	1	1	0.200	0.167	0.182
2	0	2	0	0	0	0	0	0	0	0	---	0	0
3	1	6	1	0	0	0	0	0	1	0	1.000	0	0.143
4	8	1	2	0	0	0	0	0	2	0	0.250	0	0.222
5	4	1	1	0	0	0	0	0	1	0	0.250	0	0.200
6	10	23	2	0	0	0	0	1	2	1	0.200	0.043	0.091
7	8	27	0	3	2	11	0	6	2	20	0.250	0.740	0.629
8	11	5	2	3	0	0	0	0	2	3	0.182	0.600	0.313
9	4	0	0	0	0	0	0	0	0	0	0	---	0
10	0	20	0	1	0	0	0	1	0	2	---	0.100	0.100
11	---18---		0	0	0	0	0	0	0	0	---	---	0
12	1	13	0	0	0	0	0	1	0	1	0	0.076	0.071
13	11	0	1	0	0	0	0	0	1	0	0.091	---	0.091
totals	63	104	10	8	2	11	0	9	12	28	0.190	0.269	0.240

Table 4. Number of juvenile salmon stocked to the Nepisiguit system. Value in parentheses is percentage of salmon marked (AC=adipose fin clip, NT = magnetic wire nose tag, CT = Carlin tag). Source: 1976-1981, Newbould 1983; 1982-1994, Nepisiguit Salmon Association). Swim-up fry from streamside incubation boxes, all other life stages from hatcheries.

Year	Swim-up fry	Feeding fry (3 cm)	Fingerling fry (7 cm)	1+ parr	2+ smolt	YEARLY TOTAL
1974	---	numbers as yet undetermined				
1975	---	numbers as yet undetermined				
1976	----	----	78,196 (unmarked)	----	33,101 (100% AC)	111,297
1977	----	----	----	----	----	0
1978	----	----	166,283 (100% AC)	5,320 (100% AC)	----	171,603
1979	----	138,600 (unmarked)	86,947 (100% AC)	4,229 (100% AC)	2,002 (100% AC&CT)	231,778
1980	----	----	178,047 (100% AC)	6,978 (100% AC)	23,588 (100% AC&NT)	208,613
1981	----	176,440 (unmarked)	498,301 (100% AC)	3,819 (100% AC)	7,635 (100% AC&NT)	686,195
1982	----	----	293,140 (100% AC)	2,980 (100% AC)	----	296,120
1983	----	216,172 (unmarked)	298,453 (100% AC)	10,645 (100% AC)	10,454 (100% AC)	535,724
1984	----	65,576 (unmarked)	261,141 (100% AC)	18,667 (100% AC)	10,752 (100% AC&NT)	356,136
1985	25,669 (unmarked)	----	316,618 (100% AC)	11,153 (100% AC)	10,650 (100% AC)	364,090
1986	48,312 (unmarked)	98,734 (unmarked)	268,277 (unmarked)	2,540 (100% AC)	72,937 (100% AC&NT)	490,800

Table 4 (con't)

Year	Streamside incubation	Feeding fry (3 cm)	Fingerling fry (7 cm)	1+ parr	2+ smolt	YEARLY TOTAL
1987	144,450 (unmarked)	82,306 (unmarked)	206,814 (unmarked)	1,872 (100% AC)	10,706 (100% AC&NT)	446,148
1988	293,465 (unmarked)	141,000 (unmarked)	208,000 (unmarked)	----	10,000 (100%AC&NT)	652,465
1989	335,533 (unmarked)	----	284,004 (28% AC)	----	10,000 (100%AC&NT)	629,537
1990	342,981 (unmarked)	----	400,000 (35% AC)	6,500 (100%AC)	11,700 (100% AC&NT)	761,181
1991	243,016 (unmarked)	----	177,000 (100% AC)	----	9,700 (100% AC&NT)	429,716
1992	335,801 (unmarked)	118,542 (unmarked)	146,950 (10% AC)	12,441	11,641 (100% AC)	625,375
1993	336,277 (unmarked)	----	149,522 (65% AC)	30,944 (100% AC)	----	516,743
1994	255,000 (unmarked)	168,000 (unmarked)	----	----	----	423,000

TOTAL STOCKED, 1976 - 1994: 7,936,521

Table 5. Dates of operation of the Nepisiguit counting fence, 1982-1994.

YEAR	OPERATION DATES
1982	May 28-Nov. 1
1983	May 26-Nov. 4
1984	May 27-30, June 4-Nov. 7
1985	May 30-Nov. 8
1986	June 2-Nov. 5
1987	June 4-July 12, July 17-Nov. 5
1988	June 3-Oct. 23
1989	June 5-Aug. 14, Aug. 17-Nov. 6
1990	June 15-July 25, Aug. 4-11, Aug. 26-Sept. 4
1991	July 22-July 5, July 9-12, July 16-19, July 23-26, July 30-31, Aug. 1-2, Aug. 6-9, Aug. 13-15, Aug. 19-22, Aug. 26-30, Sept. 3-13
1992	June 25-Oct. 23
1993	July 2-Oct. 25
1994	June 29-Oct. 26

Table 6. Salmon counts at the fence, subdivided into adipose fin-clipped (AC) and unclipped salmon.

	Small salmon			Large salmon		
Year	AC	not AC	Total	AC	not AC	Total
1982	211	784	995	138	234	372
1983	70	236	306	29	262	291
1984	125	831	956	102	310	412
1985	160	349	509	194	627	821
1986	496	913	1409	363	581	944
1987	734	1000	1734	477	905	1382
1988	552	1865	2417	460	1392	1852
1989	90	386	476	323	757	1080
1990*	65 (564)	87 (755)	152 (1319)	59 (303)	125 (641)	184 (944)
1991*	15 (226)	104 (1570)	119 (1796)	22 (175)	88 (698)	110 (873)
1992	182	930	1112	13	428	441
1993*	14 (100)	104 (742)	118 (842)	20 (80)	177 (709)	197 (789)
1994*	24 (52)	242 (525)	266 (577)	6 (17)	227 (635)	233 (652)

* bracketed numbers are adjusted counts at fence, obtained by regression analysis as explained in the text.

Table 7. Monthly returns to the fence of adipose fin-clipped salmon. Numbers in parentheses are percentages of nose-tagged fish (included in adipose-clipped percentages).

(a) Percentage of adipose-clipped large salmon relative to total large salmon counted at the fence, by month.

	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
1982	100	65 (3)	51 (3)	29 (3)	26	19 (1)	40	37
1983	100	5	13 (3)	29 (18)	9	11 (2)	0	10
1984	--	19	34	38	18	19	14	25
1985	--	48	32	21	13	12	0	24
1986	--	72	61	34	18	16	14	38
1987	--	58	58	36	30	22	0	34
1988	--	66	46	23	25	13	--	25
1989	--	62	36	35	23	15	12	30
1990	--	42	32	13	20	--	--	32
1991	--	40	29	21	7	--	--	20
1992	--	4	5	0	2	0	--	3
1993	--	--	15	7	6	0	--	10
1994	--	0	3	0	2	1	--	2

(b) Percentage of adipose-clipped small salmon relative to total small salmon counted at the fence, by month.

	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
1982	0	39 (11)	18 (2)	19	21 (3)	21 (3)	12	21
1983	--	18 (9)	37 (8)	25 (8)	19	8	0	23
1984	--	7	19	10	4	4	0	13
1985	--	100	49	12	13	3	0	31
1986	--	37	42	34	36	26	33	35
1987	--	78	62	48	26	17	0	42
1988	--	61	41	29	24	8	--	23
1989	--	54	32	6	15	15	0	19
1990	--	44	61	14	20	--	--	43
1991	--	0	0	14	7	--	--	13
1992	--	41	26	7	1	2	--	16
1993	--	--	20	4	0	5	--	13
1994	--	0	22	14	2	0	--	10

Table 8. Biological characteristics of Atlantic salmon sampled at the Nepisiguit River counting fence facility in 1994. Fish sampled were not selected randomly. Ages were determined from scale samples read by the Nepisiguit Salmon Association.

Fresh water age	Salt water age	N (% of total)	Repeat spawners (%)	Adipose clips (%)	Fork length (cm)	
					Mean	Standard deviation
2	1	43(35.5)	0	11.6	55.4	3.5
2	2	63(52.1)	0	4.7	76.9	5.7
2	3	14(11.6)	93	0	87.1	8.9
2	4	1(0.8)	100	0	106.0	---

Table 9. Mean (± standard deviation) fork length-at-age of Nepisiguit salmon and proportion of adipose-clipped salmon in each age group, from salmon sampled at the counting fence, 1982-1994.

Freshwater age (years)	Sea age (years)	N	Mean ± SD Fork length (cm)	Proportion (%) adipose-clipped
2	1	1688	54.5 ± 14.26	42.4
2	2	1772	74.7 ± 6.05	34.6
2	3	455	84.9 ± 10.20	29.6
2	4	301	93.7 ± 8.13	33.2
2	5	61	99.8 ± 6.79	47.5
2	6	14	101.8 ± 4.60	14.3
3	1	151	54.8 ± 4.10	36.4
3	2	109	75.3 ± 4.76	48.6
3	3	21	87.5 ± 8.40	52.4
3	4	11	96.9 ± 5.22	45.4
3	5	2	108.0 ± 0.00	50.0
3	6	0	-----	---
3	7	1	118.0	100.0
4	1	1	62.0	0
4	2	1	80.0	100.0

Table 10. Age distribution of Nepisiguit large salmon sampled at the counting fence, mean of 1982-1994 and proportion of each age group that had previously spawned once or twice.

Freshwater age (years)	Sea-age (years)	Proportion (%) of large salmon in age group	Proportion (%) of previous spawners within each age group	
			2nd spawning	3rd spawning
2	2	64.5	1.8	0
	3	16.6	72.8	3.1
	4	11.0	92.7	7.3
	5	2.2	54.1	45.9
	6	0.5	0	100.0
3	2	4.0	0	0
	3	0.8	52.4	0
	4	0.4	100.0	0
	5	0.1	100.0	0
	6	0	---	---
	7	0.1	0	100.0
4	2	0.1	0	100.0
Total numbers, N		2749	709	80

Table 11. Age-at-spawning of fish spawning for the second (N=705) or third (N=71) time, of 2749 large salmon sampled at the Nepisiguit counting fence, 1982-1994.

(a) Fish spawning for the second time.

River age (years)	Sea-age at 1st spawning (years)	Sea-age at 2nd spawning (years)	Number of fish
2	1	2	24
		3	211
		4	16
		5	10
	2	3	103
		4	248
		5	17
		6	14
	3	4	6
		5	32
3	1	3	10
	2	3	1
		4	11
	3	5	1
		7	1

(b) Fish spawning for the third time.

River age (years)	Sea-age at 1st spawning (years)	Sea-age at 2nd spawning (years)	Sea-age at 3rd spawning (years)	Number of fish
2	1	2	3	7
			4	1
		3	4	14
			5	10
	2	3	4	5
			5	1
		4	5	17
			6	13
		5	6	1
	3	5	7	1
3	3	5	7	1

Table 12. Proportion of large salmon which were previous spawners, based on analysis of scales sampled at the counting fence, 1982-1994.

Year	Adipose-clipped		Wild	
	Number examined	Percent previous spawners	Number examined	Percent previous spawners
1982	277	4	202	3
1983	67	4	101	3
1984	158	4	221	8
1985	251	4	210	7
1986	166	4	244	10
1987	188	9	273	15
1988	254	13	294	8
1989	260	39	614	55
1990	83	28	73	37
1991	6	50	19	32
1992	23	13	456	12
1993	16	6	78	3
1994	8	0	113	12
Total	1757	12	2898	20

Table 13. Redd counts in the Nepisiguit River and tributaries. Above and below fence refer to the 1991 fence location. Both tributaries are located below the fence. (--) indicates that no observations were made.

	Nepisiguit River		Gordon		
Year	Above fence	Below fence	Pabineau River	Meadow Brook	% of redds above fence
1981	---	--	17	8	
1982	149	87	52	66	63.1
1983	1164	414	--	--	73.8
1984	1014	564	--	--	64.3
1985	1341	513	--	--	72.3
1986	2250	692	337	91	76.5
1987	2447	1383	158	64	63.9
1988	3017	1468	177	39	67.3
1989	732[a]	43[a]	--	--	--
1990	--	--	--	--	--
1991	--	--	--	--	--
1992	--	--	--	--	--
1993	1647	--	--	--	--
1994	2198	754	--	--	74.5
					Mean = 69.5%

[a] Incomplete counts

Table 14. Distribution of angling above and below the fence, based on angler scale data returns.

	Large salmon		Small salmon		
Year	Above fence	Below fence	Above fence	Below fence	Combined % Above fence
1982	5	21	19	64	22.0
1983	3	8	5	4	40.0
1984	-	-	-	-	--
1985	-	-	24	33	42.1
1986	-	-	15	43	25.9
1987	-	-	20	25	44.4
1988	-	-	16	28	36.4
1989	-	-	18	32	36.0
1990	-	-	26	33	44.1
1991	-	-	20	21	48.8
1992	-	-	36	36	50.0
1993	-	-	22	24	47.8
1994	-	-	21	25	45.7

MEAN = 40.3 %

Table 15. Calculations of total returns and spawners for large salmon.

(a) Above the fence.

Year	[1] Returns to fence	[2] Brood-stock	[3] Mortality at fence	[4] Native harvest	[5] Angling mortality	[6]=[1]-[2]-[3]-[4]-[5] Spawners
1982	372	68	0	59	74	171
1983	291	87	0	59	70	75
1984	412	92	1	59	2	258
1985	821	111	0	59	0	651
1986	944	104	0	59	6	775
1987	1382	150	0	59	6	1167
1988	1852	151	0	59	7	1635
1989	1080	164	0	59	6	851
1990	944	114	0	59	4	767
1991	873	104	1	59	4	705
1992	441	147	1	59	3	231
1993	789	128	3	20	3	635
1994	652	112	0	0	3	537

(b) Below the fence.

Year	[6] Spawners above fence	[7]=[6] x 0.439 Spawners below fence	[8] Angling mortality	[9] Native harvest	[10] Commer-cial harvest	[11]=[7]+[8]+[9]+[10] Returns below fence
1982	171	78	113	91	14	296
1983	75	34	106	91	23	254
1984	258	118	3	91	68	280
1985	651	297	0	91	0	397
1986	775	353	9	91	0	453
1987	1167	532	9	91	0	632
1988	1635	746	11	91	0	848
1989	851	388	9	91	0	488
1990	767	350	5	91	0	446
1991	705	321	5	91	0	417
1992	231	105	5	91	0	201
1993	635	290	5	30	0	295
1994	537	236	4	0	0	240

Table 16. Calculations of total returns and spawners for small salmon.

(a) Above the fence.

Year	[1] Returns to fence	[2] Brood-stock	[3] Mortality at fence	[4] Native harvest	[5] Angling mortality	[6]=[1]-[2]-[3]-[4]-[5] Spawners
1982	995	84	0	20	51	840
1983	306	17	0	20	46	223
1984	956	4	7	20	239	686
1985	509	4	0	20	90	395
1986	1409	5	1	20	321	1062
1987	1734	6	0	20	323	1385
1988	2417	5	0	20	400	1992
1989	476	6	0	20	238	212
1990	1319	6	0	20	199	1094
1991	1796	10	1	20	279	1486
1992	1112	16	6	20	320	750
1993	842	0	2	79	187	574
1994	577	15	0	60	154	348

(b) Below the fence.

Year	[6] Spawners above fence	[7]=[6] x 0.439 Spawners below fence	[8] Angling mortality	[9] Native harvest	[10] Commer-cial harvest	[11]=[7]+[8]+[9]+[10] Returns below fence
1982	840	383	79	30	50	542
1983	223	102	71	30	53	256
1984	686	313	366	30	474	1183
1985	395	180	139	30	0	349
1986	1062	484	491	30	0	1005
1987	1385	632	494	30	0	1156
1988	1992	908	702	30	0	1640
1989	212	97	365	30	0	492
1990	1094	499	304	30	0	833
1991	1486	678	426	30	0	1134
1992	750	342	490	30	0	862
1993	574	262	286	121	0	669
1994	348	153	228	60	0	441

Table 17. Summary of total returns and total spawners for large and small salmon. Spawner numbers in bold type exceeded CAFSAC spawning escapement requirement (1363 large salmon, 690 small salmon).

Year	Large salmon		Small salmon	
	Returns	Spawners	Returns	Spawners
1982	668	249	1537	**1223**
1983	545	109	562	325
1984	692	376	2139	**999**
1985	1218	948	858	575
1986	1397	1128	2414	**1546**
1987	2014	**1699**	2890	**2017**
1988	2700	**2381**	4057	**2900**
1989	1568	1239	968	309
1990	1390	1117	2152	**1593**
1991	1290	1026	2930	**2164**
1992	642	336	1974	**1092**
1993	1084	925	1511	**836**
1994	892	773	1018	501

Table 18. Summary of egg production relative to CAFSAC spawning requirements of 9.535 x 10^6 eggs.

Year	No. of eggs (x10^6)			% of spawning
	Large salmon	Small salmon	Total	requirement met
1982	1.742	0.512	2.254	24
1983	0.763	0.136	0.899	9
1984	2.631	0.418	3.049	32
1985	6.634	0.241	6.875	72
1986	7.893	0.648	8.541	90
1987	11.889	0.845	12.734	134
1988	16.662	1.215	17.877	187
1989	8.670	0.129	8.799	92
1990	7.816	0.667	8.483	89
1991	7.180	0.906	8.086	85
1992	2.351	0.457	2.808	29
1993	6.472	0.350	6.822	72
1994	5.409	0.210	5.619	59

Assumptions:
Mean weight: large salmon, 5.6 kg; small salmon, 1.4 kg
% females: large salmon, 71%; small salmon, 17%
fecundity: 1760 eggs.kg^{-1}

Table 19. Angling exploitation rates calculated (1) for the whole river (total removals/total returns) and (2) for the area above the fence (total removals x mean percentage of angling above the fence/returns to fence).

	Large salmon exploitation (%)		Small salmon exploitation (%)	
Year	Whole river	Above fence	Whole river	Above fence
1982	28.0	19.9	8.5	5.1
1983	32.2	24.1	20.8	15.0
1984	----	----	28.3	25.0
1985	----	----	26.7	17.7
1986	----	----	33.6	22.8
1987	----	----	28.3	18.6
1988	----	----	27.2	16.5
1989	----	----	62.3	50.0
1990	----	----	23.4	15.1
1991	----	----	24.1	15.5
1992	----	----	41.0	28.8
1993	----	----	31.3	22.2
1994	----	----	37.3	26.5

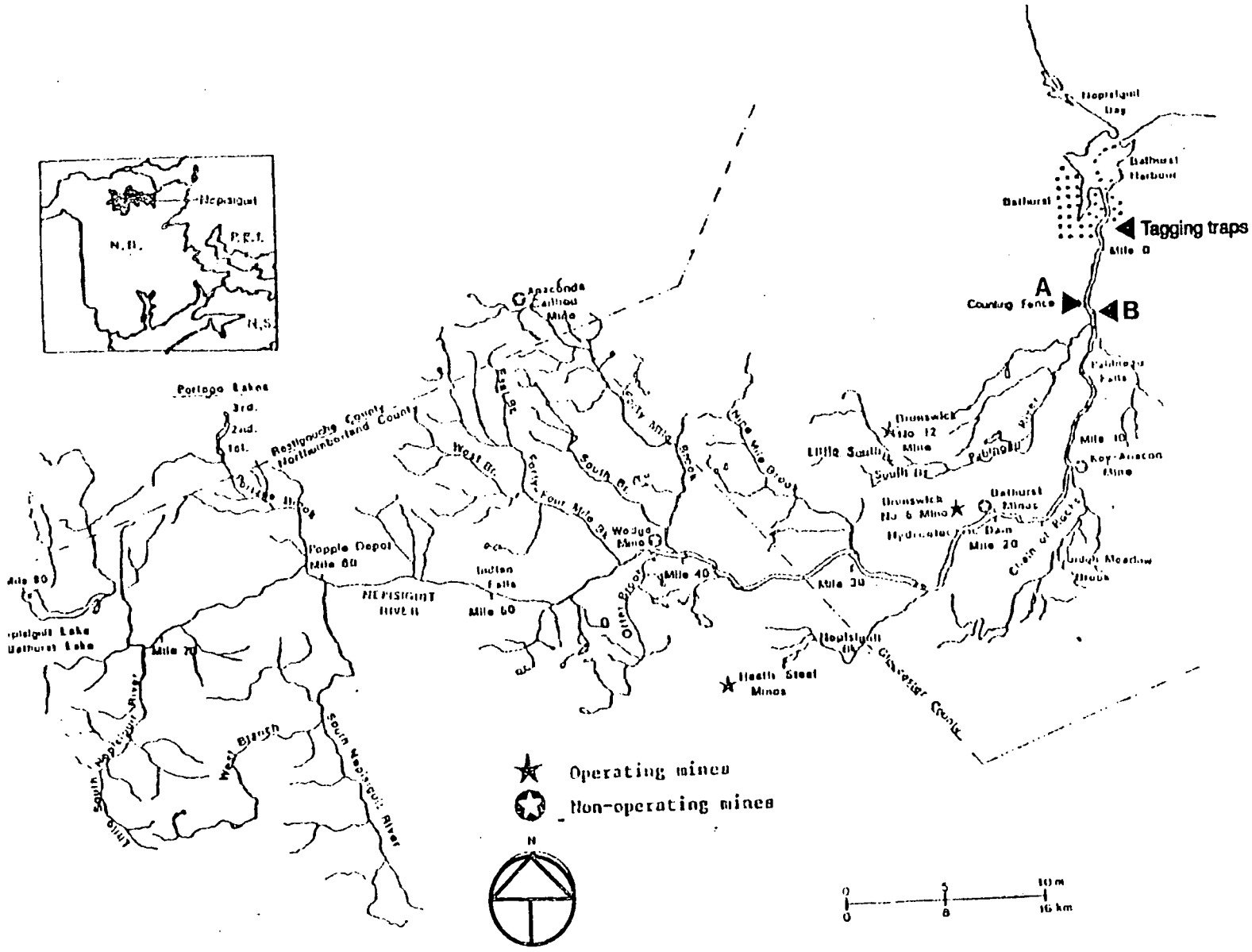


Figure 1. Map of the Nepisiguit River system, showing locations of the counting fence in 1981-1991 (A) and 1992-1994 (B), and the tagging traps in 1994.

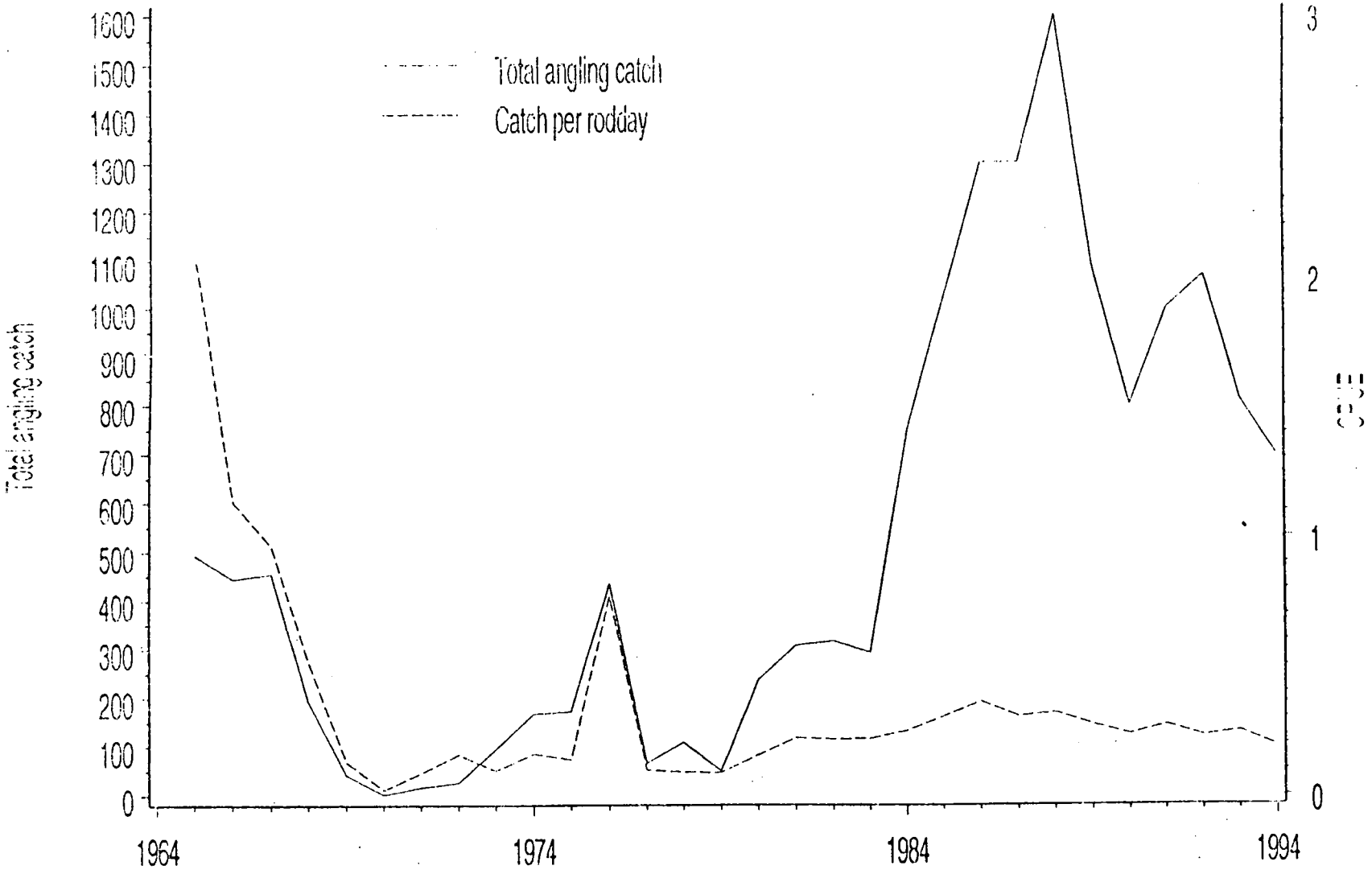
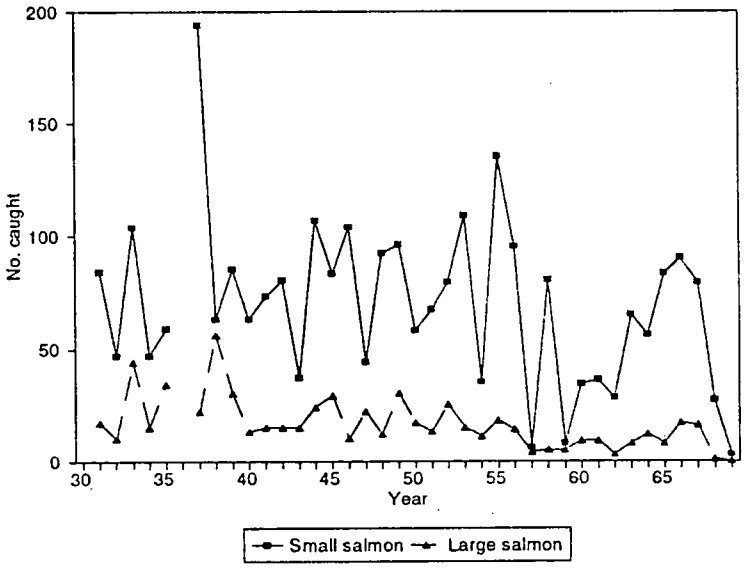


Figure 2. Total catch and catch per rod-day of Atlantic Salmon on the Nepisiguit River, 1965-1994.



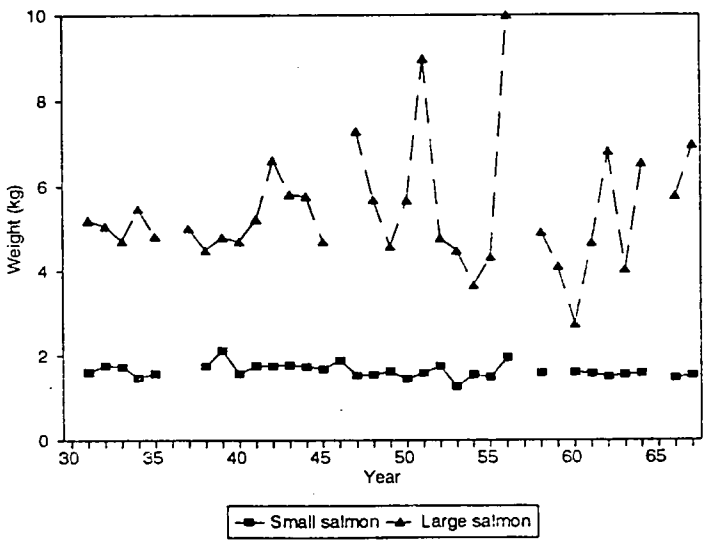


Figure 3. Historical angling catches of the Nepisiguit Salmon Club, 1931-1969. (a) Total yearly catches of small and large salmon. (b) Mean weight of small and large salmon, by year.

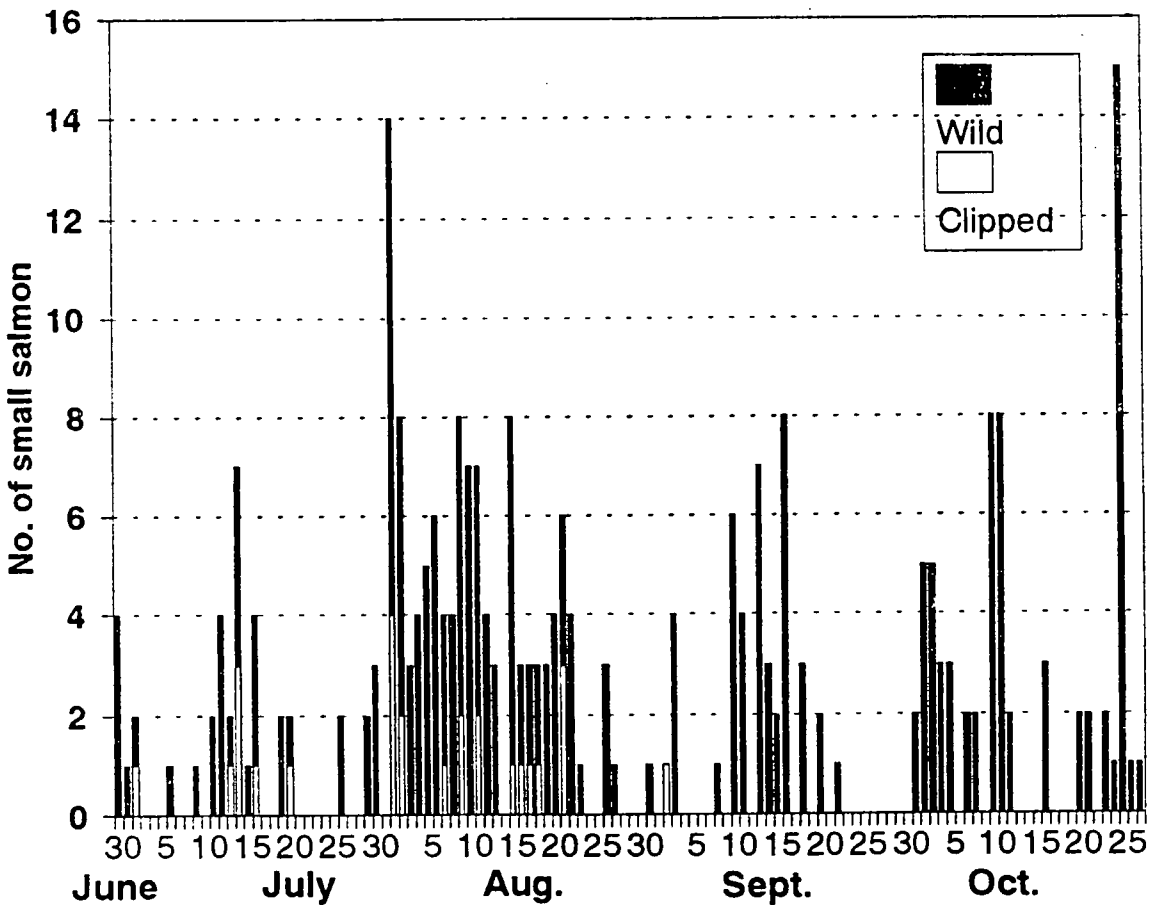


Figure 4. Daily counts of small salmon (wild and adipose fin-clipped) at the Nepisiguit River counting fence, 1994.

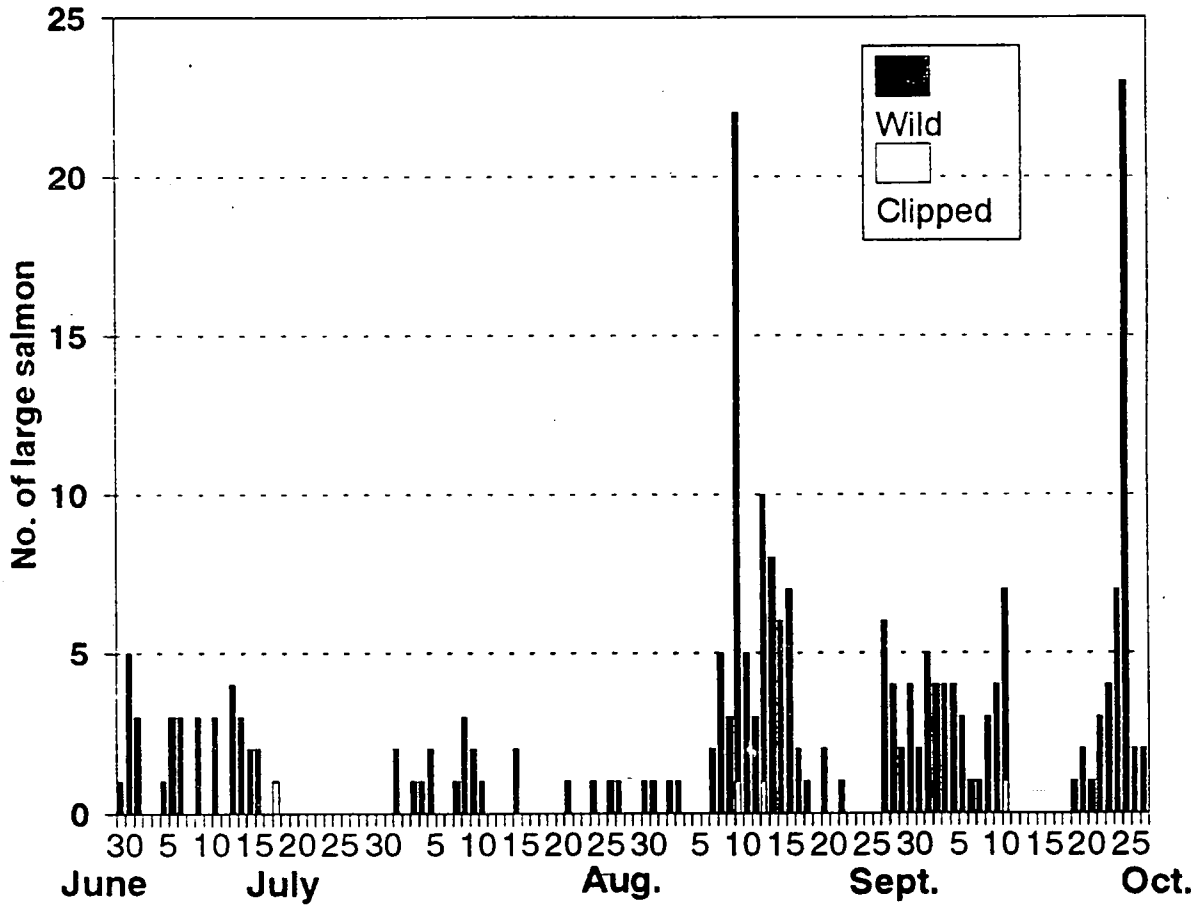


Figure 5. Daily counts of large salmon (wild and adipose fin-clipped) at the Nepisiguit River counting fence, 1994.

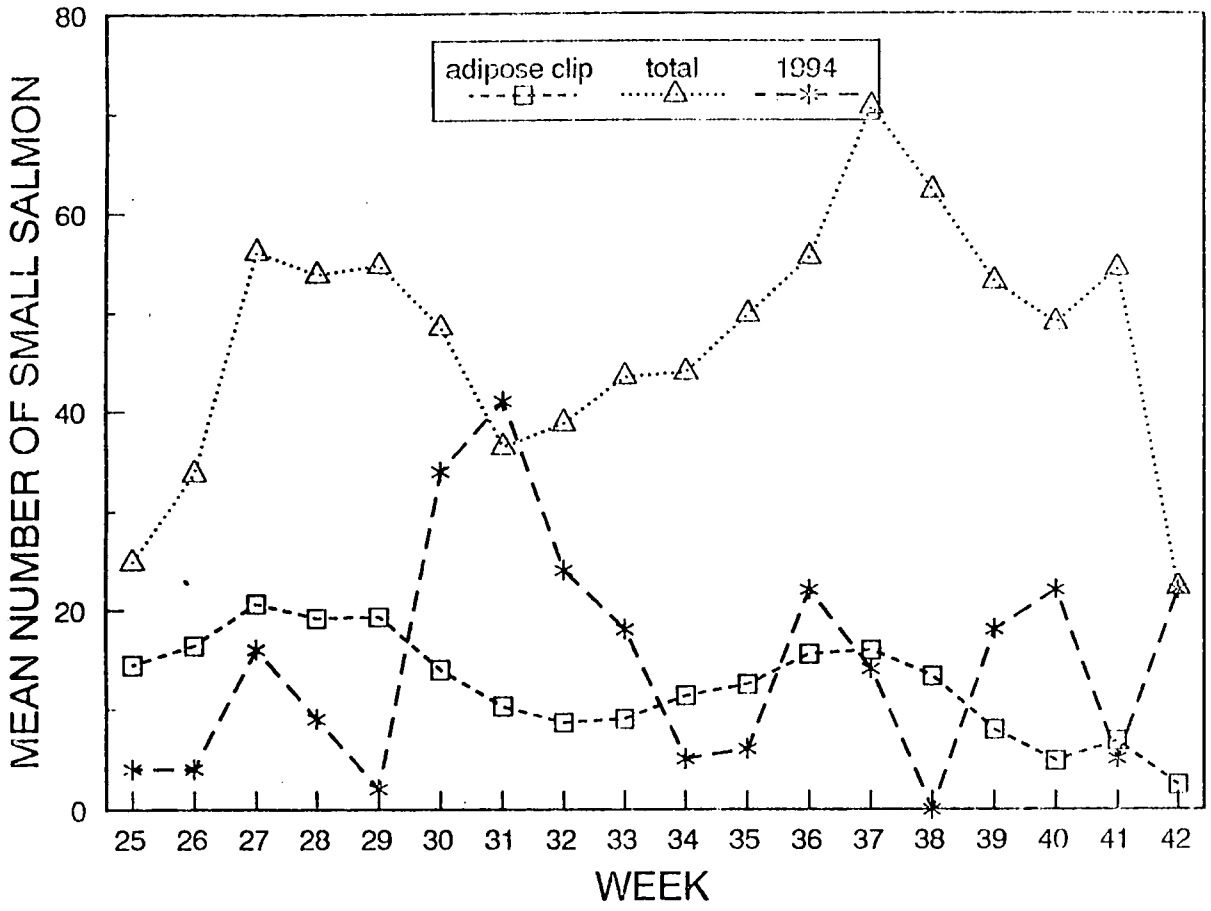


Figure 6. Timing of total small salmon returns to counting fence in 1994 (wild and adipose clip combined) compared with mean timing (1982-1993) of total small salmon returns and only adipose clipped small salmon (1982-1993).

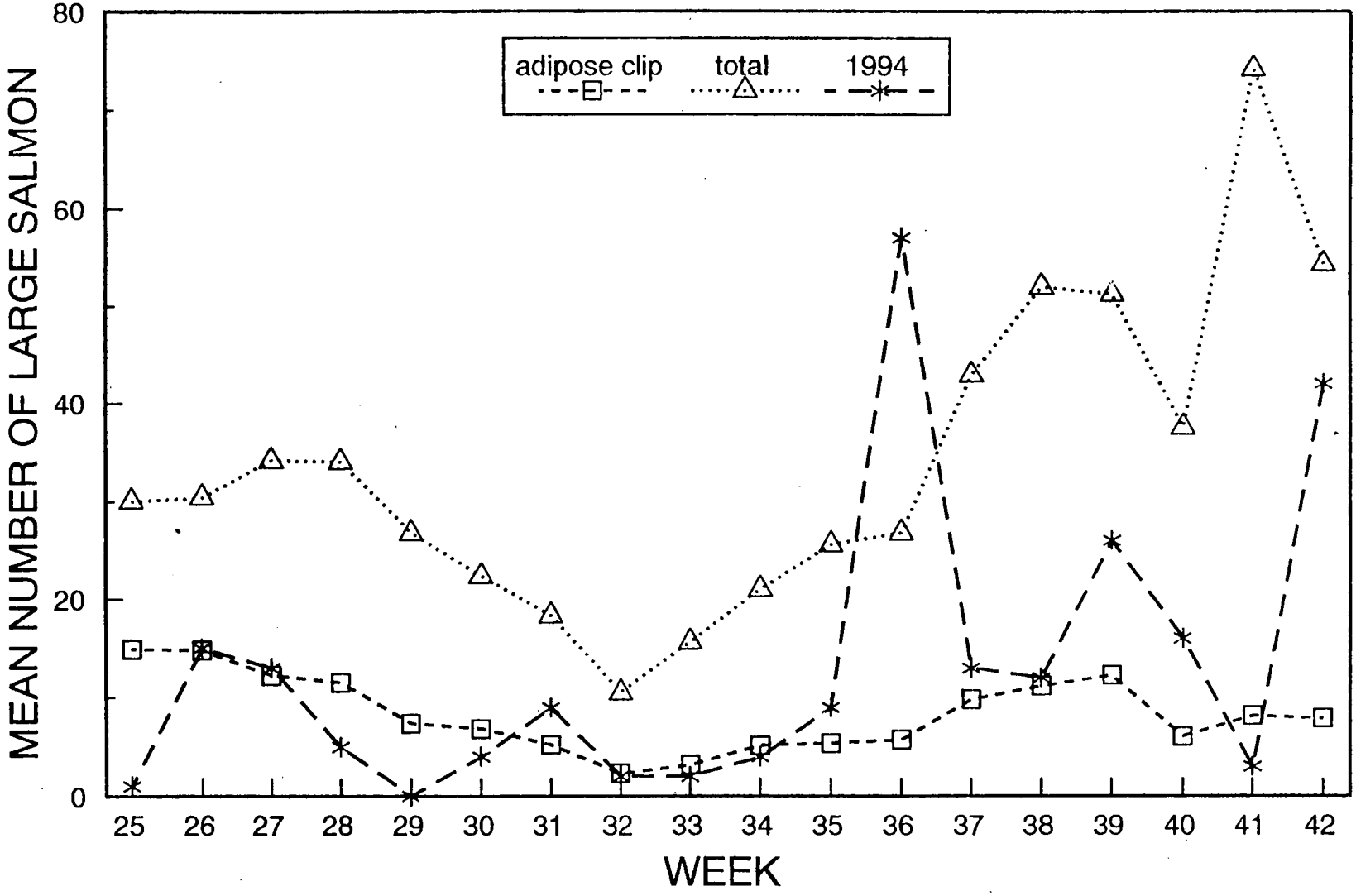


Figure 7. Timing of total large salmon returns to counting fence in 1994 (wild and adipose clip combined) compared with mean timing (1982-1993) of total large salmon returns and only adipose clipped large salmon (1982-1993).

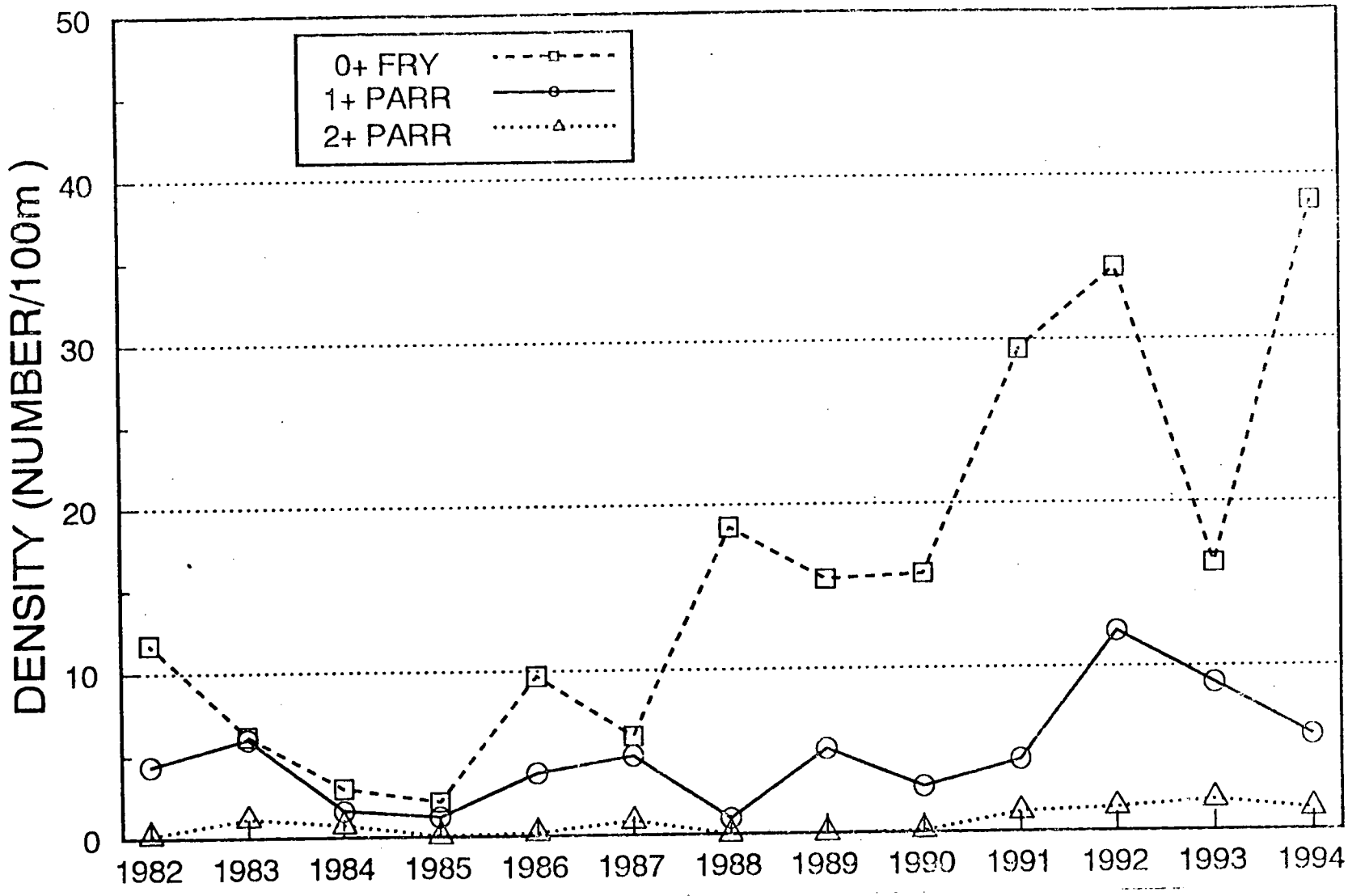


Figure 8. Mean juvenile salmon abundance at 19 electrofishing sites on the Nepisiguit River (below dam), Pabineau River and Gordon Meadow Brook, sampled in at least five years from 1982-1994.

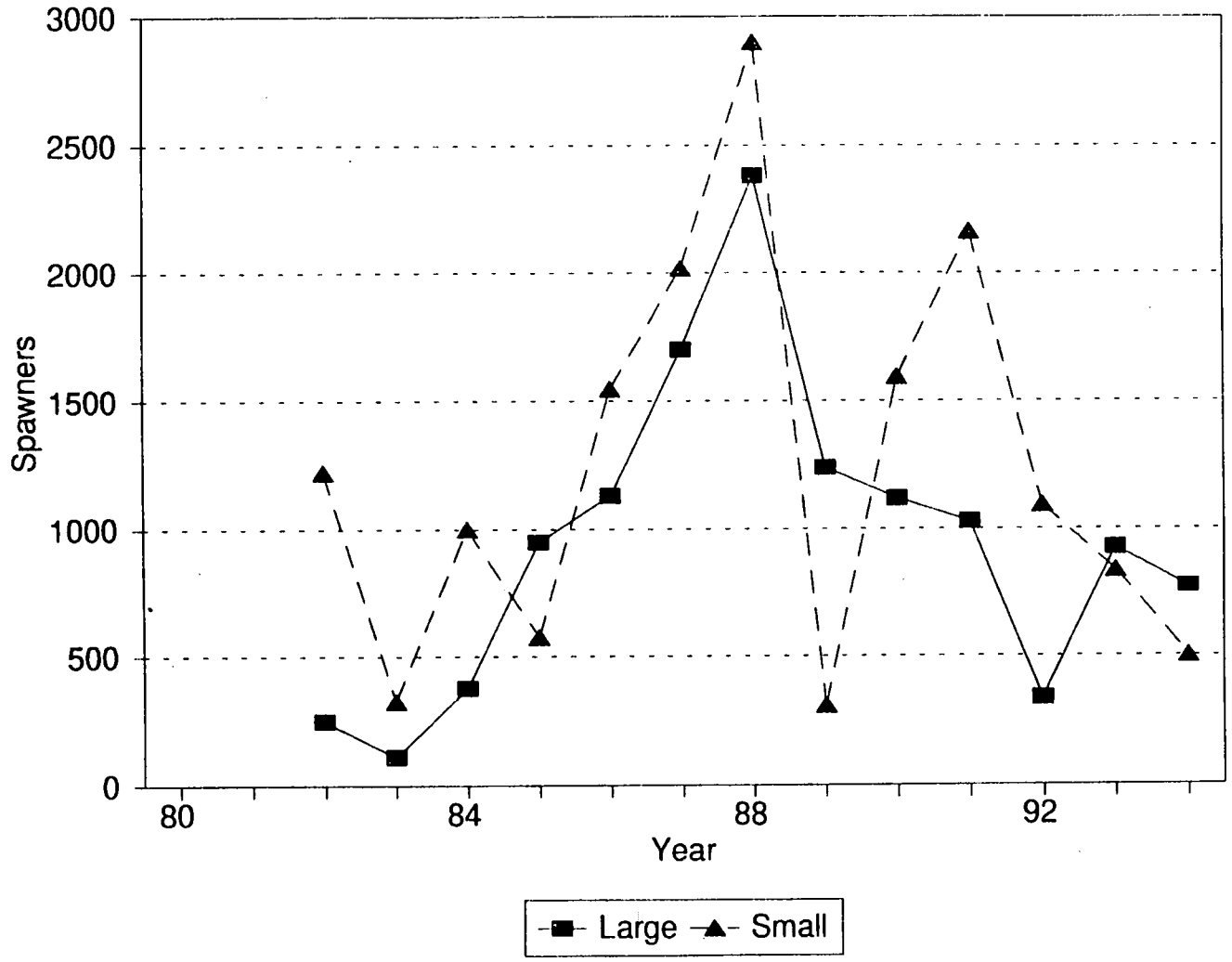


Figure 9. Estimated large and small salmon spawners in the Nepisiguit River, 1982-1994.

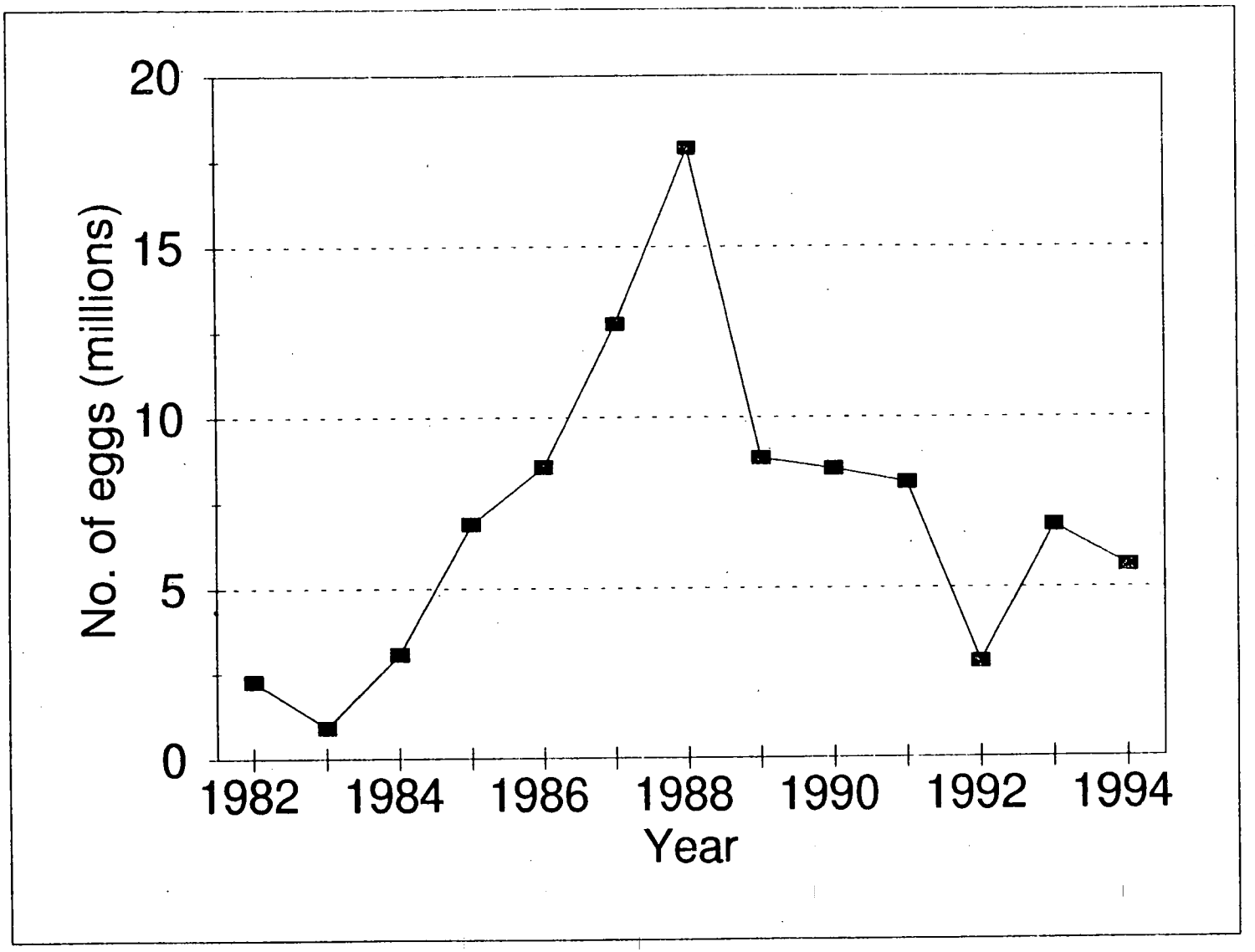


Figure 10. Estimated egg deposition of small and large Atlantic salmon, Nepisiguit River, 1982-1994.

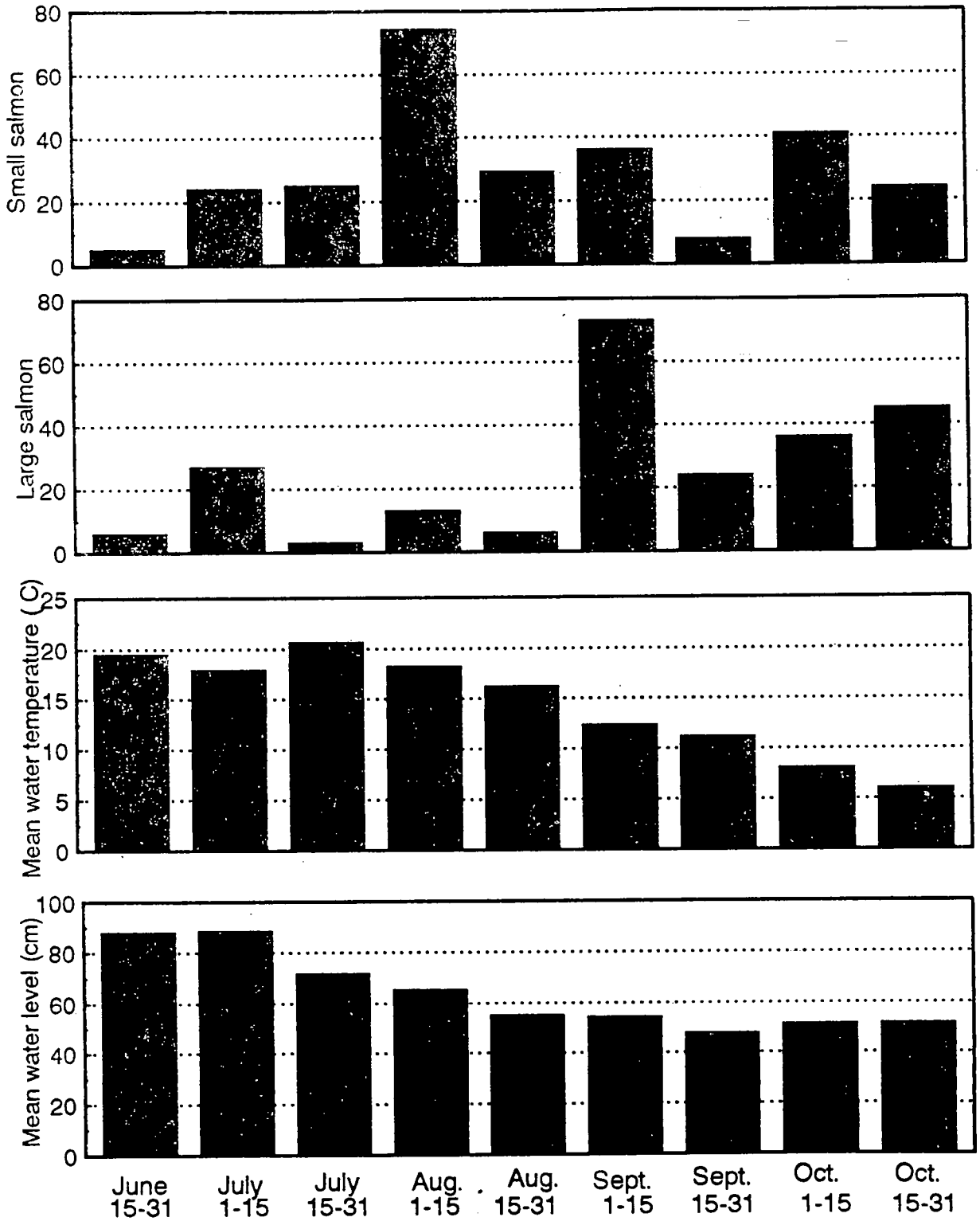
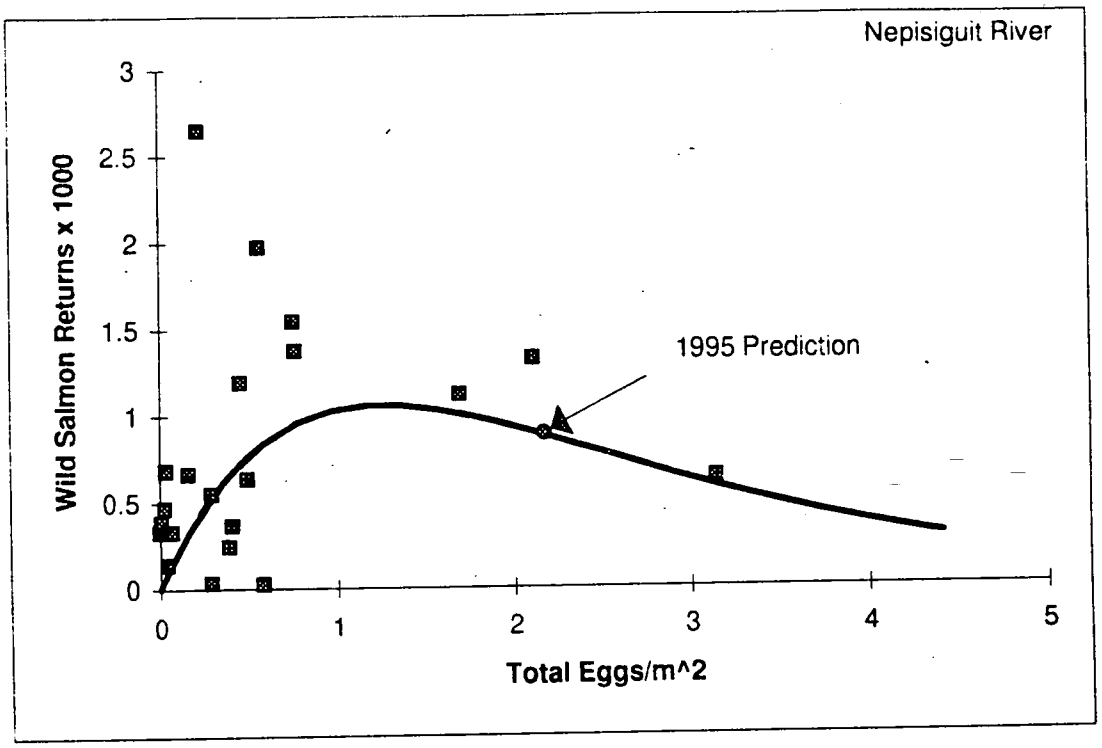


Figure 11. Semimonthly summary of small and large salmon abundance, mean water temperature and mean water level at the Nepisiguit River counting fence, 1994.



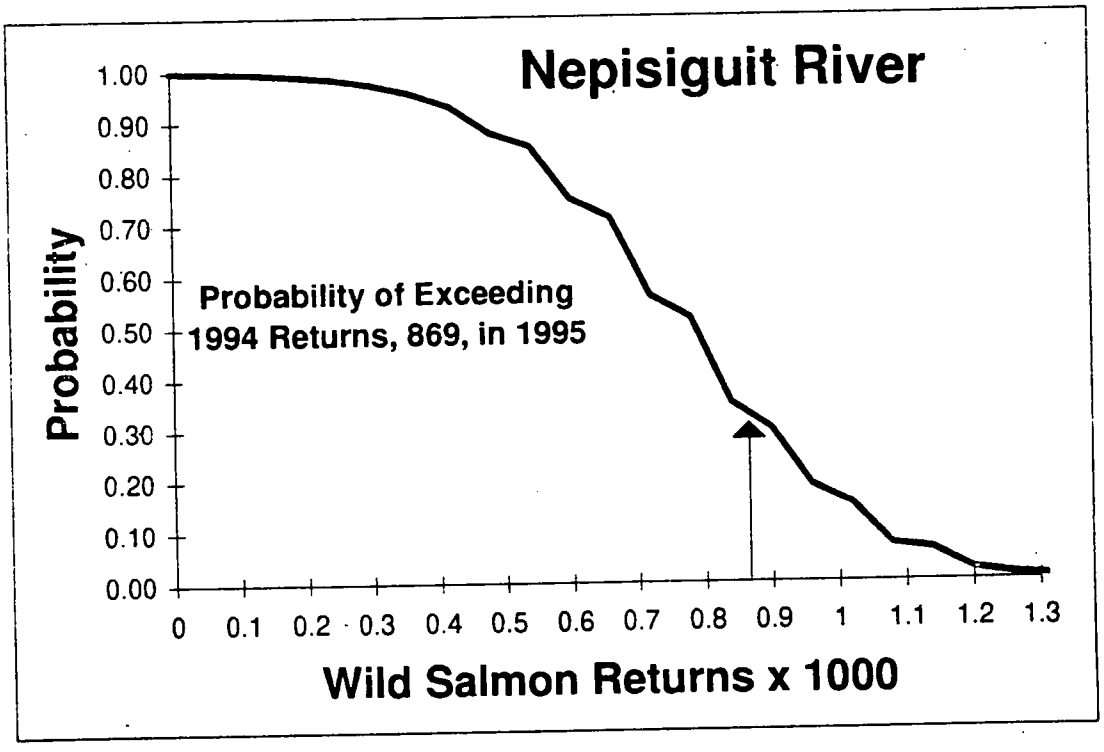


Figure 12. Predicted versus observed pre-season forecasts based on Ricker recruitment function and probability of exceeding 1994 returns in 1995.

Appendix 1. Operation of tagging traps on the Nepisiguit River, 1994.

Summary

As an initial step in the development of a mark-recapture based assessment program for the Nepisiguit River, two tagging traps were installed in the river just below the trans-Canada crossing. The traps were to provide an index of sea returns and release marked fish for subsequent determination of total run size, run timing, and exploitation rates through recapture by anglers and at the counting fence. The advantages of a trapnet are that a) it could be installed earlier than the fence ; b) it would be less susceptible to washouts; and c) could provide an estimate of salmon spawning below the counting fence.

The trapnet project ran from July 17 to October 29. During this period various trap styles and locations were tested (see operational details). The early trapnet styles and locations were not very successful and catches were negligible, however the styles and locations settled on at the end of the project appear to be capable of catching adequate numbers of salmon. In total 76 small salmon and 13 large salmon were caught among the traps. Of these 73 small and 12 large salmon were tagged. It appears that in this tidal portion of the river directed salmon movement (necessary for capture in traps) occurred very sporadically. On numerous occasions fish were observed jumping in the vicinity of the traps, but none were captured. It is probable that such behaviour is linked to the unusually dry weather, and low water levels experienced this year.

Four tags were returned by anglers, and a fifth observed at the counting fence. Details of recaptures are:

Source	Tag number	Date tagged	Date recaptured	Location
angler	zz64005	Sept. 17	Oct. 5	Gray's Ledge
angler	zz64006	Sept. 17	Sept. 24	Long Hole
angler	zz64011	Sept. 17	Oct. 5	Long Pool
angler	zz64025	Sept. 17	Sept. 29	Gorge
fence	zz64023	Sept. 17	Oct. 1	

Operational details

Smelt net

On July 29 a floating smelt box net was installed in the cove just below the trans Canada bridge on the west side of the river. The trapnet itself was 6.7 m wide, 9.1 m long and 3.7 m deep, and was made from 25 mm knotless nylon. The funnel entry (common in smelt nets) was replaced with one set of doors with an gap of 25 cm. The inside leader was made of 50 mm knotted green twine and measured 23 m in length. Leaders were attached at approximately 45 degree angles of the entry of the trap. The outside leader consisted of two sections, one identical to the inside leader and the other a 30 m section made of 150 mm mesh (3mm polypropylene twine) for a total outside leader length of 53 m. The trap and leaders were floated with 20*25cm

spongex net floats attached at 50 cm intervals. Nets were weighted with rocks and leadline. On August 8, a rebar and wood frame was installed on the trapnet to facilitate fishing. Upon installation of the set poles it was noted that the trap was not resting on the bottom during high tides, therefore a vertical apron 1.5 m deep was attached to the front of the trap, eliminating the gap underneath. While operating at this site no salmon were caught in the trapnet, however two small salmon were gilled on the inside leader. These mortalities prompted the changeover of all leaders to 150 mm mesh (3mm polypropylene twine). This changeover occurred on August 13, and included extending the outside leader by an additional 21 m for a total length of 74 m. Final catches at this location included juvenile herring, juvenile gaspereau, juvenile mackerel, juvenile flounder, tomcod, gaspereau, trout, smelt, and jellyfish.

On August 29 this trap was moved approximately 150 m down river, off the point. Catches of salmon in the new location were also scant (total 2 salmon) with bycatch similar to the first location.

Double gated fair-tide trap

On October 8 the smelt trapnet was replaced with a double gated fair tide trap made of 57 mm knotless nylon. Trap dimensions were 18.2 m long, 3.6 m wide and 4.6 m deep. The set of doors located at the entry had a 30 cm gap and the second set of doors a 25 cm gap. The 150 mm mesh leaders from the smelt trap were reattached but with a wider angle on the inside leader (closer to perpendicular with the shore). The rebar and wood frame constructed for the smelt trap was adjusted to fit this new trap. Set lines were attached at either end and at two equally spaced intervals along the length. During its two weeks of operation 19 salmon were caught. Other species included trout, mackerel and flounder and American eel.

Floating two-way trap

A side entry double ended salmon trap was rigged with a perpendicular leader and installed on the east side of the river at the narrowest point of channel just below the bridge on September 7. This trap was constructed from 570 mm knotless nylon and measured 9.1 m long, 2.4 m wide, and 3 m deep. The leader (attached to the upriver side of the entry) was made of 150 mm mesh (3 mm polypropylene twine) and varied in depth from 3 m to 4 m. Both trap and leader were rigged with spongex floats and weighted with rocks and leadline. On September 13 the trap was moved 60 m upstream into slightly shallower water.

Despite the relatively small size of this trap it caught 66 salmon, 43 of which were taken on September 17. Bycatch included trout, tomcod and American eel.

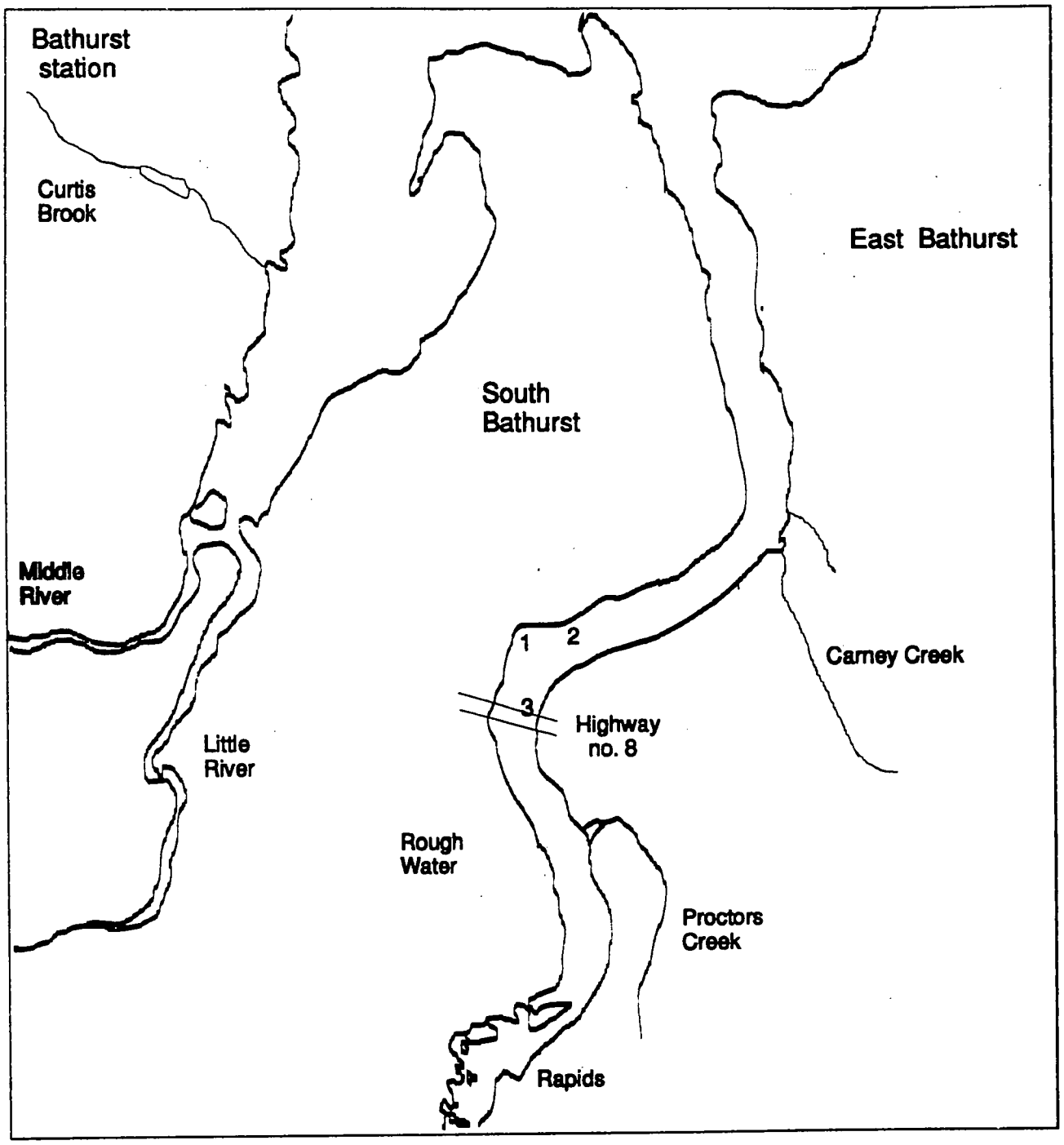


Figure for Appendix 1. Locations of salmon tagging traps on the Nepisiguit River (1994). The number 1 indicates the first site where the smelt trap was installed, 2 is the second location for the smelt net, and 3 is the location of the floating two-way trap.

Appendix 2. Minutes of the Nepisiguit River Salmon Stock Status Workshop, 1994.

Nepisiguit River Salmon
Stock Status Workshop

December 7, 1994

DNRE Bathurst Office

Participants:

Bob Baker	Nepisiguit Salmon Assoc.
Ross Claytor	DFO - Science
Andrea Locke	DFO - Science
Alan Madden	DNRE - Campbellton
Bill Hooper	DNRE - Fredericton
Craig Wood	Noranda Research
Dave Mason	Stone Container
Marc Godin	DNRE - Campbellton
Floyd Ronalds	DNRE - Bathurst
Francois Chiasson	DNRE - Bathurst
Mike Lavigne	Nepisiguit Trout Prot. Assoc.
Paul Cameron	DFO - Charlo
Rick Schwenger	Brunswick Mining
Danny Surette	Atlantic Salmon Fed.
Robert Kyezko	Pabineau Band
Louis Arsenault	Nepisiguit Trout Prot. Assoc.

General:

- The stock status workshop was held as part of the Nepisiguit River Watershed Management Committee meeting and many items relevant to the assessment

of stock status were brought up during the meeting and are incorporated into these notes

Landings:

- Angling catches are provided by the Nepisiguit Salmon Association. As the assessment of this stock moves to a mark-recapture method tag returns from this group will be important in estimating abundance
- Angler logbooks can be incorporated into the assessment to examine catch per unit effort and tag return locations. Large salmon tags could be noted on these logbooks but large salmon tags should not be removed
- Historical data from camps collected during the 1930s could be examined to determine if run-timing of the stock has changed
- It is difficult to put an estimate on the numbers of fish poached in the system but it is believed to be between 10 and 15%
- The numbers of net marked fish at the trap are recorded and could be reported as an index of poaching

Hatchery Contributions:

- Many hatchery fish are not marked, a method of estimating total hatchery returns based on percentage of marked returns could be developed
- Methods for marking small fish could be examined

Abundance:

- Examine the relationship between spawning escapement estimates and redd counts and juvenile densities
- Examine the relationship between redd counts and years when fence operated for the entire season to determine if they are a useful index of spawning escapement
- It was recommended that the fence be run for one more year until the mark-recapture method of estimation from the trapnets is in place for a full year. The fence site used prior to 1991 would be better for this purpose as the river conditions at the current site make it difficult to keep the fence in at the beginning of the season

Multispecies:

- Merganser predation was discussed as a possible reason for poor juvenile survival from 1+ to 2+ and a project to investigate this reason was proposed by Craig Wood. Science staff from DNRE and DFO are to review the existing data and the proposal and provide comments