Progress Report Of Atlantic Salmon Enhancement Projects In Western Newfoundland, 1984-1992: Hughes Brook, North Brook, and Bound Brook.

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by

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ABSTRACT

Salmonid enhancement activities in western Newfoundland prior to 1993 have centred around a number of **'Public Involvement Projects'**; projects sponsored and conducted by local Regional Development Associations. Funding for these projects was obtained primarily through government sources, such as the Canada Employment Commission, the Department of Fisheries and Oceans (NIFDA - Newfoundland Inshore Fisheries Development Agreement), and the Provincial Department of Development. They have been basically low capital projects, employment-intensive, with most skills being acquired through on-the-job training. Biological and technical direction has been provided by the Department of Fisheries & Oceans, Gulf Region.

The focus of public involvement activities has been on **smaller streams** which had been severely abused, (from poor forestry practices, over-harvesting of salmonid stocks, etc.), or neglected in the past. Such streams are typically well below their salmonid production and spawning potentials. Enhancement strategies have included: **habitat evaluation/improvement** (clean-up and bank stabilization operations, stream surveys); **stock assessment** (operation of fish counting fences, biological sampling, electrofishing operations); **stocking activities** (adult broodstock collecting/holding/spawning, egg incubation, distribution of swim-up fry to parental streams); and, **public awareness/community involvements** (site visits, community and school involvements, 'open-houses', distributions of literature).

Rivers targeted in western Newfoundland included: **Hughes Brook** (stock remedial project, incubation facility, salmonid enhancement centre for W. Nfld.; Bay of Islands area -- North Shore Bay of Islands Development Association), **North Brook** (stock remedial/colonization project; Deer Lake area -- Humber Valley Development Association), and **Bound Brook** (stock remedial project; Bellburns area -- Central Development Association). This report documents the methodologies and data collection from the operations conducted at each of these three sites. In addition, some suggested technical recommendations regarding future activities at the respective sites are provided, as well as, a view of the future strategies or directions planned by each of the project proponents.

RÉSUMÉ

Avant 1993, les activités de mise en valeur des salmonidés dans l'ouest de Terre-Neuve ont surtout porté sur un certain nombre de «**programmes de participation du public**», soit des activités proposées et conduites par des associations locales de développement régional. Le financement de telles activités a surtout émané de sources gouvernementales, comme les Centres d'emploi du Canada, le ministère des Pêches et des Océans (dans le cadre de l'Entente sur le développement de la pêche côtière à Terre-Neuve - EDPCT), et le ministère provincial du Développement. Il s'est essentiellement agi de projets à faibles budgets et à forts coefficient de main-d'oeuvre, où la plupart des compétences ont été acquises par de la formation en cours d'emploi. Les directives biologiques et techniques ont surtout été fournies par Pêches et Océans Canada, région du Golfe.

Les principales activités auxquelles le public a participé ont touché de **petits cours d'eau** qui avaient été gravement endommagés (par de mauvaises pratiques forestières, la surpêche des stocks de salmonidés, etc.) ou négligés. Il s'agissait de cours d'eau qui étaient bien en dessous de leurs potentiels de production et de frai. Au nombre des stratégies de mise en valeur appliquées, mentionnons : l'**évaluation et l'amélioration de l'habitat** (campagnes de nettoyage et de stabilisation des berges, relevés des cours d'eau); l'**évaluation des stocks** (exploitation de barrières de dénombrement, échantillonnage biologique, électropêche); les **activités d'empoissonnement** (collecte/retenue/frai de reproducteurs, incubation des oeufs, distribution des alevins dans les cours d'eau originels); et **sensibilisation du public/participation de la collectivité** (visites, participation des localités et des écoles, opérations portes ouvertes, diffusion de documentation).

Les cours d'eau touchés par ces activités dans l'ouest de Terre-Neuve étaient : le **ruisseau Hughes** (projet de rétablissement des stocks, installation d'incubation, centre de mise en valeur des salmonidés pour l'ouest de Terre-Neuve; région de la baie des Îles -- Association de développement North Shore Bay of Islands); le **ruisseau North** (projet de rétablissement des stocks/colonisation; région de Deer Lake -- Association de développement Humber Valley); et le **ruisseau Bound** (projet de rétablissement des stocks; région de Bellburns -- Association de développement Central). Le présent rapport décrit les méthodes employées et les données recueillies dans le cadre des activités tenues à chacun de ces trois endroits. En outre, il formule certaines recommandations techniques associées aux activités futures dans ces sites, ainsi qu'un résumé des stratégies ou des perspectives de chacun des promoteurs d'activités pour l'avenir.

PREFACE

In the early 1980's, and with the introduction of the 1984 Atlantic salmon management plan, much government and public attention was focused on conservation of declining Atlantic salmon stocks in the Atlantic provinces. In western Newfoundland, in particular, recreational catches in many of the more than 50 scheduled salmon rivers had declined to the point where individual river recreational quotas were introduced, several rivers were closed entirely in cooperation with local community-based conservation organizations. Over the next ten years, this community-based interest grew to the point where some enhancement of salmon stocks on closed rivers took place with the goal of eventually managing a renewed recreational fishery with a sustainable population base.

From 1984-1992, this community-based interest in cooperative management and conservation of local salmon resources in western Newfoundland materialized in the formation of the 'Western Newfoundland Salmon Enhancement Steering Committee' and in the implementation of assessment and stocking programs on Hughes Brook, North Brook (a tributary of the Humber River), and Bound Brook, as well as generating community interest in streams in a number of other areas. It was recognized by the committee members early on, that in order to achieve the goal of conservation and sustainable development of the salmon resource, an essential objective would be training of a local workforce and public education.

This report is the final achievement of these initial attempts at community-based watershed management. The primary focus of the report is on describing the methodology and results for the individual river assessments and stocking activities, but these could only have been achieved through substantial commitment from the community groups involved. Funding had to be re-acquired each year from often reluctant agencies with mandates other than the enhancement of Atlantic salmon stocks. This document should at the very least represent a tangible return on their investment. In many ways, among the individuals and groups involved, this work forms the foundation for a new cooperative approach and direction in the conservation and management of salmonid resources in western Newfoundland.

1. INTRODUCTION

In the early-1980's (prior to 1983), non-government agencies and community-based groups interested in developing 'salmonid enhancement projects' were encouraged by the Department of Fisheries and Oceans (DFO), Newfoundland Region, to prepare project proposals for inclusion in a 'Salmon Enhancement Discussion Document' being prepared by the CORE Working Group on Newfoundland Salmon Enhancement. The completed document, **'Salmon Resource Development in Newfoundland and Labrador'** (Pratt, 1984) with input from DFO, Gulf Region, was submitted to Ottawa in 1984 to obtain funding for a 'Salmonid Enhancement Program' for the province.

Most of the project proposals included in the 'Discussion Document' were: 1) major, technical, and ambitious in nature; 2) highly dependent on large amounts of operating funds, capital, and labour; and 3) called for a substantial amount of DFO biological, technical, and engineering support. In other words, successful completion of these projects would require substantial federal and provincial government funding of a **'Salmonid Enhancement Program'**, which was not been forthcoming at the time.

The focus of salmonid enhancement activities by public involvement groups from 1984 to 1992 has been to scale-down these first efforts, and develop projects with methods best-suited to smaller streams. These projects have offered a unique opportunity to provide within the communities of this area of the province **information and education relating to the salmonid resource and stream environment**, a medium for the **training of personnel in salmonid enhancement methodologies**, and a major contribution to **restoring local fish populations and stream habitat**.

Projects have relied on similar sources of financial and technical support. In fact, one of the keys to the success of the community-based enhancement endeavours has been the ability and willingness of proponents to cooperatively undertake activities which would otherwise have been unavailable on an individual basis. The best example of this was the formation of a **'Salmonid Enhancement Steering Committee'** to jointly undertake development of funding proposals. By combining training requirements into a joint proposal, individual project costs were decreased. In addition, this provided the means whereby funding agencies could deal effectively with a number of organizations. Proponents have been able to deliver comprehensive training programs for employees and, at the same time, conduct extensive salmon enhancement work on their respective streams.

Canada Employment Centres (CEC) have provided the key financial support for development of these enhancement projects. However, support for specific equipment and initiatives was also forthcoming from other agencies including the Department of Development (Rural Development Cooperation Agreement II and III) and the Canada-Newfoundland Inshore Fisheries Development Agreement (NIFDA). Science Branch personnel, (DFO Gulf Region), provided the chief source of biological and technical support.

The present report details methodology and results of three salmon enhancement projects conducted in western Newfoundland from 1984 to 1992 and provides technical recommendations. The three streams targeted (and sponsors) include **Hughes Brook** (North Shore Bay of Islands Development Association), **North Brook** (Humber Valley Development Association), and **Bound Brook** (Central Development Association).

The objective of this publication is to provide a progress report on these projects. The presentation, like the projects themselves, represents a collaborative effort in all aspects of its development, including the actual writing of the report, between the non-government (three Regional Development Associations) and government (Federal Department of Fisheries and Oceans - Gulf Region) agencies involved. Much of the document's preparation (including data compilations and analyses) was initiated by the various project personnel, primarily through the staff training programs conducted over the past couple of years. Project data work-ups not only provided an important component of the actual training, but as well, resulted in providing many of the tables and figures, and some of the associated text, for this presentation. Methods described in detail in the section relating to Hughes Brook also apply to North Brook and Bound Brook.

The report is in many ways one of the final products of these staff training programs. As such, it reflects the continued effort that the Development Associations have put into their projects, their interpretations of what they have done and why, and what has been achieved. The report will provide a medium for the Associations to present to funding agencies to document what has been accomplished with resources received over the past several years. In addition, the report will present to these agencies and others, such as the Department of Fisheries & Oceans, recommendations for future activities relating to these type projects in western Newfoundland.

This emphasis on more non-government involvement through all phases of a project (from initial proposal presentation, through operation, management and control of the project, to the analysis and presentation of the results), has been rather unique. In many ways, this approach has broken with tradition, and represents a new cooperative vision and direction for the future.

2. SMALL STREAM SALMONID ENHANCEMENT - A GENERALIZED PERSPECTIVE

2.1 FOCUS OF ENHANCEMENT STRATEGIES

- small streams;
- public/community involvement; and
- public education/awareness.

Many of the smaller streams in Atlantic Canada have been severely abused and neglected in the past, and remain today well below their potential in terms of their habitat utilization and salmonid production. Although highly vulnerable to environmental degradation and poaching, (especially near centres of population), small streams can be highly productive and contribute substantially to total area productions. Through public/community participation, enhancement activities offer a unique opportunity to develop a greater awareness of the salmonid resource and man's influence on the stream environment. The projects are often highly visible to the communities where they are conducted, thus, they tend to inform and educate the local communities. Although benefits can sometimes be difficult to quantify, minor achievements can be very additive, and as a whole, ensure continuance of salmonid runs in smaller watersheds.

2.2 PRIMARY ENHANCEMENT INITIATIVES AND OBJECTIVES

2.2.1 Habitat Evaluation and Improvement

Objective: To document the stream's production and enhancement potentials, improve fish passage, and reduce delays to migration.

Techniques: **Stream Surveys** were conducted to quantify fluvial and lacustrine rearing and spawning areas available to anadromous salmonids, document the location of barriers to migration and sources of pollution; **Remedial Work** improved fish passage at natural and man-made obstructions by reducing gradients of falls or rapids, removal of dams, weirs, or other barriers, construction of fishways, bank stabilization operations and clean-up activities.

2.2.2 Stock Assessment

Objective: To evaluate current status of stocks before, during, and after any enhancement initiatives.

Techniques: **Operation of Fish Counting Fences** to enumerate and biologically sample (acquire lengths, weights, sex, and scale samples for aging) downstream (juvenile) and upstream (adults) migrants; **Electrofishing Operations** were conducted to evaluate densities and distributions of juveniles within the stream and document other stream parameters.

2.2.3 Stocking Activities

Objective: To enhance stocks in the stream.

Techniques: **Adult Salmon Broodstock** were collected, held, and stripped to acquire eggs for subsequent incubation; **Incubation of Eggs** to eyed stage (in troughs) with further incubation of eyed eggs in streamside incubation boxes (deep substrate), and/or incubation of green eggs in streamside incubation boxes, to acquire swim-up (unfed) fry for enhancement of parental streams; **Distribution of Fry** from incubation boxes to appropriate rearing areas of parental streams.

2.2.4 Public Awareness and Community Involvement

Objective: To inform, educate, and develop a greater awareness of the salmonid resource, and man's influence on the stream environment.

Techniques: **Direct and Indirect Involvements** including project tours and site visits, 'open houses', displays, distributions of literature to schools, community halls and the like, establishment of public interpretation centres, 'hands-on' projects for schools, and publications. The location of each site was clearly marked with distinctive and informative signs, such that project sites were readily accessible to both residents and visitors. A video was jointly produced in 1990 by the members of the Western Salmon Enhancement Steering Committee, detailing activities at Hughes Brook, as well as, other projects in western Newfoundland. In 1991, a joint pamphlet (black and white only) of the North Brook, Hughes Brook, and Bound Brook projects was produced and distributed. In 1992, this idea was taken a step further and a poster and/or pamphlet was produced for each individual site.

2.2.5 Management Activities

Objective: To begin the process of developing individual river management strategies.

Techniques: **Closure** of target streams to angling, (enacted via DFO). This was done to assist with stock restoration. At North Brook, signs indicating the point of closure were placed upstream of the river's mouth at Deer Lake, allowing anglers to fish for salmon holding downstream of the counting fence. In latter years, this problem was corrected and the signs appropriately placed at the limits of the stream mouth. **River Patrols** by project employees to help deter illegal fishing activities were undertaken on a regular basis. Incidents of illegal activity were reported to DFO. In one case in particular in 1986, a project employee at the North Brook site was instrumental in apprehending a person illegally fishing and obtaining evidence for prosecution.

3. HUGHES BROOK SALMON ENHANCEMENT PROJECT

Hughes Brook flows into the north side of Humber Arm, across from the city of Corner Brook, on the west coast of Newfoundland at approximately 48°59'N, 57°57'W. An outline map of Hughes Brook (River Code 4402450) is included (Figure 1).

3.1 BACKGROUND

Hughes Brook was used extensively to drive pulp logs for many years due to its close proximity to the paper mill in Corner Brook. Log driving and the associated dams and debris, combined with high angling exploitation of salmon stocks and poaching, led to a serious decline in the stock and degradation of rearing and spawning habitat.

In 1983, the North Shore Bay of Islands Development Association (NSBIDA) received funding from CEIC to initiate stream enhancement activities on Hughes Brook. The funds were used to conduct selected stream clearance operations (removal of debris, log jams, etc.), to initiate site preparation for a field camp, and to locate a potential site for the future operation of a fish counting fence.

A fish counting fence for enumeration and sampling of adult and juvenile salmonids was set in 1984 and operated each year until 1992 to monitor and evaluate anadromous fish stocks on the system and estimate production and enhancement potentials. (To simplify presentations and clarify result comparisons from year to year, activity dates in this report have been converted to standardized weeks as per Table 1.)

In early 1986, the NSBIDA received funds to build an egg incubation facility on one of the tributaries of Hughes Brook. Adult salmon broodstock were collected in the fall of 1986. Eggs were incubated in streamside incubation boxes and the first fry were released back into the Hughes Brook system in 1987. In 1988, North Brook and Bound Brook also used the Hughes Brook Hatchery to incubate eggs (with each project operating a separate streamside incubation box within the facility).

Stream surveys were initiated in 1988 and have provided a documentation of the stream habitat (spawning and rearing areas) from the mouth of the brook to an impassable natural falls located near the origin of the brook.

In 1989, the incubation facility was redesigned to accommodate three large double hatchery troughs, so that initial incubation of the eggs to the eyed stage could be completed in trays placed in the troughs. Final incubation of the eyed eggs was carried out in streamside incubation boxes at each of the respective project sites. In 1991, a further expansion of the Hughes Brook incubation facility was initiated and completed in 1992, doubling the size of the building and providing sufficient space for increased egg incubation, as well as, indoor holding tanks for broodstock. The Hughes Brook facility continues to serve as a 'Regional Incubation Centre' for enhancement activities in western Newfoundland.

Other enhancement activities conducted at Hughes Brook focused on public awareness and increased river patrols. These activities were directed towards the reduction of resource abuse and poaching, identified as one of the key causes of the original stock decline on Hughes Brook.

Like the other publicly operated salmon enhancement projects, the Hughes Brook Salmon Enhancement Project directed a great deal of effort towards the development of a skilled workforce trained in salmon enhancement techniques. In cooperation with the Humber Valley Development Association (North Brook) and Central Development Association (Bound Brook), the North Shore Bay of Islands Development Association participated in the development and delivery of both classroom and field training to enhancement technicians at the Hughes Brook Salmon Enhancement Project. Currently, two technicians at the site have completed Level IV training and three technicians have completed Level III training.

3.2 HABITAT EVALUATION

3.2.1 Stream Survey

Methods and materials for stream surveys followed the general guidelines of Amiro (1978), Pickard and Peppar (1975), Pickard, Blair, and Peppar (1983), Schofield and Peppar (1983), and Snow (1986), (Figure 2).

Stream surveys were conducted on the Hughes Brook system in 1988, 1990, and 1991. A total of 19.18 km of stream habitat were surveyed (Table 2). This represents the bulk of the accessible stream habitat and includes the portion of the mainstem from the mouth, in the Humber Arm, to the natural falls located approximately 1.5 km downstream of Balls Pond. In addition, stream surveys on several key tributaries were completed; a 1.6 km section of the Incubation Building Brook, an 800 m section of 26 Brook, and a 365 m section of 17 Brook were surveyed (Figure 1). This comprises a total stream habitat area of 192,697 square meters (Table 2). It is assumed that the area surveyed, (Table 2; Figure 1), represents 80% of the total accessible stream habitat. The total stream habitat area accessible to migrating adult salmon on Hughes Brook is estimated at 240,871 square meters or 2,408.71 rearing units. Rearing units were calculated as per O'Connell et al. (1991), after Elson (1957, 1975):

Rearing Unit (RU) = Area / 100 m^2 (where Area refers to fluvial area in m^2)

A review of the standing water area within the Hughes Brook system has focused on those ponds and lakes which feed into Hughes Brook below the falls near Balls Pond (Figure 1). As such, this review includes the ponds located on the three tributaries which merge and enter Hughes Brook just below the falls, and the ponds on 26 Brook, 17 Brook, and the Incubation Building Brook. Ponds upstream of the falls, such as Hughes Lake and Balls Pond, were excluded from the survey since they are inaccessible to migrating salmonids. The total combined surface area of the accessible ponds is estimated to be 152 hectares. Calculation of the surface area of standing waters was completed using dot grids, obtained from, and commonly used by, the Provincial Department of Forestry for the estimation of surface areas from topographic maps (scale 1:50,000).

3.3.2 Minimum Egg Deposition Requirement for Conservation

It has been well documented that juvenile Atlantic salmon make extensive use of lacustrine habitat for rearing in addition to utilizing fluvial habitat (Pepper 1976; O'Connell and Reddin 1983; Chadwick and Green 1985; Pepper et al. 1985; O'Connell 1986; Ryan 1986; O'Connell and Ash 1989; O'Connell et al. 1990; O'Connell and Dempson 1990). Egg deposition requirements were calculated as per O'Connell and Dempson (1991):

ED (fluvial) = RU x 3 smolt/RU ÷ 1.25% smolt/egg = 240 eggs/RU x RU
ED (lacustrine) = ha x 7 smolt/ha ÷ 1.9% smolt/egg = 368 eggs/ha x ha
ED = ED (fluvial) + ED (lacustrine)

where ED is egg deposition, RU is rearing unit, and ha refers to standing water surface area in hectares.

Using the egg deposition requirement as per O'Connell and Dempson (1991) of 240 eggs per rearing unit of stream habitat and 368 eggs per hectare of standing water, the minimum egg deposition requirement for conservation for Hughes Brook can be calculated as follows:

ED (fluvial) = 240 eggs/RU x 2,408.71 RU = 578,090 eggs
ED (lacustrine) = 368 eggs/ha x 152 ha = 55,936 eggs
ED = 634,026 eggs

Target spawning requirements were calculated for small salmon only (< 63 cm in length). As per O'Connell and Dempson (1991), egg deposition from large salmon (≥ 63 cm in length) was considered as a conservation buffer to estimates of spawning requirements. In addition, large fish generally play a less significant role in the total egg deposition of these particular stocks since large salmon constitute less than 10% of the total run to the streams documented. The calculation used was as follows:

SR = ED ÷ (FEC x % female)

where SR represents the minimum spawning requirement of small salmon, ED is egg deposition requirement, FEC is fecundity, and % female refers to that portion of the small salmon run which is female. Fecundity was estimated as per Porter (1986), using an estimated mean small salmon weight of 1.5 kg and an assumed fecundity of 1,760 eggs/kg (converted from Elson 1975) to yield an estimate of 2640 eggs per female. Percent female was derived from data collected at the individual stream sites during broodstock collection.

The minimum spawning escapement (males and females combined) required to meet conservation targets for Hughes Brook, calculated using the above noted fecundity value and an estimate of the sex ratio of the population derived from broodstock holding experience, (Table 3), was estimated at 316 small salmon:

SR = 634,026 eggs ÷ (2640 eggs/female x 76% female)
SR = 316 small salmon

3.2.3 Production Potential

Adult Atlantic salmon production potential for each stream has been estimated as per O'Connell et al. (1991). The calculations used were as follows:

SP (fluvial) = RU x 3 smolts/RU
SP (lacustrine) = ha x 7 smolts/ha (except for Northern Peninsula streams, such as Bound Brook, where a value of 2 smolts/ha was used)
PP = [SP(fluvial) + SP(lacustrine)] x SSS

where PP is production potential, SP is smolt production in terms of fluvial habitat and lacustrine habitat, and SSS is smolt to adult survival, estimated at 10%. This value was used to present a compromise between previously recorded high survivorship values expressed by Reddin (1981) and low values expressed by Dempson (1992).

The estimated adult salmon production potential (PP) for the Hughes Brook system is 829 adult salmon, calculated as follows:

SP (fluvial) = 2,408.71 RU x 3 smolts/RU = 7,226 smolts
SP (lacustrine) = 152 ha x 7 smolts/ha = 1,064 smolts
PP = (7,226 + 1,064) x 10% = 829 adult salmon

3.3 STOCK ASSESSMENT

3.3.1 Fish Counting Fence

The counting fence constructed and operated at Hughes Brook in 1984-1992 followed the design of Anderson and McDonald (1978). From 1984 to 1986, downstream and upstream migrating fish were enumerated using a two way counting fence, with one trap to enumerate upstream migrants and one to enumerate downstream migrants. However, in 1987, the trap for upstream migrants was relocated approximately 100 m further upstream. The downstream counting trap was left in its original location. This new arrangement improved the efficiency of capture of upstream migrating adult salmonids. The counting fence was set and operated in this manner each year since 1987 (Tables 4-18; Figures 3-4).

Returns of adult salmon to the counting fence did not reach the estimated spawning requirement in the nine years of operation from 1984-1992 (Table 6; Figure 3). However, total adult returns enumerated have greatly improved in the past three years.

Late starting dates because of spring freshets have prevented complete counts of smolt migrations in certain years (Tables 8, 12). In addition, fence washouts (Tables 11-12) have occurred at the Hughes Brook site on several occasions during periods of extremely high water (Table 13).

Mean adult salmon run-timing, (the time at which 50% of the run has occurred), for small and large salmon combined, has occurred around week 32 in most years at Hughes Brook (Figure 4).

3.3.2 Juvenile Densities

A limited number of juvenile density surveys were conducted using the removal method, (closed sites using barrier nets), of electrofishing (Elson 1967; Peppar and Schofield 1978; Peppar and Pickard 1979). Juvenile density surveys were undertaken to establish baseline information for fry stocking and monitor the success of completed stocking programs. The sites selected were thought to be representative of the available juvenile salmonid habitat. Four sweeps were usually required to complete the removal of fish from each enclosed area. The numbers of salmon fry (fork length < 6 cm), salmon parr (fork length > 6 cm), and brook trout were converted to densities per unit area.

Electrofishing operations were completed on Hughes Brook from 1984 to 1987. The number of sites surveyed have ranged from one (1984) to five (1985). Densities of salmon fry and parr, and Brook trout are presented (Table 19). The sites studied are well defined in the data records and can continue to be used in on-going electrofishing surveys. No electrofishing activities were completed for the period from 1988 to 1991.

3.3.3 Biological Sampling

Scale samples, fork length (cm) and whole weight (gm) were collected (as described by Hubbs and Lagler 1958) from adult salmon and smolts throughout their migrations. Approximately 10 scales for age determination were collected from the left side of the fish, behind the adipose fin and above the lateral line. Collection frequency was usually 1 in 10, but often varied between projects because of the small numbers of fish involved.

Results of biological sampling activities completed at the Hughes Brook Enhancement Project were unavailable at the time of publication.

3.4 ENHANCEMENT ACTIVITIES

3.4.1 Stream Remedial Measures

Most of this work was completed in the first years of operation of the respective projects. The work focused primarily on the removal of minor obstructions to fish passage and general stream clean-up. Major obstructions and sources of pollution were identified. The methods and general strategies for the stream remedial work undertaken were similar to those detailed by DFO, B.C., KWL and DBL (1980).

Hughes Brook was historically used by Bowaters Ltd. to run pulpwood from logging areas in the upper watershed area to the mill in Corner Brook. The initial year of the Hughes Brook project (1983), was devoted entirely to stream remedial activities which focused primarily on repairing instream damage caused by these logging methods. Efforts were concentrated on the removal of instream barriers to fish migration including inactive beaver dams, old logging dams, and associated logging debris. This work represented the first step taken to help restore a healthy salmon population on Hughes Brook.

Stream remedial work since 1983 has been on a more limited scale. These activities have concentrated on maintenance of the natural stream system, through removal of any new obstacles which arise from time to time. In effect, the majority of the physical barriers to fish production and migration were removed in 1983, and this aspect of the stream environment no longer poses a significant problem on Hughes Brook.

3.4.2 Stocking Activities

Stocking activities were initiated at Hughes Brook in 1986, when the first adult salmon broodstock were collected from the counting fence. Potential broodstock were collected throughout the upstream migration and held in wood-frame boxes anchored to the stream bottom until ready to spawn. The fish were checked frequently for ripeness as spawning time approached. The mature females were considered ready to spawn when eggs flowed easily with gentle stroking of the abdomen. Broodstock were stripped and the eggs were fertilized and water-hardened as described in Snow (1986).

Initially, fertilized eggs were placed in deep substrate incubation boxes (Gray and Cameron, 1987) for the entire incubation period, and after hatching the unfed fry were distributed into the stream. In 1989, the deep substrate incubation boxes at the Hughes Brook facility were replaced with hatchery troughs. The fertilized eggs were incubated to the eyed stage in the troughs and were then transferred to streamside incubation boxes for final incubation and hatching. By 1992, the Hughes Brook facility contained sufficient troughs to provide an incubation capacity in excess of 500,000 eggs.

Since 1986, there has been an on-going program of broodstock collection, egg stripping, incubation, and release of swim-up (unfed) fry back to the stream system (Table 3). Total survival from egg to fry stages achieved at the Hughes Brook incubation program has ranged from a low of 76% (1987) to a high of 92.1% (1991). This is significant when compared to the wild egg to fry survival rate estimated by Sturge (1968) at 20%.

The first adult returns (grilse) from the stocking program were expected in 1991, assuming a 3 year old smolt and one sea winter based on data from the Humber River (Mullins and Chaput, 1993). Although only 12,179 fry were stocked in 1987, adult returns to Hughes Brook in 1991 were the highest recorded since initiation of the program (Table 6; Figure 3).

In 1987, the North Brook project initiated the same system of stripping and fertilizing eggs on-site. Water-hardened eggs were transported to the Hughes Brook incubation facility for incubation. Separate incubation boxes were used for eggs from different stream systems. In the spring, the fry were returned to North Brook to be released. In 1988, Bound Brook followed suit, using the same type of system and a separate incubation box at the

Hughes Brook facility. However, the installation of incubation troughs at the Hughes Brook hatchery in 1989 allowed for distribution of the eyed eggs to the individual project sites (i.e., parental streams), eliminating the need for the transfer of fry from Hughes Brook. Instead, eyed eggs could be moved to the North Brook and Bound Brook project sites and placed in incubation boxes for the final incubation period. By the time the eggs reached the eyed stage, it was usually April, and incubation boxes could be readily set-up at the individual sites. In addition, the eyed eggs could be transferred easily in one trip, whereas the previous method of moving fry to the individual sites involved several trips to accommodate different hatching times and increased the risk of losses. Until 1992, eggs from all three sites were incubated to the eyed stage in troughs at the Hughes Brook facility and later moved to the individual stream side incubators for the final incubation period.

3.5 DISCUSSION / RECOMMENDATIONS

The NSBIDA has accumulated a substantial database of information as a result of the enhancement endeavours of the past nine years, in addition to the training programs completed. A spawning requirement of 316 small salmon and a production potential of 829 adult salmon have been estimated, providing a realistic view of the longterm goal of the project. Moreover, the information accumulated during the holding and stripping of broodfish (% female within the population) has permitted this spawning requirement to be properly refined to reflect the specific characteristics of the Hughes Brook stock.

The operation of the fish counting fence at Hughes Brook provided good counts of both upstream and downstream migrants in most years (Tables 4-12). However, high water levels and washouts have caused periods of down-time for short periods in each year. In addition, late project starting dates have prevented complete smolt counts in several years.

Nevertheless, there has been an increasing trend in adult salmon returns in each of the last several years (Figure 3). Using smolt counts from years in which the counts appear to have been complete (1986,1987, and 1988 from Table 8), and assuming a salmon stock composed chiefly of grilse (Figure 3), a survival rate of approximately 5.0% from smolt to adult is demonstrated for this period.

The first fry distribution took place in 1987 (Table 3), and consisted of 12,179 fry. With an estimated freshwater age of 3 years, followed by one winter at sea, the adult return of grilse from the 1987 year class would have been expected to return in 1991. The higher number of adult returns in both 1991 and 1992 might then be thought to reflect the fry stocking programs of 1987-1988.

Referring again to Table 3, the increasingly large number of eggs incubated at the Hughes Brook site in each of the past four years would indicate a source of optimism for future years. Given the lag time between fry release and adult return and natural variability in survival rates from year to year, this can be expected to take an additional three to five years. In any case, the definite trend of improvement, significant incubation program, and recent closure of the commercial fishery all indicate that this stream may become one of the first local river systems to be effectively restored to enable the development of a properly managed recreational fishery.

On the basis of the work conducted thus far, a number of gaps in the database and/or operating methods have been identified:

(a) In order to effectively enumerate the smolt run on Hughes Brook, the downstream counting fence should be operated from week 18 to week 25 of each year.

(b) In order to effectively enumerate adult salmon returns to Hughes Brook, the upstream counting fence should be operated from week 26 to week 41.

(c) Scale sampling should be completed annually on a statistically significant portion of the smolt run (sampled randomly throughout the run). In addition, weight, length, and age (scale samples) should be recorded for all adult salmon broodfish utilized in future enhancement programs. This would provide an ongoing information base regarding three important characteristics of the Hughes Brook salmon stock: (1) average freshwater age of the yearly smolt run, (2) average freshwater age of returning adults, and (3) provide insight into the percentage of multi-sea winter and repeat spawners amongst the large salmon which utilize the Hughes Brook system.

(d) Electrofishing operations should be completed at the Hughes Brook site each year to provide indications on juvenile stock status and survival rates between the various freshwater age classes. Such indicators provide an early insight into how management practices may be best developed to help build and maintain healthy stocks on the stream from year to year. Electrofishing operations should be concentrated on typical early rearing areas within the stream system such that juvenile densities in each of the various stream habitat types are documented annually and provide the basis for comparison from year to year. Using the information already available from sites previously surveyed, plus study of additional sites in future years, will provide this necessary information.

(e) In the past, counting of eggs from broodstock has been completed using the volumetric method. In a graduated cylinder filled to the 500 ml mark with water, sufficient eggs were added to fill to the 600 ml mark, (100 ml of eggs were added). These eggs were then counted. This process was repeated three times for each stripping period and the average utilized to estimate the number of eggs per 100 ml. The remainder of the eggs to be incubated would simply be measured to ascertain the volume displaced. Unfortunately, three counts were taken regardless of the number of females stripped in a given day. In the future, it is suggested that for every 500 ml of eggs, one 100 ml container of eggs be counted. This will provide a more consistent and accurate method of establishing an average number of eggs per 100 ml and total egg count. This information will aid in the development of an accurate estimate of the fecundity of the stock, as well as, provide the basis for an improved data collection process regarding incubation success.

(f) The recent addition of two broodstock holding tanks to the Hughes Brook incubation facility is a substantial improvement from the instream holding boxes used in previous years. This feature should be fully utilized to hold broodstock from time of capture to spawning. The holding tanks provide better facilities for the broodstock, and thereby increase fish health and condition at spawning, as well as, provide better security from natural predators. (In the past, employees had to live-trap mink to remove them from the vicinity of the instream holding units.)

(g) The North Shore Bay of Islands Development Association, in conjunction with DFO, should make full use of Hughes Brook Project personnel and facilities to complete additional research work involving new enhancement strategies and alternatives. The project site and hatchery provides an economical and unique opportunity in the region through which research into alternative strategies such as kelt re-conditioning and the practicality of releasing later life stages (fall fingerling, parr, or smolt) can be completed. The watershed's close proximity to Federal Fisheries' Area Office in Western Newfoundland (Corner Brook), further enables this facility and experienced personnel at the site to be effectively utilized by DFO. In addition, the NSBIDA should continue to strive to provide an effective and efficient hatchery service to other enhancement projects within the region. The current incubation capacity should be expanded as required to meet this demand, and, other services of a contractual nature supplied as required to any new projects in the region.

3.6 FUTURE DIRECTION

Upon review of the results of the nine years work at Hughes Brook from 1984-1992, the North Shore Bay of Islands Development Association was keen to continue to participate in the continued development of the Hughes Brook system and contribute to ongoing salmonid enhancement activities in the region, in conjunction with and under the direction of DFO. Future directives envisioned by the Association in 1992 included:

(1) Continue the Hughes Brook Salmon Enhancement Project for an additional three to five years, including the incubation program, until estimated spawning requirements were met in several consecutive years. During this time period, identification of effective management strategies which would permit the development of an ongoing recreational fishery, once the stock has been rebuilt, was planned. In all likelihood, Hughes Brook may be the first river system in the region to be successfully restored and provide the first opportunity for development and analysis of specific river management strategies.

(2) Continue and expand the operation of the Hughes Brook incubation facility to meet the ongoing incubation requirements of the local enhancement community. The facility has proven its competence and capacity in this regard and is ideally suited to continue in this role.

(3) Expand the scope of the Hughes Brook project and incubation facility to provide a professional centre for the completion of research programs relating to new enhancement techniques and strategies. Such a facility was envisioned to be able to serve the research requirements of private business (eg. egg incubation for Valley Char Ltd.), local and regional salmonid conservation groups, and DFO.

4. NORTH BROOK SALMON ENHANCEMENT PROJECT

North Brook is a tributary of the Humber River system. It flows into Deer Lake at approximately 49°8'N, 57°32'W, near the town of Nicholsville, NF. An outline map of North Brook, (River Code 44024321), is included (Figure 5).

4.1 BACKGROUND

The Humber Valley Development Association initially developed and submitted a proposal to DFO to undertake work related to re-establishment of fish passage into Grand Lake, as a means of enhancing the salmon population of the Humber River system (Pratt, 1984). Grand Lake, and the river which flowed from it into the Humber River (Junction Brook), was dammed in the early-1920's to permit water to be re-routed to produce hydro electricity for the paper mill in Corner Brook. Although a lack of funding prevented work on the Grand Lake proposal, tremendous local interest in conservation of declining salmon stocks encouraged the Humber Valley Development Association (HVDA) to focus initial efforts on North Brook. This tributary of the Humber River was known to possess a large number of obstructions to fish passage. Local DFO field staff noted that the presence of obstructions and extensive poaching had contributed to the decline of salmon angling success on this small stream.

Activities on North Brook were initiated in 1985, when the Association received funding to conduct some preliminary surveys to document the obstructions to fish passage. A major obstruction, a natural falls, (known as Main Falls), about 10 km from the mouth of the brook (Figure 5), became the focus of the Association's interest for future colonization prospects. Subsequent stream surveys further documented natural and man-made obstructions to fish passage throughout the system. Using standard stream remedial methods, many obstructions were altered or removed. However, initial cost estimates of providing fish passage over Main Falls were prohibitive and it still remains a complete barrier to upstream migration.

A fish counting fence for enumeration of adult salmonids, biological sampling, and the collection of adult broodstock was set in 1986 and operated each year until 1992. Adult salmon broodstock collection, spawning and egg incubation (at the Hughes Brook incubation facility), was initiated in 1987, with the first swim-up fry (unfed) being released back to the parental stream in 1988. This work continued until 1992. Other enhancement activities included increased river patrols and public education programs geared to generating a greater awareness of the salmonid resource and stream environment, and its proper use and conservation.

4.2 HABITAT EVALUATION

4.2.1 Stream Survey

Stream surveys were conducted in 1987-1989 and 1991, to document spawning and rearing areas and to establish an estimate of the stream's production and enhancement potentials, below (accessible) and above (inaccessible) Main Falls (Figure 2).

A total of 21.195 km of stream habitat was surveyed below Main Falls. This represents the majority of the accessible stream habitat within the North Brook system (Tables 20-22). The total stream habitat area surveyed below Main Falls includes the portion of North Brook from the mouth at Deer Lake to the falls (Table 20) and the section of Coal Brook (Figure 5) stretching 9 km from where it enters North Brook (Table 21). The total surveyed stream habitat area below the falls is 166,793 square meters. The area surveyed represents approximately 80% of the total accessible stream habitat. Therefore, the total accessible stream habitat was estimated at 208,491 square metres or 2,084.91 rearing units.

The total standing water accessible below the main falls include Bingles Pond, Mistaken Pond, and Bridger's Pond (not shown on Figure 5, but west of Bingles Pond). Other standing waters include two ponds on the Coal Brook stream system (also not shown on Figure 5). Topographic maps used to determine the surface area of standing waters were Provisional Maps 12H/3 and 12H/4 of the National Topographic Mapping System. The total combined surface area of these ponds and lakes was estimated at 98.4 hectares.

The total stream habitat area surveyed above the main falls (Table 22) was 48,954 square metres. The area surveyed represents approximately 90% of the inaccessible stream habitat above the falls. The total stream habitat area above the falls was estimated at 54,393 square metres or 543.93 rearing units. The total standing water above the falls (Figure 5) was estimated at 405.6 hectares.

4.2.2 Minimum Egg Deposition Requirement for Conservation

Egg deposition requirements for North Brook were calculated as per O'Connell and Dempson (1991) using 240 eggs per rearing unit of stream habitat and 368 eggs per hectare of standing water, as follows:

Accessible (below Main Falls):

ED (fluvial) = 240 eggs/RU x 2,084.91 RU = 500,378 eggs
ED (lacustrine) = 368 eggs/ha x 98.4 ha = 36,211 eggs
ED = 536,589 eggs

Inaccessible (above Main Falls):

ED (fluvial) = 240 eggs/RU x 543.93 RU = 130,543 eggs
ED (lacustrine) = 368 eggs/ha x 405.6 ha = 149,261 eggs
ED = 279,804 eggs

Adult spawners required to meet this minimum egg deposition required for conservation was calculated using the fecundity value of 2640 eggs per female noted previously and an estimate of the sex ratio of the stock derived from broodstock collections (Table 23):

- For the area below Main Falls; SR = 536,589 eggs ÷ (2640 eggs/female x 68.7% female)
  SR = 296 small salmon

- For the area above Main Falls: SR = 279,804 eggs ÷ (2640 eggs/female x 68.7% female)
  SR = 155 small salmon

The estimated minimum spawning escapement required to meet conservation targets for North Brook as it presently exists is 296 small adult salmon. The development of a means for fish passage above Main Falls would open new habitat for salmon migration, and would require an additional estimated spawning escapement of 155 small salmon.

4.2.3 Production Potential

Production potential for the accessible and inaccessible portions of North Brook has been estimated as per O'Connell et al. (1991):

- Accessible (below Main Falls):

SP (fluvial) = 2,084.91 RU x 3 smolts/RU = 6,255 smolt
SP (lacustrine) = 98.4 ha x 7 smolt/ha = 689 smolt
PP = (6,255 + 689) x 10% = 695 adult salmon

- Inaccessible (above Main Falls):

SP (fluvial) = 543.93 RU x 3 smolts/RU = 1,632 smolt
SP (lacustrine) = 405.6 ha x 7 smolt/ha = 2,840 smolt
PP = (1,632 + 2,840) x 10% = 448 adult salmon

The total estimated production potential of the North Brook system is 695 adult salmon. Opening and colonization of the area above Main Falls would provide a further estimated production of 448 adult salmon.

4.3 STOCK ASSESSMENT

4.3.1 Fish Counting Fence

The North Brook counting fence was located approximately 100 m upstream from the point where North Brook empties into Deer Lake. In the spring, the trap was oriented to capture and count downstream migrants. After the salmon smolt run was enumerated, the fence was oriented to capture upstream migrants. This methodology was employed each year from 1986-1992 (Tables 24-34; Figures 6-8).

Adult returns enumerated at the counting fence (Tables 24-26), have not reached the estimated spawning requirement. Furthermore, while no clear trend of increase in adult returns is evident, a significant increase in 1992 provides some optimism for future years (Figure 6).

Due to late project starting dates and unacceptable ice conditions, parts of, and in some cases all of, the smolt run at North Brook has been missed in several years (Table 27). In addition, fence washouts caused by excessively high water levels have often prevented complete counts of upstream migrants (Table 28). In 1988, it appears that a fairly complete count of the smolt run was achieved, with a total of 574 smolt enumerated (Tables 27-28). In the subsequent year, 1989, adult salmon returns totalled 48, (Table 26), indicating a smolt to adult survival rate of approximately 8.4%.

Mean adult salmon run-timing for small and large salmon combined, has occurred between week 31 and week 36 at North Brook (Figure 7).

4.3.2 Juvenile Densities

Juvenile density surveys were not conducted regularly at North Brook. For the most part, electrofishing operations have only been completed as part of the employee training program. In 1988, electrofishing operations were completed at seven sites (Table 35), but these sites were not sampled in subsequent years. In most cases, the exact location of the electrofishing sites completed in 1988 were not recorded precisely, and the ability to locate the exact sites for comparison work is now limited. The only other electrofishing completed at the site included an operation conducted in 1991 to collect samples of juvenile salmonids for subsequent disease analysis at DFO's Halifax Laboratory. Thus, there is no consistent database of information available from which juvenile densities of salmonids on North Brook can be compared from year to year.

4.3.3 Biological Sampling

Scale samples obtained from the North Brook salmon stock consist of a limited number of adult scale samples from 1986 (Table 36) and a limited number of smolt scale samples from 1988 (Table 37). Study of the smolt scales indicates the average smolt age on North Brook in 1988 was 3 years.

4.4 ENHANCEMENT ACTIVITIES

4.4.1 Stream Remedial Measures

Stream remedial measures completed at North Brook have concentrated on the removal of obstructions to fish passage. The bulk of this effort in early years was directed to the removal of old beaver dams from both North Brook and Coal Brook, where they presented problems. Other stream remedial work started at this time consisted of various efforts to establish a means for fish passage above Main Falls.

In 1986, one of two rock-filled dams located above Main Falls was partially removed. In 1987, the remainder of this dam was removed and a second rock-filled dam partially removed. In addition, a blasting project was undertaken in 1987 to attempt to provide fish passage above Main Falls. Access to the pool at the base of the falls was widened and deepened, and a new pool was started above the base pool. In 1988, the remainder of the second rock-filled dam above Main Falls was removed. These efforts, however, did not fulfil the task of providing fish passage above Main Falls.

In 1989, Shawmount Engineering was contracted to complete a feasibility study of constructing a fishway at Main Falls. Upon completion of this study, the Humber Valley Development Association decided to review its objectives and approach to enhancement on North Brook. Since it was clear that fulfilment of the spawning requirement for the area below Main Falls had not yet been accomplished, the HVDA decided to put all plans for a fishway at Main Falls on-hold until such time as this primary objective had been accomplished. Since 1989, stream remedial activities at the site have focused on the yearly removal of any debris and old beaver dams which posed a salmonid migration obstacle below Main Falls.

4.4.2 Stocking Activities

Initial broodstock collection at North Brook was completed in 1987. From 1987-1992, an ongoing program of broodstock collection and incubation of eggs (at the Hughes Brook hatchery) was accomplished with subsequent release of swim-up (unfed) fry to the stream system (Table 23).

The total survival rate from the egg to fry stage achieved with this incubation procedure has ranged from a low of 70.1% in 1988 to a high of 91.5% in 1991. Total fry stocked in North Brook has ranged from a low of about 7,800 in 1988, to an annual high of about 69,000 in 1991 and 1992. Although only a small number of fry were stocked in 1988, the projected date of grilse returns from this stocking program, (assuming a 3 year old smolt and one winter at sea as per Mullins and Chaput, (1993)), coincide with the increase in adult returns evidenced in 1992.

Stocking of swim-up fry was completed both above and below Main Falls in several years. In this manner, the HVDA felt that salmon fry and parr would have access to the rearing areas in both these regions, thereby reducing competition, and hopefully effecting increased survival.

4.5 DISCUSSION / RECOMMENDATIONS

From the current review of the North Brook Enhancement Project, it is clear that in addition to the training which has taken place, a considerable database of information was accumulated and a number of worthwhile enhancement measures undertaken. The fact that the vast majority of the North Brook system has been extensively surveyed and stock characteristics documented aids development of proper management and enhancement decisions.

Review of counting fence operation indicate that complete counts of upstream and downstream migrants were difficult to attain. Complete counts of upstream migrants were achieved in 1992 only (Table 28). Thus, total fish counts in other years do not necessarily reflect total upstream migrations of the indicated fish species.

While speculation as to the actual number of adults missed would be poor at best, a review of recorded enumerations (Tables 24-28; Figure 7) does provide some overview of the significance of the counting fence downtime in each year. For example, during 1986 the counting fence was down for four days during weeks 32 and 33, at a time when substantial numbers of salmon were moving upstream. As such, one would expect that some fish were definitely missed in the count during this period. However, during 1989 the fence was down for one day in each of weeks 26 and 39, yet few salmon were moving prior to or after these particular periods and probably few fish were missed, if any, in the total count for that year. Also notable is the fact that upstream counts of adult salmon acquired at North Brook in 1992, when no downtime was experienced at the counting trap, were substantially higher than most previous years.

Operation of a downstream counting trap (Table 28) was only marginally effective in monitoring the smolt migrations in one year (1988). Late project starting dates and difficult ice conditions at the fence site in the spring prevented the accumulation of a complete database from which estimation of smolt survival and production could be ascertained. This information could have played a beneficial role in the development of an effective management plan for North Brook.

The first fry distribution took place in 1988 (Table 23), and consisted of only 7,815 fry. As noted, with an estimated freshwater age of 3 years (Tables 36-37), followed by one winter at sea, the adult return of grilse from the 1988 year class would have been expected to return in 1992. The increase in fish counts in 1992 might then be thought to reflect the fry stocking in 1988. However, as is evident from Tables 24-25 and Table 28, during the period of the greatest migration of fish in 1987 the North Brook counting fence washed out, and thus, the number of natural spawning fish for 1987 may have been larger than that enumerated (Table 26).

Evidence of the positive affect of the stocking program cannot be clearly identified in terms of adult returns at the present time. Furthermore, positive impacts of the fry stocking program cannot be demonstrated in higher smolt counts, either, since these counts have also been incomplete. Nevertheless, while the number of fry released in 1988 (7,815 fry), was quite small, the larger numbers of fry released in 1989, 1991, and 1992 provide hope that increasingly large numbers of adult returns will be evidenced in the future.

In summary, the adult salmon count on North Brook does provide reason for optimism, especially with respect to the substantial increase observed in 1992. The overall high survival rates achieved through the incubation program is also a clear indication of the benefit of this work. With the combination of increasingly large numbers of fry released in 1991 and 1992, and increased fish counts in 1992, the projected time frame for achievement of the minimal spawning requirement for North Brook was in the three to five year range. Natural variations in environmental conditions from year to year, particularly at sea, and the closure of the commercial fishery may impact substantially on this projected time frame.

From the foregoing data summary, several recommendations can be made to help rectify omissions in the database and/or operational procedures at North Brook:

(a) One area lacking in the database of information gathered at the North Brook site relates to enumeration of the stream's smolt production. In the future, every effort should be made to find a more effective site for the establishment and operation of a smolt counting fence. Information derived from such an operation would help ascertain the annual productivity of the stream and survival rate from smolt to grilse. This information would help identify any potential problems affecting the stock and provide key insights in the development of a specific management plan for this watershed area.

(b) Scale sampling should be completed on a statistically significant sample of the annual smolt run (sampled randomly throughout the run). In addition, weight, length, and age (scale samples) should be recorded for all adult salmon broodfish utilized in future enhancement programs. This would provide an ongoing information base regarding three important characteristics of the salmon stock: (1) average freshwater age of the yearly smolt run, (2) average freshwater age of returning adults, and (3) provide insight into the percentage of multi-sea winter and repeat spawners amongst the large salmon which utilize the system.

(c) Electrofishing operations should be completed at North Brook each year to provide indications on juvenile stock status and survival rates between the various freshwater age classes. Such indicators provide an early insight into how management practices may be best developed to help build and maintain healthy stocks on the stream from year to year. Electrofishing operations should be concentrated on typical early rearing areas within the stream system such that juvenile densities in each of the various stream habitat types are documented annually and provide the basis for comparison from year to year. Electrofishing sites chosen should be clearly identified and marked such that they can be easily recognized and surveyed annually.

(d) In the past, counting of eggs from broodstock has been completed using the volumetric method. In a graduated cylinder filled to the 500 ml mark with water, sufficient eggs were added to fill to the 600 ml mark, (100 ml of eggs were added). These eggs were then counted. This process was repeated three times for each stripping period and the average utilized to estimate the number of eggs per 100 ml. The remainder of the eggs to be incubated would simply be measured to ascertain the volume displaced. Unfortunately, three counts were taken regardless of the number of females stripped in a given day. In the future, it is suggested that for every 500 ml of eggs, one 100 ml container of eggs be counted. This will provide a more consistent and accurate method of establishing an average number of eggs per 100 ml and total egg count. This information will aid in the development of an accurate estimate of the fecundity of the stock, as well as, provide the basis for an improved data collection process regarding incubation loading and success.

(e) Aside from the suggested operation of a smolt counting trap at North Brook, adult salmon run-timing (Figure 7) indicates that the period of operation of the adult counting trap should extend from week 24 to week 40 of each year to effectively enumerate the upstream fish migration. In previous years, the upstream counting trap was not always operated during this entire period.

(f) Continuation of the egg incubation program at North Brook should focus on development of a more secure means of holding broodstock. From 1987 to 1992, holding of broodstock was accomplished using instream holding boxes. Installation of land-based holding tanks would provide improved conditions for broodfish, as well as, provide greater security of the stock. In 1989, all of the male broodfish were lost when debris from a beaver dam washed downstream and damaged the instream holding box.

4.6 FUTURE DIRECTION

Upon review of the results attained at North Brook, the Humber Valley Development Association and its Salmon Enhancement Sub-Committee established a broad-based plan for future salmon enhancement activities in their region in 1992. The key directives of this new strategy included:

(1) Continue the North Brook stock assessment and incubation operations for an additional three to five years, to fully ascertain if estimated goals could effectively reached.

(2) During the summer of 1992, the Humber Valley Development Association undertook an extensive electrofishing program on the Upper Humber River under contract from the DFO. The HVDA planned to utilize the experience gained from work completed during 1992 to continue to undertake electrofishing surveys on a continuing basis for the next three to five years as required, to provide key information to aid management of the Humber River system.

(3) The Association expressed interest in pursuing an additional contract to operate a counting fence scheduled to be put in place in the Birchy Basin region. With the completion of an extensive employee training program, the Association had acquired the experience and trained personnel to effectively undertake contracts of this nature within their region.

(4) The Association and its Salmon Enhancement Sub-Committee felt that with the experience gained from the work completed at the North Brook site, they were now prepared to undertake the project which had been originally proposed - the re-opening of Grand Lake to fish passage. In 1992, no other group in the region had a comparable level of experience and training to undertake such a project. The HVDA hoped to capitalize on these assets to undertake initial assessment and evaluation of the region and the proposed project, with advisory and technical support from DFO. Initial efforts would be directed towards habitat assessment and investigation of historical stock status information to establish the practicality and potential net benefit of proposed enhancement efforts.

(5) The Association felt that renewal of previous interest to open fish passage at Main Falls on North Brook would only be considered if a cost effective and practical means were identified. This opportunity would continue to be reviewed as stocks rebuild on North Brook. However, the expenditure of monies to open fish passage at Main Falls would first be evaluated in terms of whether the money and effort might be better served in developing the Grand Lake system. In summary, the Association and Enhancement Committee felt that their direction must be dictated in terms of cost effectiveness and overall net benefit to the region.

5. BOUND BROOK SALMON ENHANCEMENT PROJECT

Bound Brook is located on the Great Northern Peninsula and flows into the Gulf of St. Lawrence at approximately 50°20'N, 57°32'W, through the community of Bellburns, NF. An outline map of Bound Brook (River Code 47046600) is included (Figure 8).

5.1 BACKGROUND

The Central Development Association (CDA) initially submitted a proposal to DFO to undertake a major enhancement initiative to restore salmonid populations and habitat on the Portland Creek River system (Pratt, 1984). Since no program of funding or technical support required for such a project was available at the time, DFO suggested the CDA focus initial assessment and enhancement efforts on Bound Brook, to provide a forum for employee training programs and determine if the Bound Brook Atlantic salmon stock would be a suitable source of broodstock for large scale stocking programs originally proposed for Portland Creek River.

A fish counting fence, employing a unique trap design developed by Mullins et al. (1991) to simultaneously count downstream and upstream migrants, was constructed in 1986 and operated annually from 1986-1992.

Stream surveys initiated in 1988, have documented spawning and rearing areas and provided the means to establish the stream's production and enhancement potentials. This exercise also provided the means to identify habitat problems such as obstructions to fish migration, where specific habitat restoration efforts were required.

Atlantic salmon broodstock were first collected from the Bound Brook counting fence in 1988. Eggs were incubated at the Hughes Brook incubation facility and the first fry (unfed) released back to the parental stream in 1989. Subsequently, similar stocking strategies were completed annually to 1992. Other enhancement / conservation measures at Bound Brook included increased river patrols and public awareness and education programs designed to decrease misuse of the resource and increase local involvement in the restoration and conservation process.

5.2 HABITAT EVALUATION

5.2.1 Stream Survey

Stream surveys were conducted on the Bound Brook system in 1987, 1988, and 1989 (Figure 2). A total of 8.539 km of stream habitat was surveyed. This represents the majority of accessible stream habitat within the Bound Brook system (Table 38).

Stream surveys on Bound Brook have extended along the mainstream from the mouth to a point 1 km upstream of a forest access road built by Corner Brook Pulp and Paper Limited. Although this reference point is not illustrated in Figure 8, the forest access road crosses Bound Brook just downstream of Bellburns Pond, near the source of Bound Brook. The total stream habitat area surveyed equals 106,858 square meters (Table 38). The area surveyed represents about 90% of the total stream habitat within the Bound Brook system (Table 38; Figure 8). Thus, the total stream habitat area available to salmonids within the Bound Brook system is estimated at 118,731 square metres or 1,187.31 rearing units.

An analysis of the standing waters (lakes and ponds) within the Bound Brook system was completed using the dot grid method of estimating surface area. All of the ponds illustrated in Figure 8 were included in the survey and comprised a standing water surface area estimated at 197.6 hectares.

5.2.2 Minimum Egg Deposition Requirement for Conservation

As per O'Connell and Dempson (1991), the minimum egg deposition requirement for conservation at Bound Brook was calculated:

ED (fluvial) = 240 eggs/RU x 1,187.31 RU = 284,954 eggs
ED (lacustrine) = 368 eggs/ha x 197.6 ha = 72,717 eggs
ED = 357,671 eggs

Minimum adult spawners (small salmon) required to meet this egg deposition target was calculated using the estimated fecundity value of Porter (1986) and an estimate of the sex ratio of the Bound Brook salmon stock derived from broodstock collections (Table 39):

SR = 357,671 eggs ÷ (2640 eggs/female x 66% female)
SR = 205 small salmon

The estimated minimum spawning escapement required to meet conservation targets for Bound Brook is 205 small salmon.

5.2.3 Production Potential

The Atlantic salmon production potential of the Bound Brook system, estimated as per O'Connell et al. (1991), was estimated at 396 adult salmon, as follows:

SP (fluvial) = 1,187.31 RU x 3 smolts/RU = 3,562 smolt
SP (lacustrine) = 197.6 ha x 2 smolt/ha = 395 smolt
PP = (3,562 + 395) x 10% = 396 adult salmon

5.3 STOCK ASSESSMENT

5.3.1 Fish Counting Fence

The Central Development Association has operated a fish counting fence, employing a trap of unique design developed by Mullins et al. (1991), on Bound Brook from 1986-1992 (Tables 40-51; Figures 9-10). The trap incorporates both an upstream and downstream compartment in a single box, with both compartments operating simultaneously.

Adult salmon returns enumerated at the counting fence have not reached the stream's conservation spawning target (Tables 40-42). Furthermore, counts at Bound Brook have not yielded any clear trend of stock increase (Figure 9). Late project starting dates and freshets caused part of the smolt run to be missed in several years (Table 43). However, with the exception of 1989, adult enumeration at the Bound Brook counting fence was both consistent and comprehensive (Tables 40-42, 45).

Survivorship from smolt to adult at Bound Brook appears to be very low. In 1988, a year when the bulk of the smolt run appears to have been successfully enumerated, 1079 smolt were counted (Tables 43, 45). However, only 17 adults returned in the following year, although this is primarily a grilse stock (Table 42). This represents a 1.6% survival rate from smolt to adult. One problem evidenced near Bound Brook was the incidental bycatch of salmon in the local cod trap fishery (reported by project staff). Hence, the stock enhancement program undertaken at Bound Brook may have been seriously undermined by interception of returning adults in local cod trap fisheries. The degree to which this was a factor in the low returns recorded at Bound Brook is unknown.

Mean adult salmon run-timing, (for small and large salmon combined), occurred at approximately week 32 in each year (Figure 10). A cursory examination of water levels (Table 46) and run-timing (Figure 10; Tables 40-41) records reveals a close relationship between upstream migration runs and periods of increased water levels.

5.3.2 Juvenile Densities

Juvenile density surveys involving electrofishing operations were completed at Bound Brook as part of employee training programs only. The extent of the electrofishing database consists of records from two sites surveyed in 1987 (Table 52). These sites were not re-evaluated in subsequent years, making annual comparisons of juvenile salmonid densities impossible.

5.3.3 Biological Sampling

Results of scale sampling activities completed at Bound Brook were unavailable at the time of publication.

5.4 ENHANCEMENT ACTIVITIES

5.4.1 Stream Remedial Measures

Stream remedial activities completed by enhancement personnel at Bound Brook from 1986-1992 were of a minor nature. This is primarily due to the fact that Bound Brook, for the most part, has been largely unaffected by development activities. Enhancement personnel surveyed the system on a regular basis and removed old beaver dams and other natural barriers such as log jams and debris which posed an impediment to salmonid migration. These conditions, as a whole, did not represent a major problem on this particular stream. However, two problems did become evident in latter years which may require remedial action.

One problem relates to the low water levels found on the stream. After periods of high rainfall, the water level in the stream rises and falls very quickly. This very short runoff period means that Bound Brook is characterized by very low water levels, which impedes fish passage and lowers productivity. The condition is believed to have been augmented by the extensive logging activities completed in the Bound Brook watershed area. Reforestation of certain areas of the watershed may help alleviate this problem.

An additional problem noted by enhancement employees, relates to the point of entrance of the stream into the ocean. The beach area in the region is composed of coarse gravel. During periods of high winds, in particular, the stream entrance may become closed off as this gravel is shifted to form a bar at the stream mouth, which impedes the migration of fish into the system.

5.4.2 Stocking Activities

Broodstock collection was initiated on Bound Brook in 1988. From 1988-1992, an ongoing program of broodstock collection, egg incubation (at the Hughes Brook hatchery facility), and release of swim-up (unfed) fry back to the system was undertaken (Table 39). Survival from the egg to fry stage achieved with this incubation procedure ranged from a low of 43.4% in 1989, to a high of 86% in 1991.

Assuming a smolt age similar to salmon stocks of the Humber River, (Mullins and Chaput, 1993), grilse returns from the initial year of fry stocking were not expected until 1993.

5.5 DISCUSSION / RECOMMENDATIONS

Like the other publicly operated enhancement enterprises in western Newfoundland, the Bound Brook Salmon Enhancement Project accumulated a significant database of information, undertook extensive enhancement efforts, and developed local skills in enhancement techniques through annual training programs. An Atlantic salmon spawning requirement of 205 small salmon and a production potential of 396 adult salmon can be projected with confidence as a result of these endeavours.

The operation of a fish counting fence on Bound Brook from 1986-1992 provided accurate counts of both upstream and downstream migrants (Tables 40-44). This is verified by the fact that very few incidents of downtime occurred at the Bound Brook site (Table 45), and periods of operation of the counting fence enabled the successful enumeration of the bulk of the smolt and the adult runs annually.

Adult Atlantic salmon returns to Bound Brook remained low throughout the 1986-1992 period. Annual returns ranged from a high of 73 adults (1987) to a low of 11 adults (1986). Moreover, as of yet, there is no evident trend of improvement. However, this does not bear any negative reflection on the enhancement program completed at Bound Brook, since positive effects of the incubation program would only begin to be evidenced in terms of adult returns in 1993. Due to the small number of broodstock available and, hence, the small number of fry released, the effect of this initiative is expected to be minimal in early years. However, it should also be noted that with such a small population base, the incubation activities and conservation measures completed at Bound Brook may be one of the chief reasons for the continued survival of the stock.

Based on the foregoing program review, the following recommendations can be used to help improve data collection and operating procedures at the Bound Brook site:

(a) To better establish the magnitude of the salmon bycatch in the local cod trap fishery, a monitoring program should be developed in cooperation with local fishermen. As the local representative body for the region and champion of local enhancement efforts and public education programs relating to Bound Brook, this study might best be facilitated by the Central Development Association. A voluntary reporting program could be put in place and coordinated by the Association and employees of the Enhancement Project. This information would provide a basis upon which DFO, local fishermen, and the CDA could evaluate the extent of the problem and investigate potential solutions.

(b) With regard to the problem associated with the beach material at the mouth of Bound Brook, engineering and technical resources available through the DFO, the Department of Development, the Marine Institute, and other such agencies should be used to formulate an effective and practical (economical) means of alleviating this problem. The above agencies have specialized personnel who are available at minimal cost to provide assistance to Regional Development Associations.

(c) The short run-off period and low water levels associated with Bound Brook may be a problem which takes more time to alleviate. However, the initiation of a solution to at least a partial cause of the problem may be able to be quickly effected. The Central Development Association is directly involved in completing replanting programs in logging areas under the direction of Provincial authorities. Bringing the problem to the attention of the proper officials and effective lobbying to have the Bound Brook watershed area replanted in the near future would hasten the stabilization of the watershed area, hopefully increase runoff time, and help stabilize and increase water levels on Bound Brook. Most probably, this will simply be a matter of convincing officials to re-prioritize local replanting schedules such that the Bound Brook watershed area is replanted as soon as possible.

(d) If possible, the Bound Brook fish counting fence should be operated from week 19 to week 43, so that the entire salmon smolt and adult migrations are enumerated.

(e) Scale sampling should be completed on a statistically significant sample of the annual smolt run (sampled randomly throughout the run). In addition, weight, length, and age (scale samples) should be recorded for all adult salmon broodfish utilized in future enhancement programs. This would provide an ongoing information base regarding three important characteristics of the salmon stock: (1) average freshwater age of the yearly smolt run, (2) average freshwater age of returning adults, and (3) provide insight into the percentage of multi-sea winter and repeat spawners amongst the large salmon which utilize the system.

(f) Electrofishing operations should be completed at Bound Brook each year to provide indications on juvenile stock status and information regarding survival rates between the various freshwater age classes. Such indicators provide an early insight into how management practices may be best developed to help build and maintain healthy stocks on the stream from year to year. Electrofishing operations should be concentrated on typical early rearing areas within the stream system such that juvenile densities in each of the various stream habitat types are documented annually and provide the basis for comparison from year to year. Electrofishing sites chosen should be clearly identified and marked such that they can be easily recognized and surveyed annually.

(g) In the past, counting of eggs from broodstock has been completed using the volumetric method. In a graduated cylinder filled to the 500 ml mark with water, sufficient eggs were added to fill to the 600 ml mark, (100 ml of eggs were added). These eggs were then counted. This process was repeated three times for each stripping period and the average utilized to estimate the number of eggs per 100 ml. The remainder of the eggs to be incubated would simply be measured to ascertain the volume displaced. Unfortunately, three counts were taken regardless of the number of females stripped in a given day. In the future, it is suggested that for every 500 ml of eggs, one 100 ml container of eggs be counted. This will provide a more consistent and accurate method of establishing an average number of eggs per 100 ml and total egg count. This information will aid in the development of an accurate estimate of the fecundity of the stock, as well as, provide the basis for an improved data collection process regarding incubation loading and success.

(h) In a similar fashion to the other enhancement projects in western Newfoundland, it is suggested that consideration be given to installing land-based holding tanks for broodfish to increase security and improve holding conditions.

5.6 FUTURE DIRECTION

Having completed seven years work at Bound Brook, the Central Development Association re-evaluated its enhancement efforts in 1992 and established new directives for salmon conservation activities:

(1) Continue the Bound Brook Enhancement Project for an additional three to five years, to ascertain if problems at the site can be alleviated and fully evaluate whether enhancement goals can be reached. It was felt that results of previous incubation programs not become evident until 1993-1997.

(2) The CDA was also very keen to initiate work on Portland Creek, one of the largest salmon rivers in the province. This river had been the focus of recreational fishing development in previous years. However, since that time salmon stocks have declined and in response, CDA is eager to help in the process of developing longterm plans to conserve and manage the salmon stocks on Portland Creek. It was projected that initial efforts would focus on habitat and stock assessment including a review of angling catch and effort statistics. This information would help determine the potential of, and requirement for, enhancement work in terms of the net benefits available.

6. EPILOGUE

In October 1992, the Honourable John C. Crosbie, then Minister of Fisheries and Oceans, announced the implementation of the Canada-Newfoundland Cooperation Agreement for Salmonid Enhancement / Conservation (CASEC). With conservation stressed as the key goal, priorities include stock assessment, enhancement, habitat improvement, cooperative enforcement, and planning and industry development. Combined federal-provincial funding of $21 million earmarked for the five year life of the program has provided significant support to restore, enhance, and develop sustainable recreational fishing opportunities. A federal-provincial commercial salmon license retirement program announced in March 1992 signalled the recognition that potential economic benefits derived from recreational fishing activities outweighed benefits associated with the commercial salmon fishery. In addition, this license retirement program was an essential prerequisite for successful implementation of the CASEC program.

Ironically, the three salmon enhancement projects described in the present report have not been successful in obtaining funding from the CASEC program. In an effort to maximize cost effectiveness CASEC has undertaken larger scale projects which offer greater potential benefits in terms of fish production and recreational fishing opportunities. CASEC has not approved funding applications for smaller scale projects such as those on Hughes Brook, North Brook, and Bound Brook. Funding agencies previously accessed by these projects have now focused their efforts elsewhere since the CASEC program was expected to provide specific support for enhancement activities.

In spite of this disappointing turn of events, community-based groups have continued to play an integral role in salmonid conservation activities in western Newfoundland. The North Shore Bay of Islands Development Association presently provides incubation services for CASEC funded enhancement projects in western Newfoundland. The Humber Valley Development Association has utilized CASEC funding to: a) establish the feasibility of re-introducing salmon to Grand Lake; b) document habitat problems in the upper Humber River area; c) undertake creel surveys on the Humber River; and d) explore development of a new management strategy for the Humber River, (through involvement in the Humber River Watershed Development Corporation). The Central Development Association has utilized CASEC support to: a) establish the feasibility of effecting fish passage at Brian's Feeder, a tributary of Portland Creek; and b) prepare a watershed management plan for the Portland Creek watershed. These activities readily demonstrate how earlier activities by public involvement groups in western Newfoundland have played a primary role in defining and highlighting the potential of community-based watershed management initiatives currently being advocated by local development groups, conservation organizations and the provincial and federal governments.

7. ACKNOWLEDGEMENTS

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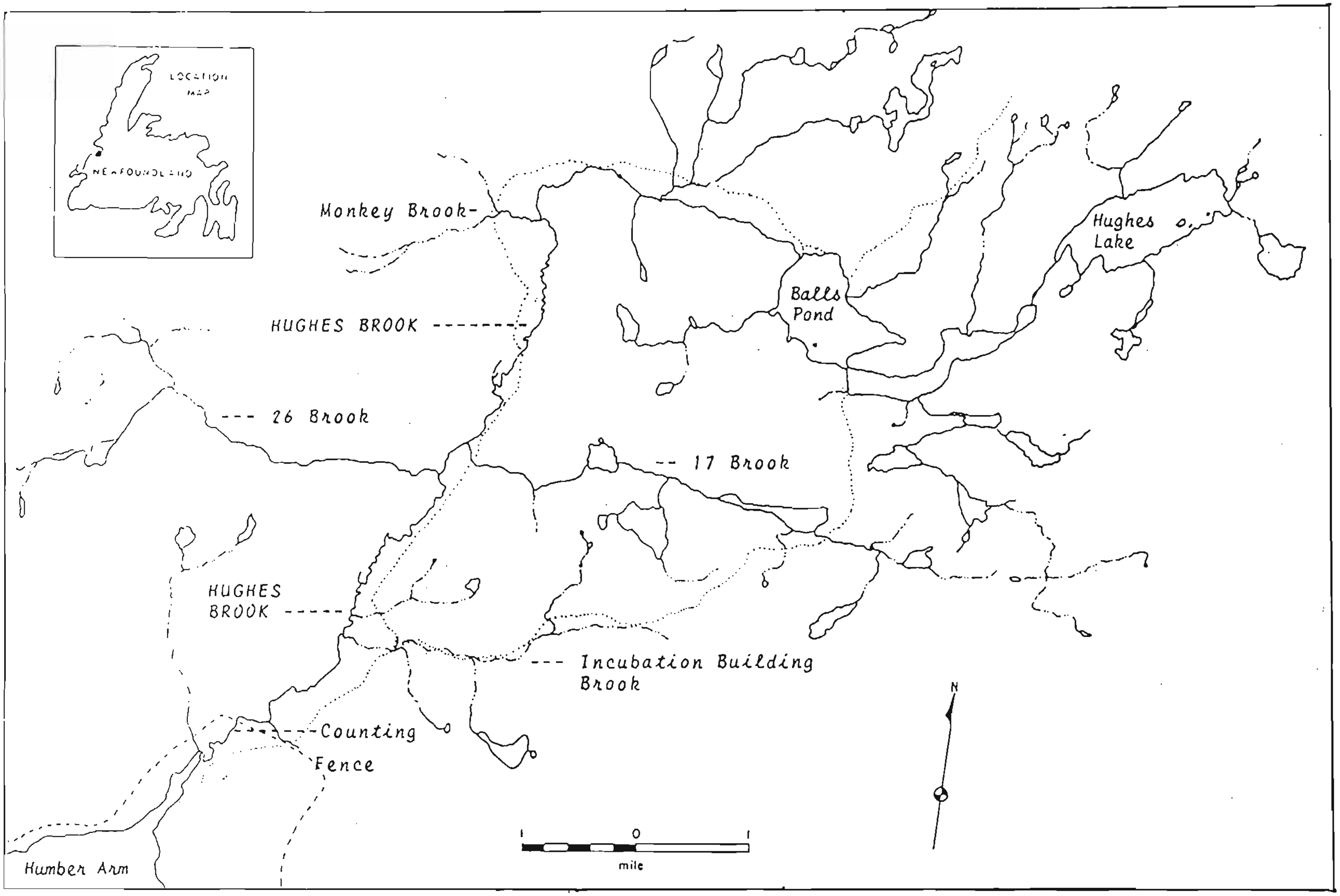


Figure 1. Outline map of Hughes Brook.

River: ____________________ Section: ____________________

Date of Survey: ____________

Length of Site (m): __________

Water Width (m): Upper ____________________
Middle ____________________ Mean: ______________
Lower ____________________

Bank Width (m): Upper ____________________
Middle ____________________ Mean: ______________
Lower ____________________

Water Depth (cm):	Upper	Middle	Lower	
	1.	1.	1.	
	2.	2.	2.	
	2.	2.	2.	
	+	+	+	Mean: ______________

River Discharge (w x d x r x k): ________________________

Water Temperature (°C): ________________

Water Flow Category (%):
- Pool ____________
- Run ____________
- Riffle ____________
- Rapids ____________
- Falls ____________

Bottom Composition (%):
1. Boulder (larger than head size): ____________
2. Cobble (from fist to head size): ____________
3. Gravel (from egg to fist size): ____________
4. Sand (from pea to egg size): ____________
5. Bedrock ____________
6. Other (mud, clay, etc.) ____________

Vegetation (% cover, in brook and on banks):
- Brook: ____________
- Banks: ____________

Note: Provide section (site) diagram and any notes/comments on reverse side of this form.

Figure 2. Stream survey data sheet.

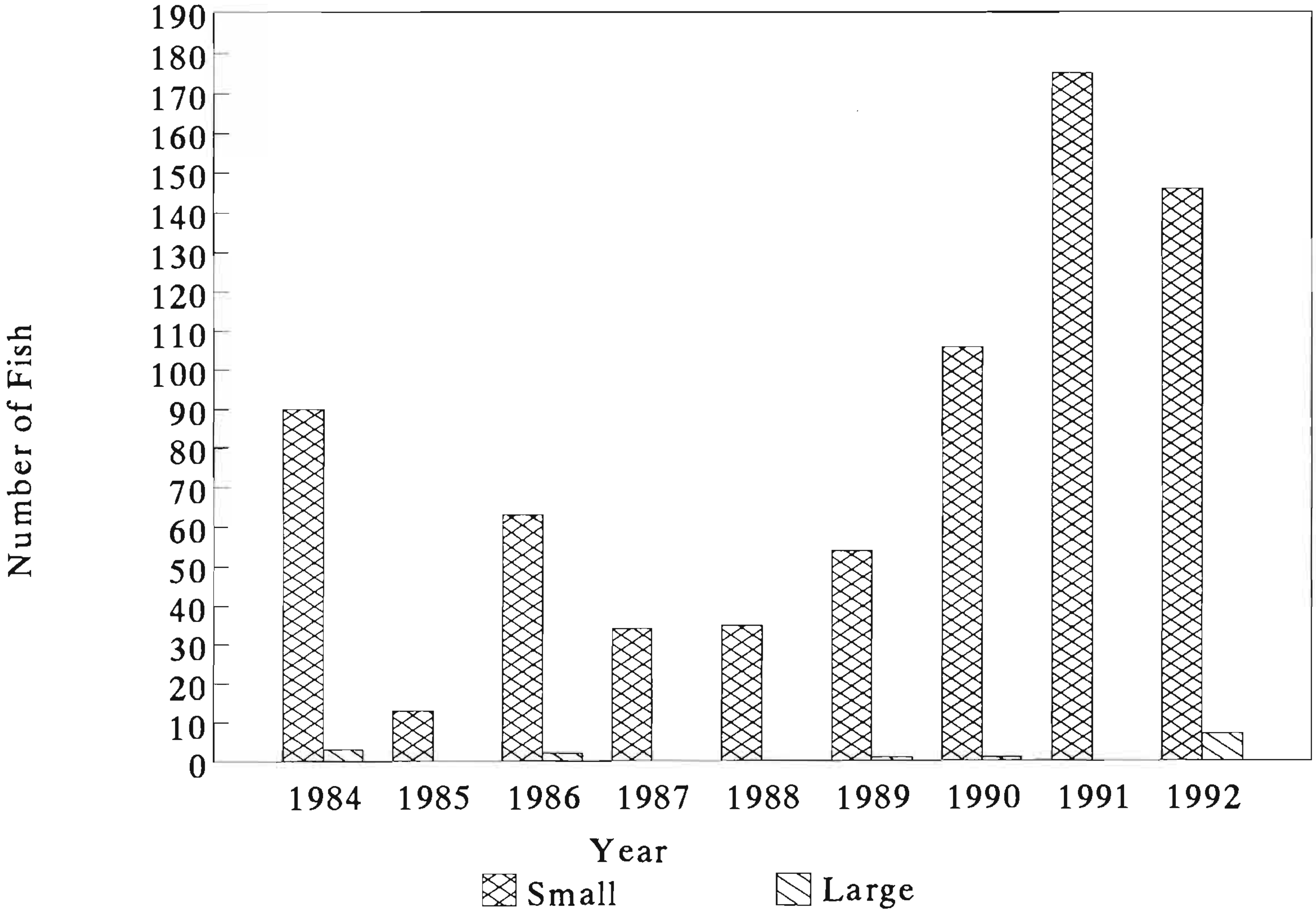
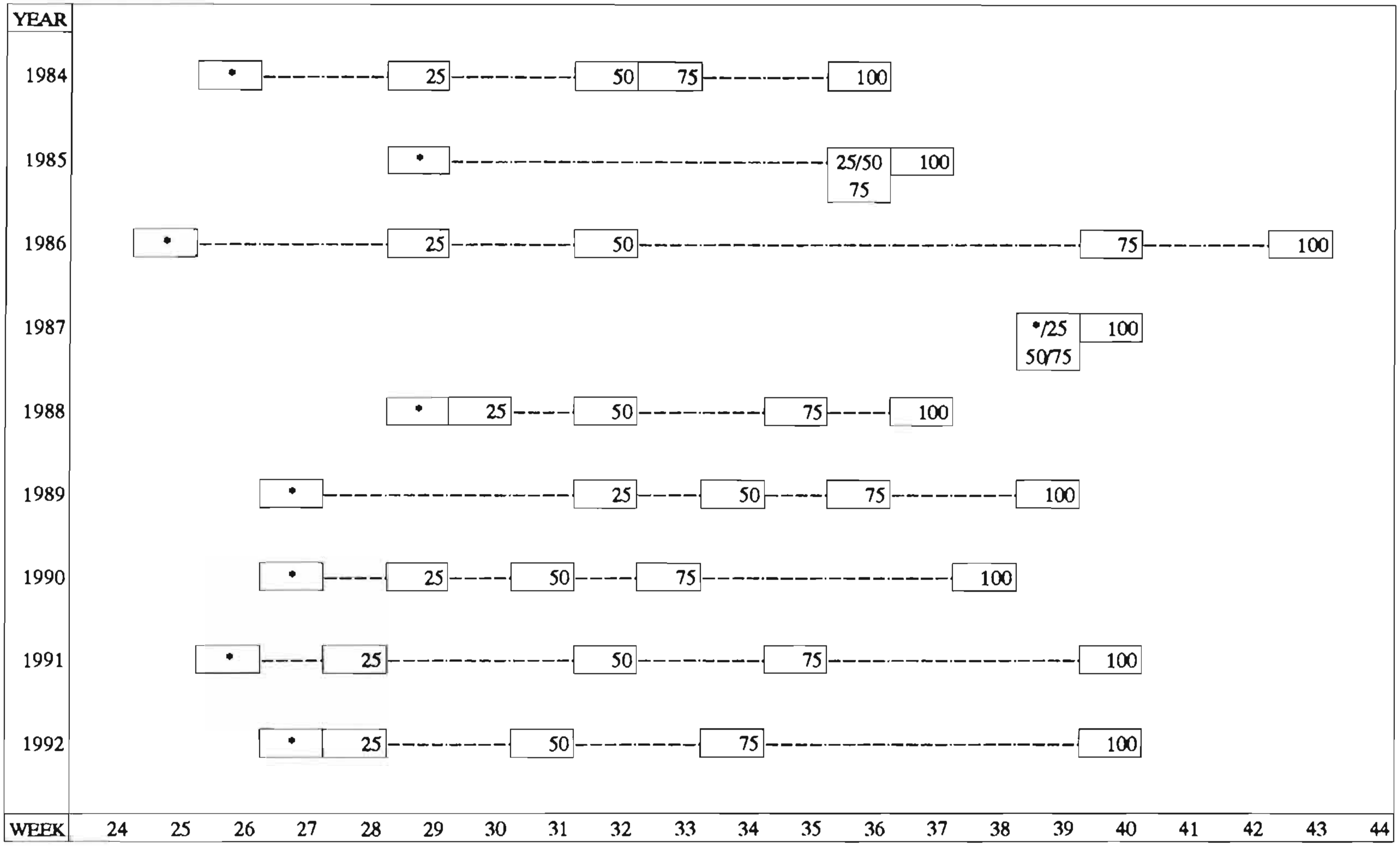


Figure 3. Adult salmon returns enumerated at the Hughes Brook counting fence, 1984 – 1992.



[•] – First week in the year in which salmon were counted.

[#] – Percentage of the salmon run through fence at the specified week.

Figure 4. Adult salmon run–timing, (small and large salmon combined), at the Hughes Brook counting fence, 1984–1992.

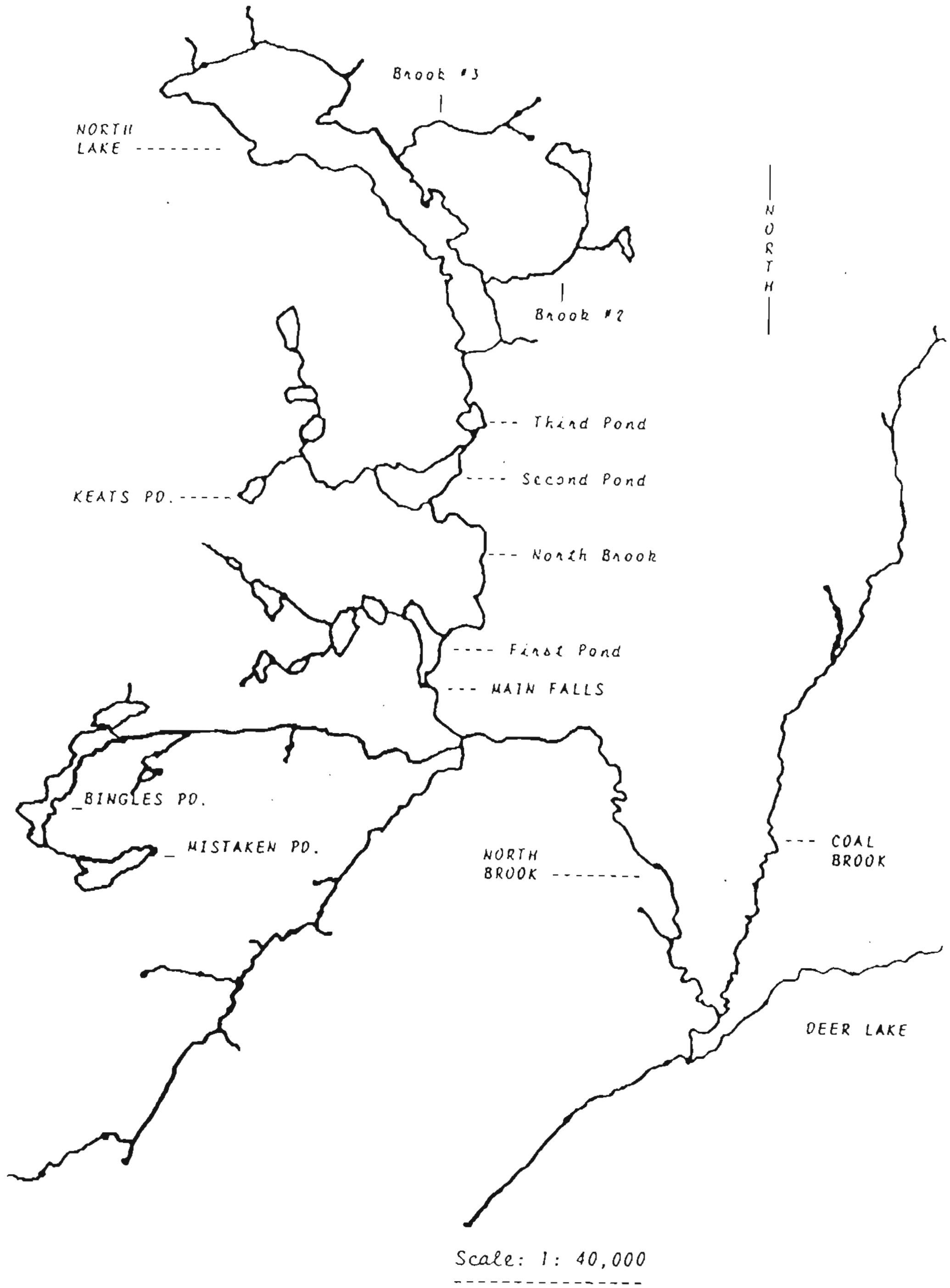


Figure 5. Outline map of North Brook.

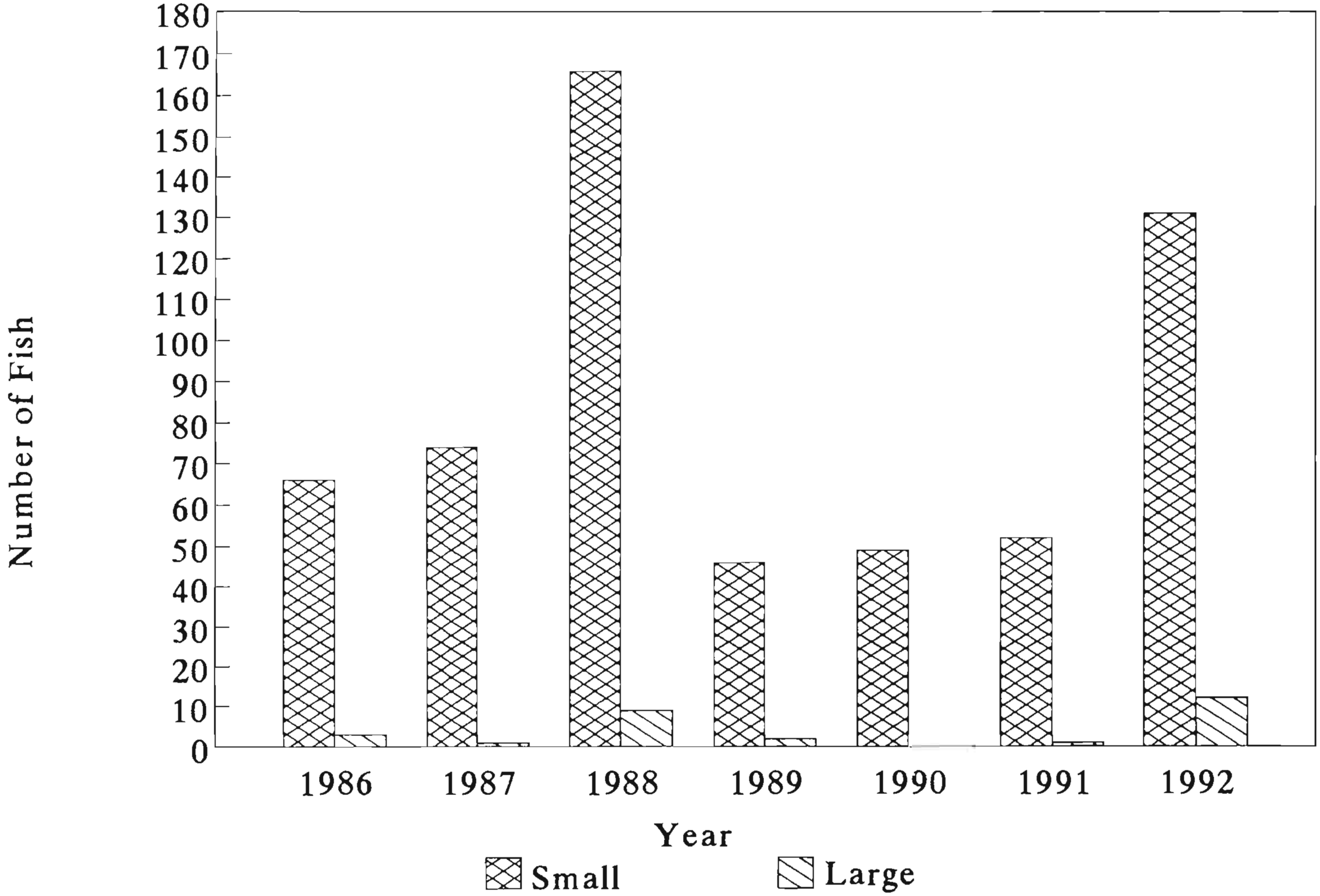


Figure 6. Adult salmon returns enumerated at the North Brook counting fence, 1986–1992.

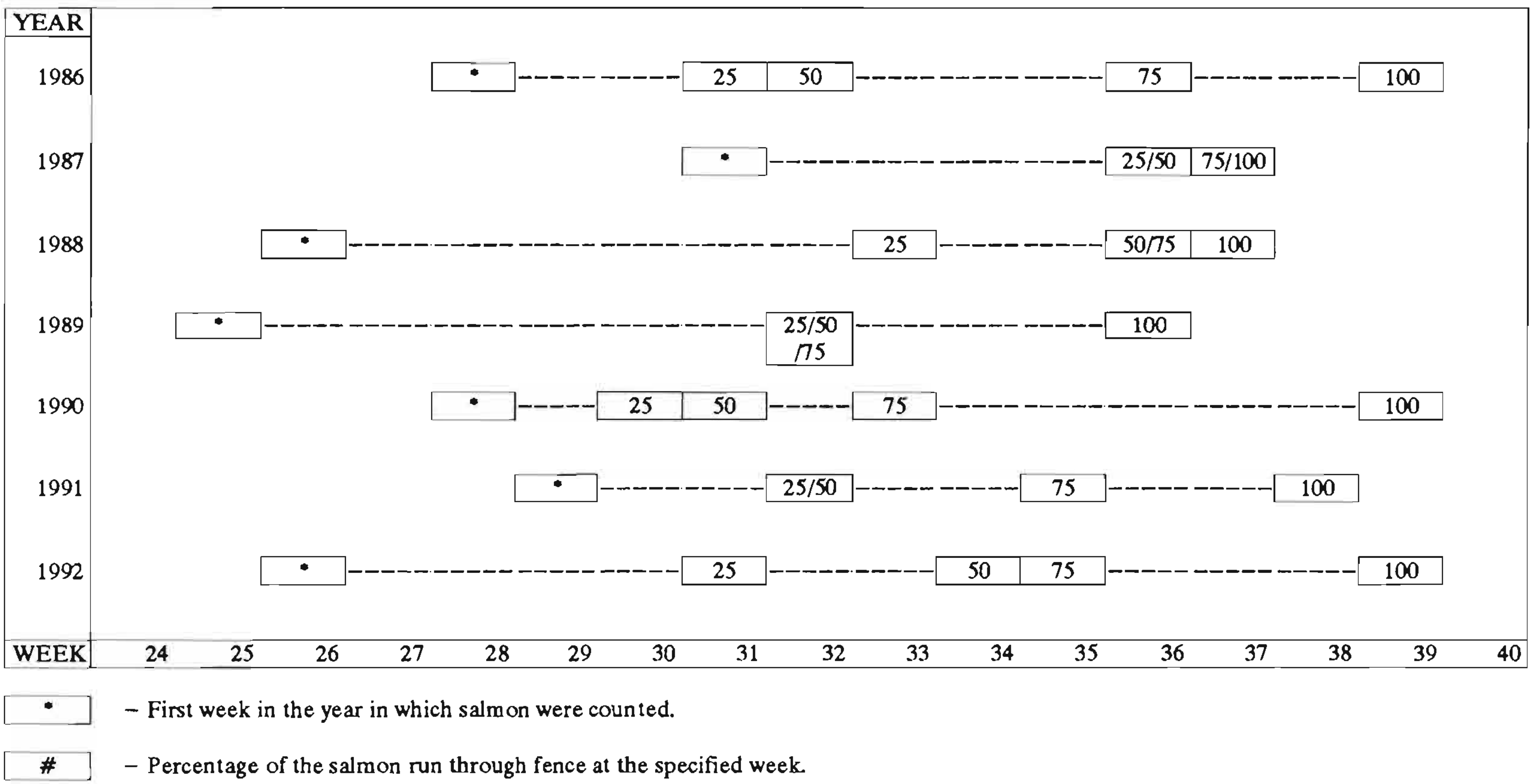


Figure 7. Adult salmon run–timing, (small and large salmon combined), at the North Brook counting fence, 1986–1992.

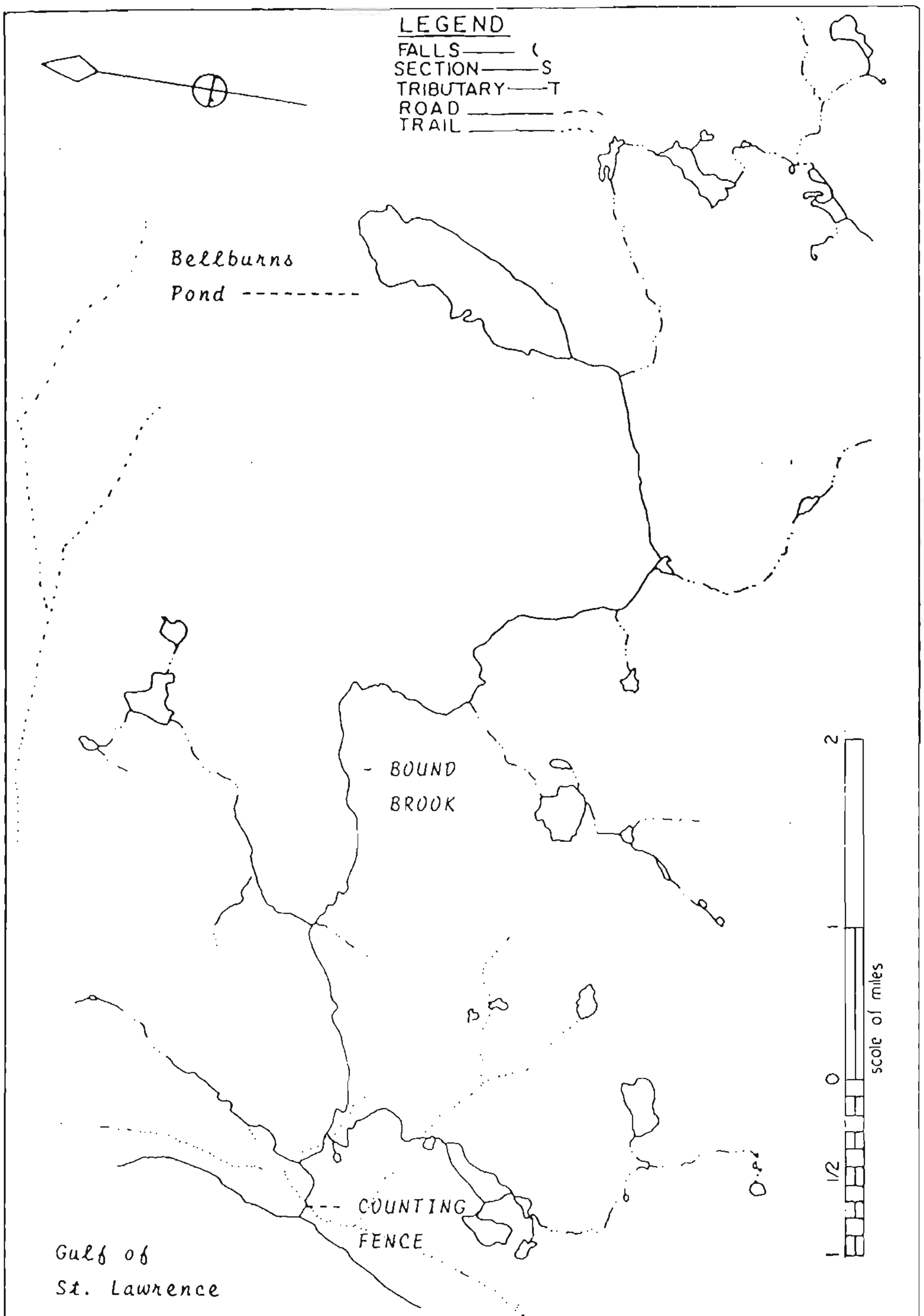


Figure 8. Outline map of Bound Brook.

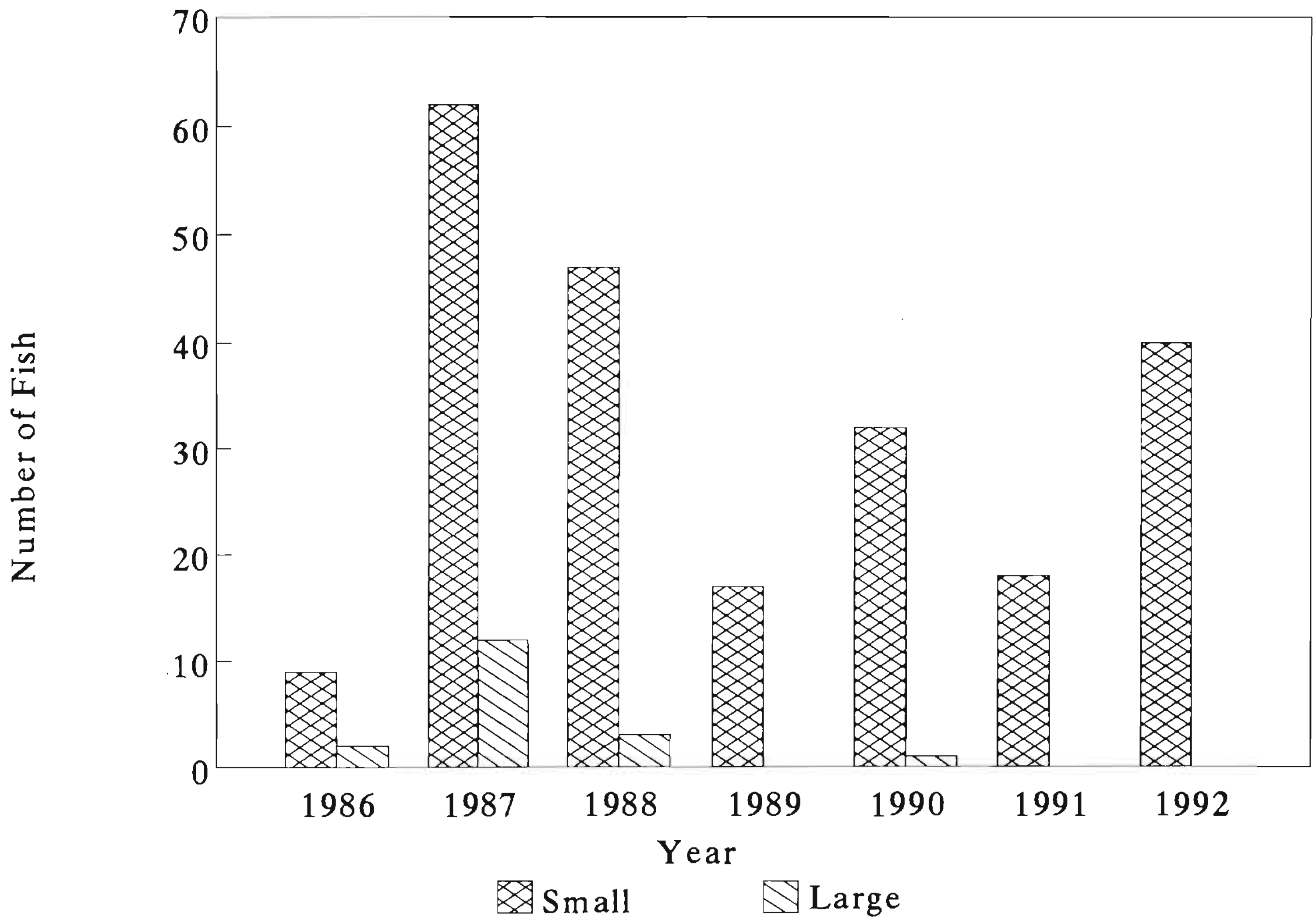
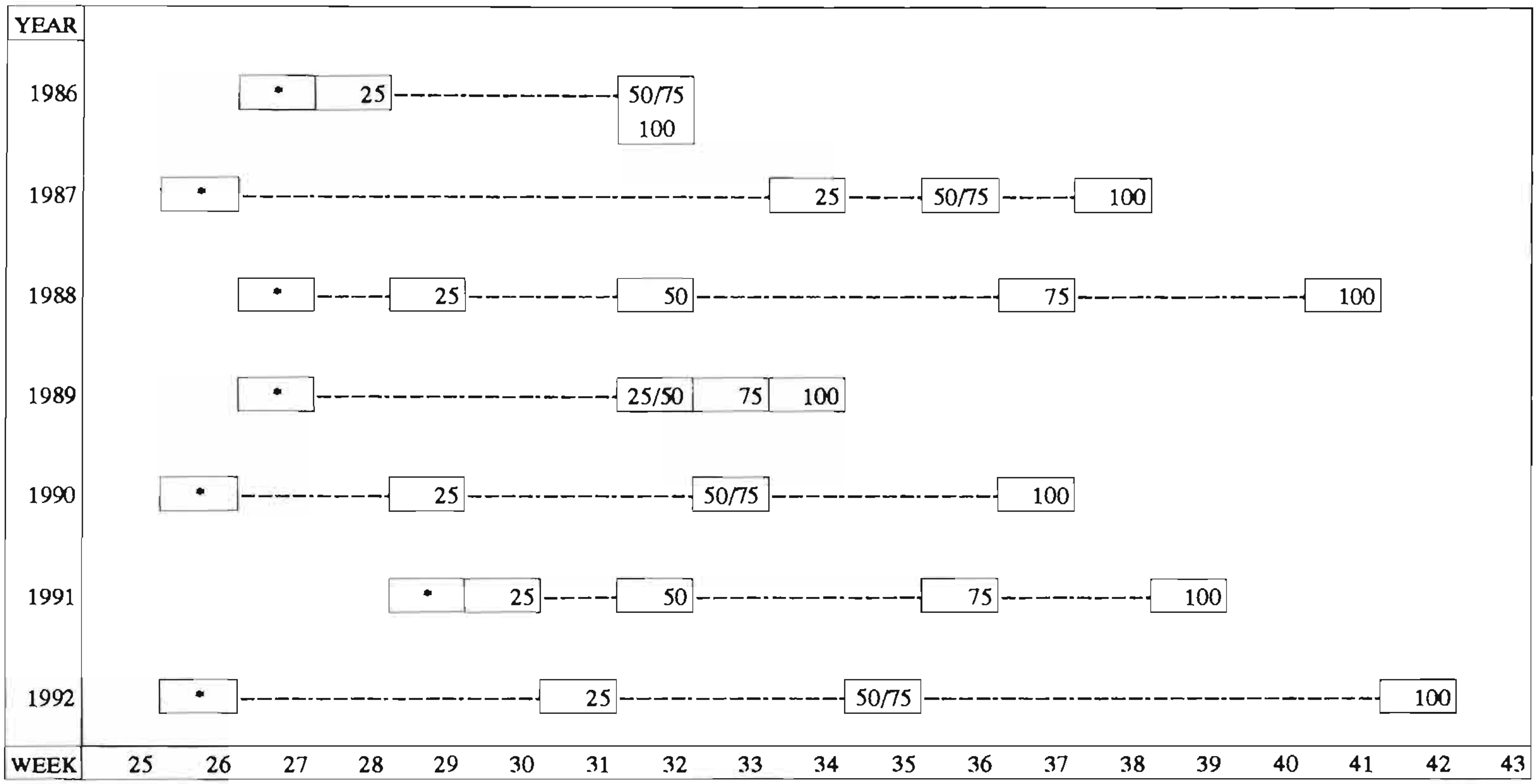


Figure 9. Adult salmon returns enumerated at the Bound Brook counting fence, 1986–1992.



[*] – First week in the year in which salmon were counted.

[#] – Percentage of the salmon run through fence at the specified week.

Figure 10. Adult salmon run–timing, (small and large salmon combined), at the Bound Brook counting fence, 1986–1992.

Table 1. Standardized weeks.

STANDARDIZED WEEK	TIME PERIOD
15	April 9 to 15
16	April 16 to 22
17	April 23 to 29
18	April 30 to May 6
19	May 7 to 13
20	May 14 to 20
21	May 21 to 27
22	May 28 to June 3
23	June 4 to 10
24	June 11 to 17
25	June 18 to 24
26	June 25 to July 1
27	July 2 to 8
28	July 9 to 15
29	July 16 to 22
30	July 23 to 29
31	July 30 to Aug. 5
32	Aug. 6 to 12
33	Aug. 13 to 19
34	Aug. 20 to 26
35	Aug. 27 to Sept. 2
36	Sept. 3 to 9
37	Sept. 10 to 16
38	Sept. 17 to 23
39	Sept. 24 to 30
40	Oct. 1 to 7
41	Oct. 8 to 14
42	Oct. 15 to 21
43	Oct. 22 to 28
44	Oct. 29 to Nov. 4

Table 2. Hughes Brook stream survey data.

SECTION LENGTH (m)	WATER WIDTH (m)	BANK WIDTH (m)	BOTTOM AREA (m x m)	% BOTTOM TYPE B	C	G	S	BDR	OTH	WATER FLOW CATEGORY (%) POOL	RUN	RIFF	RPDS	FALLS	REARING UNITS
Downstream from bridge, Section A1 – A3, 1988.															
100	14.1	18.2	1410.0	0	30	60	10			25	55	20			14.1
100	13.3	18.1	1330.0	0	30	55	15				95	5			13.3
100	15.8	21.7	1580.0	0	35	55	10				60	40			15.8
Below the Bridge (at left fork) Section A1 – A8, 1990.															
100	6.3	8.3	630.0		80	20					10	90			6.3
100	5.2	8.6	520.0	15	75	5	5				50	50			5.2
100	5.6	8.2	560.0	10	80		10				10	90			5.6
100	12.2	6.4	1220.0		40	40	20			20	10	70			12.2
100	7.4	9.7	740.0			50	50			75		25			7.4
100	8.5	8.9	850.0			60	40			90		10			8.5
100	7.9	9.1	790.0		10	20	70			50		50			7.9
100	5.0	6.1	500.0		75	5	20				55	45			5.0
Below the Bridge (at right fork) Section D1 – D5, 1990.															
100	15.2	17.4	1520.0	10	30	50	10			60	20	20			15.2
100	9.0	17.3	900.0	20	40	20	20				90	10			9.0
100	8.1	20.7	810.0	20	50	20	10			70	30				8.1
100	9.0	23.3	900.0	10	10	30	50			100					9.0
100	21.3	33.5	2130.0	10	30	10	50			100					21.3
0 – 1 KMs upstream from the upper counting fence, Section B, 1988.															
100	13.7	15.6	1370.0	20	40	35	5				70	30			13.7
100	19.2	20.5	1920.0	30	28	40	2				40	60			19.2
100	22.2	25.6	2220.0	10	40	40	10				80	20			22.2
100	13.1	17.2	1310.0	10	45	35	10			30	55	15			13.1
100	16.8	19.8	1680.0	10	25	55	10			40		60			16.8
100	17.2	20.4	1720.0	10	60	25	5			10	55	35			17.2
100	16.4	18.8	1640.0	20	30	40	10			40	60				16.4
100	14.6	16.4	1460.0	25	50	20	5				80	20			14.6
100	14.7	17.2	1470.0	35	55	7	3				95	5			14.7
100	17.2	20.4	1720.0	35	40	20	5				90	10			17.2
1 – 1.5 KMs upstream from the upper counting fence, Section C, 1988.															
100	15.1	18.8	1510.0	20	75	5	0				10	90			15.1
100	18.0	19.9	1800.0	15	80	5	0				10	90			18.0
100	15.3	17.7	1530.0	15	80	5	0				50	50			15.3
100	14.0	17.6	1400.0	15	85	0	0				60	40			14.0
100	21.4	25.9	2140.0	80	20	0	0				30	70			21.4
0 – 0.5 KMs above the first falls, Section D, 1988.															
100	12.5	15.0	1250.0	0	5	70	25			40	55	5			12.5
100	13.9	15.3	1390.0	0	5	20	75			80	20				13.9
100	14.1	16.4	1410.0	1	4	45	50				95	5			14.1
100	14.3	17.2	1430.0	0	20	20	60			5	85	10			14.3
100	12.4	14.4	1240.0	0	0	20	80			20	80				12.4

Table 2 (cont'd). Hughes Brook stream survey data.

SECTION LENGTH (m)	WATER WIDTH (m)	BANK WIDTH (m)	BOTTOM AREA (m x m)	% BOTTOM TYPE B	C	G	S	BDR	OTH	WATER FLOW CATEGORY (%) POOL	RUN	RIFF	RPDS	FALLS	REARING UNITS
0.5 – 1.5 KMs above the first falls, Section E, 1988.															
100	13.9	15.9	1390.0	0	0	30	70			30	70				13.9
100	14.0	15.9	1400.0	0	0	10	90			20	80				14.0
100	13.6	16.9	1360.0	0	35	50	15			15	70	15			13.6
100	12.1	16.9	1210.0	0	0	20	80			20	80				12.1
100	14.5	16.5	1450.0	0	0	5	95			40	60				14.5
100	18.1	20.8	1810.0	0	0	5	95			15	85				18.1
100	18.5	21.8	1850.0	0	0	20	80			30	65	5			18.5
100	13.6	17.2	1360.0	0	0	0	100			50	50				13.6
100	11.2	15.7	1120.0	0	3	22	75			10	75	15			11.2
100	10.8	17.1	1080.0	0	0	10	90			40	50	10			10.8
1.5 – 2.5 KMs above the first falls, Section F, 1988.															
100	12.3	16.5	1230.0	0	0	5	95			5	80	15			12.3
100	18.5	20.0	1850.0	0	0	5	95				85	15			18.5
100	10.2	13.0	1020.0	0	0	70	30			5	50	45			10.2
100	9.4	12.5	940.0	0	0	5	95			30	70				9.4
100	8.5	11.0	850.0	0	0	0	100			60	40				8.5
100	14.3	15.6	1430.0	2	3	75	20			30	65	5			14.3
100	13.8	16.8	1380.0	0	0	80	20				50	50			13.8
100	9.2	12.3	920.0	0	0	90	10				80	20			9.2
100	8.2	12.9	820.0	0	0	95	5				80	20			8.2
100	10.3	14.0	1030.0	0	0	98	2				95	5			10.3
2.5 – 3.5 KMs above the first falls, Section G, 1988.															
100	10.4	13.0	1040.0	5	5	85	5			5	85	10			10.4
100	10.6	12.9	1060.0	0	0	95	5			10	90				10.6
100	10.5	12.4	1050.0	0	0	95	5				100				10.5
100	13.1	15.2	1310.0	0	5	95	0				100				13.1
100	13.4	15.4	1340.0	10	20	70	0				50	50			13.4
100	12.1	15.4	1210.0	0	10	90	0				85	15			12.1
100	14.8	19.3	1480.0	0	0	80	20			15	85				14.8
100	13.5	17.8	1350.0	3	5	90	2				80	20			13.5
100	15.7	18.2	1570.0	0	0	95	5				70	30			15.7
100	14.8	19.3	1480.0	60	35	5	0				45	55			14.8
3.5 – 4.5 KMs above the first falls, Section H, 1988.															
100	12.0	16.9	1200.0	15	50	35	0			15	80	5			12.0
100	13.5	16.6	1350.0	25	70	5	0			5	80	15			13.5
100	11.1	14.2	1110.0	0	0	90	10				40	60			11.1
100	11.9	15.2	1190.0	0	5	95	0			5	95				11.9
100	11.9	17.4	1190.0	0	5	90	5			25	40	35			11.9
100	14.1	14.2	1410.0	0	0	100	0			20	45	35			14.1
100	17.5	19.0	1750.0	0	0	90	10			45	30	25			17.5
100	19.9	20.4	1990.0	0	5	55	40			30	40	30			19.9
100	16.2	18.0	1620.0	0	30	60	10				50	50			16.2
100	12.4	14.1	1240.0	5	5	20	70			30	70				12.4

Table 2 (cont'd). Hughes Brook stream survey data.

SECTION LENGTH (m)	WATER WIDTH (m)	BANK WIDTH (m)	BOTTOM AREA (m x m)	% BOTTOM TYPE B	C	G	S	BDR	OTH	WATER FLOW CATEGORY (%) POOL	RUN	RIFF	RPDS	FALLS	REARING UNITS
4.5–4.7 KMs above the first falls, Section I, 1988.															
100	10.3	13.7	1030.0	0	0	50	50			40	60				10.3
100	11.0	15.6	1100.0	0	5	80	15				100				11.0
Sections 1–45, 1991 – Starting at the inside falls (Main Falls) and proceeding downstream.															
120	7.5	10.5	900.0	60	10			30			40		60		9.0
120	10.4	11.6	1248.0	70	5			25			50		50		12.5
120	8.7	12.3	1044.0	70	20	10					30	60	10		10.4
120	6.5	9.9	780.0	70	25	5					25	75			7.8
120	7.0	10.3	840.0	60	20	20				10	50	40			8.4
120	7.6	10.2	912.0	10	70	20					30	70			9.1
120	7.0	8.6	840.0	25	75						60	40			8.4
120	8.4	10.6	1008.0	20	50	30					50	50			10.1
120	10.7	15.2	1284.0	30	50	20					70	30			12.8
120	8.9	14.1	1068.0	50	45	5					50	50			10.7
120	10.2	15.6	1224.0	50	40	10					20	80			12.2
120	8.0	13.0	960.0	20	60	10	10				25	75			9.6
120	9.3	14.0	1116.0	30	50	20					25	75			11.2
120	11.4	15.3	1368.0	20	75	5					50	50			13.7
120	6.0	14.4	720.0	5	75	20					25	75			7.2
120	6.3	15.8	756.0	20	60	20					60	40			7.6
120	8.7	14.9	1044.0		60	30	10				60	40			10.4
120	7.9	13.3	948.0		50	40	10				40	60			9.5
120	8.5	16.2	1020.0		20	70	10			10		80	10		10.2
120	11.2	15.9	1344.0		70	25	5			10		60	30		13.4
120	9.4	16.1	1128.0		75		25			30	10	60			11.3
120	5.3	11.6	636.0		50	40	10			30		60	10		6.4
120	8.6	11.6	1032.0		25	65	10			25		70	5		10.3
120	7.9	10.6	948.0		20	60	20			20		60	20		9.5
120	7.3	10.2	876.0		30	50	20			20		70	10		8.8
120	8.4	9.2	1008.0		5	75	20			20	20	60			10.1
120	7.1	10.4	852.0		5	70	25			30		60	10		8.5
120	7.3	9.3	876.0	25		5		70				40	60		8.8
120	10.2	14.5	1224.0	50				50				50	50		12.2
120	9.8	17.2	1176.0	60	20	15	5				30	50	20		11.8
120	6.8	13.8	816.0	30	30	30	10			10		70	20		8.2
120	7.8	15.7	936.0		40	60					30	50	20		9.4
120	10.2	16.0	1224.0		20	50	30			10	50	20	20		12.2
120	11.3	17.1	1356.0	10	30	40	20				30	50	20		13.6
120	15.2	15.2	1824.0	10	40	30	20			10	30	50	10		18.2
120	11.3	15.0	1356.0		40	40	20				70	30			13.6
120	12.7	17.9	1524.0	5	50	25	20				40	40	20		15.2
120	8.7	13.3	1044.0	30	60		10				50	50			10.4
120	7.2	11.3	864.0		40	30	30				40	60			8.6
120	6.5	11.2	780.0		65	30	5			30	20	50			7.8
120	6.3	10.5	756.0	5	30	60	5			20	60	20			7.6
120	7.7	11.3	924.0	5	35	50	10			10		90			9.2
120	8.0	11.7	960.0	5	40	50	5			15	5	75	5		9.6
120	8.6	11.9	1032.0	40	60					5	5	80	10		10.3
120	9.6	13.3	1152.0	10	40	50					25	50	25		11.5

Table 2 (cont'd). Hughes Brook stream survey data.

SECTION LENGTH (m)	WATER WIDTH (m)	BANK WIDTH (m)	BOTTOM AREA (m x m)	% BOTTOM TYPE B	C	G	S	BDR	OTH	WATER FLOW CATEGORY (%) POOL	RUN	RIFF	RPDS	FALLS	REARING UNITS
Sections 46–72, 1991 – Starting at end of section 45 and proceeding downstream.															
120	8.4	14.5	1008.0	20	40	40				5	35	45	15		10.1
120	9.3	11.5	1116.0		50	40	10			10	20	60	10		11.2
120	7.7	11.9	924.0		40	40	20			20	30	30	20		9.2
120	7.9	11.8	948.0		40	40	20			20	20	40	20		9.5
120	8.9	11.9	1068.0	10	40	40	10			10	40	40	10		10.7
120	9.8	11.6	1176.0		30	60	10			5	60	30	5		11.8
120	9.9	15.3	1188.0		20	60	20				20	70	10		11.9
120	11.4	14.3	1368.0	10	20	60	10					90	10		13.7
120	11.5	15.3	1380.0	10	50	20	20			20		80			13.8
120	7.3	13.3	876.0	5	45	40	10				10	80	10		8.8
120	8.1	12.5	972.0	10	40	40	10					100			9.7
120	10.6	13.4	1272.0		35	60	5			20	70		10		12.7
120	9.3	15.2	1116.0		20	70	10				70	20	10		11.2
120	9.7	14.8	1164.0			10	90			90	10				11.6
120	9.2	17.4	1104.0			50	50				70		30		11.0
120	8.8	16.2	1056.0			40	60			30	60		10		10.6
120	10.4	18.6	1248.0			50	50					70	30		12.5
120	9.2	21.3	1104.0			50	50				85		15		11.0
120	8.2	22.9	984.0			30	70				100				9.8
120	9.0	20.7	1080.0			30	70				60	10	30		10.8
120	10.2	16	1224.0	40	40	5	15				30	50	20		12.2
120	9.3	13.8	1116.0	5	40	40	15				20	80			11.2
120	11.0	19.1	1320.0			30	70				20	70	10		13.2
120	10.8	18.9	1296.0			40	60				80	20			13.0
120	10.7	16.8	1284.0			40	60				50	50			12.8
120	7.6	15.5	912.0	10	10	40	40				20	80			9.1
120	9.7	15.1	1164.0			20	80				100				11.6
Incubation building brook, starting at mouth, Section I, 1990.															
60	6.4	8.2	384.0	40	20	40				20	40	40			3.8
60	3.4	5.9	204.0	20	40	40				40		60			2.0
60	3.6	4.4	216.0	20	50	30				50		50			2.2
100	6.7	7.2	670.0		60	30	10			40	10	50			6.7
100	3.3	5.3	330.0	40	40	15		5		10	50	40			3.3
100	4.1	5.8	410.0	50	50					10	60	30			4.1
100	4.8	5.5	480.0	10	80	10					80	20			4.8
100	4.1	4.9	410.0	40	20	40					50	50			4.1
100	5.8	6.8	580.0	70	30						80	20			5.8
100	3.5	4.4	350.0	70	20	10					60	40			3.5
100	4.1	5.8	410.0	80	10	10					100				4.1
100	4.1	5.5	410.0	40	55		5			10	90				4.1
100	3.3	5	330.0	45	45	10				10	70	20			3.3
100	2.7	4.2	270.0	60	30	10					70	30			2.7
100	3.8	4.7	380.0	80	20					10	60	30			3.8
100	4.2	5.1	420.0	70	20	10				20	60	20			4.2
100	4.2	5	420.0	60	30	10				10	90				4.2
56	4.2	5.2	235.2	60	30	10				30	60	10			2.4

Table 2 (cont'd). Hughes Brook stream survey data.

SECTION LENGTH (m)	WATER WIDTH (m)	BANK WIDTH (m)	BOTTOM AREA (m x m)	% BOTTOM TYPE B	C	G	S	BDR	OTH	WATER FLOW CATEGORY (%) POOL	RUN	RIFF	RPDS	FALLS	REARING UNITS
26 Brook, Section B, 1990.															
100	4.8	6.7	480.0	40	40	10	10				50	50			4.8
100	5.5	9.9	550.0	20	50	20	10			5	40	55			5.5
100	6.3	11.1	630.0	40	40	10	10			10	30	60			6.3
100	6.5	8.2	650.0	40	40	10	10			20	20	60			6.5
100	5.9	9.7	590.0	60	30	5	5			5	90	5			5.9
100	5.0	7.9	500.0	50	40	10				10	60	30			5.0
100	2.9	6.4	290.0	40	50	10				10	40	50			2.9
100	3.6	7.9	360.0	70	20	10					40	60			3.6
17 Brook, Section C, 1990.															
100	4.3	7	430.0	30	50	20				10	40	50			4.3
100	5.3	7.6	530.0	70	20	10					60	40			5.3
100	5.7	10	570.0	70	20	10					80	20			5.7
65	6.8	8.6	442.0	80	20					10	90				4.4
TOTAL			192697.2												1927.0

Please refer to the applicable topographic map (scale 1:50,000).

Table 3. Atlantic salmon stocking activities completed at Hughes Brook, 1986–1992.

	1986	1987	1988	1989	1990	1991	1992
No. Male Broodstock (small)	–	–	–	9	22	–	–
No. Male Broodstock (small & large)	–	–	–	–	–	38	57
No. Female Broodstock (small)	–	–	–	46	85	–	–
No. Female Broodstock (small & large)	–	–	–	–	–	137	96
% Female – small	–	–	–	83.6	79.4	–	–
% Female – small & large	–	–	–	–	–	78.3	62.7
Mean % Female * 76.0							
No. of Females Stripped	7	–	–	25	50	63	66
No. of eggs put down in box	15,372	58,600	16,100	70,629	123,288	130,065	198,594
No. of Eggs per Female	2,196	–	–	2,825	2,466	2,065	3,009
Mean # Eggs per Female** 2,512							
No. of fry hatched out – (following spring)	12,300	45,000	12,615	62,321	115,444	120,753	
No. of fry distributed in stream – (following spring)	12,179	44,780	12,489	61,468	112,607	119,777	
Total Hatching Rate (%)	80.0	76.8	78.4	88.2	93.6	92.8	
Total Survival Rate to Distribution (%)	79.2	76.4	77.6	87.0	91.3	92.1	

"–" indicates that data is unavailable.

"*" indicates that only data from the years of 1989–1992 was used in this calculation. This value represents an estimate of the percent female of the entire population.

"**" indicates that only data from the years 1986, and 1989–1992 was used in this calculation. This value represents an estimate of the # of eggs per female ascertained from stripping activities at the Hughes Brook site.

Table 4. Weekly counts of Atlantic salmon parr and small adult salmon recorded at the upstream counting fence on Hughes Brook, 1984–1992.

	Salmo Salar (parr)									Salmo Salar (small)								
Week	1984	1985	1986	1987	1988	1989	1990	1991	1992	1984	1985	1986	1987	1988	1989	1990	1991	1992
25	0	0	2	0	–	0	0	–	0	0	0	1	0	–	0	0	–	0
26	0	0	0	0	–	0	0	0	0	2	0	0	0	–	0	0	3	0
27	0	0	0	0	–	0	0	0	0	4	0	5	0	–	6	5	10	9
28	0	0	0	0	–	0	0	0	0	0	0	3	0	–	3	9	34	39
29	0	0	0	0	0	0	0	0	0	18	1	8	0	1	1	21	21	18
30	0	0	1	0	0	0	0	0	0	3	0	2	0	10	0	10	8	2
31	1	0	0	0	0	0	0	0	0	1	1	1	0	6	0	14	6	19
32	1	0	0	0	0	0	0	0	0	26	1	17	0	2	12	9	13	15
33	0	0	0	0	0	0	0	0	0	24	0	2	0	4	4	18	15	2
34	0	0	0	0	0	0	0	0	0	7	0	0	0	3	12	6	21	23
35	0	0	0	1	0	0	0	0	0	3	0	0	0	1	1	1	37	6
36	0	0	2	0	0	0	0	0	0	2	7	0	0	0	3	1	4	6
37	0	0	1	0	0	0	0	0	0	0	3	0	0	8	3	1	1	5
38	1	0	1	0	0	0	0	0	0	0	0	0	0	0	3	11	1	0
39	0	1	0	0	–	0	0	0	0	0	0	0	27	–	6	0	0	0
40	0	0	0	0	–	–	0	0	0	0	0	18	7	–	–	0	1	2
41	0	0	1	1	–	–	0	0	–	0	0	0	0	–	–	0	0	–
42	0	0	0	1	–	–	–	–	–	0	0	0	0	–	–	–	–	–
43	–	0	0	0	–	–	–	–	–	–	0	6	0	–	–	–	–	–
44	–	0	0	–	–	–	–	–	–	–	0	0	–	–	–	–	–	–
Total	3	1	8	3	0	0	0	0	0	90	13	63	34	35	54	106	175	146

Table 5. Weekly counts of Atlantic salmon (large) and brook trout recorded at the upstream counting fence on Hughes Brook, 1984 – 1992.

Week	Salmo Salar (large)									Salvelinus fontinalis								
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1984	1985	1986	1987	1988	1989	1990	1991	1992
25	0	0	1	0	–	0	0	–	0	0	1	3	1	–	0	0	–	0
26	0	0	0	0	–	0	0	0	0	0	1	5	0	–	62	0	5	0
27	0	0	1	0	–	0	0	0	2	46	2	34	10	–	91	13	4	1
28	0	0	0	0	–	0	0	0	1	84	11	98	18	–	126	50	26	13
29	0	0	0	0	0	0	1	0	1	669	96	140	102	6	249	408	80	23
30	0	0	0	0	0	0	0	0	0	360	280	83	29	70	448	233	169	84
31	0	0	0	0	0	0	0	0	1	174	352	272	69	263	212	286	275	287
32	2	0	0	0	0	0	0	0	0	272	540	143	12	113	201	312	472	97
33	1	0	0	0	0	0	0	0	0	125	342	14	55	48	8	470	168	29
34	0	0	0	0	0	0	0	0	0	31	68	7	11	14	0	128	288	95
35	0	0	0	0	0	0	0	0	0	12	13	2	0	0	2	114	88	10
36	0	0	0	0	0	1	0	0	1	9	11	13	0	5	0	48	1	3
37	0	0	0	0	0	0	0	0	0	1	0	14	2	1	0	30	5	2
38	0	0	0	0	0	0	0	0	0	4	2	1	0	0	1	22	1	1
39	0	0	0	0	–	0	0	0	0	2	0	15	9	–	16	16	0	3
40	0	0	0	0	–	–	0	0	1	4	0	21	3	–	–	8	1	1
41	0	0	0	0	–	–	0	0	–	3	0	26	1	–	–	8	0	–
42	0	0	0	0	–	–	–	–	–	0	59	13	2	–	–	–	–	–
43	–	0	0	0	–	–	–	–	–	–	0	2	0	–	–	–	–	–
44	–	0	0	–	–	–	–	–	–	–	0	58	–	–	–	–	–	–
Total	3	0	2	0	0	1	1	0	7	1796	1778	964	324	520	1416	2146	1583	649

Table 6. Annual summaries of adult Atlantic salmon returns, broodstock removals, mortalities, and wild spawners enumerated at the upstream counting fence on Hughes Brook, 1984–1992.

Year	No. Small (< 63cm)	No. Large (≥ 63cm)	Total Adult Count	No. Broodfish (small)	No. Broodfish (small & large)	No. Mortalities	No. Wild Spawners
1984	90	3	93	0	0	0	93
1985	13	0	13	0	0	0	13
1986	63	2	65	–	–	–	–
1987	34	0	34	–	–	–	–
1988	35	0	35	–	–	–	–
1989	54	1	55	34	0	0	21
1990	106	1	107	72	0	0	35
1991	175	0	175	–	101	0	74
1992	146	7	153	–	123	0	30

" – " indicates that data is not available.

Table 7. Weekly counts of Atlantic salmon parr recorded at the downstream counting fence on Hughes Brook, 1984–1992.

Week	Salmo Salar (parr)								
	1984	1985	1986	1987	1988	1989	1990	1991	1992
15	–	–	–	5	–	–	–	–	–
16	–	–	–	11	–	–	–	–	–
17	–	–	–	0	–	–	–	–	–
18	–	–	19	18	2	–	–	–	–
19	–	–	23	86	0	–	–	–	–
20	–	–	57	15	0	41	–	–	–
21	26	–	32	6	51	68	–	–	26
22	179	–	119	25	64	8	69	111	284
23	3	0	139	16	18	19	212	84	260
24	5	0	49	3	104	8	378	107	295
25	20	1	14	0	178	1	12	78	148
26	2	1	11	0	24	–	–	–	–
27	3	0	12	0	11	–	–	–	–
28	0	0	2	0	–	–	–	–	–
29	0	0	3	0	–	–	–	–	–
30	0	0	1	0	–	–	–	–	–
31	0	0	3	0	–	–	–	–	–
32	0	0	4	0	–	–	–	–	–
33	0	0	0	0	–	–	–	–	–
34	0	0	2	0	–	–	–	–	–
35	0	0	1	0	–	–	–	–	–
36	0	0	3	8	–	–	–	–	–
37	0	0	3	0	–	–	–	–	–
38	0	0	9	0	–	–	–	–	–
39	1	0	4	1	–	–	–	–	–
40	0	0	5	0	–	–	–	–	–
41	0	0	0	0	–	–	–	–	–
42	0	0	9	1	–	–	–	–	–
43	–	0	14	10	–	–	–	–	–
44	–	2	17	–	–	–	–	–	–
45	–	4	0	–	–	–	–	–	–
Total	239	8	555	205	452	145	671	380	1013

Table 8. Weekly counts of Atlantic salmon smolt recorded at the downstream counting fence on Hughes Brook, 1984–1992.

Week	Salmo Salar (smolt)								
	1984	1985	1986	1987	1988	1989	1990	1991	1992
15	–	–	–	0	–	–	–	–	–
16	–	–	–	0	–	–	–	–	–
17	–	–	–	0	–	–	–	–	–
18	–	–	20	14	12	–	–	–	–
19	–	–	21	200	3	–	–	–	–
20	–	–	246	266	0	98	–	–	–
21	133	–	194	63	614	393	–	–	29
22	101	–	88	79	432	20	185	255	897
23	6	16	16	26	56	5	627	78	626
24	9	4	1	0	50	1	92	142	234
25	3	1	1	0	31	0	0	37	4
26	1	0	0	0	8	–	–	–	–
27	0	0	0	0	0	–	–	–	–
28	0	0	0	0	–	–	–	–	–
29	0	0	0	0	–	–	–	–	–
30	0	0	0	0	–	–	–	–	–
31	0	0	0	0	–	–	–	–	–
32	0	0	0	0	–	–	–	–	–
33	0	0	0	0	–	–	–	–	–
34	0	0	0	0	–	–	–	–	–
35	0	0	0	0	–	–	–	–	–
36	0	0	0	0	–	–	–	–	–
37	0	0	0	0	–	–	–	–	–
38	0	0	0	0	–	–	–	–	–
39	0	0	0	0	–	–	–	–	–
40	0	0	1	0	–	–	–	–	–
41	0	0	0	0	–	–	–	–	–
42	0	0	10	0	–	–	–	–	–
43	–	16	0	0	–	–	–	–	–
44	–	20	1	–	–	–	–	–	–
45	–	3	1	–	–	–	–	–	–
Total	253	60	600	648	1206	517	904	512	1790

Table 9. Weekly counts of brook trout recorded at the downstream counting fence on Hughes Brook, 1984–1992.

Week	Salvelinus fontinalis								
	1984	1985	1986	1987	1988	1989	1990	1991	1992
15	–	–	–	37	–	–	–	–	–
16	–	–	–	65	–	–	–	–	–
17	–	–	–	0	–	–	–	–	–
18	–	–	375	225	39	–	–	–	–
19	–	–	213	554	14	–	–	–	–
20	–	–	265	360	0	488	–	–	–
21	1039	–	122	115	517	426	–	–	39
22	844	–	242	202	367	106	153	235	636
23	259	54	320	127	191	132	716	199	1140
24	153	236	165	121	595	32	1413	243	1311
25	282	88	47	11	932	3	280	242	670
26	135	91	77	0	222	–	–	–	–
27	157	47	23	0	52	–	–	–	–
28	22	4	6	1	–	–	–	–	–
29	15	3	13	0	–	–	–	–	–
30	0	0	9	0	–	–	–	–	–
31	0	0	3	0	–	–	–	–	–
32	0	0	21	0	–	–	–	–	–
33	0	0	15	0	–	–	–	–	–
34	7	0	0	0	–	–	–	–	–
35	19	0	5	2	–	–	–	–	–
36	5	30	4	14	–	–	–	–	–
37	0	45	6	13	–	–	–	–	–
38	16	1	37	0	–	–	–	–	–
39	53	0	43	80	–	–	–	–	–
40	42	22	160	4	–	–	–	–	–
41	0	58	55	1	–	–	–	–	–
42	6	130	63	127	–	–	–	–	–
43	–	350	115	65	–	–	–	–	–
44	–	55	148	–	–	–	–	–	–
45	–	7	10	–	–	–	–	–	–
Total	3054	1221	2562	2124	2929	1187	2562	919	3796

Table 10. Weekly counts of American eel recorded at the downstream counting fence onHughes Brook, 1984 – 1992.

Week	Anguilla rostrata								
	1984	1985	1986	1987	1988	1989	1990	1991	1992
15	–	–	–	0	–	–	–	–	–
16	–	–	–	0	–	–	–	–	–
17	–	–	–	0	–	–	–	–	–
18	–	–	0	0	0	–	–	–	–
19	–	–	1	1	0	–	–	–	–
20	–	–	1	0	0	0	–	–	–
21	0	–	0	0	0	0	–	–	0
22	0	–	1	0	0	0	0	0	0
23	0	0	1	0	1	0	0	0	0
24	0	0	0	0	0	0	0	0	0
25	0	0	0	0	2	0	0	0	0
26	0	0	0	0	0	–	–	–	–
27	0	0	0	0	0	–	–	–	–
28	0	0	0	0	–	–	–	–	–
29	0	0	0	0	–	–	–	–	–
30	0	0	0	0	–	–	–	–	–
31	0	0	0	0	–	–	–	–	–
32	0	0	11	0	–	–	–	–	–
33	0	0	0	0	–	–	–	–	–
34	3	0	1	0	–	–	–	–	–
35	0	0	0	0	–	–	–	–	–
36	1	0	0	3	–	–	–	–	–
37	0	27	1	0	–	–	–	–	–
38	28	0	6	0	–	–	–	–	–
39	2	0	8	1	–	–	–	–	–
40	1	4	2	1	–	–	–	–	–
41	0	2	0	0	–	–	–	–	–
42	0	1	0	0	–	–	–	–	–
43	–	0	0	0	–	–	–	–	–
44	–	0	0	–	–	–	–	–	–
45	–	0	0	–	–	–	–	–	–
Total	35	34	33	6	3	0	0	0	0

Table 11. Operating schedule of the upstream counting trap at Hughes Brook, 1984–1992.

<table>
<tr><th></th><th colspan="9">Upstream Counting Trap</th></tr>
<tr><th>Week</th><th>1984</th><th>1985</th><th>1986</th><th>1987</th><th>1988</th><th>1989</th><th>1990</th><th>1991</th><th>1992</th></tr>
<tr><td>15</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>16</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>17</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>18</td><td>–</td><td>–</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>19</td><td>–</td><td>–</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>20</td><td>–</td><td>–</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>21</td><td>[//|\\]</td><td>–</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>22</td><td>5</td><td>–</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>23</td><td>4</td><td>[//|\\]</td><td>6</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>24</td><td>4</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>25</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>5</td></tr>
<tr><td>26</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>27</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>28</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>29</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>30</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>3</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>31</td><td>–</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>32</td><td>–</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>4</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>33</td><td>4</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
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<tr><td>36</td><td>5</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>37</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>6</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>38</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>4</td><td>[//|\\]</td></tr>
<tr><td>39</td><td>[//|\\]</td><td>1</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>3</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>40</td><td>[//|\\]</td><td>4</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>[//|\\]</td><td>[//|\\]</td><td>4</td></tr>
<tr><td>41</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>6</td><td>[//|\\]</td><td>–</td></tr>
<tr><td>42</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>43</td><td>–</td><td>[//|\\]</td><td>[//|\\]</td><td>2</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>44</td><td>–</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>45</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
</table>

" – " indicates a week in which the counting trap was not operated.

"[//|\\]" indicates that the counting trap was operational for the full week.

Numbers indicate how many days the trap was operational in the indciated week.

Table 12. Operating schedule of the downstream counting trap at Hughes Brook, 1984–1992.

<table>
<tr><th></th><th colspan="9">Downstream Counting Trap</th></tr>
<tr><th>Week</th><th>1984</th><th>1985</th><th>1986</th><th>1987</th><th>1988</th><th>1989</th><th>1990</th><th>1991</th><th>1992</th></tr>
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<tr><td>16</td><td>–</td><td>–</td><td>–</td><td>3</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
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<tr><td>18</td><td>–</td><td>–</td><td>[//|\\]</td><td>3</td><td>6</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>19</td><td>–</td><td>–</td><td>[//|\\]</td><td>[//|\\]</td><td>1</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>20</td><td>–</td><td>–</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>21</td><td>[//|\\]</td><td>–</td><td>[//|\\]</td><td>[//|\\]</td><td>5</td><td>[//|\\]</td><td>–</td><td>–</td><td>1</td></tr>
<tr><td>22</td><td>5</td><td>–</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>6</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>23</td><td>4</td><td>[//|\\]</td><td>6</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
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<tr><td>25</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>6</td><td>[//|\\]</td><td>2</td></tr>
<tr><td>26</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>27</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
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<tr><td>29</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>30</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
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<tr><td>36</td><td>5</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>37</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>38</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>39</td><td>[//|\\]</td><td>1</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>40</td><td>[//|\\]</td><td>4</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>41</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>42</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>43</td><td>–</td><td>[//|\\]</td><td>[//|\\]</td><td>6</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>44</td><td>–</td><td>[//|\\]</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>45</td><td>–</td><td>2</td><td>3</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
</table>

" – " indicates a week in which the counting trap was not operated.
"[//|\\]" indicates that the counting trap was operational for the full week.
Numbers indicate how many days the trap was operational in the indicated week.

Table 13. Mean weekly water levels (cm) recorded at the Hughes Brook counting fence, 1984–1992.

	WATER LEVEL (averaged by date and then week)																	
	1984		1985		1986		1987		1988		1989		1990		1991		1992	
Week	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD
17	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
18	–	–	–	–	34.1	26.3	30.6	0.8	34.8	9.6	–	–	–	–	–	–	–	–
19	–	–	–	–	20.0	25.0	34.6	1.8	60.8	22.1	–	–	–	–	–	–	–	–
20	–	–	–	–	33.1	21.8	29.0	2.3	–	–	31.5	2.5	–	–	–	–	–	–
21	36.1	2.0	–	–	22.0	1.4	22.7	2.6	39.7	4.1	26.9	4.1	–	–	–	–	14.0	–
22	36.1	9.7	–	–	23.1	5.5	24.3	1.4	35.1	4.6	24.7	3.6	23.8	1.2	16.0	2.0	19.0	2.3
23	53.4	7.8	39.5	13.0	33.1	7.1	20.2	1.0	33.9	1.4	17.2	1.5	17.6	3.9	12.2	1.2	12.0	2.3
24	43.2	4.9	21.3	3.2	35.5	2.4	21.1	8.5	27.9	1.9	12.1	1.8	33.7	30.7	27.3	3.3	23.9	23.6
25	38.8	2.0	41.2	2.3	33.9	2.1	41.0	3.2	30.9	2.1	32.7	24.1	43.5	7.2	24.6	2.2	49.1	18.0
26	37.6	2.7	40.4	5.0	30.5	1.9	37.0	0.6	26.7	4.5	31.6	5.7	41.9	3.0	38.0	0.7	35.0	1.2
27	39.3	3.7	39.4	2.0	35.6	6.3	36.6	1.0	29.1	2.5	30.6	1.4	33.7	2.1	35.6	1.9	34.6	1.0
28	34.6	1.0	47.5	16.1	36.5	3.8	33.6	0.6	–	–	27.8	0.7	32.2	2.0	32.7	1.0	37.7	3.6
29	42.2	8.8	40.6	9.1	37.4	5.3	32.3	0.6	74.2	1.5	24.5	0.5	32.2	2.3	31.6	1.8	34.7	1.1
30	43.6	4.9	60.9	12.5	32.2	1.0	55.9	17.3	69.6	1.4	23.2	0.5	53.1	16.6	29.1	1.4	31.4	1.2
31	40.0	11.9	43.2	8.9	30.6	1.0	45.8	15.0	66.8	1.8	22.0	0.6	49.2	5.2	26.2	0.7	38.5	7.5
32	51.4	11.9	58.7	12.3	37.2	8.7	34.2	7.2	65.2	2.2	42.6	7.9	38.9	1.8	28.6	1.3	37.3	3.6
33	56.5	3.8	61.6	5.4	38.0	4.7	57.8	12.7	64.6	1.6	41.5	6.3	46.5	10.7	27.1	1.2	30.8	2.6
34	52.3	4.2	46.3	1.8	32.1	2.2	37.1	3.2	67.5	2.6	37.6	4.0	43.4	5.3	45.9	7.8	43.0	3.8
35	44.9	7.3	38.5	3.6	30.8	0.6	36.4	2.4	64.2	0.4	46.1	7.0	36.0	0.8	49.6	18.1	50.2	9.1
36	54.8	8.2	41.7	8.7	30.7	1.6	43.8	4.3	63.0	0.7	32.7	3.8	33.7	2.0	52.7	5.2	42.3	3.2
37	44.9	2.3	43.4	4.6	32.5	2.1	45.5	2.0	85.4	10.7	26.6	0.7	32.8	0.9	44.0	1.8	39.1	1.7
38	47.5	4.3	34.3	2.0	36.0	2.5	40.7	1.8	76.3	2.5	25.0	0.5	48.3	9.0	51.8	12.0	36.7	1.6
39	41.5	1.7	39.6	3.8	35.5	2.7	52.2	8.0	–	–	37.1	11.2	46.2	6.6	60.0	8.7	36.1	3.4
40	44.6	5.7	30.7	3.4	38.3	1.8	48.7	4.5	–	–	–	–	38.5	0.8	55.1	4.0	45.1	8.6
41	44.3	2.5	26.2	1.4	29.9	4.0	45.7	1.3	–	–	–	–	52.1	19.9	75.3	–	–	–
42	37.2	2.3	29.1	3.2	30.2	2.3	41.2	0.8	–	–	–	–	–	–	–	–	–	–
43	–	–	38.6	9.9	32.6	4.5	27.7	8.9	–	–	–	–	–	–	–	–	–	–
44	–	–	47.9	2.5	30.5	1.3	–	–	–	–	–	–	–	–	–	–	–	–

"–" indicates that data is unavailable for this time period.

Table 14. Mean weekly water temperatures (°C) recorded at the Hughes Brook counting fence, 1984–1992.

Week	WATER TEMPERATURES (average of maximum and minimum daily temperatures)																	
	1984		1985		1986		1987		1988		1989		1990		1991		1992	
	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD
18	–	–	–	–	3.8	1.0	6.8	1.0	5.0	0.0	–	–	–	–	–	–	–	–
19	–	–	–	–	4.3	1.8	8.3	0.6	4.9	0.4	–	–	–	–	–	–	–	–
20	–	–	–	–	8.4	1.9	8.6	1.3	5.8	1.2	–	–	–	–	–	–	–	–
21	11.5	1.1	–	–	7.2	1.6	10.8	1.0	8.6	1.3	–	–	–	–	–	–	7.8	–
22	11.5	1.7	11.5	–	7.8	1.3	11.4	1.0	7.7	1.0	–	–	–	–	6.2	0.6	8.0	1.8
23	8.2	1.6	10.3	0.6	8.1	1.6	14.0	0.8	7.4	0.8	–	–	–	–	8.5	1.5	9.3	1.7
24	9.8	2.9	10.0	1.7	9.9	1.3	12.2	1.0	11.6	2.5	16.0	–	13.5	–	8.6	1.3	10.2	1.0
25	11.6	1.9	12.7	0.8	12.5	3.0	14.4	1.4	12.2	1.0	17.1	1.0	13.5	1.8	11.5	1.4	14.4	1.2
26	12.2	2.5	15.8	1.2	12.8	0.8	14.4	0.9	11.5	1.2	18.8	1.7	15.5	1.3	13.2	2.6	11.9	1.1
27	15.2	1.2	16.9	1.7	13.7	2.3	16.2	1.2	13.6	1.4	17.4	0.8	14.1	1.4	12.6	1.5	11.5	1.1
28	19.1	0.7	19.9	1.8	15.2	1.1	19.9	0.8	–	–	16.4	3.0	15.1	0.9	13.1	0.9	13.2	1.3
29	16.9	1.8	16.1	0.8	15.6	1.7	18.0	2.0	17.6	1.0	19.2	2.2	15.1	2.1	16.4	0.9	14.1	1.1
30	17.4	1.1	18.4	0.8	16.5	0.7	17.0	0.8	18.4	1.4	19.6	1.7	15.5	2.2	15.6	1.5	14.0	2.0
31	16.8	1.3	17.4	1.7	16.4	1.6	16.2	0.9	20.0	0.9	19.1	1.1	13.7	1.3	15.4	1.3	13.7	1.4
32	16.9	1.3	18.7	1.4	15.9	1.1	16.8	1.5	19.6	0.8	17.5	3.5	15.7	1.1	14.5	0.9	15.7	1.1
33	17.6	1.7	15.6	0.9	16.9	1.2	17.1	0.9	17.1	3.5	18.5	1.9	14.9	1.2	16.3	1.3	14.8	1.2
34	15.1	2.3	16.3	0.8	15.6	1.7	15.9	1.2	15.1	0.9	16.5	2.8	15.5	2.5	13.7	1.0	14.4	1.4
35	16.0	1.0	13.0	2.9	13.6	1.4	14.1	0.8	15.9	1.2	12.9	1.6	16.1	1.6	12.6	1.9	12.3	1.2
36	14.7	0.9	13.3	1.3	13.1	1.8	11.9	1.3	13.2	0.6	13.4	2.5	13.3	0.9	12.4	1.1	10.6	1.6
37	14.1	2.0	11.4	1.0	11.4	0.8	12.1	0.9	13.0	0.8	13.1	5.3	12.4	1.7	10.8	0.6	13.5	1.1
38	11.3	0.8	11.9	2.5	8.9	0.8	11.8	1.0	13.6	2.0	14.0	1.6	11.8	0.6	10.9	0.9	11.9	1.3
39	9.9	1.8	11.4	1.3	8.3	1.9	9.9	1.6	10.0	1.3	12.7	1.5	11.5	0.9	10.9	1.3	10.8	1.6
40	7.8	1.3	9.6	1.0	7.8	0.8	11.7	1.6	10.4	2.2	9.5	0.7	9.9	1.0	9.8	0.4	8.7	1.0
41	6.6	0.7	6.7	1.7	6.4	1.1	8.5	1.6	9.3	0.9	–	–	7.8	0.7	9.0	–	9.3	1.3
42	8.1	1.4	6.4	1.2	6.4	2.2	7.0	1.1	7.9	1.1	–	–	–	–	–	–	6.6	0.7
43	–	–	5.0	1.4	5.1	1.1	7.2	1.2	9.1	1.0	–	–	–	–	–	–	–	–
44	–	–	3.0	1.0	5.0	3.1	7.3	0.8	6.8	0.8	–	–	–	–	–	–	–	–

"–" indicates that data is unavailable for this time period.

Table 15. Mean weekly water temperature maximums (°C) recorded at the Hughes Brook counting fence, 1984–1992.

	AVERAGE MAXIMUM DAILY WATER TEMPERATURE																	
	1984		1985		1986		1987		1988		1989		1990		1991		1992	
Week	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD
18	–	–	–	–	5.0	0.6	9.7	1.5	6.5	0.7	–	–	–	–	–	–	–	–
19	–	–	–	–	6.9	2.8	9.4	0.9	6.7	0.9	–	–	–	–	–	–	–	–
20	–	–	–	–	11.6	2.4	10.5	2.2	7.6	1.7	–	–	–	–	–	–	–	–
21	13.0	1.4	–	–	9.7	2.6	14.7	1.7	9.5	1.1	–	–	–	–	–	–	10.0	–
22	13.0	2.1	13.0	–	10.6	2.6	13.7	1.8	8.7	1.4	–	–	–	–	7.2	1.1	9.6	2.4
23	8.9	1.5	12.0	1.4	9.7	1.8	17.9	1.5	8.4	0.8	–	–	–	–	10.5	2.4	11.5	1.8
24	11.7	3.9	11.7	2.6	11.9	2.0	14.6	1.9	13.7	4.0	20.0	–	14.0	–	10.1	1.7	11.6	1.8
25	13.6	2.0	15.0	1.5	15.7	1.9	18.3	2.3	13.3	1.5	19.8	1.1	15.8	2.8	13.7	2.1	16.3	1.4
26	15.0	2.0	19.1	1.4	16.0	0.8	16.9	1.2	12.7	1.8	21.3	2.7	17.7	2.0	15.0	3.4	13.3	1.4
27	16.7	1.4	20.0	1.5	17.7	3.1	19.7	1.3	16.4	2.6	19.7	2.1	17.0	1.2	14.7	2.6	13.1	1.6
28	21.3	1.1	22.9	2.4	18.3	2.9	22.4	1.4	–	–	20.0	1.5	17.4	1.3	14.4	0.7	15.1	2.2
29	19.9	2.3	17.7	1.8	18.4	2.4	23.3	2.7	19.3	1.5	22.9	1.6	17.9	2.1	19.0	1.2	16.5	1.6
30	19.4	1.3	21.6	0.8	19.1	1.6	20.0	1.4	20.3	1.9	22.3	1.6	18.0	3.5	17.7	2.8	16.9	1.8
31	19.7	1.9	20.4	2.5	19.1	2.5	19.0	2.0	22.3	1.7	22.4	1.7	14.4	1.1	18.1	2.3	15.1	1.9
32	20.0	1.6	21.7	2.3	18.4	2.6	20.9	1.8	21.7	1.1	21.8	2.3	17.4	1.7	16.9	1.5	17.6	1.7
33	19.9	2.5	17.7	1.3	19.0	1.2	20.3	1.3	18.7	4.3	20.9	2.0	16.6	1.6	19.2	1.6	17.1	1.5
34	17.1	2.6	18.7	1.5	17.3	2.1	18.7	1.4	17.3	1.1	19.0	2.5	19.0	3.0	15.1	1.1	16.1	1.6
35	19.3	1.4	15.3	3.0	16.0	1.9	17.0	1.0	17.3	1.6	16.0	2.7	18.6	1.7	14.1	2.8	13.2	1.4
36	16.3	1.1	15.4	2.2	16.0	2.7	13.1	1.5	15.0	0.8	16.6	1.5	15.6	1.3	13.8	1.4	12.1	0.9
37	16.1	2.0	13.6	1.6	13.4	1.1	15.3	1.4	13.9	0.7	14.9	6.2	14.6	1.6	12.0	1.1	14.9	0.9
38	13.1	0.9	14.1	1.9	12.0	1.0	14.2	1.2	14.4	1.8	16.7	3.1	12.6	0.5	11.9	1.3	13.8	1.4
39	11.4	2.2	13.5	1.4	10.1	1.8	11.7	2.1	11.2	1.5	15.3	3.4	12.8	0.6	11.9	1.3	12.9	0.9
40	9.3	1.5	11.1	1.1	9.7	1.5	13.4	1.5	11.1	2.2	10.0	0.0	11.1	1.1	10.9	0.7	9.9	0.4
41	8.3	0.8	7.7	2.0	10.3	2.5	10.3	1.7	10.3	1.3	–	–	8.7	1.3	10.0	–	10.7	1.4
42	9.7	2.0	7.6	1.6	9.1	3.4	8.9	1.4	9.0	1.4	–	–	–	–	–	–	7.8	0.9
43	–	–	6.4	1.6	8.0	2.8	8.9	1.1	9.7	1.3	–	–	–	–	–	–	–	–
44	–	–	4.7	1.2	8.0	5.2	9.7	1.5	7.3	0.6	–	–	–	–	–	–	–	–

"–" indicates that data is unavailable for this time period.

Table 16. Mean weekly water temperature minimums (°C) recorded at the Hughes Brook counting fence, 1984–1992.

	AVERAGE MINIMUM DAILY WATER TEMPERATURE																	
	1984		1985		1986		1987		1988		1989		1990		1991		1992	
Week	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD
18	–	–	–	–	2.7	1.5	4.0	1.0	3.5	0.7	–	–	–	–	–	–	–	–
19	–	–	–	–	1.7	1.3	7.2	0.5	3.2	0.5	–	–	–	–	–	–	–	–
20	–	–	–	–	5.3	1.6	6.7	1.4	4.0	0.7	–	–	–	–	–	–	–	–
21	10.0	0.8	–	–	4.7	0.8	6.9	1.4	7.7	1.8	–	–	–	–	–	–	5.5	–
22	10.0	1.8	10.0	–	5.0	0.0	9.1	0.7	6.7	1.3	–	–	–	–	5.2	0.5	6.4	1.4
23	7.6	1.7	8.6	0.6	6.4	1.5	10.1	0.7	6.3	1.3	–	–	–	–	6.4	0.8	7.1	1.9
24	7.9	2.7	8.3	1.1	8.0	1.0	9.9	0.4	9.4	1.3	12.0	–	13.0	–	7.1	0.9	8.9	0.5
25	9.6	1.9	10.4	0.5	9.3	4.5	10.4	1.3	11.1	1.1	14.4	0.9	11.3	1.3	9.3	1.4	12.4	1.3
26	9.4	3.6	12.4	1.1	9.6	1.7	12.0	1.6	10.3	0.8	16.3	1.0	13.3	0.8	11.3	1.9	10.6	1.1
27	13.7	1.1	13.9	2.3	9.7	2.6	12.7	1.7	10.7	0.8	15.0	1.4	11.1	1.8	10.6	1.0	9.9	1.3
28	16.9	0.9	16.9	2.0	12.0	1.0	17.3	1.8	–	–	12.7	5.0	12.9	1.1	11.9	1.1	11.3	0.6
29	13.9	1.7	14.4	0.8	12.7	1.5	12.7	5.0	16.0	1.8	15.6	3.2	12.4	3.4	13.9	0.9	11.6	0.7
30	15.4	1.0	15.3	1.7	13.9	1.2	14.0	1.8	16.4	1.1	17.0	2.4	13.0	1.0	13.6	0.8	11.1	2.8
31	13.9	0.9	14.3	1.4	13.7	1.0	13.4	0.8	17.7	1.1	15.7	0.8	13.0	1.5	12.7	1.0	12.3	1.1
32	13.7	1.5	15.7	1.1	13.3	0.5	12.7	1.9	17.6	1.7	13.2	5.0	14.0	1.0	12.0	1.1	13.8	0.7
33	15.6	1.4	13.4	1.6	14.9	1.4	13.9	1.2	15.4	3.3	16.1	2.9	13.3	2.3	13.4	1.1	12.4	1.4
34	13.0	2.3	13.9	1.1	14.0	1.6	13.1	2.0	13.0	1.8	14.0	4.2	12.0	2.5	12.3	1.6	12.7	1.7
35	12.7	1.4	10.7	3.3	11.3	1.8	11.1	1.5	14.4	1.3	9.9	2.0	13.6	1.8	11.1	1.4	11.4	1.3
36	13.1	1.5	11.1	1.1	10.3	1.5	10.6	1.9	11.4	1.4	10.3	3.9	10.9	0.9	10.9	1.1	9.2	2.7
37	12.0	2.2	9.3	1.3	9.3	0.5	8.9	2.1	12.1	1.1	11.3	4.4	10.2	1.9	9.6	0.6	12.1	1.8
38	9.4	1.3	9.6	3.5	5.9	1.9	9.3	1.6	12.7	2.4	11.3	2.1	11.1	0.9	9.9	1.2	9.9	1.6
39	8.4	1.4	9.4	2.0	6.4	2.4	8.1	1.4	8.8	1.1	10.0	2.6	10.2	1.4	9.9	1.4	8.7	3.0
40	6.3	1.4	8.0	1.2	5.9	1.2	10.0	1.9	9.7	2.4	9.0	1.4	8.8	1.1	8.6	0.5	7.6	1.6
41	4.9	0.9	5.7	1.5	2.6	1.3	6.7	1.7	8.3	1.0	–	–	6.8	0.8	8.0	–	7.9	1.5
42	6.6	1.1	5.1	1.5	3.7	1.4	5.1	1.2	6.9	1.2	–	–	–	–	–	–	5.5	0.9
43	–	–	3.6	1.6	2.3	2.4	5.6	1.8	8.5	0.9	–	–	–	–	–	–	–	–
44	–	–	3.0	1.0	2.0	1.7	5.0	1.0	6.3	1.2	–	–	–	–	–	–	–	–

"–" indicates that data is unavailable for this time period.

Table 17. Mean weekly air temperatures (°C) recorded at the Hughes Brook counting fence, 1984–1992.

	AIR TEMPERATURES (average of maximum and minimum daily temperatures)																	
	1984		1985		1986		1987		1988		1989		1990		1991		1992	
Week	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD
18	–	–	–	–	8.4	2.2	9.8	2.1	9.5	2.1	–	–	–	–	–	–	–	–
19	–	–	–	–	6.9	1.7	11.4	2.3	11.2	2.4	–	–	–	–	–	–	–	–
20	–	–	–	–	12.1	4.2	10.6	2.8	11.4	2.1	5.3	2.8	–	–	–	–	–	–
21	16.3	1.3	–	–	8.6	2.2	13.4	1.6	11.8	3.0	6.6	2.9	–	–	–	–	7.3	–
22	12.1	4.0	12.5		11.2	2.2	14.1	1.1	9.0	4.3	8.2	1.7	–	–	7.6	1.0	10.4	5.1
23	8.1	4.3	10.8	1.0	10.3	0.4	15.5	0.7	8.9	1.6	8.1	3.8	–	–	9.7	2.6	10.0	4.6
24	10.7	3.6	12.1	4.2	–	–	13.9	2.0	15.1	3.5	4.6	2.7	17.5	1.4	9.1	4.0	10.0	1.5
25	12.4	3.5	14.7	2.4	–	–	15.3	1.3	15.6	3.6	10.4	2.2	12.1	3.7	13.1	2.2	16.7	1.0
26	13.4	3.6	16.4	1.4	12.0	–	16.6	1.9	13.3	2.5	12.0	3.3	17.9	1.9	14.5	4.8	12.6	2.8
27	18.6	3.2	20.1	1.6	14.3	1.8	18.4	3.5	16.4	1.8	10.7	3.6	14.4	2.3	14.1	2.9	11.5	2.6
28	22.5	1.8	21.5	2.1	14.6	1.4	24.0	2.1	–	–	10.1	2.8	16.1	1.5	14.4	2.3	13.6	2.6
29	20.1	2.3	18.3	1.7	16.5	3.0	18.9	2.3	16.6	1.7	11.6	4.2	17.4	1.0	18.6	3.2	14.1	2.7
30	18.8	1.9	19.2	2.5	16.0	2.3	19.1	1.0	18.5	2.1	15.4	3.8	17.6	1.7	17.3	2.0	15.9	2.2
31	17.8	3.0	17.9	3.1	17.1	2.7	18.3	1.2	19.8	3.2	12.6	2.5	18.1	2.3	15.8	3.0	15.1	2.4
32	19.4	2.2	21.1	2.2	15.9	0.7	19.1	1.9	20.6	2.0	13.9	1.2	21.5	2.2	14.6	2.5	16.9	1.5
33	19.1	4.1	15.3	1.7	18.2	2.7	19.1	1.3	15.2	4.9	13.5	4.1	17.6	4.7	18.0	2.9	15.5	2.6
34	14.0	3.6	17.5	2.3	16.4	1.6	17.2	1.6	10.8	2.0	11.0	3.4	15.0	3.2	13.4	1.9	15.4	2.9
35	18.5	3.0	13.7	2.2	14.8	1.7	16.1	1.8	13.4	1.6	7.3	4.3	16.7	2.9	11.3	4.0	13.0	2.8
36	12.3	1.9	13.4	1.7	13.9	2.5	14.1	1.4	8.3	2.6	8.1	2.4	12.9	2.8	12.3	2.5	11.2	2.9
37	12.5	2.7	11.9	2.1	11.6	1.7	14.3	2.1	7.2	1.5	9.1	3.7	12.7	2.9	11.3	1.4	15.0	2.4
38	8.9	1.8	12.9	3.3	7.2	0.9	13.7	2.0	10.1	3.5	7.8	3.1	12.0	2.1	10.5	2.9	12.2	2.5
39	8.8	3.4	12.9	1.7	6.9	1.8	11.8	3.5	5.4	2.9	5.4	4.2	11.0	1.6	10.7	3.6	11.5	4.2
40	5.6	1.9	10.4	3.3	7.2	0.8	13.7	4.2	5.5	4.5	3.8	0.4	9.2	1.4	9.3	2.5	6.1	1.8
41	5.1	1.2	5.4	2.2	5.3	1.0	7.9	3.5	3.9	2.5	–	–	4.4	0.8	6.0	–	9.8	3.3
42	7.5	2.0	6.7	2.8	6.1	2.8	8.5	3.3	2.1	2.6	–	–	–	–	–	–	5.6	2.2
43	–	–	5.6	1.7	2.5	2.6	9.7	2.6	3.8	2.0	–	–	–	–	–	–	–	–
44	–	–	3.0	1.5	4.7	1.6	7.0	5.8	0.0	0.5	–	–	–	–	–	–	–	–

"–" indicates that data is unavailable for this time period.

Table 18. Mean weekly air temperature (°C) mimimums and maximums recorded at the Hughes Brook counting fence, 1984−1992.

Week	AVERAGE MINIMUM DAILY AIR TEMPERATURE									AVERAGE MAXIMUM DAILY AIR TEMPERATURE								
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1984	1985	1986	1987	1988	1989	1990	1991	1992
18	–	–	4.8	1.0	5.0	–	–	–	–	–	–	12.0	18.7	14.0	–	–	–	–
19	–	–	−0.3	6.8	4.8	–	–	–	–	–	–	14.1	16.0	17.6	–	–	–	–
20	–	–	3.0	5.3	6.4	−1.3	–	–	–	–	–	21.1	15.8	16.4	12.0	–	–	–
21	11.3	–	1.7	7.3	8.7	1.0	–	–	3.0	21.3	–	15.6	19.6	14.8	12.3	–	–	11.5
22	9.0	11.0	5.7	8.3	4.4	4.3	–	4.1	5.0	15.3	14.0	16.7	19.9	13.6	12.1	–	11.1	15.7
23	5.7	7.6	6.0	6.7	6.3	1.0	–	4.4	4.6	10.4	14.0	14.5	24.3	11.6	15.1	–	15.0	15.3
24	7.6	7.7	–	8.3	11.0	−1.7	12.5	5.9	4.6	13.8	16.4	–	19.5	19.1	10.8	22.5	12.2	15.4
25	8.1	9.3	–	7.4	12.9	3.8	8.1	6.3	10.5	16.6	20.1	–	23.1	18.4	17.0	16.1	19.9	22.9
26	7.1	9.7	8.0	9.4	11.1	5.1	12.3	8.7	8.1	19.7	23.0	16.0	23.7	15.5	18.9	23.6	20.4	17.1
27	13.6	13.9	6.7	10.1	10.7	5.0	7.4	7.8	7.0	23.7	26.3	21.9	26.7	22.0	16.4	21.3	20.5	15.9
28	17.0	16.7	7.8	17.0	–	4.3	9.9	9.9	8.6	28.0	26.3	21.4	31.0	–	16.0	22.4	18.9	18.6
29	13.0	14.5	8.9	12.6	11.5	6.3	11.3	11.4	7.9	27.1	22.1	24.1	25.3	21.8	17.0	23.6	25.9	20.4
30	13.6	14.0	8.6	10.0	13.2	8.3	12.4	12.1	10.0	24.0	24.4	23.4	28.3	23.9	22.4	22.9	22.4	21.7
31	10.7	12.6	12.1	11.4	14.9	4.9	13.0	10.1	10.0	24.9	23.1	22.1	25.1	24.7	20.3	23.3	21.4	20.3
32	12.0	15.1	11.1	12.0	16.1	7.9	16.0	8.8	11.0	26.7	27.1	20.6	26.3	25.0	20.0	26.9	20.4	22.9
33	13.7	11.0	9.7	11.7	10.5	9.1	12.3	11.9	8.0	24.6	19.6	26.7	26.6	19.8	17.9	23.0	24.1	22.9
34	9.9	12.9	10.0	9.1	3.9	6.4	7.9	8.1	11.7	18.1	22.1	22.7	25.3	17.7	15.6	22.2	18.6	19.1
35	13.0	9.6	6.7	8.6	10.0	3.0	10.2	6.2	9.6	23.9	17.9	22.9	23.7	16.7	11.6	23.1	16.3	16.4
36	7.1	9.0	7.7	11.1	3.9	1.3	6.3	7.6	5.6	17.4	17.7	20.1	17.0	12.7	14.9	19.5	17.0	16.8
37	8.3	8.0	5.0	6.7	4.7	3.0	6.3	7.2	9.8	16.7	15.7	18.1	21.9	9.7	15.1	19.1	15.3	20.2
38	3.4	7.3	0.4	8.5	7.0	3.1	8.6	6.1	5.1	14.4	18.4	14.0	18.8	13.3	12.4	15.4	14.9	19.3
39	4.3	8.7	2.4	6.7	3.4	0.4	5.6	6.4	6.2	13.3	18.2	11.4	16.9	7.4	10.4	16.4	15.0	16.9
40	0.9	5.7	0.9	8.8	3.5	1.0	5.4	4.1	1.7	10.4	15.1	13.6	18.6	7.4	6.5	13.0	14.6	10.5
41	0.9	2.0	−1.4	3.1	1.5	–	−0.8	3.0	4.7	9.3	8.9	12.0	12.6	6.3	–	9.7	9.0	14.8
42	3.9	4.0	0.0	3.0	−2.9	–	–	–	2.1	11.1	9.4	12.1	14.0	7.1	–	–	–	9.2
43	–	3.1	−3.3	5.1	1.1	–	–	–	–	–	8.0	8.3	14.3	6.6	–	–	–	–
44	–	2.0	−1.7	3.0	−2.2	–	–	–	–	–	4.0	11.0	11.0	2.2	–	–	–	–

"–" indicates that data is unavailable for this time period.

Table 19. Results of electrofishing surveys completed at Hughes Brook, 1984–1987.

Station	Date (yr/mn/day)	Site Type	Area (m x m)	Flow rate (m/sec)	Average Depth (cm)	Water Temp. (°C)	Habitat Type	Density (No. per 100 m²) Salmon Fry	Salmon Parr	Brook Trout	Description of Site Location
# 3	840820	closed	402.3	0.70	15.7	16	Run	0.54	2.00	5.91	– just above bridge
# 1	850826	closed	361.2	0.42	20.5	20	Run	0.00	2.30	13.87	– below bridge
# 2	850826	closed	422.6	0.47	20.6	15	Run	1.06	0.71	8.00	– below bridge
# 4	850826	closed	479.2	0.43	29.3	12	Run	2.72	2.97	39.12	– on the first turn above bridge
# 5	850827	closed	543.8	0.28	28.9	14	Run	1.88	2.72	25.70	– below first falls
# 6	850827	closed	509.6	0.44	25.7	11	Riffle	7.07	12.95	12.91	– above first falls
# 3	860901	closed	833.0	0.57	39.7	13	Run	2.40	9.18	4.92	– just above bridge
# 4	860903	closed	583.2	0.49	27.9	11	Run	4.05	10.24	7.61	– on the first turn above bridge
#5	860904	closed	469.5	–	24.2	11	Run	11.00	34.27	3.04	– below first falls
#1	870722	closed	361.2	0.51	17.9	15	Run	9.40	14.69	18.96	– below bridge
#2	870723	closed	421.2	0.36	16.6	15	Run	0.95	18.61	10.95	– below bridge
#3	870724	closed	552.5	0.52	18.2	14	Run	9.35	12.45	19.21	– just above bridge
#4	870724	closed	479.2	0.22	22.3	16	Run	4.14	17.33	20.95	– on the first turn above bridge

Please refer to the applicable topographic maps (scale 1:50,000).

Table 20. North Brook stream survey data, (mouth to Main Falls), 1987–1988.

SECTION LENGTH (m)	WATER WIDTH (m)	BANK WIDTH (m)	BOTTOM AREA (m x m)	% BOTTOM TYPE B	C	G	S	BDR	OTH	WATER FLOW CATEGORY (%) POOL	RUN	RIFF	RPDS	FALLS	REARING UNITS
Mouth of North brook upstream to first bridge, Station A1 and Station A, 1987.															
100	18.3	35.0	1830.0	0	5	20	75			100					18.3
100	15.8	25.1	1580.0	10	35	20	35			30	40	30			15.8
100	16.5	22.7	1650.0	20	30	5	25	20		10	90				16.5
100	12.0	19.3	1200.0	20	50	5	15	10		20	80				12.0
100	14.5	19.5	1450.0	20	50	10	10	10		20	80				14.5
100	15.4	19.6	1540.0	0	0	90	10			20		80			15.4
100	13.3	20.2	1330.0	0	0	85	15			10		90			13.3
100	12.6	20.7	1260.0	0	5	20	80			40		55			12.6
100	11.1	21.0	1110.0	0	5	75	20			50	10	40			11.1
100	19.4	27.7	1940.0	20	65	10	5				50	50			19.4
111	19.23	29.56	2134.5	23	60	5	10	2		5	40	45			21.3
From first bridge, upstream, Station B, 1987.															
100	16.5	17.0	1650.0	25	25	5	15	30		35	50	15			16.5
100	15.7	56.5	1570.0	15	20	5	0	60		10	85	5			15.7
100	19.2	28.6	1920.0	25	60	10	0	5		5	75	20			19.2
100	22.0	28.5	2200.0	15	65	5	0	15		10	90				22.0
100	17.6	22.0	1760.0	15	20	5	0	60		30	20	50			17.6
100	9.9	15.5	990.0	25	10	5	0	60			90	10			9.9
100	14.0	20.7	1400.0	3	0	20	2	75		40	60				14.0
100	22.5	27.6	2250.0	15	70	5	0	10			50	50			22.5
100	20.7	25.9	2070.0	5	10	0	5	80		50	25	25			20.7
100	17.5	25.4	1750.0	15	65		5	15			100				17.5
Between 1Km and 2Km's above first bridge, Station C, 1988.															
100	10.8	21.7	1080.0	5	5	10	0	80			80	20			10.8
100	10.9	25.3	1090.0	5	20	20	5	50		25	25	50			10.9
100	16.6	26.9	1660.0	3	5	2	0	90				100			16.6
100	21.7	27.0	2170.0	5	15	15	5	60				100			21.7
100	15.4	26.4	1540.0	3	10	7	0	80			30	70			15.4
100	15.6	31.4	1560.0	3	20	10	2	65			60	40			15.6
100	23.6	27.1	2360.0	10	15	20	5	50			10	90			23.6
100	17.2	20.1	1720.0	5	30	20	5	40		5	20	75			17.2
100	20.0	24.7	2000.0	10	35	10	5	40			30	70			20.0
100	21.5	24.7	2150.0	5	30	10	5	50		30	30	40			21.5
Between 2–3Km above first bridge on North Brook, Station D, 1988.															
100	16.9	19.9	1690.0	10	10	40	5	35		20	40	40			16.9
100	16.1	20.9	1610.0	5	5	5	5	80			10	90			16.1
100	20.9	26.0	2090.0	30	30	10	10	20		10	20	70			20.9
100	26.0	30.2	2600.0	30	40	15	5	10			20	80			26.0
100	20.2	25.1	2020.0	5	20	10		65		5	80	15			20.2
100	19.2	26.6	1920.0	10	70	5		15			10	90			19.2
100	20.7	28.5	2070.0	40	40	5		15		5	15	80			20.7
100	23.5	25.6	2350.0	30	30	10		30		20		80			23.5
100	20.1	22.9	2010.0	35	30	5	10	20		10	5	85			20.1
100	16.7	22.3	1670.0	45	30			25			30	70			16.7

Table 20 (cont'd). North Brook stream survey data, (mouth to Main Falls), 1987–1988.

SECTION LENGTH (m)	WATER WIDTH (m)	BANK WIDTH (m)	BOTTOM AREA (m x m)	% BOTTOM TYPE						WATER FLOW CATEGORY (%)					REARING UNITS
				B	C	G	S	BDR	OTH	POOL	RUN	RIFF	RPDS	FALLS	
Between 3–4 Km above first bridge on North Brook, Station E, 1988.															
100	17.1	20.9	1710.0	30	5	10	5	50			60	40			17.1
100	15.7	20.7	1570.0	25	10		5	60			30	70			15.7
100	17.0	22.3	1700.0	20	30	10	10	30			30	70			17.0
100	16.8	19.4	1680.0	10	10	10		70			70	30			16.8
100	22.3	24.3	2230.0	30	40	10	10	10				100			22.3
100	22.3	24.8	2230.0	5	60	5		30			50	50			22.3
100	15.6	20.2	1560.0	20	25	10		45		5	45	50			15.6
100	17.9	22.6	1790.0	40	50	5		5			40	60			17.9
100	21.8	24.9	2180.0	40	50	10		0			10	90			21.8
100	5.7	23.3	570.0	35	40	5		20			20	80			5.7
Between 4–5Km above first bridge on North Brook, Station F, 1988.															
100	16.3	19.8	1630.0	35	50			15			20	80			16.3
100	11.7	15.8	1170.0	50				50		60				40	11.7
100	15.0	18.1	1500.0	20	45	5		30			30	70			15.0
100	20.8	23.0	2080.0	20	45	5		30			10	90			20.8
100	18.0	21.1	1800.0	15	25	8	2	50		20		80			18.0
100	16.5	21.1	1650.0	30	50	5		15		10	5	85			16.5
100	16.8	21.3	1680.0	45	35	20					5	95			16.8
100	18.7	22.7	1870.0	55	35	10						100			18.7
100	18.8	21.1	1880.0	50	45			5		5	5	90			18.8
92	15.2	17.7	1398.4	65	35					5		95			14.0
Between 5 – 5.9Km above the first bridge on North Brook, Station G, 1988.															
– Not surveyed because the whole of 900m is a series of pools and falls.															
– This natural obstruction known as Main Falls, prevents the passage of fish beyond this point.															
TOTAL			105,822.9												1,058.2

Note: Refer to topographic maps 12H/4 and 12H/3 (scale 1:50,000).

Table 21. Coal Brook stream survey data, (mouth to 9 km mark), 1989, 1991.

Section Length (m)	Water Width (m)	Bank Width (m)	Bottom Area (m x m)	% Bottom Type						WATER FLOW CATEGORY (%)					REARING UNITS
				B	C	G	S	BDRK	OTH	POOL	RUN	RIFF	RPDS	FALLS	
Coal Brook, from mouth to 1 km mark, Station 1, Site A – Site J, 1989.															
100	8.3	9.5	830.0	2	8	60	30				90	10			8.3
100	6.8	7.7	680.0	0	15	70	15				100				6.8
100	5.0	6.4	500.0		10	60	30				30		70		5.0
100	5.2	6.4	520.0	0	10	40	50				30	60	10		5.2
100	4.9	8.7	490.0	0	0	90	5	5			10	80	10		4.9
100	5.3	8.6	530.0	0	0	60	40					10	90		5.3
100	6.1	7.8	610.0	0	0	80	20				5	35	60		6.1
100	8.4	8.0	840.0	0	0	80	20					80	20		8.4
100	11.0	12.3	1100.0	0	5	5	90				90	10			11.0
100	6.4	8.9	640.0	5	50	45	0					60	40		6.4
Coal Brook, between the 1 km and 2 km mark from mouth, Station 2, Site A – Site J, 1989.															
100	7.6	10.0	760.0	20	20	40	0	20					100		7.6
100	5.9	7.5	590.0	40	50	10	0	0				40	60		5.9
100	7.5	8.1	750.0	50	50							50	50		7.5
100	6.5	7.3	650.0	10	20	10	30	30				30	70		6.5
100	7.4	8.5	740.0	20	40	30	10	0				50	50		7.4
100	7.6	9.1	760.0	10	50	0	20	20				20	80		7.6
100	7.3	9.2	730.0	20	30	0	10	40					100		7.3
100	9.2	11.8	920.0	20	20	20	20	20			20	40	40		9.2
100	6.8	8.6	680.0	40	30	30	0	0				50	50		6.8
100	7.3	8.8	730.0	10	60	20	10				20	40	40		7.3
Coal Brook, between the 2 km and 3 km mark from mouth, Station 3, Site A – Site J, 1989.															
100	8.3	9.7	830.0	30	40	10	0	20				50	50		8.3
100	6.1	7.8	610.0	20	40	10	10	20				50	50		6.1
100	5.6	7.2	560.0	5	15	5	5	70				50	50		5.6
100	6.1	7.7	610.0	35	15	30	20	0				75	25		6.1
100	6.4	7.9	640.0	30	40	5	25	0					100		6.4
100	6.9	8.1	690.0	10	30	50	10	0				60	40		6.9
100	10.7	11.9	1070.0							100					10.7
100	22.5	18.6	2250.0							100					22.5
100	17.3	11.0	1730.0							100					17.3
100	8.3	9.2	830.0			50	50				100				8.3
Coal Brook, between the 3 km and 4 km mark from mouth, Station 4, Site A – Site J, 1989.															
100	7.6		760.0	estimate water width											7.6
100	7.6		760.0	estimate water width											7.6
100	7.6		760.0	estimate water width											7.6
100	6.9	7.9	690.0	25	35	40	0					100			6.9
100	8.5	9.2	850.0	0	90	10	0			25	25	35			8.5
100	7.5	9.6	750.0	5	50	45	0			10	20	70			7.5
100	7.5	9.3	750.0	10	90	0	0					100			7.5
100	8.0	10.1	800.0	5	25	70	0					80	20		8.0
100	6.9	7.9	690.0	10	90	0	0				20	80			6.9
100	7.7	9.1	770.0	6	90	0	0	4				100			7.7

Table 21 (con't). Coal Brook stream survey data, (mouth to 9 km mark), 1989, 1991.

Section Length (m)	Water Width (m)	Bank Width (m)	Bottom Area (m x m)	% Bottom Type B	C	G	S	BDRK	OTH	WATER FLOW CATEGORY (%) POOL	RUN	RIFF	RPDS	FALLS	REARING UNITS
Coal Brook, between the 4 km and 5 km mark from mouth, Station 5, Site A – Site J, 1989.															
100	8.3	8.5	830.0	50	75	0	0					40	60		8.3
100	7.4	8.9	740.0	15	85	0	0					100			7.4
100	7.9	9.3	790.0		*****	0	0					95	5		7.9
100	6.4	7.9	640.0	20	60	5	5	10			100				6.4
100	5.3	6.7	530.0	20	65	0	0	15			100				5.3
100	5.8	7.3	580.0	30	60	0	0	10			100				5.8
100	7.2	9.0	720.0	25	70	0	0	5			100				7.2
100	6.7	8.2	670.0	15	65	0	5		15		100				6.7
100	6.2	7.5	620.0	3	32	0	20	15	30	40	20	40			6.2
100	6.7	7.5	670.0	0	25	0	65		10	35	30	35			6.7
Coal Brook, between the 5 km and 6 km mark from mouth, Station 11, Site A – Site J, 1991.															
100	5.1	7.5	510.0	5	95	0	0				10	90			5.1
100	5.6	8.6	560.0	10	76	4	1	9		3	17	80			5.6
100	5.0	8.2	500.0	15	83	2	0				10	90			5.0
100	4.7	7.0	470.0	5	88	3	0	4			10	90			4.7
100	4.5	6.4	450.0	5	95	0	0					100			4.5
100	4.6	6.4	460.0	55	45	0				10		90			4.6
100	5.0	6.8	500.0	65	35							100			5.0
100	5.5	6.8	550.0	48	50			2				100			5.5
100	4.1	7.6	410.0	0	*****	0	0					100			4.1
100	4.5	6.8	450.0	5	95	0	0					100			4.5
Coal Brook, between the 6 km and 7 km mark from mouth, Station 12, Site A – Site J, 1991.															
100	5.0	5.4	500.0	0	60	20	20			10		90			5.0
100	4.3	17.4	430.0	0	55	30	15				10	90			4.3
100	14.9	7.0	1490.0	5	40	50	5			10		90			14.9
100	5.7	7.2	570.0	15	70	15	0			5		95			5.7
100	5.5	6.6	550.0	20	70	10	0					100			5.5
100	5.2	6.8	520.0	15	70	15	0			10	10	80			5.2
100	5.8	8.1	580.0	20	65	15	0					100			5.8
100	5.6	7.5	560.0	15	70	15	0					100			5.6
100	5.5	7.9	550.0	10	80	10				20	30	50			5.5
100	5.3	7.5	530.0	15	55	10	20					100			5.3
Coal Brook, between the 7 km and 8 km mark from mouth, Station 13, Site A – Site J, 1991.															
100	7.2	10.3	720.0	15	65	15	5					80	20		7.2
100	7.2	10.6	720.0	10	50	35	5			25		75			7.2
100	5.5	8.6	550.0	5	80	10	5					80	20		5.5
100	6.1	10.9	610.0	5	40	45	10			10		90			6.1
100	6.0	11.3	600.0	20	70	10					20	80			6.0
100	5.5	9.0	550.0	30	50	20						70	30		5.5
100	5.4	8.7	540.0	25	50	25	0				20	30	50		5.4
100	5.7	9.0	570.0	30	50	10	10					100			5.7
100	6.0	9.5	600.0	40	30	30						85	15		6.0
100	6.2	8.8	620.0	30	60	10	0					70	30		6.2

Table 21 (con't). Coal Brook stream survey data, (mouth to 9 km mark), 1989, 1991.

Section Length (m)	Water Width (m)	Bank Width (m)	Bottom Area (m x m)	% Bottom Type B	C	G	S	BDRK	OTH	WATER FLOW CATEGORY (%) POOL	RUN	RIFF	RPDS	FALLS	REARING UNITS
Coal Brook, between the 8 km and 9 km mark from mouth, Station 14, Site A – Site J, 1991.															
100	6.4	9.3	640.0	30	40	30	0					75	25		6.4
100	5.9	7.8	590.0	25	35	40	0					25	75		5.9
100	5.4	8.0	540.0	25	50	10	0	15		5		60	35		5.4
100	5.7	8.1	570.0	15	40	20	0	25				40	60		5.7
100	6.8	9.1	680.0	30	35	30	0	5		15		35	50		6.8
100	5.2	8.9	520.0	40	30	30	0			10		20	70		5.2
100	4.8	7.0	480.0	30	30	35	5					25	75		4.8
100	4.7	7.0	470.0	25	35	40	0				10	30	50	10	4.7
100	4.9	7.7	490.0	30	35	35	0			20			80		4.9
100	5.3	7.5	530.0	25	30	40	5			5			95		5.3
TOTAL			60,970.0												609.7

Note: Refer to topographic maps 12H/4 and 12H/3 (scale 1:50,000).

Table 22. North Brook stream survey data, (areas above Main Falls), 1987–89.

Section Length (m)	Water Width (m)	Bank Width (m)	Bottom Area (m x m)	% Bottom Type B	C	G	S	BDRK	OTH	WATER FLOW CATEGORY (%) POOL	RUN	RIFF	RPDS	FALLS	REARING UNITS
North Brook, from the first pond above Main Falls, upstream to first bridge above falls, Station L, 1987.															
100	10.0	13.1	1000.0	20	70	5	4	1			50	50			10.0
100	7.4	16.9	740.0	5	10	5	80			70	30				7.4
100	9.2	15.9	920.0	0	10	5	85			100					9.2
100	7.6	12.2	760.0	5	10	5	80			100					7.6
100	6.0	10.6	600.0	1	9	10	80			80	20				6.0
95	7.2	9.2	684.0	3	20	70	7			20	80				6.8
North Brook, from first bridge above falls to second pond above falls, Station M, 1987–1988.															
100	9.5	13.1	950.0	2	30	8	60			20		80			9.5
100	11.1	14.4	1110.0	5	30	30	30	5		70		20			11.1
100	10.4	11.6	1040.0	10	10	40	40			90		10			10.4
100	11.9		1190.0												11.9
100	11.9		1190.0												11.9
100	13.4	14.0	1340.0	5	55	40					40	60			13.4
100	9.6	10.5	960.0	30	40	20	5	5		10	45	45			9.6
100	10.1	11.1	1010.0	10	80	10					20	80			10.1
100	13.7	16.7	1370.0	40	45	10	5				10	90			13.7
100	10.7	13.4	1070.0	25	55	15	5				75	25			10.7
100	12.4	15.1	1240.0	5	40	40	5	10			20	80			12.4
100	12.6	13.5	1260.0	10	65	20	5					100			12.6
100	8.7	9.5	870.0	5	15	50	5	25		15	20	65			8.7
100	31.1	32.4	3110.0	10	30	10	15	35			100				31.1
100	22.8	23.6	2280.0	15	35	30	15	5			15	85			22.8
100	10.3	11.8	1030.0	10	60	5		25		15	10	75			10.3
100	33.6	34.8	3360.0	5	70	20	5				50	50			33.6
North Brook, from the third pond above the falls to North Lake, Station R, 1988.															
100	7.8	9.5	780.0	25	20	10	45			10	20	70			7.8
100	6.0	9.6	600.0	40	40	10		10			90	10			6.0
30	11.0	12.6	330.0	10	85	5					100				3.3
159	40		6360.0	STEADY						100					63.6
100	5.9	12.3	590.0	20	10	40	30				10	90			5.9
100	7.5	13.4	750.0	20	35	35	10				20	80			7.5
100	9.4	8.5	940.0	20	50	20	10				50	50			9.4

Table 22 (cont'd). North Brook stream survey data, (areas above Main Falls), 1987–89.

Section Length (m)	Water Width (m)	Bank Width (m)	Bottom Area (m x m)	% Bottom Type B	C	G	S	BDRK	OTH	WATER FLOW CATEGORY (%) POOL	RUN	RIFF	RPDS	FALLS	REARING UNITS
Tributary running from Keat's Pond to the Second Pond above Main Falls, Stations 7 and 8, 1989.															
100	1.8	1.9	180.0	10	20	0	10	60		5	30	15	50		1.8
100	2.8	3.8	280.0	10	60	0	30			30	50	20			2.8
100	4.1	5.5	410.0	5	90	0	5				100				4.1
100	3.4	5.7	340.0	5	35	45	10	5			100				3.4
100	3.2	1.9	320.0	10	35	30	15	10			100				3.2
100	3.0	4.3	300.0	5	30	5		60			30			70	3.0
100	1.4	5.0	140.0	10	40	10	15	20	5		75		25		1.4
100	4.2	4.7	420.0	10	25	25	40			5	25	70			4.2
100	3.4	4.6	340.0	15	60	10	15				50	50			3.4
100	4.2	5.2	420.0	5	50	20	25			15	85				4.2
100	4.1	5.3	410.0	3	25	22	50			15	85				4.1
100	5.0	6.2	500.0	10	50	25	15			40	60				5.0
100	4.2	5.3	420.0	2	35	30	33			5	95				4.2
100	4.2	4.5	420.0	2	30	35	33					100			4.2
Brook #2 flowing into North Lake, Station 10, 1989.															
100	2.4	4.4	240.0	5	50	42	3			10	30		60		2.4
100	1.1	3.1	110.0	0	50	48	2				100				1.1
Brook #3 flowing into North Lake, Station 9, 1989.															
100	3.7	5.7	370.0	3	50	42	5	0							3.7
100	2.7	4.7	270.0		50	45	5								2.7
100	3.4	4.7	340.0		50	45	5								3.4
100	2.7	4.4	270.0	5	40	40	15								2.7
100	3.3	3.7	330.0	5	38	35	20	2							3.3
100	2.1	3.6	210.0	30	70										2.1
100	2.3	4.1	230.0	10	90	0	0								2.3
100	2.5	3.9	250.0	30	65	5									2.5
100	4.1	5.4	410.0	20	75		5								4.1
100	2.8	3.8	280.0	40	60										2.8
100	2.4	4.2	240.0	40	40			20							2.4
100	2.4	4.6	240.0	40	50			10							2.4
100	2.3	4.2	230.0	40	50		10								2.3
100	2.7	4.8	270.0	20	20	20	40								2.7
100	3.3	4.8	330.0	30	60	10									3.3
TOTAL			48,954.0												489.5

Note: Refer to topographic maps 12H/4 and 12H/3 (scale 1:50,000).

Table 23. Atlantic salmon stocking activities completed at North Brook, 1987–1992.

	1987	1988	1989	1990	1991	1992
No. Male Broodstock (small)	4	–	parr*	21	–	–
No. Male Broodstock (small & large)	–	–	–	–	20	26
No. Female Broodstock (small)	14	23	9	28	–	–
No. Female Broodstock (small & large)	–	–	–	–	32	95
% Female – Small	77.8	–	–	57.1	–	–
% Female – Small & Large	–	–	–	–	61.5	78.5
Mean % Female ** 68.7						
No. Females (small) Stripped	11	23	9	28	–	–
No. Females (small & large) Stripped	–	–	–	–	32	58
No. of eggs put down in box	10,995	49,737	9,744	79,512	75,317	160,618
No. of Eggs per Female	1,000	2,162	1,083	2,840	2,354	2,769
Mean # Eggs per Female *** 2,035						
No. of fry hatched out – (following spring)	7,880	–	8,597	71,293	69,000	
No. of fry distributed in stream – (following spring)	7,815	34,882	8,593	69,614	68,904	
Total Hatching Rate (%)	71.7	–	88.2	89.7	91.6	
Total Survival Rate to Distribution (%)	71.1	70.1	88.2	87.6	91.5	

"*" – Precocious parr were used to fertilize the eggs after debris from a beaver dam smashed the instream holding box, freeing the male broodstock.

"**" – Only data from the years of 1987, 1990, 1991, and 1992 were used in this calculation. This value represents an estimate of the percent female of the entire population,

"***" – This value represents an estimate of the number of eggs per female ascertained from stripping activities at the North Brook site.

" – " This symbol indicates that data is unavailable for this period.

Table 24. Weekly counts of Atlantic salmon parr and small adult salmon recorded at the upstream counting fence on North Brook, 1986–1992.

	Salmo Salar (parr)							Salmo Salar (small)						
Week	1986	1987	1988	1989	1990	1991	1992	1986	1987	1988	1989	1990	1991	1992
24	–	–	–	–	114	–	–	–	–	–	–	0	–	–
25	–	–	–	0	3	–	84	–	–	–	1	0	–	0
26	–	1	20	59	27	16	101	–	0	2	0	0	0	3
27	136	61	101	68	21	15	131	0	0	2	0	0	0	4
28	113	40	43	861	28	61	158	11	0	7	5	5	0	12
29	292	50	37	102	229	100	108	5	0	6	0	6	5	5
30	53	13	28	50	16	44	35	1	0	0	0	11	2	2
31	151	36	6	43	17	58	166	4	5	0	1	3	1	8
32	23	15	1	3	11	34	187	24	0	4	28	5	20	9
33	51	5	3	9	1	10	94	0	0	40	9	14	0	2
34	66	28	34	5	8	6	284	2	0	21	1	0	9	33
35	36	56	10	4	23	0	85	1	1	2	0	0	13	44
36	76	102	2	0	9	4	12	5	35	69	1	0	0	1
37	84	14	1	1	27	18	118	9	33	13	0	1	0	4
38	46	73	17	5	2	4	87	2	0	0	0	3	2	2
39	9	0	0	1	2	0	33	2	0	0	0	1	0	2
40	22	–	0	0	3	–	10	0	–	0	0	0	–	0
41	7	–	–	0	0	–	2	0	–	–	0	0	–	0
42	12	–	–	–	–	–	–	0	–	–	–	–	–	–
43	9	–	–	–	–	–	–	0	–	–	–	–	–	–
44	0	–	–	–	–	–	–	0	–	–	–	–	–	–
Total	1186	494	303	1211	541	370	1695	66	74	166	46	49	52	131

Table 25. Weekly counts of Atlantic salmon (large) and brook trout recorded at the upstream counting fence on North Brook, 1986–1992.

Week	Salmo Salar (large)							Salvelinus fontinalis						
	1986	1987	1988	1989	1990	1991	1992	1986	1987	1988	1989	1990	1991	1992
24	–	–	–	–	0	–	–	–	–	–	–	6	–	–
25	–	–	–	1	0	–	0	–	–	–	3	1	–	43
26	–	0	0	0	0	0	0	–	0	4	11	0	13	8
27	0	0	0	0	0	0	0	38	36	27	23	1	3	20
28	0	0	0	0	0	0	1	43	93	19	70	15	0	49
29	0	0	0	0	0	0	0	137	90	20	31	101	20	29
30	0	0	0	0	0	0	0	130	77	41	67	11	40	15
31	0	1	0	0	0	0	1	120	153	13	92	26	49	26
32	2	0	0	0	0	0	1	102	32	24	18	7	34	57
33	0	0	2	1	0	0	0	21	33	31	9	16	19	25
34	0	0	0	0	0	1	4	53	45	44	9	5	13	24
35	0	0	0	0	0	0	4	31	11	8	1	4	12	17
36	0	0	7	0	0	0	0	28	30	6	0	2	0	2
37	1	0	0	0	0	0	0	12	4	1	3	1	6	33
38	0	0	0	0	0	0	0	3	0	7	1	5	2	9
39	0	0	0	0	0	0	1	5	0	0	1	3	0	2
40	0	–	0	0	0	–	0	6	–	0	0	0	–	2
41	0	–	–	0	0	–	0	1	–	–	0	0	–	0
42	0	–	–	–	–	–	–	0	–	–	–	–	–	–
43	0	–	–	–	–	–	–	0	–	–	–	–	–	–
44	0	–	–	–	–	–	–	0	–	–	–	–	–	–
Total	3	1	9	2	0	1	12	730	604	245	339	204	211	361

Table 26. Annual summaries of adult Atlantic salmon returns, broodfish removals, mortalities, and wild spawners enumerated at the upstream counting fence on North Brook, 1986–1992.

Year	No. Small (< 63cm)	No. Large (≥ 63cm)	Total Adult Count	No. Broodfish (small)	No. Broodfish (small & large)	No. Mortalities	No. Wild Spawners
1986	66	3	69	0	0	1	68
1987	74	1	75	18	0	0	57
1988	166	9	175	35	0	0	140
1989	46	2	48	9	0	0	39
1990	49	0	49	49	0	0	0
1991	52	1	53	0	52	1	0
1992	131	12	143	0	84	1	58

Table 27. Weekly counts of Atlantic salmon parr, Atlantic salmon smolt, brook trout, and American eels recorded at the downstream counting fence on North Brook, 1988, 1990–91.

Week	Salmo Salar (parr)							Salmo Salar (smolt)						
	1986	1987	1988	1989	1990	1991	1992	1986	1987	1988	1989	1990	1991	1992
21	–	–	9	–	–	0	–	–	–	44	–	–	44	–
22	–	–	42	–	0	0	–	–	–	219	–	0	0	–
23	–	–	28	–	0	0	–	–	–	124	–	0	0	–
24	–	–	66	–	1	0	–	–	–	150	–	0	0	–
25	–	–	102	–	–	–	–	–	–	37	–	–	–	–
26	–	–	5	–	–	–	–	–	–	0	–	–	–	–
Total	0	0	252	0	1	0	0	0	0	574	0	0	44	0

Week	Salvelinus fontinalis							Anguilla rostrata						
	1986	1987	1988	1989	1990	1991	1992	1986	1987	1988	1989	1990	1991	1992
21	–	–	4	–	–	13	–	–	–	3	–	–	0	–
22	–	–	5	–	0	0	–	–	–	0	–	0	0	–
23	–	–	7	–	0	0	–	–	–	2	–	0	0	–
24	–	–	19	–	0	0	–	–	–	3	–	0	0	–
25	–	–	7	–	–	–	–	–	–	2	–	–	–	–
26	–	–	1	–	–	–	–	–	–	1	–	–	–	–
Total	0	0	43	0	0	13	0	0	0	11	0	0	0	0

"–" indicates that the counting fence was not operating during this period.

Table 28. Operating schedule of the upstream and downstream counting fences at North Brook, 1986–1992.

Week	Upstream Counting Trap						
	1986	1987	1988	1989	1990	1991	1992
24	–	–	–	–	2	–	–
25	–	–	–	[//|\\]	[//|\\]	–	[//|\\]
26	–	1	1	6	[//|\\]	[//|\\]	[//|\\]
27	3	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]
28	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]
29	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]
30	[//|\\]	[//|\\]	[//|\\]	[//|\\]	4	[//|\\]	[//|\\]
31	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]
32	4	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]
33	6	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]
34	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]
35	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]	6	[//|\\]
36	[//|\\]	5	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]
37	[//|\\]	6	5	[//|\\]	[//|\\]	[//|\\]	[//|\\]
38	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]	[//|\\]
39	[//|\\]	[//|\\]	6	6	[//|\\]	1	[//|\\]
40	[//|\\]	–	2	[//|\\]	[//|\\]	–	[//|\\]
41	[//|\\]	–	–	4	2	–	1
42	[//|\\]	–	–	–	–	–	–
43	[//|\\]	–	–	–	–	–	–
44	[//|\\]	–	–	–	–	–	–

Week	Downstream Counting Trap						
	1986	1987	1988	1989	1990	1991	1992
21	–	–	3	–	–	4	–
22	–	–	[//|\\]	–	3	[//|\\]	–
23	–	–	[//|\\]	–	[//|\\]	[//|\\]	–
24	–	–	[//|\\]	–	5	4	–
25	–	–	[//|\\]	–	–	–	–
26	–	–	2	–	–	–	–

" – " indicates a week in which the counting trap was not operated.

"[//|\\]" indicates that the counting trap was operational for the full week.

"#" indicates the number of days in the indicated week that the trap was operational.

Table 29. Mean weekly water levels (cm) recorded at the North Brook counting fence, 1986–1992.

Week	WATER LEVEL (averaged by date and then week)													
	1986		1987		1988		1989		1990		1991		1992	
	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD
21	–	–	–	–	55.6	4.5	–	–	–	–	23.6	14.2	–	–
22	–	–	–	–	47.4	3.2	–	–	–	–	–	–	–	–
23	–	–	–	–	46.3	3.5	–	–	–	–	81.3	–	–	–
24	–	–	–	–	37.6	3.3	–	–	53.0	12.4	85.7	2.4	–	–
25	–	–	–	–	33.5	2.8	13.3	3.5	51.3	11.3	–	–	49.0	10.4
26	–	–	–	–	34.9	8.6	26.5	11.8	30.6	9.6	23.9	5.3	33.8	2.6
27	–	–	21.6	2.3	49.1	7.4	30.1	0.9	20.3	1.4	16.7	1.2	30.7	2.0
28	31.8	1.8	16.6	0.8	47.3	14.2	29.6	1.1	24.4	5.0	20.3	2.4	32.8	5.5
29	31.3	1.0	14.5	1.4	45.0	6.4	22.2	3.8	28.3	4.8	21.8	3.7	39.4	2.2
30	28.1	0.6	12.9	0.8	36.6	1.4	18.3	2.7	42.9	11.6	21.6	2.6	30.7	2.2
31	27.7	0.6	16.6	4.8	33.7	1.4	17.8	6.3	29.7	1.0	21.0	1.5	34.7	9.7
32	39.3	15.9	13.8	1.5	32.6	2.3	26.6	5.1	26.2	1.9	22.4	3.5	58.1	5.9
33	45.6	5.4	12.9	3.5	32.9	5.2	28.5	4.6	37.5	10.8	17.4	1.3	38.5	3.9
34	34.7	2.3	17.1	2.3	39.4	4.9	31.2	7.2	32.7	4.9	29.8	4.5	36.5	3.7
35	31.5	1.1	17.9	2.1	33.9	1.5	29.2	2.2	28.1	1.8	35.8	14.2	53.4	23.7
36	32.5	1.9	29.5	6.7	34.3	5.6	27.2	1.4	24.6	1.4	28.0	3.3	81.8	23.8
37	35.9	4.9	31.1	3.3	57.0	11.5	23.7	1.4	23.0	1.2	25.2	1.4	43.1	2.1
38	36.5	4.5	26.1	3.2	42.4	2.9	24.8	7.2	38.6	9.2	31.1	12.0	35.2	3.3
39	40.1	9.9	25.4	2.1	45.0	10.1	34.5	4.3	37.9	6.4	–	–	30.3	3.3
40	46.5	7.0	–	–	52.5	11.8	31.9	3.6	32.4	1.0	–	–	27.5	1.6
41	46.8	2.4	–	–	–	–	35.7	2.7	32.0	0.0	–	–	29.8	–
42	44.4	2.6	–	–	–	–	–	–	–	–	–	–	–	–
43	45.2	4.9	–	–	–	–	–	–	–	–	–	–	–	–
44	44.6	2.4	–	–	–	–	–	–	–	–	–	–	–	–

Please Note: "–" indicates that data is unavailable for this time period.

Table 30. Mean weekly water temperatures (°C) recorded at the North Brook counting fence, 1986–1992.

Week	WATER TEMPERATURE (average of maximum and minimum daily temperatures)													
	1986		1987		1988		1989		1990		1991		1992	
	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD
21	–	–	–	–	10.5	0.8	–	–	–	–	6.8	0.1	–	–
22	–	–	–	–	7.1	3.5	–	–	5.5	–	–	–	–	–
23	–	–	–	–	8.8	1.3	–	–	12.0	2.5	–	–	–	–
24	–	–	–	–	13.0	3.3	–	–	16.1	2.8	11.3	1.4	–	–
25	–	–	–	–	16.3	2.6	17.2	1.1	13.3	5.5	–	–	16.3	2.0
26	–	–	–	–	11.7	3.6	18.0	3.0	18.2	2.1	19.6	0.9	15.5	1.8
27	15.6	2.5	17.0	3.6	14.7	2.7	15.5	0.8	17.0	2.9	14.0	2.1	13.0	1.8
28	17.3	1.0	22.1	1.6	16.7	3.9	19.7	2.1	17.4	1.6	14.6	3.4	15.5	1.7
29	18.2	1.9	16.9	3.5	13.9	4.3	20.1	1.7	17.6	1.4	19.0	2.3	16.7	1.3
30	17.9	0.8	17.2	3.3	17.1	1.5	19.6	2.0	18.4	1.0	17.1	1.4	15.4	2.0
31	15.9	3.6	17.5	1.2	19.0	3.0	19.3	0.6	18.9	2.0	16.9	2.4	14.1	2.3
32	15.7	2.1	17.5	1.7	15.3	7.1	17.6	2.4	21.9	1.8	17.4	1.5	17.1	3.1
33	18.3	2.0	16.7	2.7	15.7	0.8	18.0	2.1	18.1	5.8	20.1	1.7	17.1	1.5
34	16.7	2.4	15.5	3.0	13.6	1.4	15.9	2.6	16.3	3.2	15.7	1.1	16.4	2.1
35	15.4	1.7	15.2	0.7	13.5	4.8	14.2	4.6	18.2	2.9	14.3	2.9	13.5	2.1
36	13.3	2.5	12.2	1.5	11.2	0.6	14.8	2.2	15.1	2.6	14.3	1.5	12.3	2.1
37	12.1	1.2	12.6	1.7	10.4	3.6	15.0	3.1	13.5	1.7	12.4	1.5	15.5	1.4
38	9.5	1.3	10.6	1.7	12.2	2.4	13.5	2.0	12.3	1.4	12.5	1.2	14.1	1.6
39	7.9	0.9	10.2	2.2	9.7	2.2	12.3	2.9	12.7	0.9	–	–	11.9	0.9
40	8.3	0.8	–	–	8.8	2.1	9.0	1.4	11.0	0.7	–	–	8.0	2.5
41	6.3	1.1	–	–	–	–	9.8	0.4	7.5	2.8	–	–	5.0	–
42	6.2	1.8	–	–	–	–	–	–	–	–	–	–	–	–
43	3.1	1.4	–	–	–	–	–	–	–	–	–	–	–	–
44	3.6	0.8	–	–	–	–	–	–	–	–	–	–	–	–

Please Note: "–" indicates that data is unavailable for this time period.

Table 31. Mean weekly water temperature maximums (°C) recorded at the North Brook counting fence, 1986–1992.

	AVERAGE MAXIMUM DAILY WATER TEMPERATURE													
	1986		1987		1988		1989		1990		1991		1992	
Week	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD
21	–	–	–	–	12.7	2.3	–	–	–	–	7.8	0.3	–	–
22	–	–	–	–	10.5	3.1	–	–	7.0	–	–	–	–	–
23	–	–	–	–	11.3	2.8	–	–	15.0	2.2	–	–	–	–
24	–	–	–	–	17.4	5.9	23.5	–	21.4	1.9	13.0	1.0	–	–
25	–	–	–	–	19.6	3.9	25.2	2.4	16.3	7.5	–	–	21.0	3.8
26	–	–	21.0	–	18.1	4.4	24.0	4.0	22.7	2.9	24.5	1.0	20.4	1.8
27	18.5	4.1	24.1	1.7	18.2	3.7	19.5	2.2	21.6	2.4	17.8	3.0	17.3	2.8
28	21.4	2.3	26.8	0.7	19.5	5.0	24.3	4.4	20.1	2.8	18.1	4.1	21.1	2.6
29	21.7	3.1	23.8	1.9	20.1	1.3	24.8	2.2	21.4	3.3	22.9	2.5	21.4	2.0
30	21.7	2.2	22.9	1.9	20.7	1.8	24.2	2.6	19.8	1.8	20.6	3.0	19.4	3.3
31	20.6	3.4	23.1	2.3	23.6	3.4	23.6	1.3	20.7	2.5	21.1	3.0	16.4	3.1
32	18.4	3.2	23.0	1.6	21.3	8.6	20.0	3.4	26.0	1.3	22.1	2.6	20.5	4.4
33	22.3	2.6	22.0	2.7	19.9	1.6	19.4	2.4	22.0	2.8	24.4	3.1	22.2	1.7
34	21.0	4.3	19.7	2.7	17.5	2.6	18.5	1.8	18.1	4.3	18.6	2.1	19.9	3.1
35	19.0	1.4	19.8	1.2	14.3	8.7	17.0	6.4	20.2	3.5	18.4	4.3	15.6	3.1
36	16.7	2.3	15.0	2.3	15.3	1.0	17.6	4.1	19.3	1.4	18.4	5.2	14.4	2.9
37	15.6	1.7	16.5	1.7	11.2	7.1	17.7	4.3	16.9	2.6	17.0	4.1	18.4	1.6
38	13.3	2.8	14.7	1.4	15.2	2.7	17.1	1.4	14.6	2.2	15.4	2.4	18.1	2.1
39	10.3	0.8	14.5	2.7	12.6	1.6	15.6	3.3	13.9	1.2	–	–	16.5	1.1
40	11.6	1.8	–	–	10.3	2.4	12.5	3.3	13.1	1.2	–	–	11.4	2.1
41	8.8	1.2	–	–	–	–	12.0	0.0	8.3	3.2	–	–	8.0	–
42	8.7	2.2	–	–	–	–	–	–	–	–	–	–	–	–
43	4.8	2.1	–	–	–	–	–	–	–	–	–	–	–	–
44	5.6	0.0	–	–	–	–	–	–	–	–	–	–	–	–

"–" indicates that data is unavailable for this time period.

Table 32. Mean weekly water temperature mimimums (°C) recorded at the North Brook counting fence, 1986–1992.

	AVERAGE MINIMUM DAILY WATER TEMPERATURE													
	1986		1987		1988		1989		1990		1991		1992	
Week	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD
21	–	–	–	–	8.2	0.7	–	–	–	–	5.8	0.3	–	–
22	–	–	–	–	4.8	2.3	–	–	4.0	–	–	–	–	–
23	–	–	–	–	6.3	0.7	–	–	9.0	2.9	–	–	–	–
24	–	–	–	–	8.5	1.5	–	–	10.9	3.9	9.7	2.1	–	–
25	–	–	–	–	13.1	2.0	9.2	1.6	10.3	4.0	–	–	11.6	1.5
26	–	–	10.1	–	8.8	1.2	11.9	2.8	13.7	2.4	14.8	1.0	10.6	2.2
27	12.8	0.9	10.0	6.0	11.3	3.6	10.6	1.5	12.4	4.4	10.2	1.3	8.7	1.8
28	13.1	1.0	17.5	2.7	14.0	3.0	15.0	1.2	14.6	1.3	11.1	4.7	9.9	1.8
29	14.7	1.8	10.0	5.5	11.1	2.6	15.4	3.0	13.9	2.3	15.1	3.5	12.0	1.5
30	14.2	2.1	11.6	5.4	14.3	2.0	15.1	2.1	17.0	0.7	13.7	2.0	11.5	1.6
31	11.3	4.6	12.0	2.8	14.3	3.6	15.0	1.0	17.1	1.7	12.7	2.2	11.7	1.8
32	13.7	1.6	12.0	2.2	9.3	7.8	15.3	2.3	17.7	2.9	12.6	2.0	13.6	2.2
33	14.3	1.7	11.4	3.5	11.5	1.5	16.6	2.0	16.5	5.0	15.9	1.2	11.9	1.5
34	12.4	1.4	11.3	3.6	10.5	1.2	13.3	4.4	14.4	3.0	12.7	1.8	13.0	1.2
35	11.7	2.4	10.6	1.3	12.8	2.2	11.3	3.1	16.1	2.6	10.1	3.2	11.4	1.9
36	10.0	2.7	9.5	1.7	7.0	1.5	11.9	0.6	11.0	4.7	10.2	3.6	10.3	1.6
37	8.7	1.3	8.6	2.6	9.6	0.6	12.3	2.1	10.1	1.7	7.8	4.6	12.7	1.5
38	5.7	1.5	6.5	3.3	9.2	2.7	9.8	3.3	9.9	2.3	9.5	0.5	10.2	2.3
39	5.5	1.4	6.0	2.3	8.4	1.7	8.9	3.0	11.4	1.1	–	–	7.3	1.1
40	4.9	1.9	–	–	7.3	2.1	5.5	2.4	8.9	0.5	–	–	4.5	3.1
41	3.7	1.3	–	–	–	–	7.5	0.7	6.7	3.1	–	–	2.0	–
42	3.6	1.7	–	–	–	–	–	–	–	–	–	–	–	–
43	1.5	1.1	–	–	–	–	–	–	–	–	–	–	–	–
44	1.7	1.7	–	–	–	–	–	–	–	–	–	–	–	–

"–" indicates that data is unavailable for this time period.

Table 33. Mean weekly air temperatures (°C) recorded at the North Brook counting fence, 1986–1992.

Week	AIR TEMPERATURES (average of maximum and minimum daily temperatures)													
	1986		1987		1988		1989		1990		1991		1992	
	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD
21	–	–	–	–	8.9	2.4	–	–	–	–	–	–	–	–
22	–	–	–	–	5.5	3.3	–	–	5.5	–	–	–	–	–
23	–	–	–	–	7.7	1.7	–	–	9.8	5.5	12.5	–	–	–
24	–	–	–	–	13.7	3.1	22.4	–	18.9	3.7	–	–	–	–
25	–	–	–	–	15.4	3.2	15.3	3.0	12.0	5.3	–	–	12.8	1.3
26	–	–	15.7	–	9.5	5.1	16.0	3.9	19.6	2.9	16.9	1.1	11.1	3.0
27	18.1	2.4	16.6	2.5	15.4	2.8	19.1	3.9	15.0	3.6	11.4	2.0	10.0	1.9
28	15.1	2.3	22.3	3.2	16.7	5.4	17.8	2.6	16.8	2.3	15.2	2.5	12.0	3.6
29	16.9	2.7	17.2	2.8	12.9	4.9	18.5	2.7	18.8	1.7	16.9	3.4	12.6	2.5
30	17.5	2.4	16.6	2.1	16.9	2.6	21.1	4.2	19.0	2.1	15.4	1.8	14.0	2.0
31	16.3	3.3	16.4	1.7	16.9	6.7	18.7	1.9	18.7	2.8	15.3	3.7	15.6	2.9
32	14.5	2.5	18.1	2.6	18.5	7.9	18.5	1.4	22.4	2.8	14.5	3.9	16.0	1.3
33	18.1	2.6	17.0	3.2	16.1	1.9	19.9	2.1	20.6	2.5	18.5	2.5	–	–
34	15.7	3.0	15.8	2.5	13.6	9.8	17.5	3.6	17.1	3.7	14.8	3.6	–	–
35	14.5	2.4	18.4	10.1	16.8	3.2	13.9	3.0	17.4	1.4	13.4	1.9	13.5	3.3
36	13.0	3.4	11.8	2.8	12.5	2.3	15.6	2.5	14.3	2.4	12.5	3.0	10.3	3.9
37	11.5	1.7	12.8	2.5	11.6	4.2	19.9	1.2	13.0	3.1	11.8	3.4	16.1	3.0
38	9.0	2.0	10.2	1.8	12.9	4.5	16.1	2.7	13.4	2.4	12.3	1.7	13.0	2.1
39	6.9	1.5	12.2	3.3	8.0	4.4	12.1	5.6	12.9	1.7	12.5	–	12.4	2.9
40	8.4	3.2	–	–	8.5	4.7	8.0	2.7	9.3	1.9	–	–	6.8	2.2
41	6.9	1.6	–	–	–	–	9.3	0.4	6.5	3.0	–	–	4.0	–
42	6.8	3.4	–	–	–	–	–	–	–	–	–	–	–	–
43	3.3	2.6	–	–	–	–	–	–	–	–	–	–	–	–
44	4.5	2.9	–	–	–	–	–	–	–	–	–	–	–	–

"–" indicates that data is unavailable for this time period.

Table 34. Mean weekly air temperature (°C) minimums and maximums recorded at the North Brook counting fence, 1986–1992.

	AVERAGE MINIMUM DAILY AIR TEMPERATURE							AVERAGE MAXIMUM DAILY AIR TEMPERATURE						
Week	1986	1987	1988	1989	1990	1991	1992	1986	1987	1988	1989	1990	1991	1992
21	–	–	3.4	–	–	–	–	–	–	14.4	–	–	–	–
22	–	–	1.8	–	2.0	–	–	–	–	10.4	–	9.0	–	–
23	–	–	3.4	–	5.0	2.0	–	–	–	11.9	–	14.7	23.0	–
24	–	–	5.6	–	9.7	–	–	–	–	21.7	22.4	26.1	–	–
25	–	–	11.3	7.4	9.0	–	8.0	–	–	19.4	23.2	15.0	–	19.7
26	–	10.1	7.0	8.9	12.6	6.8	5.8	–	21.2	15.7	23.2	26.6	27.1	16.4
27	12.7	9.3	7.9	12.6	7.1	4.4	5.3	23.5	23.9	22.8	22.7	22.4	18.3	14.7
28	8.4	15.5	12.1	12.4	10.9	10.0	6.3	21.8	29.0	21.3	23.2	22.7	20.4	17.6
29	10.4	9.1	8.2	12.4	12.1	8.6	6.6	23.5	25.2	22.2	24.7	25.5	25.3	18.6
30	12.8	9.9	11.0	15.1	13.8	9.6	8.6	22.1	23.4	24.3	27.1	24.1	21.3	19.5
31	11.8	10.5	11.8	11.1	13.8	7.5	9.8	20.8	22.3	22.0	26.3	23.6	23.1	21.4
32	10.5	12.5	13.0	13.0	14.0	5.4	12.3	18.6	23.6	23.9	24.0	30.7	23.6	19.7
33	12.3	11.3	9.7	14.1	14.9	10.3	–	24.0	22.7	22.5	25.7	26.3	26.7	–
34	11.1	11.3	11.8	14.0	10.8	7.5	–	20.4	20.2	17.1	21.1	23.5	22.1	–
35	9.0	15.8	11.8	7.6	9.7	6.2	10.7	20.0	21.0	21.8	20.3	25.1	20.6	16.4
36	8.4	9.2	7.8	10.6	6.6	4.8	7.3	17.6	14.4	17.1	20.7	21.9	20.2	13.3
37	4.8	6.9	8.2	13.2	5.6	5.7	11.7	18.1	18.8	16.4	26.6	20.5	17.9	20.5
38	2.6	5.1	7.6	8.0	8.8	6.6	6.9	15.3	15.2	18.1	24.1	17.9	17.9	19.1
39	1.8	6.5	5.3	6.8	6.1	3.0	6.8	12.0	17.9	13.9	17.4	19.6	22.0	18.0
40	2.3	–	4.9	2.9	3.9	–	2.8	14.6	–	12.2	13.1	14.6	–	10.9
41	1.0	–	–	5.0	1.6	–	1.0	12.9	–	–	13.5	11.4	–	7.0
42	0.8	–	–	–	–	–	–	12.8	–	–	–	–	–	–
43	−0.5	–	–	–	–	–	–	7.0	–	–	–	–	–	–
44	0.9	–	–	–	–	–	–	8.0	–	–	–	–	–	–

"–" indicates that data is unavailable for this time period.

Table 35. Results of electrofishing surveys completed at North Brook, 1988.

Station	Date (yr/mn/day)	Site Type	Area (m x m)	Average Depth (cm)	Water Temp. (°C)	Habitat Type	Density (No. per 100 m²) Salmon Fry	Salmon Parr	Brook Trout	Description of Site Location
A – Site 2	880803	closed	506.9	18.2	12.0	Riffle/Run	7.10	5.92	0.46	– below first bridge on North Brook
D – Site 1	880808	closed	845.5	22.0	19.0	Riffle	24.51	18.20	1.45	– 2.5 km above first bridge on North Brook
F – Site 1	880810	closed	319.4	25.7	14.5	Riffle/Run	28.46	27.73	2.19	– just below small falls
G – Site 1	880811	closed	372.2	21.5	19.0	Riffle/Run	9.07	24.92	0.87	– just below second falls
H – Site 1	880812	closed	401.7	28.4	–	Riffle/Run	0.00	23.69	1.74	– just below Bingles Brook
H – Site 2	880816	closed	546.9	16.6	22.0	Riffle/Run	0.55	17.95	0.37	– just below Main Falls
I – Site 1	880815	closed	332.5	21.2	15.0	Riffle/Run	0.30	15.42	10.89	– Bingles Brook

Please refer to topographic map numbers 12H/4 and 12H/3 (scale 1:50,000).
"–" indicates that data is unavailable.

Table 36. Freshwater age profile of adult Atlantic salmon returns to North Brook, 1986.

Smolt	Fork Length (cm)		Weight (grams)		Number	Number	Percent	Smolt Age		
Age	N	Mean	N	Mean	Sexed	Female	Female	N	%	Mean
Not Aged	2	52.00	–	–	2	1	50.0	2	22.2	Not Aged
3	4	51.88	–	–	4	3	75.0	5	55.6	3
4	2	51.00	–	–	2	1	50.0	2	22.2	4
Total	9	51.63	–	–	9	5	55.6	9	100	3.29

"–" indicates that data is unavailable.

Table 37. Freshwater age profile of Atlantic salmon smolt migrants at North Brook, 1988.

Smolt	Fork Length (cm)		Weight (grams)		Number	Number	Percent	Smolt Age		
Age	N	Mean	N	Mean	Sexed	Female	Female	N	%	Mean
2	2	11.05	2	8.75	0	–	–	2	6.9	2
3	24	13.85	24	12.12	0	–	–	24	82.8	3
4	3	14.00	3	11.83	0	–	–	3	10.3	4
Total	29	12.97	29	10.9	0	–	–	29	100	3.03

"–" indicates that data is unavailable.

Table 38. Bound Brook stream survey data, 1987–89.

SECTION LENGTH (m)	WATER WIDTH (m)	BANK WIDTH (m)	BOTTOM AREA (m x m)	% BOTTOM TYPE B	C	G	S	BDR	OTH	WATER FLOW CATEGORY (%) POOL	RUN	RIFF	RPDS	FALLS	REARING UNITS
Downstream from counting fence to the sea, Section F, 1988.															
100	15.6	15.6	1560.0	25	60	10	5				15	85			15.6
100	12.0	12.7	1200.0	65	35	0	0				10	90			12.0
100	10.7	13.3	1070.0	20	10	0	0	70			15	85			10.7
62	7.1	7.1	440.2	5	45	30	15	5			40	60			4.4
Salmon Holes downstream to the counting fence, Section A, 1987.															
100	14.6	15.4	1460.0	10	40	20	30				100				14.6
100	11.4	12.2	1140.0	25	75						60	40			11.4
100	10.7	14.4	1070.0	80	20					17	83				10.7
100	11.0	15.8	1100.0	10	45	40	5				90	10			11.0
100	9.2	12.3	920.0	80	20						95		5		9.2
100	15.3	16.9	1530.0	50	25	20	5				100				15.3
58	12.9	13.8	748.2	20	60	20				10	90				7.5
100	14.5	15.3	1450.0	10	75	15				5	35	60			14.5
100	13.3	16.0	1330.0	60	40						100				13.3
100	14.2	16.6	1420.0	85	15						90	10			14.2
62	13.5	17.7	837.0								100				8.4
Upstream from Salmon Holes to the Deephole, Section B, 1987.															
100	13.9	17.3	1390.0			85	15			100					13.9
86	13.8	16.1	1186.8	15	85						50	50			11.9
83	12.5	13.8	1037.5	20	40	30	10				100				10.4
100	17.2	19.5	1720.0	5	20	20	55				95	5			17.2
100	15.0	17.2	1500.0	60	30	10					80	20			15.0
60	9.6	10.4	576.0	60	30	10				10	10	85			5.8
100	11.5	12.2	1150.0	30	60	10					50	50			11.5
100	12.7	13.8	1270.0	85	10	5					100				12.7
100	10.6	11.8	1060.0	50	40	10					70	30			10.6
100	9.7	10.6	970.0	20	70	10				20	50	30			9.7
100	10.9	11.9	1090.0	10	45	45					10	90			10.9
100	11.3	12.8	1130.0	10	70	20					85	15			11.3
100	16.1	18.0	1610.0	30	60	10					50	50			16.1
100	14.7	15.9	1470.0	90	10						100				14.7
100	9.7	10.6	970.0	80	20						100				9.7
100	10.5	11.5	1050.0	60	30	10					30	70			10.5
100	12.2	12.9	1220.0	20	60	20				20	10	70			12.2
100	14.0	15.4	1400.0	30	55	15				30	10	60			14.0
100	13.4	13.7	1340.0	40	30	30				30	40	30			13.4
100	11.1	12.2	1110.0	70	30						80	20			11.1
100	10.7	11.1	1070.0	70	30					50	50				10.7
100	10.7	11.6	1070.0	10	60				30	100					10.7
100	10.5	11.6	1050.0	10	40				50	100					10.5
100	9.7	12.1	970.0		5				95	100					9.7
100	10.7	11.5	1070.0						100	100					10.7
100	9.1	11.1	910.0				50		50	100					9.1
100	7.6	8.1	760.0		60	40				100					7.6
100	7.5	7.8	750.0		40	50			10	100					7.5
100	7.5	8.7	750.0		50	50						100			7.5
100	8.5	8.9	850.0		70	20	10			70		30			8.5

Table 38 (cont'd). Bound Brook stream survey data, 1987–89.

SECTION LENGTH (m)	WATER WIDTH (m)	BANK WIDTH (m)	BOTTOM AREA (m x m)	% BOTTOM TYPE						WATER FLOW CATEGORY (%)					REARING UNITS
				B	C	G	S	BDR	OTH	POOL	RUN	RIFF	RPDS	FALLS	
From the Deephole upstream to the Pound, Section C, 1987.															
100	8.8	12.4	880.0	30	60	10					25	75			8.8
100	9.4	9.9	940.0	70	20	10					70	30			9.4
100	8.6	9.3	860.0	70	15	15					70	30			8.6
100	7.7	8.7	770.0	70	30						30	70			7.7
100	7.7	11.5	770.0	60	30	10				20	20	60			7.7
100	7.1	8.7	710.0	60	30	10				80		20			7.1
100	8.6	10.0	860.0	10	60	20	10			100					8.6
100	14.0	15.5	1400.0		30	20			50	80		20			14.0
100	14.2	15.8	1420.0	20	40	40				30	10	60			14.2
100	8.3	9.3	830.0	30	50	20				60	40				8.3
100	7.2	8.3	720.0	60	30	10				20	30	50			7.2
100	9.6	10.6	960.0	20	70	10				60		40			9.6
100	13.2	13.8	1320.0		10	20	10		60	100					13.2
100	14.1	16.1	1410.0	10	20				70	100					14.1
100	13.0	16.2	1300.0		20				80	100					13.0
100	10.8	14.0	1080.0		60				40	100					10.8
100	12.1	14.3	1210.0		70				30	50		50			12.1
100	11.5	13.5	1150.0	30	50	20				10		90			11.5
Downstream from Kruger Road, Section D, 1988.															
100	9.6	9.6	960.0	20	60	10	10				80	20			9.6
100	10.5	10.5	1050.0	10	25	60	5				60	40			10.5
100	10.3	10.3	1030.0	5	10	80	5				80	20			10.3
100	12.3	12.3	1230.0	10	70	20	10			5	40	55			12.3
118	13.2	13.2	1557.6	0	30	40	30				40	60			15.6
100	18.2	18.2	1820.0	0	0	20	80				100				18.2
100	23.3	23.3	2330.0	0	0	10	90				100				23.3
100	20.5	20.5	2050.0	0	0	5	95				100				20.5
125	32.6	32.6	4075.0	45	50	5	0				10	90			40.8
Upstream from Kruger Road, Section E, 1988.															
100	19.0	19.0	1900.0	20	60	15	5				50	50			19.0
100	17.8	17.8	1780.0	20	50	25	5				30	70			17.8
100	8.6	8.6	860.0	40	50	10	0					100			8.6
Upstream from Kruger Road, Section E (cont'd), 1989.															
100	11.9	12.3	1190.0	20	80						60	40			11.9
100	15.5	16.2	1550.0	30	70						80	20			15.5
100	15.0	17.1	1500.0	5	95						100				15.0
100	10.2	10.2	1020.0	40	60						10	90			10.2
100	16.2	16.2	1620.0	20	50	30					50	50			16.2
100	13.2	13.2	1320.0	15	80	5					50	50			13.2
100	10.9	12.9	1090.0	55	40	5						100			10.9

Table 38 (cont'd). Bound Brook stream survey data, 1987–89.

SECTION LENGTH (m)	WATER WIDTH (m)	BANK WIDTH (m)	BOTTOM AREA (m x m)	% BOTTOM TYPE B	C	G	S	BDR	OTH	WATER FLOW CATEGORY (%) POOL	RUN	RIFF	RPDS	FALLS	REARING UNITS
1 KM upstream from from Kruger Road, Section G, 1989.															
100	24.3	27.9	2430.0	5	5	5	35		50		100				24.3
100	21.0	25.7	2100.0	5	5	20	35		35		100				21.0
100	11.6	11.6	1160.0	10	10	20	30		30		100				11.6
100	8.5	9.6	850.0	10	80	10					10	90			8.5
85	12.0	12.3	1020.0	20	80							100			10.2
TOTAL			106,858.3												1,068.6

Note: Refer to applicable topographic map (scale 1:50,000).

Table 39. Atlantic salmon stocking activities completed at Bound Brook, 1988–1992.

	1988	1989	1990	1991	1992
No. Male Broodstock (small)	–	–	10	7	13
No. Female Broodstock (small)	–	–	23	11	27
% Female (small)	–	–	69.7	61.1	67.5
Mean % Female (small) * 66.1					
No. Female Small Stripped	11	3	23	9	26
No. of Eggs put down in box	18,260	3,982	47,803	17,910	82,494
No. of Eggs per Female	1,660	1,327	2,078	1,990	3,173
Mean # Eggs per Female 2,046					
No. of fry hatched out – (following spring)	12,926	1,765	39,200	15,396	
No. of fry distributed in stream – (following spring)	12,865	1,728	38,000	15,395	
Total Hatching Rate (%)	70.8	44.3	82.0	86.0	
Total Survival Rate to Distribution (%)	70.5	43.4	79.5	86.0	

"–" indicates that data is unavailable.

"*" indicates that only data from the years of 1990–1992 were used in this calculation.

Please Note: At the Bound Brook site, all broodstock have consisted of small salmon. As such, the above data relates only to the portion of the Bound Brook stock comprised of small salmon.

Table 40. Weekly counts of Atlantic salmon parr and small adult salmon recorded at the upstream counting fence on Bound Brook, 1986–1992.

	Salmo Salar (parr)							Salmo Salar (small)						
Week	1986	1987	1988	1989	1990	1991	1992	1986	1987	1988	1989	1990	1991	1992
19	–	–	0	–	–	–	–	–	–	0	–	–	–	–
20	–	–	0	–	–	–	–	–	–	0	–	–	–	–
21	–	0	2	0	–	–	–	–	0	0	0	–	–	–
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	1	0	0	0	0	0	0	0	0	0
26	0	0	1	0	0	0	0	0	1	0	0	2	0	1
27	0	1	0	0	0	0	0	2	0	4	2	1	0	0
28	0	1	0	0	0	0	0	2	0	7	2	2	0	0
29	0	1	0	0	0	0	0	1	0	6	0	4	2	0
30	0	0	0	0	0	0	0	0	2	5	0	4	5	0
31	0	0	0	0	0	0	0	0	0	1	0	2	1	10
32	0	0	0	0	0	0	0	4	2	1	7	0	1	7
33	0	0	0	0	0	0	0	0	2	0	3	9	0	0
34	0	0	0	0	0	0	0	0	11	1	3	4	1	0
35	0	0	0	0	0	0	0	0	2	0	0	2	2	12
36	0	0	0	0	0	0	0	0	35	0	0	1	2	6
37	0	0	0	0	0	0	0	0	3	13	0	1	0	1
38	0	0	0	0	0	0	0	0	4	3	0	0	2	0
39	0	0	0	0	0	0	0	0	0	0	0	0	2	0
40	–	–	0	–	0	–	0	–	–	5	–	0	–	0
41	–	–	0	–	0	–	0	–	–	1	–	0	–	0
42	–	–	0	–	–	–	2	–	–	0	–	–	–	3
43	–	–	–	–	–	–	11	–	–	–	–	–	–	0
Total	0	3	3	0	1	0	13	9	62	47	17	32	18	40

" – " indicates weeks when the counting trap was not operating.

Table 41. Weekly counts of Atlantic salmon (large) and brook trout completed at the upstream counting fence on Bound Brook, 1986–1992.

Week	Salmo Salar (large)							Salvelinus fontinalis						
	1986	1987	1988	1989	1990	1991	1992	1986	1987	1988	1989	1990	1991	1992
19	–	–	0	–	–	–	–	–	–	0	–	–	–	–
20	–	–	0	–	–	–	–	–	–	1	–	–	–	–
21	–	0	0	0	–	–	–	–	0	5	0	–	–	–
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	9	13	4	2	0	0	0
24	0	0	0	0	0	0	0	3	50	0	0	0	0	0
25	0	0	0	0	0	0	0	2	56	15	10	0	28	0
26	0	0	0	0	0	0	0	15	9	2	6	6	1	0
27	0	0	0	0	0	0	0	11	3	6	3	8	5	0
28	0	0	0	0	0	0	0	15	2	1	0	5	64	0
29	0	0	0	0	0	0	0	4	7	4	3	0	13	0
30	0	0	1	0	0	0	0	4	99	12	3	14	9	0
31	0	0	0	0	0	0	0	20	36	18	6	13	4	45
32	2	0	0	0	0	0	0	55	43	73	429	5	9	95
33	0	0	0	0	1	0	0	6	112	16	76	259	15	25
34	0	2	0	0	0	0	0	19	242	107	155	152	28	57
35	0	1	0	0	0	0	0	91	105	60	137	40	153	331
36	0	8	0	0	0	0	0	249	74	12	27	25	198	316
37	0	0	1	0	0	0	0	24	20	202	17	7	34	74
38	0	1	0	0	0	0	0	4	9	62	9	16	72	9
39	0	0	0	0	0	0	0	9	8	21	0	1	341	3
40	–	–	1	–	0	–	0	–	–	83	–	6	–	29
41	–	–	0	–	0	–	0	–	–	16	–	2	–	23
42	–	–	0	–	–	–	0	–	–	1	–	–	–	31
43	–	–	–	–	–	–	0	–	–	–	–	–	–	5
Total	2	12	3	0	1	0	0	540	888	721	883	559	974	1043

" – " indicates weeks when the counting trap was not operating.

Table 42. Annual summaries of adult Atlantic salmon returns, broodstock removals, mortalities, and wild spawners enumerated at the upstream counting fence on Bound Brook, 1986–1992.

Year	No. Small (< 63cm)	No. Large (≥ 63 cm)	Total Adult Count	No. Broodfish (small)	No. Mortalities	No. Wild Spawners
1986	9	2	11	0	0	11
1987	62	12	74	0	2	72
1988	47	3	50	19	0	31
1989	17	0	17	17	0	0
1990	32	1	33	33	0	0
1991	18	0	18	18	0	0
1992	40	0	40	40	0	0

Table 43. Weekly counts of Atlantic salmon parr and smolt recorded at the downstream counting fence on Bound Brook, 1986–1992.

Week	Salmo Salar (parr)							Salmo Salar (smolt)						
	1986	1987	1988	1989	1990	1991	1992	1986	1987	1988	1989	1990	1991	1992
19	–	–	3	–	–	–	–	–	–	8	–	–	–	–
20	–	–	0	–	–	–	–	–	–	27	–	–	–	–
21	–	11	11	1	–	–	–	–	90	271	77	–	–	–
22	0	4	3	0	2	15	0	0	334	317	220	311	218	869
23	0	1	2	0	3	24	0	98	298	313	90	306	1218	425
24	2	1	1	0	1	3	0	36	63	83	4	191	955	253
25	1	6	0	0	17	3	2	4	11	30	2	24	187	91
26	0	0	0	0	2	4	1	2	3	5	0	1	39	9
27	0	1	1	0	3	0	0	0	3	0	0	1	4	1
28	0	2	0	0	0	2	0	1	0	3	0	0	6	1
29	0	0	0	0	0	1	0	0	0	0	0	0	0	0
30	0	2	0	0	1	0	0	1	2	0	0	0	1	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	2	0	0	0	0	0	0	0	0	0	0	0	0
35	0	0	0	0	1	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	0	1	0	0	0	0
38	0	4	0	0	1	0	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	–	–	0	–	1	–	0	–	–	3	–	0	–	0
41	–	–	0	–	1	–	0	–	–	18	–	0	–	0
42	–	–	0	–	–	–	0	–	–	0	–	–	–	3
Total	3	34	21	1	33	52	3	142	804	1079	393	834	2628	1652

" – " indicates weeks when the counting trap was not operating.

Table 44. Weekly counts of brook trout and American eel recorded at the downstream counting fence on Bound Brook, 1986–1992.

Week	*Salvelinus fontinalis*							*Anguilla rostrata*						
	1986	1987	1988	1989	1990	1991	1992	1986	1987	1988	1989	1990	1991	1992
19	–	–	6	–	–	–	–	–	–	4	–	–	–	–
20	–	–	15	–	–	–	–	–	–	1	–	–	–	–
21	–	64	195	11	–	–	–	–	2	10	4	–	–	–
22	2	421	227	122	50	35	279	1	3	8	1	7	1	6
23	165	526	148	192	212	243	314	5	3	1	0	32	3	1
24	114	218	399	76	438	361	414	14	0	19	0	4	3	0
25	58	148	272	73	180	594	291	3	0	1	0	2	3	0
26	103	56	51	15	131	336	41	2	0	0	0	7	1	0
27	38	37	55	2	51	118	34	5	1	0	0	0	0	0
28	33	8	30	2	9	216	32	1	0	1	0	0	1	0
29	4	3	1	2	3	39	8	0	0	0	0	0	0	0
30	0	43	0	1	2	1	5	2	0	0	0	1	0	0
31	4	1	3	0	0	1	3	2	0	0	0	0	0	0
32	2	1	0	0	0	6	2	4	0	0	0	0	0	0
33	0	0	0	0	2	4	0	0	0	0	0	13	0	0
34	0	9	0	1	3	1	0	1	0	0	0	7	0	0
35	1	2	0	0	1	0	9	1	39	0	0	0	12	107
36	0	0	0	0	0	0	3	134	45	1	0	31	27	3
37	0	1	0	0	1	0	0	24	3	28	0	4	2	0
38	0	0	5	0	1	0	0	95	10	1	0	24	0	0
39	0	0	5	0	0	1	0	90	0	6	0	0	88	0
40	–	–	12	–	4	–	0	–	–	51	–	1	–	3
41	–	–	14	–	6	–	0	–	–	9	–	0	–	1
42	–	–	0	–	–	–	3	–	–	0	–	–	–	1
Total	524	1538	1438	497	1094	1956	1438	384	106	141	5	133	141	122

" – " indicates weeks when the counting trap was not operating.

Table 45. Operating schedule of the upstream and downstream counting traps at Bound Brook, 1986–1992.

<table>
<tr><th rowspan="2">Week</th><th colspan="7">Upstream Counting Trap</th><th colspan="7">Downstream Counting Trap</th></tr>
<tr><th>1986</th><th>1987</th><th>1988</th><th>1989</th><th>1990</th><th>1991</th><th>1992</th><th>1986</th><th>1987</th><th>1988</th><th>1989</th><th>1990</th><th>1991</th><th>1992</th></tr>
<tr><td>19</td><td>–</td><td>–</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td></td></tr>
<tr><td>20</td><td>–</td><td>–</td><td>4</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>4</td><td>–</td><td>–</td><td>–</td><td></td></tr>
<tr><td>21</td><td>–</td><td>[//|\\]</td><td>6</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>–</td><td>[//|\\]</td><td>6</td><td>[//|\\]</td><td>–</td><td>–</td><td></td></tr>
<tr><td>22</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>3</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>4</td></tr>
<tr><td>23</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>24</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>25</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>2</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>2</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>26</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>27</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>28</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>29</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>30</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>31</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>32</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>33</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>4</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>4</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>34</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>6</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>6</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>35</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>6</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>6</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>36</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>37</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>38</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>39</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td><td>[//|\\]</td></tr>
<tr><td>40</td><td>–</td><td>–</td><td>[//|\\]</td><td>–</td><td>[//|\\]</td><td>–</td><td>[//|\\]</td><td>–</td><td>–</td><td>[//|\\]</td><td>–</td><td>[//|\\]</td><td>–</td><td>[//|\\]</td></tr>
<tr><td>41</td><td>–</td><td>–</td><td>[//|\\]</td><td>–</td><td>[//|\\]</td><td>–</td><td>[//|\\]</td><td>–</td><td>–</td><td>[//|\\]</td><td>–</td><td>[//|\\]</td><td>–</td><td>[//|\\]</td></tr>
<tr><td>42</td><td>–</td><td>–</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>[//|\\]</td><td>–</td><td>–</td><td>[//|\\]</td><td>–</td><td>–</td><td>–</td><td>5</td></tr>
<tr><td>43</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>5</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
</table>

" – " indicates a week in which the counting trap was not operated.
"[//|\\]" indicates that the trap was operational for the full week.
"#" indicates the number of days in the indicated week that the counting trap was operational.

Table 46. Mean weekly water levels (cm) recorded at the Bound Brook counting fence, 1986–1992.

	WATER LEVEL (averaged by date and then week)													
	1986		1987		1988		1989		1990		1991		1992	
Week	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD
19	–	–	–	–	40.8	0.7	–	–	–	–	–	–	–	–
20	–	–	41.2	–	42.7	3.9	–	–	–	–	–	–	–	–
21	–	–	35.7	1.6	40.4	1.7	33.5	0.9	–	–	37.0	–	–	–
22	53.8	–	30.0	0.8	34.1	3.2	32.6	1.6	37.5	11.6	34.6	0.9	37.1	3.4
23	68.3	3.5	29.3	0.7	34.9	3.5	26.8	1.9	33.0	5.3	32.4	2.4	35.8	2.6
24	62.1	8.2	32.0	1.0	30.0	1.9	20.9	1.9	20.2	2.1	45.6	10.8	28.4	1.7
25	35.3	4.0	28.1	1.7	24.6	1.3	17.8	1.2	38.5	10.9	39.2	5.1	23.0	1.7
26	26.0	1.9	23.4	0.8	23.7	1.9	21.9	8.8	32.2	3.9	28.6	1.4	20.2	0.6
27	20.8	1.0	23.6	1.9	24.7	2.2	25.2	1.8	21.8	3.0	26.8	2.2	18.5	1.0
28	21.2	1.8	18.1	0.8	28.5	6.2	20.8	2.5	23.9	5.1	40.0	3.1	18.9	0.9
29	16.9	1.7	16.2	1.4	28.1	2.6	15.8	1.4	19.9	2.5	30.8	2.8	18.3	0.5
30	14.6	0.5	20.7	5.1	20.9	1.6	12.3	0.5	20.2	5.3	24.2	1.6	15.6	0.8
31	14.9	1.5	21.2	1.5	18.2	1.0	11.5	2.8	17.1	1.4	20.1	1.1	36.1	18.7
32	20.6	3.8	17.4	0.9	18.0	2.3	41.7	8.6	12.3	1.6	17.4	0.9	39.9	6.6
33	16.8	1.8	21.0	5.1	16.3	1.3	44.0	15.4	30.2	10.4	14.9	0.9	25.9	2.8
34	14.3	1.4	28.2	2.2	17.9	2.2	49.7	6.2	33.3	8.1	16.6	0.9	23.5	1.3
35	12.1	0.6	26.0	4.4	14.8	0.9	55.9	7.2	24.0	3.0	21.8	9.1	44.3	13.6
36	12.6	0.9	42.0	2.1	12.9	0.6	42.8	7.0	19.6	5.1	28.0	3.2	41.7	6.2
37	11.9	0.5	32.0	2.3	24.8	7.2	28.9	2.9	19.1	1.8	26.6	2.2	29.8	2.4
38	11.8	0.9	32.9	2.8	24.0	2.1	21.0	2.1	23.3	3.7	26.1	1.3	23.4	1.3
39	13.1	0.6	28.0	1.2	21.4	1.5	20.5	0.2	21.0	2.7	38.7	18.1	21.2	1.8
40	–	–	–	–	31.3	7.2	–	–	15.5	1.5	–	–	25.3	0.9
41	–	–	–	–	33.3	2.1	–	–	15.1	2.2	–	–	23.2	0.7
42	–	–	–	–	–	–	–	–	–	–	–	–	30.4	–
43	–	–	–	–	–	–	–	–	–	–	–	–	37.5	–

Please Note: "–" indicates that data is unavailable for this time period.

Table 47. Mean weekly water temperatures (°C) recorded at the Bound Brook counting fence, 1986–1992.

	WATER TEMPERATURES (average of maximum and minimum daily temperatures)													
	1986		1987		1988		1989		1990		1991		1992	
Week	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD
19	–	–	–	–	9.1	2.0	–	–	–	–	–	–	–	–
20	–	–	6.8	–	11.6	1.6	–	–	–	–	–	–	–	–
21	–	–	8.1	1.1	12.1	1.1	9.3	0.7	–	–	–	–	–	–
22	–	–	9.3	0.7	10.7	1.7	9.9	0.7	7.8	1.4	7.8	0.6	–	–
23	–	–	12.4	1.5	10.0	0.6	11.2	1.0	9.6	0.9	9.2	0.7	–	–
24	–	–	11.5	1.5	12.3	1.2	9.7	2.3	11.4	0.5	8.7	0.8	–	–
25	13.8	3.7	11.7	1.4	13.2	1.3	14.8	2.6	10.8	1.4	10.4	1.3	–	–
26	11.6	2.1	11.9	2.6	12.9	1.6	16.8	2.8	13.0	1.0	11.8	2.9	11.0	2.3
27	12.1	1.4	15.2	1.2	15.2	1.4	14.5	1.0	12.5	3.6	11.1	2.4	10.1	2.5
28	12.5	1.4	17.6	1.5	15.9	2.0	15.7	1.4	12.3	1.7	11.3	0.9	11.8	1.1
29	14.9	2.0	14.7	1.9	13.1	0.5	15.5	1.6	13.7	1.1	13.9	0.8	12.0	1.3
30	14.4	0.9	13.9	1.5	11.4	3.5	16.6	2.2	15.2	0.9	12.9	1.1	14.2	1.2
31	15.2	1.4	14.8	2.0	14.8	1.0	16.6	1.4	14.5	3.0	13.2	2.0	12.5	1.8
32	15.0	1.0	13.3	2.3	15.5	0.5	15.1	1.6	15.3	1.0	14.5	1.6	14.8	1.0
33	15.3	1.2	14.1	2.0	14.4	1.6	14.4	0.8	13.9	1.4	16.0	1.8	15.1	0.8
34	14.2	1.9	13.8	1.3	11.8	1.4	13.3	1.2	15.7	1.9	11.7	2.1	14.5	1.9
35	13.3	1.0	12.8	2.1	14.1	2.2	11.8	1.2	16.7	1.3	11.6	2.3	11.6	2.1
36	11.1	1.9	10.1	1.8	12.2	1.8	12.2	1.2	14.8	2.1	12.4	1.3	11.0	2.4
37	9.5	1.7	11.1	1.3	10.6	2.4	12.4	1.2	12.7	2.5	10.5	0.8	13.0	0.6
38	5.7	0.9	9.3	1.9	8.7	3.9	11.7	1.5	14.2	1.6	10.3	1.3	12.3	1.9
39	8.3	2.0	8.8	1.5	9.3	3.4	10.8	0.4	14.0	1.6	10.0	0.5	11.6	1.5
40	–	–	–	–	8.1	2.0	–	–	12.4	1.5	–	–	8.2	1.0
41	–	–	–	–	6.8	0.9	–	–	9.8	1.8	–	–	7.9	2.5
42	–	–	–	–	–	–	–	–	–	–	–	–	6.6	–
43	–	–	–	–	–	–	–	–	–	–	–	–	4.6	–

Please Note: "–" indicates that data is unavailable for this time period.

Table 48. Mean weekly water temperature maximums (°C) recorded at the Bound Brook counting fence, 1986–1992.

	AVERAGE MAXIMUM DAILY WATER TEMPERATURE													
	1986		1987		1988		1989		1990		1991		1992	
Week	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD
19	–	–	–	–	13.0	3.5	–	–	–	–	–	–	–	–
20	–	–	10.0	–	16.8	1.7	–	–	–	–	–	–	–	–
21	–	–	10.9	1.9	17.0	1.6	11.2	1.0	–	–	–	–	–	–
22	–	–	12.2	1.7	17.1	2.2	12.0	1.5	10.4	1.8	9.7	1.2	–	–
23	–	–	16.3	2.8	16.1	0.6	14.6	1.1	12.2	2.0	11.9	1.3	–	–
24	–	–	14.5	2.3	19.1	0.8	12.4	2.4	14.3	1.1	10.7	0.8	–	–
25	17.3	3.0	16.9	2.4	20.7	2.1	18.6	3.6	13.6	2.1	13.1	1.5	–	–
26	15.2	1.6	15.6	2.7	16.7	3.5	20.1	3.9	15.8	1.1	15.0	2.8	13.3	2.2
27	15.8	1.5	19.5	1.2	18.7	2.4	16.9	1.5	16.6	4.4	13.7	2.6	13.6	4.2
28	14.8	2.3	20.9	2.2	20.4	1.8	19.9	2.3	15.6	1.1	13.4	2.2	14.9	1.8
29	19.1	2.1	17.9	2.0	16.3	1.4	18.3	1.5	16.0	1.6	16.6	0.8	15.1	2.3
30	17.4	1.9	18.7	1.3	14.8	3.7	19.6	1.6	17.9	1.2	15.8	1.5	18.4	1.8
31	18.5	1.6	19.1	1.9	18.6	1.5	20.1	1.9	18.3	2.3	16.7	1.1	15.7	2.1
32	17.0	2.4	17.7	2.2	19.4	0.9	17.6	2.1	18.9	0.9	17.4	1.5	17.3	0.7
33	19.1	1.2	18.0	2.2	18.8	2.4	16.1	1.2	15.7	1.9	19.8	2.6	18.3	0.5
34	18.0	3.0	17.4	1.6	15.9	2.7	15.1	1.5	19.6	3.7	15.4	0.5	16.7	2.0
35	16.0	1.7	18.0	1.7	17.4	0.9	13.4	1.3	19.7	0.5	14.0	2.2	13.3	2.1
36	14.2	1.9	12.2	2.7	15.7	1.1	14.8	1.4	18.9	1.8	15.4	1.6	13.4	2.8
37	12.0	1.3	13.7	1.1	12.9	2.6	14.7	2.1	17.4	2.0	13.0	1.0	15.0	0.8
38	9.4	1.0	12.8	2.3	9.6	6.0	15.1	1.9	16.4	2.1	12.1	1.6	15.4	2.1
39	11.9	3.5	11.8	1.8	9.8	1.6	15.0	0.0	17.3	1.0	11.0	1.0	14.7	2.4
40	–	–	–	–	9.9	2.2	–	–	16.4	1.4	–	–	9.6	0.9
41	–	–	–	–	8.4	0.9	–	–	13.6	1.3	–	–	10.1	1.8
42	–	–	–	–	–	–	–	–	–	–	–	–	8.3	–
43	–	–	–	–	–	–	–	–	–	–	–	–	7.0	–

Please Note: "–" indicates that data is unavailable for this time period.

Table 49. Mean weekly water temperature minimums (°C) recorded at the Bound Brook counting fence, 1986–1992.

	AVERAGE MINIMUM DAILY WATER TEMPERATURE													
	1986		1987		1988		1989		1990		1991		1992	
Week	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD
19	–	–	–	–	5.2	0.6	–	–	–	–	–	–	–	–
20	–	–	3.5	–	6.4	1.7	–	–	–	–	–	–	–	–
21	–	–	5.4	2.1	7.1	1.2	7.3	0.5	–	–	–	–	–	–
22	–	–	6.3	1.0	4.3	2.3	7.8	0.7	5.2	1.5	5.9	0.2	–	–
23	–	–	8.4	1.4	3.9	1.0	7.9	1.9	6.9	1.0	6.4	0.6	–	–
24	–	–	8.5	1.6	5.6	2.4	7.1	2.4	8.5	1.2	6.7	1.1	–	–
25	8.2	1.7	6.6	1.5	5.6	1.3	11.1	1.7	8.0	1.0	7.6	1.8	–	–
26	7.9	3.4	8.2	3.7	9.1	1.6	13.5	2.1	10.1	1.1	8.6	3.2	8.7	2.4
27	8.5	2.7	10.8	1.7	11.7	1.3	12.1	1.9	8.4	4.1	8.4	2.5	6.5	1.8
28	10.2	0.8	14.4	2.2	11.3	2.8	11.4	1.8	9.0	2.6	9.1	0.8	8.7	1.3
29	10.8	2.4	11.5	2.4	10.0	1.8	12.8	2.2	11.4	1.0	11.3	1.3	8.9	1.4
30	11.5	2.3	9.1	3.0	8.0	3.9	13.6	3.3	12.4	1.4	10.1	1.8	10.0	2.4
31	11.8	2.0	10.6	2.7	11.0	0.8	13.2	1.4	10.6	3.6	9.6	3.2	9.3	2.7
32	13.1	0.9	8.9	3.5	11.7	1.7	12.7	1.8	11.7	2.3	11.6	2.1	12.2	1.3
33	11.6	1.5	10.1	3.7	10.0	1.5	12.7	0.8	12.1	1.2	12.2	2.1	12.0	1.2
34	10.3	2.8	10.3	1.5	7.6	1.3	11.6	1.1	11.7	1.6	8.0	3.7	12.2	1.9
35	10.5	0.7	7.5	2.9	10.8	4.0	10.1	1.2	13.6	2.3	9.3	2.8	9.9	2.5
36	7.9	2.7	8.0	1.3	8.7	3.6	9.6	1.3	10.6	2.6	9.3	1.3	8.6	2.4
37	6.9	3.0	8.4	2.0	8.3	2.4	10.0	1.2	8.0	4.0	8.1	1.2	11.0	1.0
38	2.0	2.0	5.9	2.2	7.8	2.7	8.3	2.3	12.0	1.3	8.4	1.3	9.1	1.8
39	4.7	0.4	5.9	1.4	8.9	6.3	6.5	0.7	10.8	3.3	9.0	0.0	8.6	1.4
40	–	–	–	–	6.2	2.0	–	–	8.4	3.2	–	–	6.7	1.2
41	–	–	–	–	5.2	1.0	–	–	6.0	2.5	–	–	5.7	3.4
42	–	–	–	–	–	–	–	–	–	–	–	–	4.9	–
43	–	–	–	–	–	–	–	–	–	–	–	–	2.2	–

Please Note: "–" indicates that data is unavailable for this time period.

Table 50. Mean weekly air temperatures (°C) recorded at the Bound Brook counting fence, 1986–1992.

	AIR TEMPERATURE (average of maximum and minimum daily temperatures)													
	1986		1987		1988		1989		1990		1991		1992	
Week	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD	AVE	STD
19	–	–	–	–	8.4	3.3	–	–	–	–	–	–	–	–
20	–	–	6.5	–	8.2	3.1	–	–	–	–	–	–	–	–
21	–	–	7.1	1.8	9.3	1.3	10.9	1.7	–	–	–	–	–	–
22	–	–	8.1	2.1	7.4	1.6	12.1	0.8	8.4	3.5	8.2	2.1	10.5	4.2
23	–	–	12.5	1.8	7.2	1.4	12.1	2.5	–	–	11.3	2.5	8.8	1.8
24	–	–	11.6	1.2	11.3	1.7	10.2	2.4	–	–	10.9	2.2	10.3	1.0
25	14.6	6.5	10.6	2.3	12.7	2.1	13.6	1.8	–	–	14.0	2.3	15.1	2.2
26	12.3	2.9	13.5	3.0	11.2	1.0	15.3	3.5	19.3	2.1	14.9	4.4	10.2	2.6
27	12.9	1.9	15.6	1.8	14.1	1.8	14.0	2.2	17.3	2.7	14.1	3.1	9.9	3.4
28	12.8	1.9	18.1	1.1	14.5	2.5	15.5	2.5	17.6	1.9	15.6	2.9	10.2	0.8
29	15.5	2.9	15.9	2.9	14.7	1.6	16.1	1.5	19.6	1.7	17.8	2.3	12.1	2.0
30	14.4	1.5	15.6	1.9	13.1	1.8	17.1	1.5	20.8	1.6	16.5	1.6	14.8	1.1
31	15.4	2.0	17.2	3.3	16.0	1.2	16.6	1.6	21.5	3.3	17.0	2.2	13.2	2.8
32	15.9	2.0	15.3	2.5	17.3	2.1	17.5	2.0	22.8	1.3	18.3	2.3	15.8	0.9
33	16.9	1.3	14.9	2.5	13.9	1.6	15.9	2.0	19.1	1.8	18.1	2.6	15.4	1.2
34	15.3	1.4	14.8	3.2	11.5	1.7	13.2	3.1	18.7	1.5	14.5	1.8	14.0	3.0
35	14.5	0.7	13.1	2.6	14.4	2.2	13.0	2.5	19.1	2.1	13.5	3.4	10.5	1.6
36	11.3	4.6	10.3	2.5	11.9	2.0	13.5	2.3	14.8	2.9	17.3	3.3	10.8	2.8
37	11.5	1.7	12.1	2.7	9.7	3.5	14.0	1.6	12.9	3.2	12.8	1.3	13.9	1.3
38	6.1	1.5	8.7	3.9	9.5	3.8	12.0	3.6	15.3	1.7	13.6	2.6	13.3	1.7
39	6.7	0.4	9.7	1.6	8.8	1.8	13.0	5.0	14.5	1.7	13.7	0.8	11.7	1.2
40	–	–	–	–	6.8	3.4	–	–	11.2	2.1	–	–	6.9	0.9
41	–	–	–	–	6.2	2.5	–	–	7.7	2.7	–	–	8.0	3.5
42	–	–	–	–	–	–	–	–	–	–	–	–	5.5	–
43	–	–	–	–	–	–	–	–	–	–	–	–	3.6	–

Please Note: "–" indicates that data is unavailable for this time period.

Table 51. Mean weekly air temperature (°C) minimums and maximums recorded at the Bound Brook counting fence, 1986–1992.

Week	AVERAGE MINIMUM DAILY AIR TEMPERATURE							AVERAGE MAXIMUM DAILY AIR TEMPERATURE						
	1986	1987	1988	1989	1990	1991	1992	1986	1987	1988	1989	1990	1991	1992
19	–		2.6	–	–	–	–	–		4.2	–	–	–	–
20	–	4.5	2.9	–	–	–	–	–	8.5	13.5	–	–	–	–
21	–	3.6	5.5	5.8	–	–	–	–	10.6	13.2	16.0	–	–	–
22	–	2.6	2.5	7.1	1.7	4.2	4.0	–	13.6	12.4	17.0	15.2	12.2	17.0
23	–	4.7	2.3	4.7	–	4.4	2.7	–	20.4	12.1	19.4	–	18.2	14.9
24	–	6.8	4.2	5.8	–	5.3	3.6	–	16.3	18.4	14.6	–	16.4	17.0
25	7.3	4.8	5.6	8.4	–	6.6	5.5	18.6	16.5	19.8	18.9	–	21.4	24.6
26	7.0	7.8	4.4	9.7	12.1	7.6	6.0	17.7	19.2	18.0	20.9	26.6	22.1	14.4
27	6.9	10.8	7.8	8.7	10.1	6.1	3.6	19.0	20.4	20.4	19.2	24.5	22.1	16.1
28	8.4	13.5	8.2	9.0	12.9	10.0	4.3	17.2	22.7	20.7	21.9	22.3	21.2	16.1
29	9.1	11.0	9.4	12.0	13.4	11.4	6.0	21.9	20.9	20.1	20.2	25.8	24.1	18.1
30	9.0	8.7	4.9	12.8	14.5	10.2	8.2	19.8	22.5	21.3	21.4	27.0	22.9	21.4
31	9.2	12.3	9.9	12.3	14.1	10.0	7.3	21.6	22.2	22.1	21.0	28.9	23.9	19.1
32	11.6	8.6	11.3	13.6	16.3	11.9	10.6	20.2	22.0	23.3	21.4	29.4	24.6	21.0
33	11.1	8.7	6.5	12.4	14.9	11.7	10.3	22.7	19.8	21.3	19.4	23.4	24.6	20.4
34	10.6	9.3	5.5	10.0	11.3	7.0	8.4	20.1	20.2	17.5	16.4	26.1	21.9	19.6
35	10.3	8.1	10.0	9.4	12.3	7.8	6.8	18.7	18.2	18.9	16.5	26.0	19.3	14.3
36	4.3	6.7	6.8	10.0	7.4	12.7	5.8	18.4	13.8	17.0	17.1	22.1	21.9	15.9
37	6.0	7.8	4.5	10.1	6.1	8.9	8.3	17.0	16.5	14.9	18.0	19.7	16.6	19.6
38	−0.9	3.7	4.2	7.4	9.7	11.2	6.4	13.1	13.7	14.8	16.7	20.9	16.1	20.2
39	0.6	7.1	6.5	7.0	5.7	11.7	6.7	12.8	11.5	11.0	19.0	23.3	15.7	16.6
40	–	–	3.1	–	5.0	–	2.8	–	–	10.5	–	17.4	–	11.0
41	–	–	2.0	–	2.0	–	2.9	–	–	–	–	13.4	–	13.1
42	–	–	–	–	–	–	1.1	–	–	–	–	–	–	9.9
43	–	–	–	–	–	–	−1.2	–	–	–	–	–	–	8.5

Please Note: "–" indicates that data is unavailable for this time period.

Table 52. Results of electrofishing surveys completed at Bound Brook, 1987.

Station	Date (yr/mn/day)	Site Type	Area (m x m)	Average Depth (cm)	Water Temp. (°C)	Habitat Type	Density (No. per 100 m²) Salmon Fry	Salmon Parr	Brook Trout	Description of Site Location
# 1	870810	closed	615	26.3	16	Riffle	0.00	1.87	5.52	– just upstream from first tributary
# 4	870820	closed	458	14.2	20	Riffle	1.53	11.84	12.41	– at the beginning of the long straight section above the second tributary

Please refer to the applicable topographic map (scale 1:50,000)