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Status of Atlantic salmon in the Nepisiguit and Jacquet Rivers, New Brunswick, in 1996

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Abstract

A minimum of 62% of the egg deposition required for conservation of Atlantic salmon in the Nepisiguit River was estimated to have been achieved in 1996. The conservation requirements were recalculated as 1626 large and 823 small salmon, 19% higher than the previous requirements. The egg deposition required for conservation was not changed. Neither the large or small salmon conservation requirements for spawning escapement were met. Small salmon returns (1036 fish) exceeded the conservation requirement, but large salmon returns (1178 fish) did not. The egg deposition requirement has not been met since 1988. Egg deposition has been approximately 50 to 60% of the conservation requirement for the past four years. The 1996 egg deposition was estimated conservatively because the salmon run was unusually late.

The estimated egg deposition of Atlantic salmon in the Jacquet River was 88% of the conservation requirement. This is the first time that the conservation requirement has not been met in the three years that the salmon stock of this river has been assessed. Conservation requirements for the Jacquet River were recalculated as 412 large and 250 small salmon. Returns of large salmon (337 fish) were less than the conservation requirement for spawning. Spawning escapement of small salmon (528 fish) was more than double the conservation requirement.

Résumé

Il a été évalué qu'un minimum de 62 % de l'objectif de ponte fixé pour la conservation du saumon atlantique dans la rivière Nepisiguit a été atteint en 1996. L'objectif en matière de conservation de la ressource avait été recalculé pour l'échappée des géniteurs à 1 626 gros saumons et à 823 petits saumons, soit 19 % de plus que l'objectif précédent. L'objectif de ponte exigé pour la conservation n'a pas changé. Les besoins en matière d'échappée des géniteurs pour la conservation n'ont été atteints ni pour le gros saumon ni pour le petit. La remontée de petits saumons (1 036 poissons) a dépassé les besoins pour la conservation de la ressource, mais celle des gros saumons (1 178 poissons) n'a pas été conforme aux exigences. L'objectif de ponte n'a pas été réalisé depuis 1988. Depuis quatre ans, la ponte atteint entre 50 et 60 % environ des besoins pour la conservation de l'espèce. Les objectifs de ponte pour 1996 étaient très modérés étant donné que la montaison du saumon a accusé un retard inhabituel.

La ponte du saumon atlantique dans la rivière Jacquet a été évaluée à 88 % des besoins pour la conservation. C'est la première fois en trois ans d'évaluation du stock de saumons dans cette rivière que l'objectif n'est pas atteint. Les besoins de montaison pour la conservation de cette ressource dans la rivière Jacquet ont été recalculés à 412 gros saumons et à 250 petits saumons. La montaison de gros saumons (337 poissons) était inférieure aux besoins en matière de frai pour assurer la conservation de la ressource. Le nombre de géniteurs atteignant les frayères en ce qui concerne le petit saumon (528 poissons) était plus de deux fois supérieur aux besoins pour la conservation.

1 - Introduction

Atlantic salmon occur naturally in the Nepisiguit (Fig. 1) and Jacquet (Fig. 2) rivers of northern New Brunswick. An active salmon stocking program has been carried out in the Nepisiguit River for the past two decades, initially to restore the population following a spill of mining waste and overfishing, and subsequently for enhancement purposes. To minimize losses of the existing wild population of the Jacquet River to poaching, the New Brunswick Department of Natural Resources and Energy has operated a salmon containment barrier since 1994.

This report documents the status of Atlantic salmon in the Nepisiguit and Jacquet rivers in 1996. For the Nepisiguit River, barrier fence counts, redd counts, estimates of angling catch, electrofishing surveys of juvenile abundance, and stocking data are summarized. For the Jacquet River, barrier fence counts, stocking data, and visual counts of spawners and redds are presented. In both rivers, egg depositions are estimated from salmon returns to the counting fences, removals and spawner abundances.

In the terminology utilised herein, salmon are subdivided into two size classes. 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 - Nepisiguit River

2.1 - Conservation requirement

The conservation egg deposition that has been used for Atlantic salmon in the Nepisiguit River is **9.535 x 10^6 eggs (1363 large, 690 small salmon)**. This estimate was based on the following:

- accessible rearing habitat = 3.973 x 10^6 m^2 (Anon. 1978)
- optimal egg deposition = 2.4 eggs/m^2 (Elson 1975)
- average fecundity of females = 1,760 eggs/kg (Elson 1957)
- proportion of females in the large salmon population = 0.71, and in the small salmon population = 0.17 (Locke et al. 1994)
- mean weight of large salmon = 5.6 kg, of small salmon = 1.4 kg (weights estimated at counting fence, R. Baker, pers. comm.)

Conservation requirements were recalculated based on a lower average fecundity, 1475 eggs/kg (Randall 1984), which increased the number of fish required to attain the conservation egg deposition by 19%. The total egg requirement was not changed. The new conservation requirement is **9.535 x 10^6 eggs (1626 large, 823 small salmon).**

2.2 - Fisheries

2.2.1 - Description of fisheries

Salmon fisheries in the Nepisiguit River include recreational angling and angling by members of Pabineau First Nation. In 1996, a small food fishery trapnet was also operated at the Pabineau First Nation. The recreational angling season was June 1 to October 15. Only hook-and-release fishing was permitted for large salmon, with a daily hook-and-release limit of four fish. Seasonal and daily bag limits for small salmon were eight and two fish, respectively. Anglers were required to stop fishing once the daily small salmon limit was reached.

2.2.2 - First Nation fishery

The combined catch of First Nation anglers and the food fishery trapnet was estimated as 100 to 125 salmon (B. Paul Jr., Pabineau First Nation, personal communication). For stock assessment, it is assumed that 112 salmon were retained, 25% of which were large salmon, and that all were captured above the counting fence. First Nation harvest was therefore estimated as 28 large and 84 small salmon.

2.2.3 - Nepisiguit Salmon Association angling catch estimate

Angling catches by recreational anglers, estimated by the Nepisiguit Salmon Association (NSA), were 450 retained and 130 released small salmon, and 420 released large salmon (Table 1). Compared to the five-year mean of 687 small salmon and 276 large salmon, the 1996 angling catch of small salmon was down by 16% and large salmon catch was up by 52% (Table 2, Fig. 3).

Fishing effort in 1996 (3800 rod-days) was the highest since 1992, and was 4% higher than the five-year mean of 3660 rod-days (Table 2). As in 1994 (Locke et al. 1995) and 1995 (Locke and Mowbray 1996), most of the angling effort occurred in September (1500 rod-days) and October (800 rod-days before the season closure on October 15; Table 1).

Monthly catch per unit effort (CPUE) was highest in August at 0.30 fish/rod-day closely followed by July and October at 0.29 fish/rod-day (Table 1). The high fishing success in July and August is unusual for this river. CPUE for the full season was 0.26 fish/rod-day, the same as the five-year mean (Table 2).

2.2.4 - Angler logbooks

Angling logbooks completed by eleven members of the Nepisiguit Salmon Association indicated increased angling success in 1996 compared to either 1995 or 1994 (Table 3). CPUE increased over the three years of the logbook program (0.27 fish/rod-day in 1994, 0.35 fish/rod-day in 1995, and 0.44 fish/rod-day in 1996).

As in 1994 and 1995, most angling (73% of the total rod-days) by logbook anglers took place in the waters below the fence. In all three years, CPUE has been consistently higher below than above the fence.

2.3 - Research data

2.3.1 - Juvenile stocking and broodstock collection

In 1996, the Charlo Salmonid Enhancement Centre (S.E.C.) stocked 118,000 feeding fry, 154,129 fall fingerlings, 11,107 age 1 parr and 12,921 age 1 smolts (Table 4) into the Nepisiguit River and its tributaries below Grand Falls (Fig. 1). All fish were unmarked. This was the first year that age 1 smolts were stocked from Charlo S.E.C.

The Nepisiguit Salmon Association obtained 350,000 eyed eggs from Charlo S.E.C., for streamside incubation at Grand Falls. Survival rate in the incubation boxes was 81.7%, producing 285,000 swim-up fry, of which 240,000 were stocked to the Nepisiguit River (Table 4). An additional 45,000 swim-up fry were stocked to the Tetagouche River above the falls. All fish were unmarked.

All broodstock used to produce eggs for this stocking were collected from the Nepisiguit River in 1995. In 1996, 162 large salmon were collected as broodstock for 1997 enhancement projects. All but one were collected at the counting fence; the remaining fish was angled at Gray's angling camp. An attempt to collect broodstock using an electrofishing boat was unsuccessful (P. Cameron, DFO, pers. comm.).

2.3.2 - Counting fence

A salmon counting fence was operated by Pabineau First Nation in collaboration with Nepisiguit Salmon Association and DFO from June 18 to October 9 (Table 5). The fence was located approximately 0.5 km below the mouth of the Pabineau River, just above Gray's Ledge Pool.

Salmon captured at the fence during their upstream migration were counted, and all large and approximately 30% of small salmon were also measured, a scale sample was collected and fish were externally sexed if possible. Approximately 30% of the small salmon were tagged with numbered blue Carlin tags just posterior to the first ray of the dorsal fin. Adipose fin clips (indicating hatchery origin) or numbered Carlin tags were noted. Salmon were released above the fence or retained as broodstock to be sent to Charlo Salmonid Enhancement Centre.

In total, 197 small salmon were counted at the fence. Six small salmon were adipose fin-clipped (Table 6). In total, 335 large salmon were counted, of which five were fin-clipped. Total

returns of both small and large salmon to the fence are believed to have been larger than is indicated by counts at the fence, for two reasons. First, the fence was removed earlier than anticipated (due to budgetary constraints) and much of the late run entered the river following removal of the fence. Second, gaps in the fence could have allowed small salmon to pass through the fence without being counted during part of its early operation (J. Grant, R. Baker, pers. comm.). Large salmon were not likely to have fit through the holes in the fence.

Returns of both small (57% of total returns) and large (48% of total returns) salmon were concentrated in September (Fig. 4). Unlike the poor summer returns observed in 1995, salmon commonly returned to the fence during July and August of 1996. Compared to previous years, the timing of large salmon returns was atypical, with a large number of fish returning in week 34 (late August) (Fig. 5).

The salmon count at the fence was adjusted by regression on the number of fish angled above the fence (NSA data). The regression equations were based on 1982-1992 data, and were also used to adjust the 1993-1995 fence counts (Locke et al. 1994, 1995).

Large salmon returns to fence = 6.47 * Large salmon angled above fence (R^2=0.92)

Small salmon returns to fence = 3.18 * Small salmon angled above fence (R^2=0.81)

The adjusted returns to the fence were 615 small and 897 large salmon (Table 6). These estimated returns are probably lower than the actual returns because fish were still returning to the river after October 15, the end of the angling season on which these adjustments are based.

Averaged over the full season, 1% of large salmon and 3% of small salmon were adipose-clipped (Table 7). Adipose-clipped fish were observed only in August and September.

Carlin tags were applied to 54 small salmon at the counting fence, but only two were reported caught by anglers upriver (Table 8). No large salmon were tagged in 1996. One large salmon tagged in 1994 at a research trap located near the highway 11 bridge (Locke et al. 1995) was recaptured at the counting fence (Table 8).

Length-frequency analysis of salmon measured at the counting fence shows three distinct peaks (Fig. 6), corresponding to 1, 2 and 3 sea-winter age groups (Locke et al. 1995).

2.3.3 - Redd counts

Redd counts were conducted by the Nepisiguit Salmon Association both above and below the fence (Table 9). The total count was 2267 redds, compared to 2926 redds in 1995. It is likely that the total number of redds was underestimated in 1996 as a result of unusually late spawning (R. Baker, pers. comm.). Only 50% of the broodstock from the Nepisiguit River had spawned at Charlo

S.E.C. by mid-November, an unusually late spawning (P. Cameron, DFO, pers. comm.). Areas of the upper Nepisiguit River, examined for redds by the NSA on October 29, had at least 25% more redds during spot-checks by the NSA on November 6 and 8.

2.3.4 - Juvenile densities

Estimates of juvenile densities were obtained at 11 sites in the Nepisiguit River, 3 sites in Gordon Meadow Brook, and 6 sites in the Pabineau River electrofished by the Nepisiguit Salmon Association. Densities were estimated by the DeLury (1958) method, using removal from sites enclosed by barrier nets. Juvenile salmon were separated into age classes using fixed length categories (age 0 parr, ≤5.5 cm; age 1 parr, 5.6-10.5 cm; age 2 parr, ≥10.6 cm).

Mean density of age 0 parr at in 1996 was higher than in 1995 (the lowest recorded in five years), but lower than in 1991-1994 (Fig. 7). Mean density of age 1 parr was the lowest since 1990, as expected given the low age 0 density observed in 1995. Density of age 2 parr was the highest ever, reflecting the high age 0 density in 1994.

2.4 - Estimation of returns, removals and spawning escapement

Calculations of spawning escapement and returns were carried out by the methods outlined by Locke et al. (1994), as follows:

(1) Spawning escapement above the fence

Spawners = salmon counted at fence (adjusted by regression, as described in section 2.3.2) - (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 (none in 1996) + commercial harvest (none in 1996)

Angling mortality was calculated using angling removals and releases estimated by the Nepisiguit Salmon Association. To separate total removals and releases into above- and below-fence components, the average distribution of angling above (38%) and below (62%) the fence was calculated based on returns of scale samples by anglers (Table 10), which include information on the angling location. Hook-and-release mortality of released fish was calculated for an assumed 3%

mortality rate. Thus, angling mortality was estimated as the sum of removals and mortalities of released fish.

Mean proportions of redds above (72%) and below (28%) the fence (Table 9) were used to estimate the number of spawners below the fence, assuming that fish spawning in the two areas produce similar numbers of redds/fish.

2.5 - Assessment results

Returns of large salmon were estimated as 281 below the fence and 897 above the fence (Table 11). Returns of small salmon were estimated as 421 below the fence and 615 above the fence (Table 12).

Total returns were estimated as 1178 large and 1036 small salmon (Table 13). Spawning escapement was estimated to be 976 large and 499 small salmon. Large salmon returns were the highest since 1991. Small salmon returns were the highest since 1993 (Table 13, Fig. 8a).

Based on these estimates, 62% of the conservation requirement for egg deposition was met in 1996 (Table 13). Spawning requirements have been exceeded in only two years (1987 and 1988) of the fifteen in which salmon stocks have been assessed on this river (Fig. 8b). Neither the conservation egg deposition or large salmon escapement have been met since 1988 (Table 13). Small salmon spawning escapement was exceeded in nine years, although not since 1993 (Table 13). Egg deposition has declined since 1989, but has remained at approximately 50-60% of the conservation level over the past four years (Fig. 8b). Estimates of spawning escapement in 1996 are probably conservative because of the late spawning run.

2.6 - Ecological considerations

2.6.1 - Species interactions

Predation by piscivorous birds, primarily mergansers, on juvenile salmon is a major concern of some anglers on the Nepisiguit River. Merganser surveys carried out by the Nepisiguit Salmon Association in July-September counted the same number of mergansers present in 1994 and 1995 - a maximum of about 1.7 mergansers/river km, with up to 45 birds on the Nepisiguit River below Grand Falls. Elson (1962) recommended that merganser densities should not exceed 1 bird/20 ha (actually, 1 bird/river stretch 24 km long and 9 m wide) for maximum smolt production. This translates to 4.6 mergansers/km^2. Dividing the total count of mergansers on the main Nepisiguit River below Grand Falls by the river habitat below Grand Falls (which includes tributaries to the main Nepisiguit River), the density of mergansers in 1996 was at least 11.3/km^2.

2.6.2 - Environmental conditions

Unlike 1995, when the morning water temperature at the counting fence (sampled daily at approximately 0800 h) was commonly > 20 C and occasionally > 25 C, temperatures in 1996 rarely exceeded 20 C and never exceeded 25 C (Fig. 4).

Spot-checks of river pH by the Nepisiguit Salmon Association in July-October showed circumneutral readings in the Nepisiguit River (pH 6.95-7.38), Pabineau Brook (pH 6.90-7.25), and Gordon Meadow Brook (the most acidic of the three water bodies, with pH 6.35-6.85) (Table 14).

2.7 - Management considerations

The recommended conservation level of spawning escapement was not achieved in 1996. Even before exploitation of the stock, returns of large salmon were less than the recommended spawning escapement. Total egg deposition was estimated at 62% of the conservation level. This estimate is conservative due to late entry of fish to the river.

3 - Jacquet River

3.1 - Conservation requirements

The conservation egg deposition that has been used for the Jacquet River is **2,724,000 eggs, to be obtained from 320 large and 180 small salmon** (Anon., 1978). This egg requirement was set assuming that all eggs should come from large salmon and using a required egg deposition of 2.4 eggs·m^{-2}. Biological characteristics of the stock were based on samples from a trapnet formerly operated by DFO in the Restigouche River. Data collected in the Jacquet River since 1994, however, indicated that use of Restigouche River stock characteristics was inappropriate (Table 15).

Biological characteristics of salmon sampled at a barrier fence in the Jacquet River (section 3.3.1) were used to recalculate the number of salmon required to attain the conservation egg deposition. The mean fork length of large salmon, 80.3 cm (Table 15) was substituted in Randall's (1984) equation relating fecundity to fork length,

ln (fecundity, eggs/female) = -1.1862 + 2.3423 ln (fork length, cm).

Fecundity was 8229.8 eggs/female. This equation assumes that mean fecundity is 1475 eggs/kg (Randall 1984) rather than the fecundity in use when the previous conservation limit was set, 1760 eggs/kg (Elson 1957).

To obtain 2,724,000 eggs, 331 large female Jacquet River salmon are required. Given that females make up 80.3% of the large salmon population, a large salmon escapement of 412 (331 females, 81 males) is required. An additional 250 small salmon are required for a 1:1 sex ratio.

The new conservation requirements, then, are **412 large and 250 small salmon**. The conservation egg deposition of 2,724,000 eggs is unchanged; however, the estimate of rearing area should be reevaluated. The conservation requirement of 2.4 eggs/m^2 is also unchanged.

3.2 - Fisheries

Unlike the Nepisiguit River, angling for kelts was permitted in the Jacquet River from April 15 to May 15. Angling regulations for bright fish in the Jacquet River were similar to those in the Nepisiguit River with the exception of a later season closure, October 30.

The New Brunswick Aboriginal Peoples Council received a communal license for salmon fishing in a number of rivers, including the Jacquet River, with a total allocation of 45 small salmon. These salmon were to be taken by angling only, from the waters of the Upsalquitch, Charlo, Benjamin and Jacquet rivers in August 1 through October 31, and from the waters of the Restigouche River from the confluence of the Restigouche and Matapedia rivers for a distance of approximately 10 km upstream in August 1 through September 15.

No catch or harvest data for either the native or non-native fisheries were available for 1996. Mean 1990-1995 catches were 19 small and 24 large kelts, and 67 small and 55 large bright salmon (Table 16). Fishing effort on bright salmon increased and CPUE decreased over this six-year period.

3.3 - Research data

3.3.1 - Juvenile stocking and broodstock collection

In 1996, 18,302 age 0 parr were stocked to the Jacquet River on October 8. Charlo Salmonid Enhancement Centre staff collected eight large salmon (four males, four females) for broodstock. Broodstock were spawned at the river and 21,259 eggs were returned to the hatchery.

3.3.2 - Counting fence

In 1996, a containment barrier was operated by the New Brunswick Department of Natural Resources and Energy for the third year at Big Rock Pool just upriver of the Highway 11 bridge. The fence operated from June 17 to October 27. In total, 337 large and 600 small salmon returned to the fence (Fig. 9); 403 of these (large and small salmon combined) were seined just below the fence by DNRE personnel on October 25, and placed in the holding pool following collection of biological data (fork length and sex, where possible). Mortalities of 5 small and 2 large salmon

were recorded at the fence. The number of fish released from the fence was 335 large salmon and 595 small salmon. Small salmon were released throughout the season to afford angling opportunities upriver. Large salmon were held until October 27.

As in 1994 and 1995, the majority of fish (94% of large and 85% of small salmon) reached the fence after October 1 (Fig. 9).

Fork length and proportions of females in the population from 1994 to 1996 were consistent from year to year (Table 17).

3.3.3 - Redd surveys

In total, 786 redds were counted in the main stem of the Jacquet River from tidal water to the waterfall above Kettle Hole. This was a larger portion of the river than was sampled in previous years; the redd count from Pumphouse Pool upriver was 726 in 1996, an increase of 51% over the averaged 1994 and 1995 redd counts (479.5 redds) (Table 18). The redd count in the 8-km index stretch from Kettle Hole to Doyles Pool was the highest since redd counts began in 1971, and was 204% higher than the mean number of redds counted in 1994 and 1995.

3.4 - Estimation of returns, removals and spawning escapement

Returns to the barrier fence were assumed to represent in-river returns. Mortalities at the fence were subtracted to obtain the number of salmon released above the fence. Removals of salmon upstream of the barrier fence were estimated as the mean angling mortality on bright fish in 1990-1995. Virtually all angling takes place above the fence (A. Madden, personal observation). Angling mortality of released large salmon was estimated as 3% of the total catch.

3.5 - Assessment results

Conservation spawning escapement was not achieved in 1996 (Table 19). Only 88% of the conservation egg deposition was met. This is the first year in the three years that this stock has been assessed that spawning escapement did not exceed the requirement. Large salmon spawning escapement was only 57% of the mean escapement in 1994 and 1995. Small salmon spawning escapement in 1996 was 122% of the mean escapement in 1994-1995.

Returns of large salmon (337 fish) did not exceed the conservation requirement (412 fish).

The large number of redds counted in 1996 (Table 18), compared to those counted in the two previous years, was unexpected given that the 1996 spawning escapement was estimated to be lower than that in 1994 and 1995. Annual changes in size and sex ratio of the spawning population are not sufficient to explain the large number of redds. If one assumes that the number of redds/female was reasonably consistent from year to year, and that the redds were counted

accurately in all years, then spawning escapement may have been overestimated in 1994 and 1995 or underestimated in 1996; one possibility is that higher levels of poaching took place in 1994 and 1995 than in 1996.

3.6 - Management considerations

Atlantic salmon in the Jacquet River did not meet conservation requirements for the first time in three years. Small salmon escapement has exceeded the conservation level substantially in all years. Large salmon returns were less than the conservation requirement for spawning escapement. Poaching could reduce the large salmon escapement well below the conservation level. The extent of poaching in the Jacquet River is not quantified, but it is believed to be an important source of mortality. Retention of large salmon at the DNRE holding pool until late October was probably effective in reducing poaching mortalities.

4 - Research recommendations (Nepisiguit and Jacquet rivers)

1. Continue operation of the Nepisiguit River counting fence for assessment and broodstock collection. Early installation of the fence has been favoured in order to collect early-run broodstock. For the assessment program, it would be better to put the fence in later rather than earlier in order that the late October run of fish not be missed in the case of budget shortfalls.

2. Update the salmon habitat estimates in both the Jacquet and Nepisiguit rivers, then reevaluate conservation requirements for total egg deposition.

5 - Acknowledgements

Much of the data on Atlantic salmon in the Nepisiguit River was collected by employees and volunteers of the Nepisiguit Salmon Association and Pabineau First Nation; we especially thank R. Baker, president of the NSA, and J. Grant and the staff of the counting fence. Fence operations were assisted by L. Anderson and A. Steeves (DFO). P. Cameron supplied DFO hatchery stocking data for both rivers. We thank the staff of the Jacquet River counting fence for their contributions to this report.

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Table 1. Monthly angling catches, effort, and catch per unit effort (CPUE) of Atlantic salmon on the Nepisiguit River in 1996. Information provided by the Nepisiguit Salmon Association.

	Small salmon catch		Large salmon catch	Angling effort	CPUE (catch/
Month	Retained	Released	Released	(Rod-days)	rod-day)
June	20	0	40	400	0.15
July	110	20	100	800	0.29
August	50	10	30	300	0.30
Sept.	170	65	150	1500	0.26
Oct.	100	35	100	800	0.29
TOTAL	450	130	420	3800	0.26

Table 2. Estimates of angling catch of Atlantic salmon in the Nepisiguit River, 1951-1996. Based on DFO (C&P) statistics in 1951-1983 and 1985, Nepisiguit Salmon Association statistics in 1984, 1986-1996, DNRE FISHSYS angler surveys from 1969-1995.

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

	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. Continued.

(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.

	Removed		Released			
Year	Small	Large	Small	Large	Rod-days	Catch per rod-day
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
1995	350	0	100	300	2900	0.26
1996	450	0	130	420	3800	0.26
Mean(91-5)	540	0	147	276	3660	0.26
%96/(91-95)	-17%	-	-12%	+52%	+ 4%	0 %

Table 2. Continued.

(c) Angling data from DNRE FISHSYS angler surveys, 1969-1995, showing estimates of retained small salmon and released large salmon for the bright fishery. Data for 1996 were not available at the time of publication.

Year	Small salmon (removed)	Large salmon (released)	Total Rod-days	CPUE (catch/rod-day)
1969	46	9	150	0.37
1970	41	0	196	0.21
1971	0	0	38	0.00
1972	23	20	352	0.12
1973	0	14	294	0.05
1974	39	12	633	0.08
1975	8	8	57	0.28
1976	207	79	633	0.45
1977	52	0	221	0.24
1978	18	30	473	0.10
1979	14	0	1052	0.01
1980	752	145	2952	0.30
1981	1033	170	3599	0.33
1982	522	81	3429	0.18
1983	430	50	4140	0.12
1984	814	289	2444	0.45
1985	1135	653	7084	0.25
1986	2018	939	7365	0.40
1987	1903	1072	7498	0.40
1988	1429	703	6578	0.32
1989	778	795	5433	0.29
1990	1035	528	9781	0.16
1991	1628	792	10869	0.22
1992	1153	705	11861	0.16
1993	1546	1013	12393	0.21
1994	484	147	5044	0.13
1995	490	20	3070	0.17

Table 3. Angling records from logbooks distributed to Nepisiguit Salmon Association members, 1996. Numbers of landed fish only.

			Small salmon										
	Rod-days		retained		released		Large salmon released		Total catch		Catch/rodday		
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	2.5	14.5	1	0	0	1	0	2	1	3	0.40	0.21	0.24
2	2	0	0	0	0	0	1	0	1	0	0.50	----	0.50
3	7.5	15.5	0	7	1	1	0	1	1	9	0.13	0.58	0.43
4	0	10	0	1	0	1	0	1	0	3	---	0.30	0.30
5	9	2	2	0	0	0	0	0	2	0	0.22	0.00	0.18
6	2.8	13.2	0	2	0	0	0	1	0	3	0.00	0.23	0.19
7	6	33	0	0	5	17	1	4	6	21	1.00	0.63	0.69
8	3	17	0	7	0	1	0	6	0	14	0.00	0.82	0.70
9	8.5	12.5	1	1	0	0	0	3	1	4	0.12	0.32	0.24
10	7	7	0	1	0	0	3	2	3	3	0.43	0.43	0.43
11	0	8	0	3	0	1	0	0	0	4	----	0.50	0.50
totals													
1996	48.3	132.7	4	22	6	22	5	20	15	64	0.31	0.48	0.44
1995	58.5	114.5	5	21	3	10	3	24	11	55	0.19	0.39	0.35
1994	50	96	10	8	2	11	0	9	12	28	0.24	0.29	0.27

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; 1982-1992, Nepisiguit Salmon Association; 1993-1995, Charlo Salmonid Enhancement Centre). 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)	Age 1 parr	Age 2 smolt	YEARLY TOTAL
1976	0	0	78,196 (unmarked)	0	33,101 (100% AC)	111,297
1977	0	0	0	0	0	0
1978	0	0	166,283 (100% AC)	5,320 (100% AC)	0	171,603
1979	0	138,600 (unmarked)	86,947 (100% AC)	4,229 (100% AC)	2,002 (100% AC&CT)	231,778
1980	0	0	178,047 (100% AC)	6,978 (100% AC)	23,588 (100% AC&NT)	208,613
1981	0	176,440 (unmarked)	498,301 (100% AC)	3,819 (100% AC)	7,635 (100% AC&NT)	686,195
1982	0	0	293,140 (100% AC)	2,980 (100% AC)	0	296,120
1983	0	216,172 (unmarked)	298,453 (100% AC)	10,645 (100% AC)	10,454 (100% AC)	535,724
1984	0	65,576 (unmarked)	261,141 (100% AC)	18,667 (100% AC)	10,752 (100% AC&NT)	356,136

Table 4. Continued.

Year	Swim-up fry	Feeding fry (3 cm)	Fingerling fry (7 cm)	Age 1 parr	Age 2 smolt	YEARLY TOTAL
1985	25,669 (unmarked)	30,000 (unmarked)	316,618 (100% AC)	11,152 (100% AC)	10,650 (100% AC)	394,089
1986	48,312 (unmarked)	98,734 (unmarked)	268,277 (unmarked)	2,540 (100% AC)	10,706 (100% AC&NT)	428,569
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)	208,046 (unmarked)	0	8,792 (100%AC&NT)	651,303
1989	335,533 (unmarked)	0	284,004 (28% AC)	0	10,000 (100%AC&NT)	629,577
1990	342,981 (unmarked)	0	400,000 (35% AC)	6,500 (100%AC)	11,700 (100% AC&NT)	761,181
1991	243,016 (unmarked)	0	176,702 (100% AC)	0	9,663 (100% AC&NT)	429,381
1992	335,801 (unmarked)	118,542 (unmarked)	146,950 (10% AC)	12,441	11,641 (100% AC)	625,375
1993	336,277 (unmarked)	0	149,522 (65% AC)	30,944 (100% AC)	0	516,743
1994	255,000 (unmarked)	168,000 (unmarked)	0	0	0	423,000

Table 4. Continued.

Year	Swim-up fry	Feeding fry (3 cm)	Fingerling fry (7 cm)	Age 1 parr	Age 2 smolt	YEARLY TOTAL
1995	105,000 (unmarked)	0	90,906 (13% AC)	0	0	195,906
1996	240,000 (unmarked)	118,000 (unmarked)	154,129 (unmarked)	11,107 (100% AC)	12,921 (age 1 smolt) (100% AC)	536,157

TOTAL STOCKED, 1976 - 1996: 8,634,895

Table 5. Dates of operation of the Nepisiguit counting fence, 1982-1996.

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	June 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
1995	July 6-Oct. 20
1996	June 18-Oct. 9

Table 6. Salmon counts at the Nepisiguit River counting 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)
1995*	8 (26)	173 (551)	181 (577)	12 (25)	359 (757)	371 (782)
1996*	6 (19)	191 (596)	197 (615)	5 (13)	330 (884)	335 (897)

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

Table 7. Monthly returns of adipose fin-clipped salmon to Nepisiguit River fence. Parenthesized numbers are percentages of nose-tagged fish (included in adipose-clipped percentages).

(a) Percentage of adipose-clipped large salmon relative to total large salmon.

	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
1995	--	--	8	25	9	0	--	3
1996	--	0	0	2	2	0	--	1

(b) Percentage of adipose-clipped small salmon relative to total small salmon.

	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
1995	--	--	13	0	5	1	--	5
1996	--	0	0	4	4	0	--	3

Table 8. Summary of Carlin tags recovered from Atlantic salmon in the Nepisiguit River, 1996.

Tag No.	Date applied	Date recaptured	Recapture location
64048	Oct. 24/94	Sept. 17/96	Counting fence
64251	Sept. 9/96	Oct. 5/96	Island Pool
64253	Sept. 10/96	Oct. 11/96	Long Hole

Table 9. 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					
Year	Above fence	Below fence	Total	Pabineau River	Gordon Meadow Brook	% of redds above fence
1981	--	--	--	17	8	--
1982	149	87	236	52	66	63.1
1983	1164	414	1578	--	--	73.8
1984	1014	564	1578	--	--	64.3
1985	1341	513	1854	--	--	72.3
1986	2250	692	2942	337	91	76.5
1987	2447	1383	3830	158	64	63.9
1988	3017	1468	4485	177	39	67.3
1989	732[a]	43[a]	775[a]	--	--	--
1990	--	--	--	--	--	--
1991	--	--	--	--	--	--
1992	--	--	--	--	--	--
1993	1647	--	1647[a]	--	--	--
1994	2198	754	2952	--	--	74.5
1995	2763[a]	163	2926[a]	--	--	--
1996	2030	237	2267	--	--	89.5
						Mean = 71.7%

[a] Incomplete counts

Table 10. Distribution of salmon angling above and below the Nepisiguit River counting 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
1995	-	-	12	36	25.0
1996	-	-	9	35	20.5
					MEAN = 37.8 %

Table 11. Calculations of total returns and spawners for large salmon in the Nepisiguit River.

(a) Above the counting 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
1995	782	162	3	44	4	569
1996	897	161	0	28	5	703

(b) Below the counting fence. "A" refers to the ratio of redds below the fence:redds above the fence. In 1982-1995 stock assessments, a value of 0.44 (mean of all years up to 1995) was used. With the addition of the 1996 redd counts, the mean value used was 0.39.

Year	[6] Spawners above fence	[7]=[6] x A 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
1995	569	250	5	0	0	255
1996	703	273	8	0	0	281

Table 12. Calculations of total returns and spawners for small salmon in the Nepisiguit River.

(a) Above the counting 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
1995	577	9	0	131	142	295
1996	615	0	0	84	172	359

(b) Below the counting fence. "A" refers to the ratio of redds below the fence:redds above the fence. In 1982-1995 stock assessments, a value of 0.44 (mean of all years up to 1995) was used. With the addition of the 1996 redd counts, the mean value used was 0.39.

Year	[6] Spawners above fence	[7]=[6] x A 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
1995	295	130	211	0	0	341
1996	359	140	281	0	0	421

Table 13. Annual estimates of total returns and total spawners for large and small salmon in the Nepisiguit River. Spawner numbers in bold type exceeded the conservation spawning escapement of 1626 large salmon and 823 small salmon. Egg deposition is calculated from spawner estimates, assuming 5864.6 eggs/large spawner (8260 eggs/large female) and 351.05 eggs/small spawner (2065 eggs/small female).

Year	Large salmon			Small salmon				
	Returns	Spawners	Egg deposition (x 10^6)	Returns	Spawners	Egg deposition (x 10^6)	Total egg deposition (x 10^6)	% of egg requirement
1982	668	249	1.46	1537	**1223**	0.43	1.89	7
1983	545	109	0.54	562	325	0.11	0.75	8
1984	692	376	2.21	2139	**999**	0.35	2.56	27
1985	1218	948	5.56	858	575	0.20	5.76	60
1986	1397	1128	6.62	2414	**1546**	0.54	7.16	75
1987	2014	**1699**	9.96	2890	**2017**	0.71	10.67	112
1988	2700	**2381**	13.96	4057	**2900**	1.02	14.98	157
1989	1568	1239	7.27	968	309	0.11	7.38	77
1990	1390	1117	6.55	2152	**1593**	0.56	7.11	75
1991	1290	1026	6.02	2930	**2164**	0.76	6.78	71
1992	642	336	1.97	1974	**1092**	0.38	2.35	25
1993	1084	925	5.42	1511	**836**	0.29	5.71	60
1994	892	773	4.53	1018	501	0.18	4.71	49
1995	1037	819	4.80	918	425	0.15	4.95	52
1996	1178	976	5.72	1036	499	0.18	5.90	62

Table 14. Measurements of pH and temperature in the Nepisiguit River system, 1996.

Location	Date	pH	Temperature (C)
Nepisiguit R.	July 11	7.38	19.0
	Sept. 4	6.95	13.2
	Oct. 3	7.13	10.5
Pabineau Brook	July 11	6.90	19.6
	Sept. 4	7.25	16.5
	Oct. 3	6.90	8.4
Gordon Meadow Brook	July 11	6.50	16.0
	July 27	6.35	17.3
	Sept. 4	6.75	17.5
	Oct. 3	6.85	11.5

Table 15. Comparison of biological characteristics of Atlantic salmon in the Jacquet and Restigouche Rivers. Jacquet River salmon were sampled in 1994-1996 at the DNRE barrier fence. Restigouche River salmon were sampled at a trapnet formerly located in Dalhousie in 1972-1980 (biological characteristics from Randall 1984).

Small salmon	Jacquet R.	Restigouche R.
Mean % female	9.3	2.6
Mean fork length (cm)	55.6	53.1
Large salmon	Jacquet R.	Restigouche R.
Mean % female	80.3	59.5
Mean fork length (cm)	77.9	80.9

Table 16. Annual angling catch (including retained and hooked-and-released salmon) and effort (rod-days) in the Jacquet River.

	Kelts					Bright salmon				
Year	Small	Large	Total	Effort	CPUE	Small	Large	Total	Effort	CPUE
1984	0	3	3	50	0.06	39	-	39	275	0.14
1985	6	-	6	25	0.24	34	52	86	270	0.32
1986	10	6	16	50	0.32	76	105	181	355	0.51
1987	15	50	65	120	0.54	45	27	72	165	0.44
1988	16	42	58	180	0.32	110	70	180	320	0.56
1989	13	25	38	165	0.23	70	42	112	330	0.34
1990	20	32	52	75	0.69	82	58	140	330	0.42
1991	15	35	50	150	0.33	56	23	79	295	0.27
1992	20	15	35	90	0.39	105	95	200	455	0.44
1993	-	-	-	-	-	-	-	-	-	-
1994	20	10	30	90	0.33	33	100	133	720	0.18
1995	18	30	48	130	0.37	61	0	61	740	0.08
1996	-	-	-	-	-	-	-	-	-	-
Mean (90-95)	19	24	43	107	0.42	67	55	123	508	0.28

Table 17. Biological characteristics of Atlantic salmon sampled at the Jacquet River counting fence, 1994-1996.

(a) Mean fork length (cm)

Year	Small salmon		Large salmon	
	N	Mean	N	Mean
1994	476	55.9	358	79.2
1995	334	54.4	578	76.6
1996	386	56.3	284	79.1
Mean	1196	55.6	1220	77.9

(b) Mean proportion of females in population (%).

Year	Small salmon		Large salmon	
	N	Mean	N	Mean
1994	340	11.1	342	79.8
1995	263	7.2	589	83.0
1996	55	8.6	233	74.1
Mean	658	9.3	1164	80.3

Table 18. Summary of Atlantic salmon redd surveys of the Jacquet River.

Year	Number of redds counted					Comments
	Above Kettle Hole	Kettle Hole to Doyles Pool	Doyles Pool to tail of Pumphouse Pool	Tail of Pumphouse Pool to tidal water	Total redds	
1971	--	9	18	--	27	
1972	--	35	--	--	35	
1973	--	52	--	--	52	
1974	--	58	--	--	58	
1977	--	40	--	--	40	
1980	--	87	--	--	87	
1984	--	16	--	--	16	high water, unskilled observers
1985	--	70	--	--	70	
1986	--	51	--	--	51	
1987	--	106	--	--	106	
1988	--	124	--	--	124	
1993	--	180	--	--	180	
1994	87	81	339	--	507	
1995	34	102	306	--	477	
1996	0	279	447	60	786	beaver dam blocked access above Kettle Hole

Table 19. Summary of Atlantic salmon stock assessment in the Jacquet River, 1994-1996. Egg deposition is calculated based on biological data collected at the counting fence in 1994-1996 (large salmon: 8229.8 eggs/female, 80.3% females in population, 6608.5 eggs/fish; small salmon: 3735.3 eggs/female, 9.3% females in population, 347.4 eggs/fish). Conservation requirement is 412 large and 250 small salmon contributing 2.724 million eggs.

	1994		1995		1996	
	Large salmon	Small salmon	Large salmon	Small salmon	Large salmon	Small salmon
Returns (to fence)	595	613	584	359	337	600
Releases from fence (returns - mortalities)	594	603	582	354	335	595
Angling mortalities	3	33	0	61	2	67
Broodstock removals					8	0
Spawning escapement	591	570	582	293	325	528
Egg deposition (x 10^6)	3.9	0.2	3.8	0.1	2.1	0.2
Total egg deposition (large+small salmon) (x 10^6)	4.1		3.9		2.3	
% of conservation requirement met	151%		143%		88%	

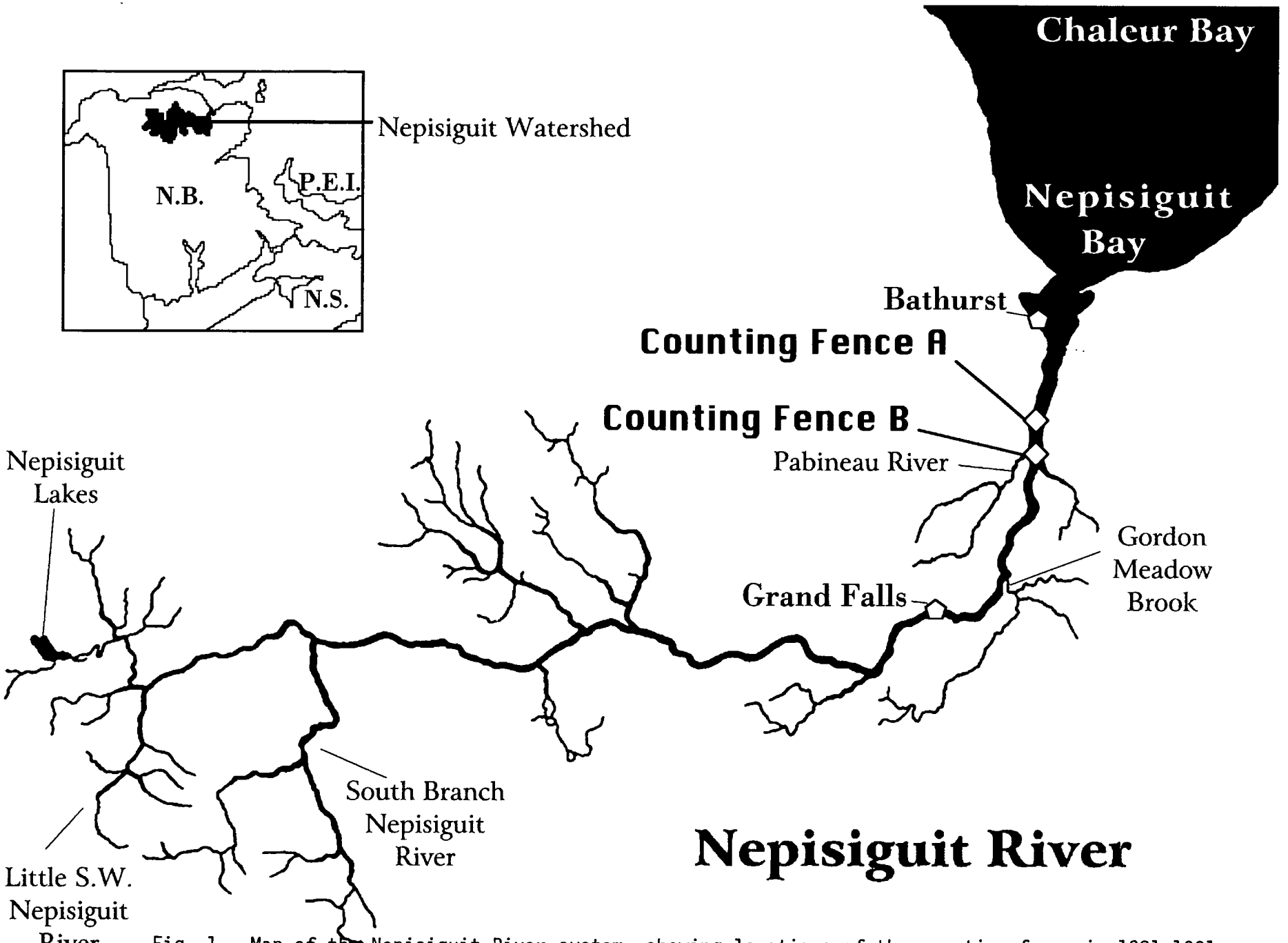


Fig. 1. Map of the Nepisiguit River system, showing locations of the counting fence in 1981-1991 and 1995-1996 (A) and 1992-1994 (B).

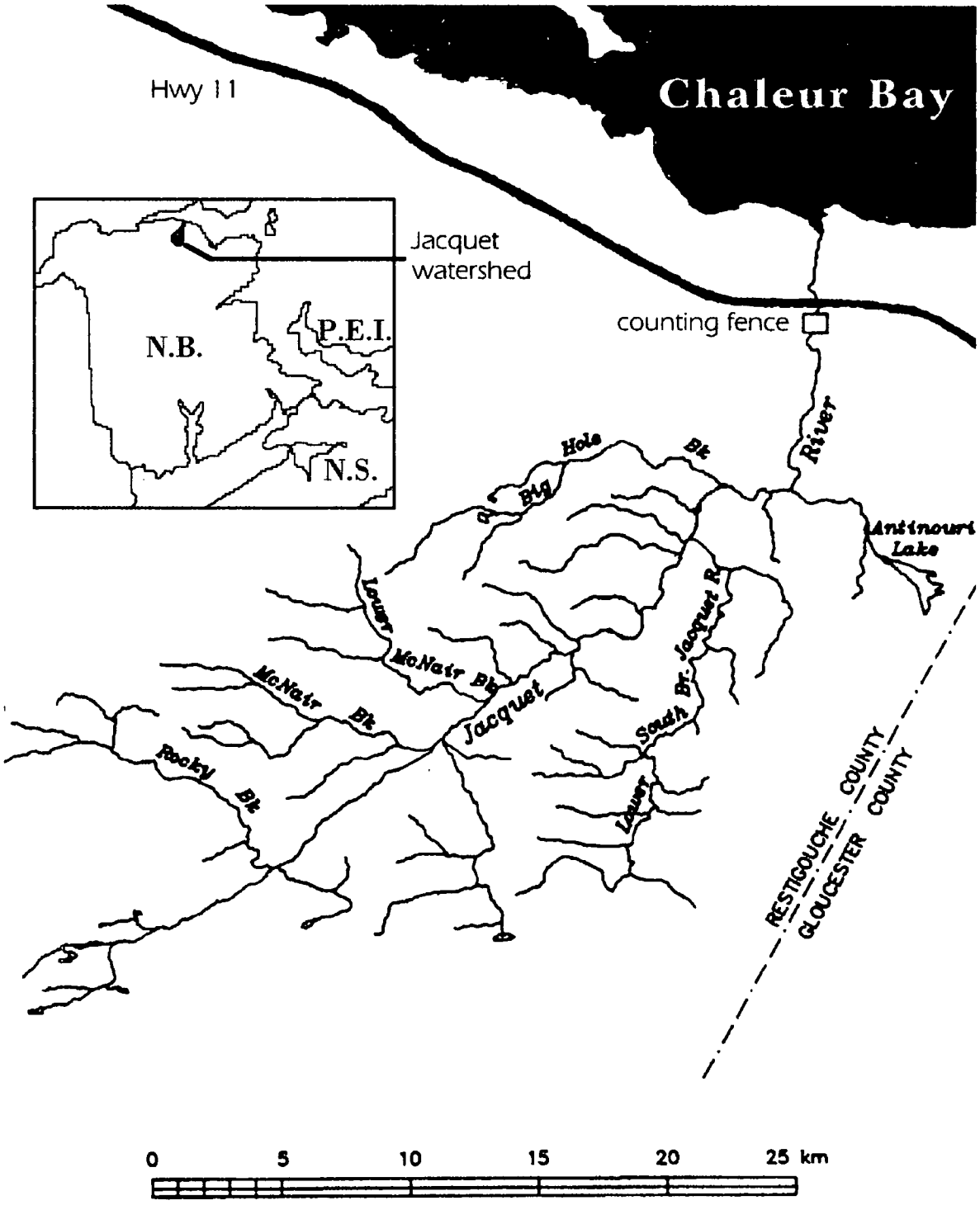


Fig. 2. Map of the Jacquet River, showing location of the barrier fence in 1994-1996.

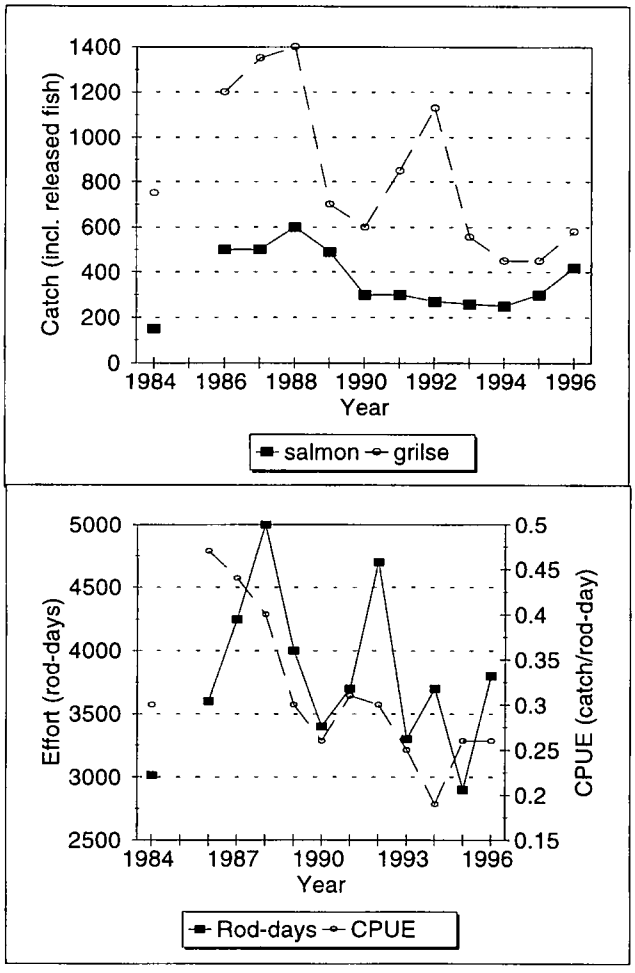


Fig. 3. Angling catches, rod-days and catch per unit effort (CPUE) of bright Atlantic salmon in the Nepisiguit River.

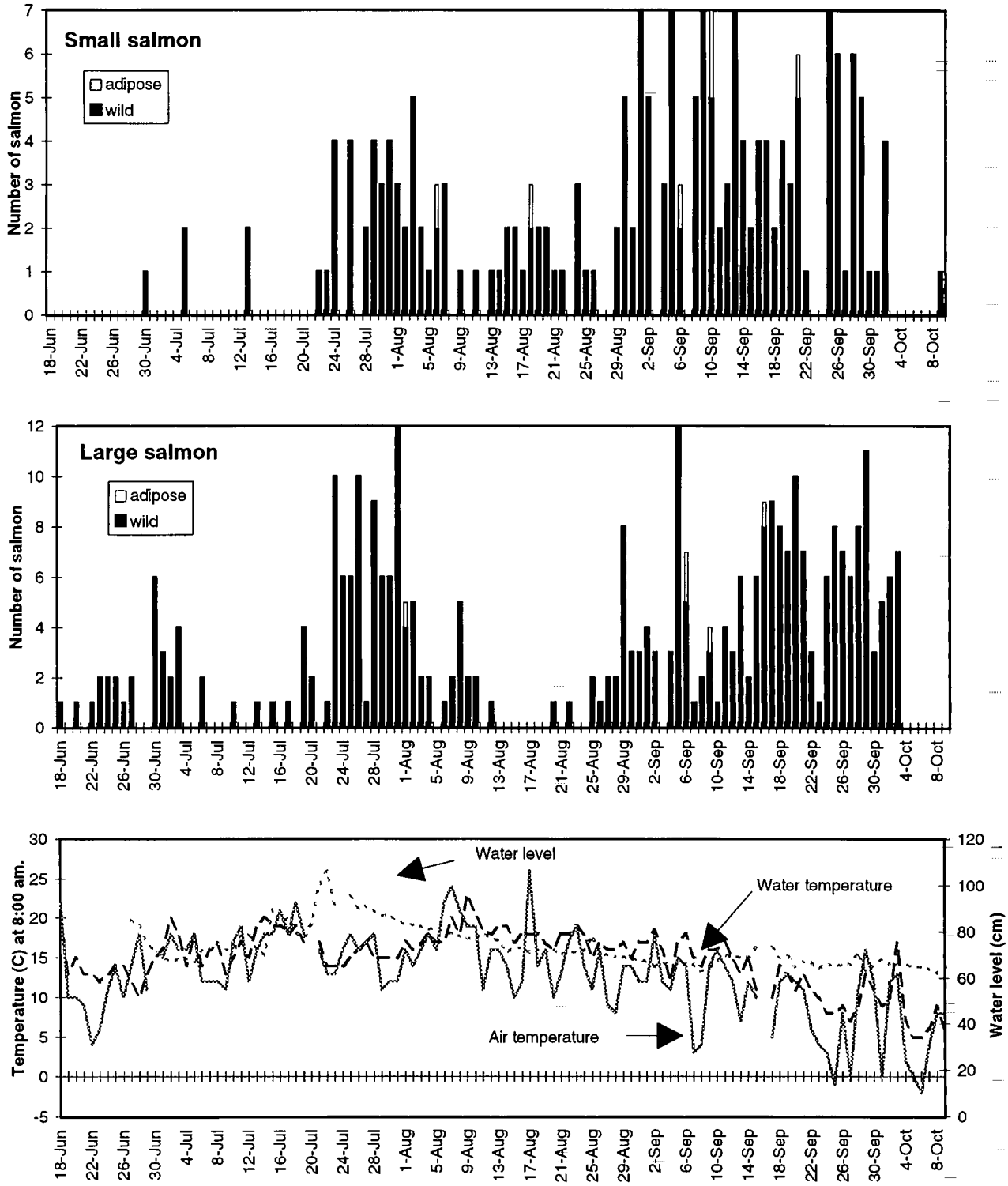
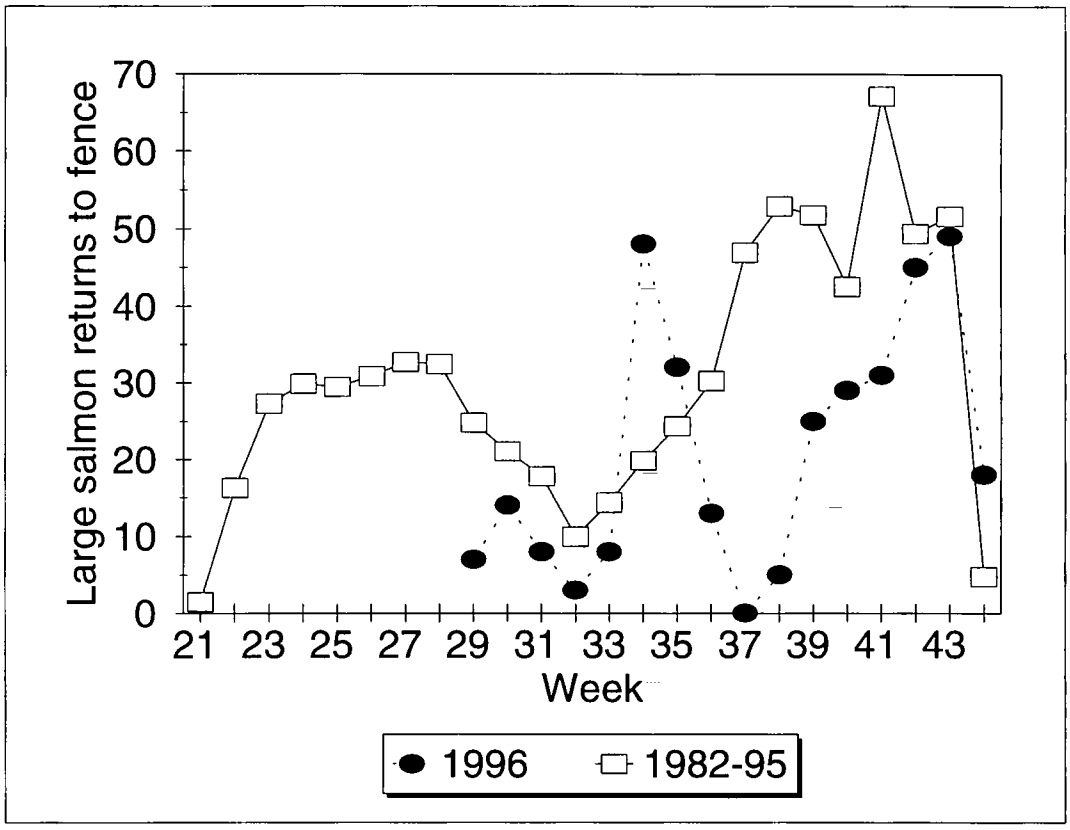


Fig. 4. Daily returns of large and small Atlantic salmon, and environmental conditions at the Nepisiguit River counting fence in 1996.



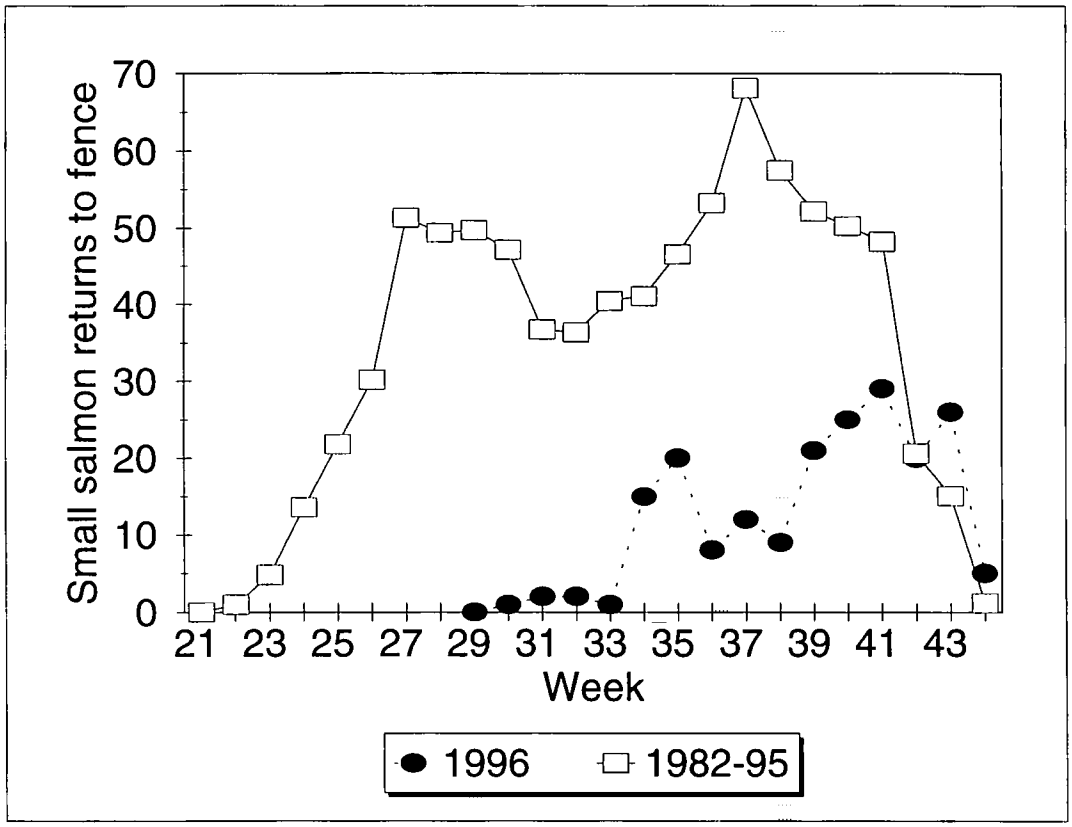


Fig. 5. Timing of salmon returns (by week) to the Nepisiguit counting fence in 1996 and mean of 1982-1995.

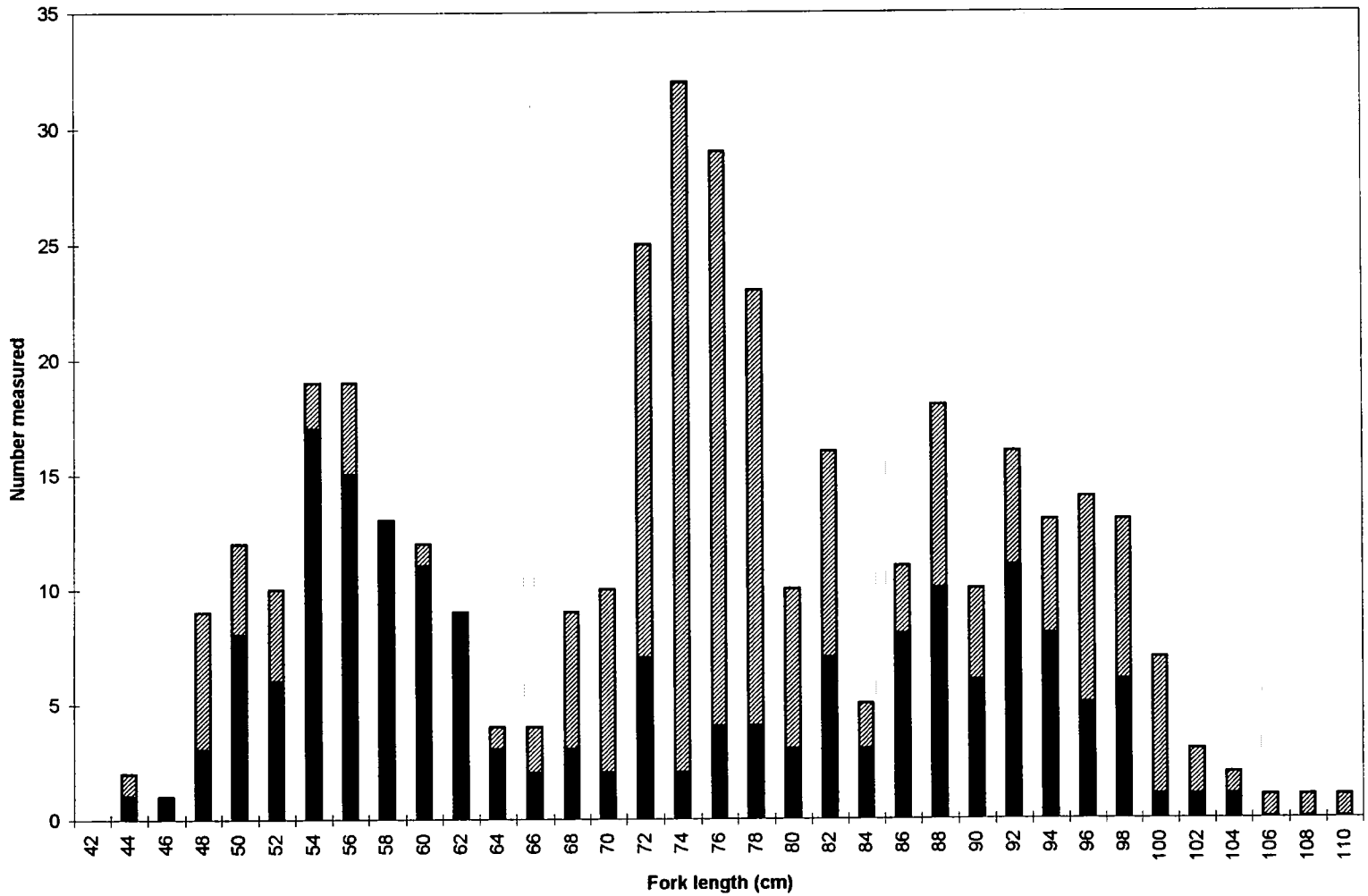


Fig. 6. Length frequency of Atlantic salmon returning the Nepisiguit River counting fence in 1996. Solid bars show number of males and hatched bars show number of females in each length category.

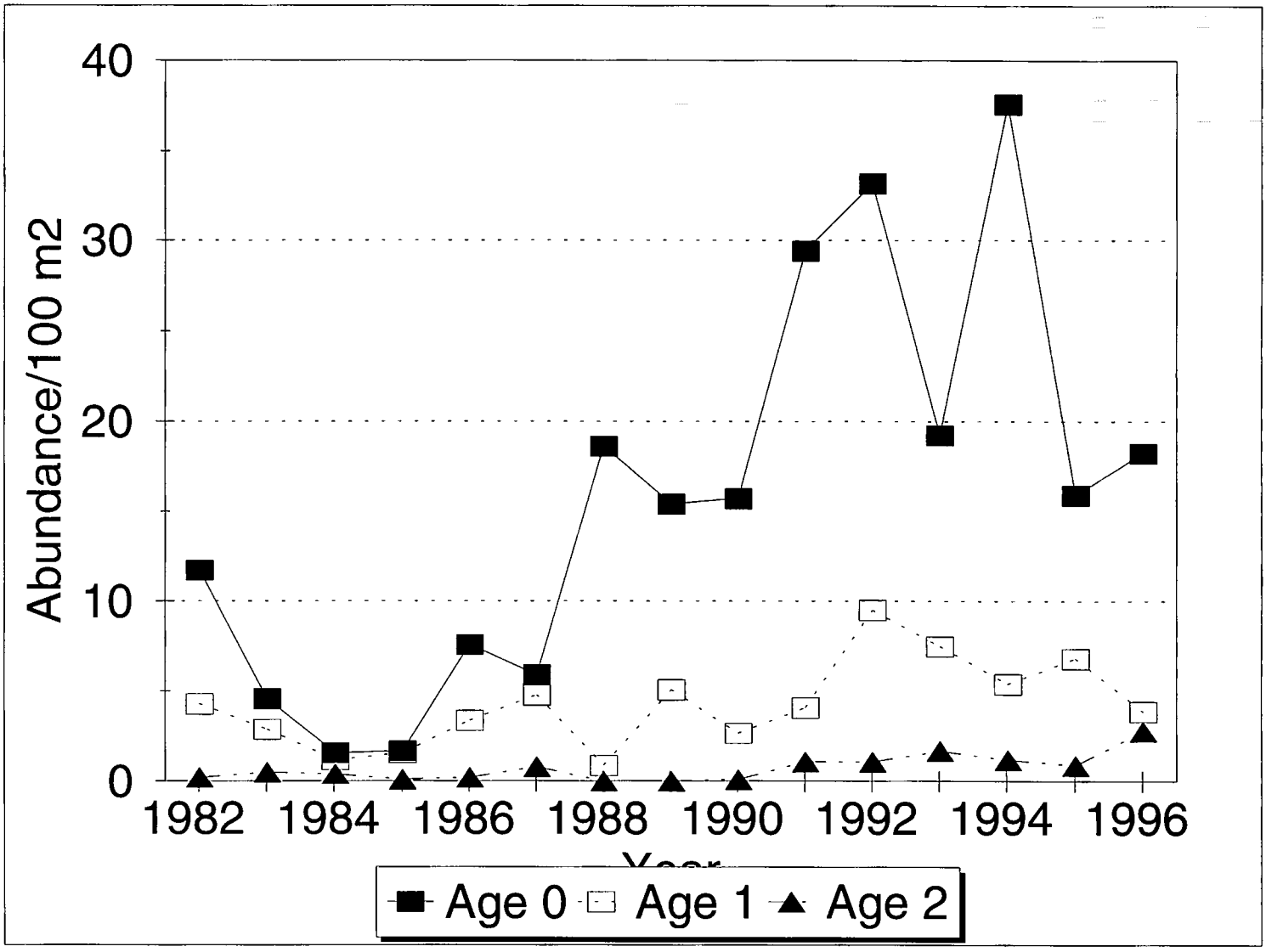


Fig. 7. Mean juvenile salmon abundance at electrofishing sites on the Nepisiguit River.

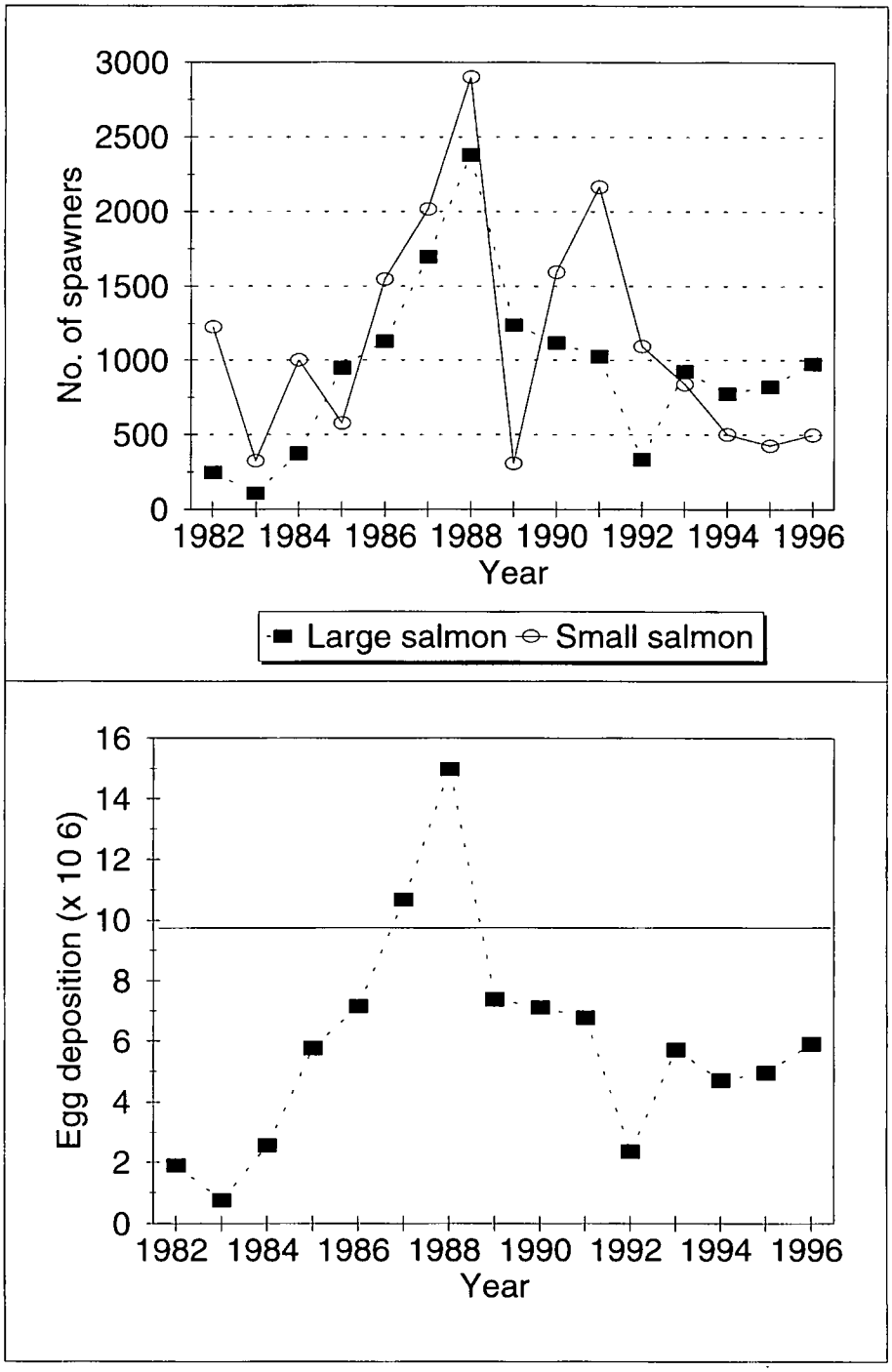


Fig. 8. Estimated spawning escapement and egg deposition of Atlantic salmon in the Nepisiguit River.

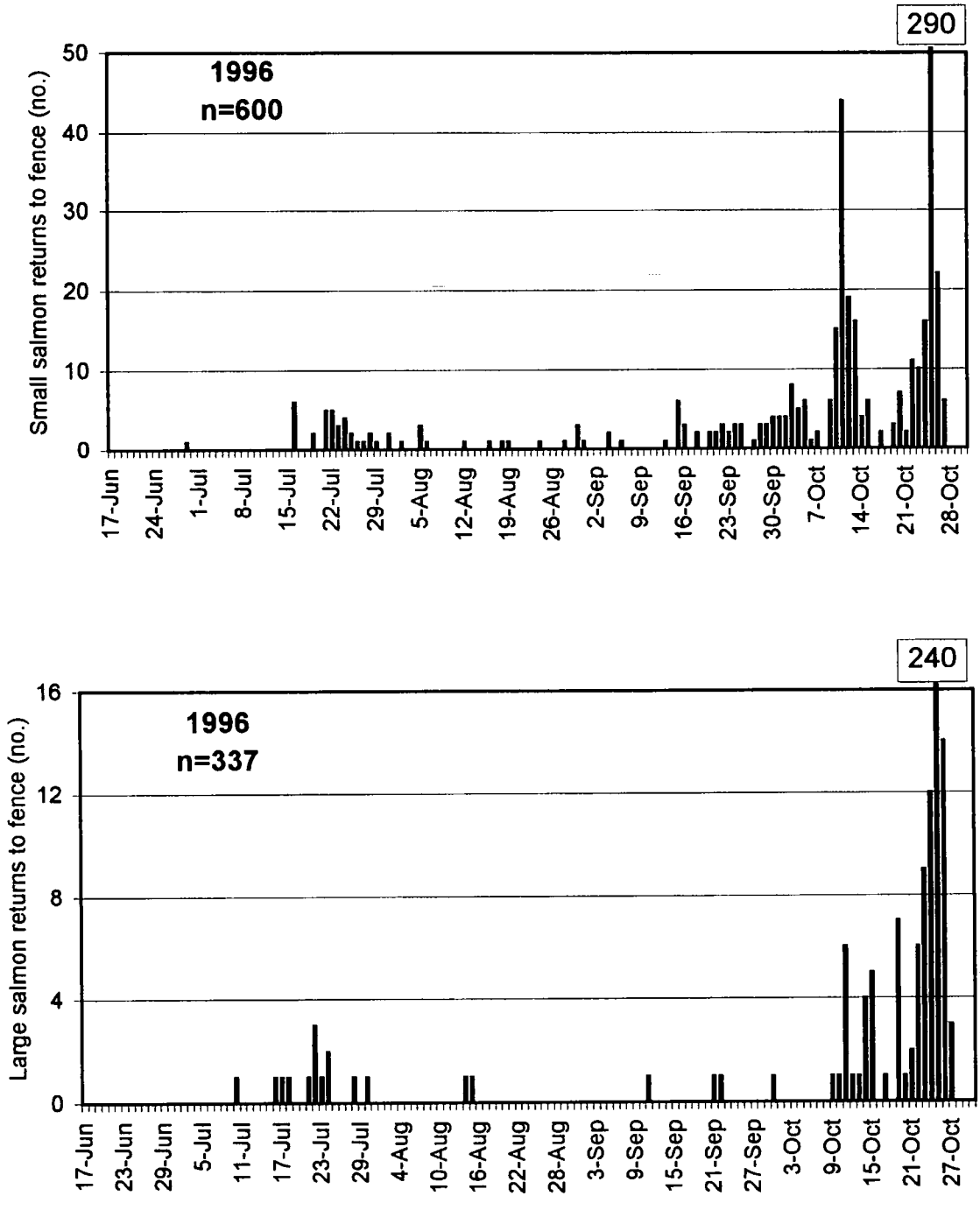


Fig.9. Daily returns of small and large Atl antic salmon to the Jacquet River counting fence. Counts for Oct. 25, 1996 include fish seined from pool below the fence

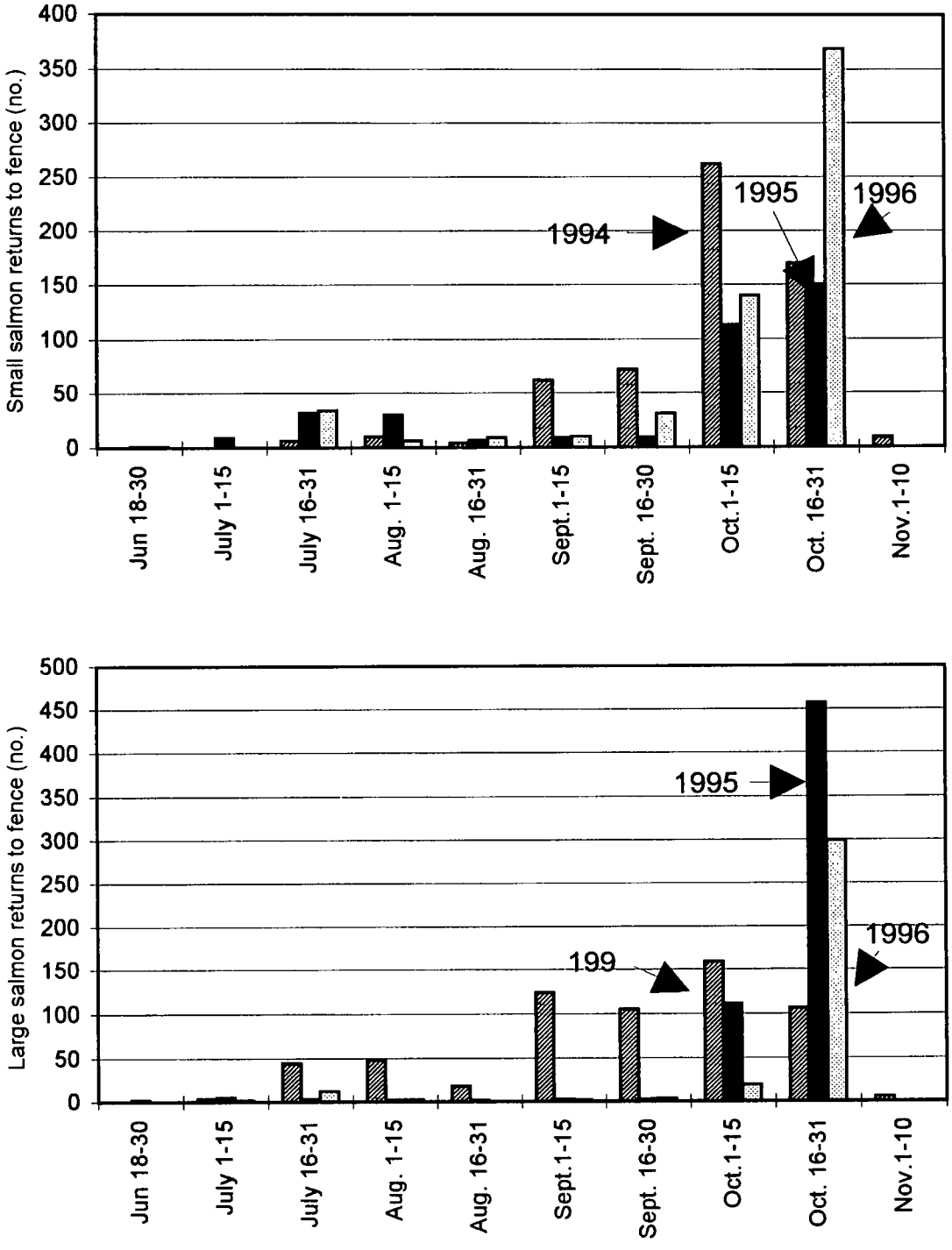


Fig. 10. Semi monthly returns of small Atlantic salmon to the Jacquet River counting fence (1994-96). Counts for Oct. 25, 1996 include fish seined from pool below the fence.